Bay of Plenty Economic Development and Transport Study

Bay of Plenty Regional Land Transport Strategy Supporting Paper No. 09

Prepared for the Bay of Plenty Regional Council
by Richard Paling (Richard Paling Consulting),
John Williamson (Ascari Partners) and
Kel Sanderson (BERL Economics)

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Bay of Plenty Regional Council
5 Quay Street
PO Box 364
Whakatāne 3158
NEW ZEALAND

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Executive summary

Background to the study

It is widely assumed that there are strong connections between transport provision and economic growth. However, the nature of this relationship is complex and subject to the interplay of a wide range of socio-economic and spatial factors. This report examines economic development and transport in the Bay of Plenty and identifies ways in which the transport network could be developed to support economic development in the region. The report is an input into the development of an updated Bay of Plenty regional Land Transport Strategy.

Main findings

In short, the main findings of the study is that the future transport system best able to support economic development in the region, will be one with a strong focus on providing for access to jobs in the main urban areas, as this is where a step change in economic activity is most likely to be achieved and supported by transport improvements.

However, the continued importance of the primary sector will also necessitate improvements to inter-urban transport networks including:

- Improving the capacity and resilience of the key transport links in the east of the region.
- Improving the capacity of the road and rail links to Kawerau and points further south.
- Improving the links to Hamilton and Auckland to allow better connectivity with these cities. This would be important both for the movement of freight and of passengers.

Achieving an appropriate balance of investment between these areas must be a key focus for future transport policies.

Linkages between transport and economic development

To provide a sound basis for the study, a review of the relevant literature was undertaken. This confirmed that transport infrastructure can make a positive contribution to economic development when:

- It resolves isolation and bottleneck issues, and
- a sound economic basis already exists for growth.

Without these preconditions, investment in transport infrastructure and services cannot be assumed automatically to lead to economic growth. This may be an issue for much of the Bay of Plenty. Arguably, a reasonably well developed network already exists providing a reasonable level of services for freight transport. Therefore, while improvements will reduce transport costs as resources can be used more efficiently, they will not necessarily alter the level of output which may be determined to a large extent by production constraints or the demands of the market. Furthermore, improvements in transport efficiency may alter the distribution of the value added from the product between producers and transporters, but may not alter total value added.

Secondly, there is an observable trend towards an increasing concentration of economic activity taking place in relatively small geographical areas.[1] The economic geography literature demonstrates the importance of concentrating knowledge intensive activities, but also indicates that for primary production, a focus on spatial transactions costs will be important, although these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value, knowledge intensive outputs. Also important are opportunities to broaden and diversify the economic base of a region and to move production processes higher up the value chain.

Based on these considerations, we have therefore distinguished between:

- The requirements for improved transport links which are necessary to support specific flows, allowing increases in production of basic and in some cases, processed commodities to be moved to ports or domestic markets; and
- More general improvements to transport accessibility which will support increases in value added activities, by increasing the interactions between firms and the sizes of the work forces on which they are able to draw.

Transport and economic activity in the Bay of Plenty

The region is a substantial producer of a range of basic commodities many of which are exported through the Port of Tauranga. Accordingly the Port is New Zealand's largest in terms of volumes, accounting for almost 25% of all imports and exports. The Port also handles considerable volumes of import and export cargoes for other regions. Consequently, the region's road network has greatest intensity of use by freight vehicles in the country (215,000 net tonnes per kilometre in 2002), over twice the national average of 105,000 net tonnes per kilometre.

The region has also experienced considerable growth in population and employment, notably in and around Tauranga placing pressures on the urban transport network. To help to alleviate the problems arising from this, there has been considerable expansion in the public transport services, although these only account for a relatively small proportion of the total traffic movements.

The western parts of the region are also characterised by large and growing proportions of people over 65 and meeting the transport needs of these people is becoming a greater problem, especially if it is desired to retain their skills in the workforce. There are also emerging issues of community access to work opportunities and education and health facilities in the east of the region, where there are a number of relatively isolated communities.

The role of transport as an input in the region's economy

To analyse the relative importance of transport related factors in supporting economic development we developed a simple breakdown of economic activity in terms of employment by its potential use of freight and other transport services. Employment was

[1] OECD, 2009, Regions at a Glance. The report finds that in approximately half of OECD countries, more than 40% of the national GDP is produced in less than 10% of all regions.

defined in terms of three main categories, classified as high, medium and low transport intensity.[2] The breakdown of employment into these three categories is set out in Table E.1.

Table E.1 Employment and GDP by transport generating category in the Bay of Plenty 2006

Transport generating category	Employment in 2006		GDP in 2006	
	Workers	Percent	$bn	Percent
High intensity	13236	13%	1,325	13%
Medium intensity	38898	39%	3,896	37%
Low intensity	48567	48%	5,224	50%
Total	100701	100%	10,445	100%

Source : Statistics NZ and Consultants Analysis. BERL (2007)

Using these categories, in 2006 only 13% of employment is associated with intensive transport use, 39% with medium transport use and almost half (48%) with relatively low transport using activities.

Breaking down employment in the transport using categories by district, reveals that the main urban areas of Tauranga, Rotorua and Whakatane all have over half their employment in the "low" transport generating capacity. Western Bay of Plenty and Opotiki have high shares in the "high" category. Kawerau has a high "medium" share reflecting the high proportion of employment in manufacturing associated with the timber processing in the town.

Over the period from 1996-2006, the pattern of employment and potential transport use changed, with growth concentrated in service type activities with relatively low freight demands but high demands for good worker access, as shown in Table E.2:

Table E.2 Changes in Employment by transport generating category 1996-2006

Transport generating category	Employment		
	1996	2006	Growth
High	13446	13236	-210
Medium	32214	38898	6684
Low	35460	48567	13107
Total	81120	100701	19581

In addition, on a spatial basis, much of the growth for both medium and low freight using sectors has been focussed in Tauranga, accounting for 80% and 65% respectively of the regional growth in these categories.

[2] A detailed definition of the employment categories is provided in Section 5.6

The role of commuter transport in the region's economy

The commuting flows in 2006, display a range of patterns in terms of the extent to which areas are self-contained or attract or generate commuters from elsewhere. At one extreme Rotorua, Whakatane, and Opotiki are relatively self-contained with 93%, 89%, and 89% of the workforce living in the area and with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga.

Tauranga itself has about 87% of its workers living in the city with much of the balance (12%) travelling in from western Bay of Plenty. Of the balance, the rest of the Bay of Plenty region including Rotorua contributes about 1% and areas outside the region, less than 1%.

The analysis of the journey to work data, emphasises the importance of the links within the individual areas as the routes that commuters use. The numbers making longer distance commuting trips between the areas or into and out of the region are relatively small.

The importance of transport related factors in the future

Over the period to 2041, population and employment in the Bay of Plenty are forecast to grow strongly. Continuing the trends observed in the past, it is anticipated that the majority of growth in employment will be in the service type activities, with relatively low usage of freight but with a greater emphasis on the movement of people and with a tendency to concentrate in and around Tauranga.

Movement of freight

Although employment growth in the activities generating high levels of freight is likely to be relatively muted, the volume of freight traffic in the region will continue to grow. In part, this will be in response to particular tasks and opportunities, and in part to support activities servicing the growing population. Forecasts from the Bay of Plenty Freight Study indicate that the scale of the freight task in the region including both flows within and to and from the region will increase by about 60-65%.

A number of specific areas have been identified which require enhanced levels of service and capacity from the freight sector if the full economic potential of the activities it serves is to be met.

Table E.3 Areas requiring enhanced freight provision in the future

Forestry	Log supply in the Bay of Plenty, central North Island and Eastland is likely to increase substantially and additional capacity will be required to move these for processing or export via Tauranga. This will put pressure on the road and rail links from Murupara, Kawerau and possibly Opotiki to the port. Logs processed at other locations within the region, primarily Rotorua before being exported will also require transport links able to accommodate this expansion. This could also result in some movement of containerised products from Kawerau.

	In addition, proposals to develop an industrial hub at Kawerau to make use of the timber resources available there and possibly including the production of biofuels would need to be supported by high quality and reliable transport links, both for the movement of products to markets and also to allow the site to draw on a large workforce with the skills needed.
Kiwifruit	Although the majority of kiwifruit is produced in the western and central parts of the Bay of Plenty, there are proposals to expand substantially the volumes harvested in the east of the region, particularly in and around Opotiki. This traffic is fairly peaked with a concentration of activity between March and October. The road network in this area is vulnerable to natural disasters particularly in the winter months and there is only very limited network resilience in the case of any disruptions.
Aquaculture	There are proposals for the substantial development of aquaculture at Opotiki. This could result in large movements of products between Opotiki and processing plants likely to be located in Tauranga. Coupled with this development, there are proposals to develop a small port at Opotiki to land the product which could also be used for other products particularly logs by coastal barge. While the volumes that might transfer are potentially large, especially if this route is used to export timber from Gisborne, the economics of such an operation are uncertain, and it is likely that the majority of this traffic will be moved by road.
Supporting the needs of the local population	As population grows, the demand for commodities both for personal and commercial use will also grow and have to be supported by the freight transport system. However, in general, while these demands are important, they are probably less sensitive to the level of service provided and while transport supports these demands, it is unlikely to act as a serious constraint on their expansion.

Movements of passengers

With much of the forecast growth in economic activity in the service sectors and focussed in the main urban areas, particularly Tauranga, satisfying the needs of these firms to attract workers will require the provision of a high level of accessibility to the main urban centres. This will need to be achieved in a way which also supports the high level of urban amenity that such workers expect especially in a centre like Tauranga, where lifestyle and quality of life may be particularly important. This would indicate a major role for quality public transport in supporting these movements and providing the necessary high level of accessibility in the urban cores.

Impacts of possible changes in accessibility

A simple regional Agglomeration Model was developed to test the potential benefits from improving accessibility within and to and from the region and the effects of changes in the balance of employment in the main urban centres. Four hypothetical scenarios were considered:

Table E.4 Future scenarios

Scenario 1	Reducing travel times within three major urban areas by 30%
Scenario 2	Reducing travel times within the Bay of Plenty outside the three major urban areas by 30%
Scenario 3	Improving inter-regional connections with Auckland and Hamilton. Construction of the Waikato Expressway and notional upgrading of the link across the Kaimai Ranges
Scenario 4	Changes in the balance of employment between Tauranga, Rotorua and Whakatane, with the total for Tauranga being reduced by 10,000 balanced by increases in Rotorua (7,500) and Whakatane (2,500).

The impacts of each scenario on the level of output in the Bay of Plenty region are fairly small in proportional terms, but in absolute terms the impacts could be substantial. The greatest impact is achieved with improving accessibility within the three towns. There would be benefits from improving the other links within the Bay of Plenty and between the Bay of Plenty and the rest of the country but given the more limited interactions between the main areas, the effects of this are much smaller.[3]

Table E.5 Impacts transport and employment changes in 2041 ($bn 2009$s)

	Impact on regional GDP	
	$bn	**Percent**
Base Case regional GDP in 2041 ($bn)	22.2	
Scenario 1	0.15	0.7%
Scenario 2	0.08	0.4%
Scenario 3	0.05	0.2%
Scenario 4	-0.02	-0.1%

The results are sensitive to the distribution of population within the region. Scenario 4 would reduce the scale of the major urban area within the region. As a result, this scenario is predicted to lead to an overall loss of economic output, because of the lower agglomeration benefits achieved.

Although the largest benefits are predicted to be achieved with improvements to accessibility within the three major towns, the modelling and analysis has demonstrated that improving interregional accessibility (particularly to Auckland) is important. This would allow employers in the Bay of Plenty to interact more effectively with firms and workers in Auckland, although because of the distances the effects of the improved transport links may be fairly limited. Improving the connections to Auckland Airport as an international gateway would also give better connections to the rest of the world, although in part this market is addressed with the air services from Tauranga and Rotorua to Auckland.

[3] It should be noted that given the nature of the modelling these figures should be considered as illustrative of the general trends rather than as precise forecasts.

Deficiencies in the region's transport infrastructure

The current and potentially emerging future deficiencies in the region's transport network likely to impact on economic growth are as follows:-

Table E.6 Network deficiencies

Network resilience	This is an issue to the east of the region. There is a very constrained transport network which is vulnerable to disruption from natural disasters. Past interruptions have had significant impact on the horticulture, agriculture, tourism and forestry industries in this part of the region. The impact on the economy of the eastern district will continue to compound as the aquaculture industry develops if issues of route security are not addressed. The vulnerability of the transport network in the east of the region could impact on proposals to expand the production of kiwifruit and also the scale of the proposals for aquaculture
Capacity of transport network for freight within the region	There are likely to be issues with the increased movement of logs and processed timber by road and rail from Murupara and Kawerau, where traffic flows are likely to grow strongly as the existing forests are harvested. There may also be a requirement to support a more diverse industrial base in Kawerau if proposals for the production of bio-fuels and other wood-based products eventuate. A lack of transport capacity may act to constrain development and thus detract from the levels of economic growth that might be achieved, although quantifying these effects is challenging.
Congestion and interactions in urban areas	There are issues with the increased volumes of freight through the port and in particular, the way in which this interacts with the movement of travellers within Tauranga. The problem of increased traffic is likely to be compounded with the likely increase in big ships which would increase the peakiness of freight flows into and out of the port and also service rationalisation by the international shipping companies which may result in international traffic being diverted to Tauranga from other ports. This will be likely to put pressure on connections to the port where they will be competing with increased flows of commuter and other traffic wanting to share the same networks. Congestion on these links will reduce the effectiveness of Tauranga as a compact urban centre able to again the benefits of clustering of a range of economic activities.
Inter-regional links	While some increases in inter-regional capacity will be necessary to support higher flows of some basic commodities (e.g. logs), the main function is to increase the scope for interactions between firms, to provide better connections with customers and suppliers and expand the work force available. For this, a key link is the connection between Tauranga and Hamilton where the Kaimai

	Ranges impose a substantial barrier to movement between Hamilton and Tauranga.
Rural Isolation	The east of the region is relatively remote from the main urban centres. For these areas access to a range of facilities is difficult, especially for those who have no or only limited options for travel by car. The difficulty of securing post school education for those who wish to remain in these communities, many of which have high Maori population may restrict their choices and economic potential, and may limit opportunities to establish or expand employment especially in industries using local raw materials. This area currently represents a significant portion of the employees for both the kiwifruit and forestry industries and having access to transport is imperative. The solution provided to date has been the provision of private transport supported by the employees and/or education providers. Improving the availability of transport not only impacts on the overall level of economic output and in addition the local social benefits from measures to provide better connections with education facilities could be substantial. The ways in which these might be achieved would include the development of remote learning facilities (which have been tested somewhat to date) or more favourably, the development of some form of shared public transport.

Enabling conditions for a 'step change'

A "step change" in economic development really calls for the substantial expansion of highly productive value added activities, primarily focussed in the service or high level manufacturing sectors. Experience from around the world and New Zealand indicates that these are most likely to be achieved in the key urban clusters where a substantial economic base exists or can be readily developed.

Here, the benefits of agglomeration arising from the interactions of firms and the availability of a large labour force can best be achieved. Using improvements in transport networks and services to increase the critical mass of cities therefore forms an important component of this strategy. The introduction or expansion of urban transport systems to allow higher levels of accessibility while seeking as far as possible to preserve urban amenity form the cornerstone of this approach.

Future patterns of transport development that would support 'step change'

The transport system likely to make the greatest contribution to the desired patterns of economic development is one with a substantial focus within the main urban areas of Tauranga and to a lesser extent Rotorua. This would aim to provide good connections between residential suburbs and central areas and take advantage of measures for traffic demand management to minimise the effects of congestion.

The transport system will still need to recognise the importance of freight movements which are often required to share roads and corridors with cars and passenger transport and should seek to minimise conflicts between heavy vehicles and other road users. This will

have both highway and public transport components to give a balanced investment for all modes.

The future transport system will need to be accompanied by appropriate planning measures. These should aim to develop urban forms which provide the densities to support public transport schemes and which also encourage the development of an attractive urban form for the central areas and for those surrounding these. Improvements to walking and cycling may form part of these, particularly in providing enhanced urban amenity but their role in stimulating economic development is likely to be small.

The emphasis within the cities will need to be supported by a range of measures across the region to support the movements of freight including:

- Improving the capacity and resilience of the key transport links in the east of the region.
- Improving the capacity of the road and rail links to Kawerau and points further south.
- Improving the links to Hamilton and Auckland to allow better connectivity with these cities. This would be important both for the movement of freight and of passengers.

An appropriate 'mix' of future transport investments across to 2040

Addressing the economic opportunities and the network deficiencies identified will require a balance of investment across transport classes. The analysis we have set above suggests that in terms of the potential impact on economic activity, the priorities for investment would be as set out in the following table and map:

Table E.7 Investment priorities to 2041

Outcome	Investment priority
Improving urban accessibility while maintaining the amenity of the urban areas	• Public transport services and infrastructure • Improving the effective capacity of the highway network through demand management and limited provision of new capacity, to the extent that this can be incorporated without impacting on amenity • Provision of walking and cycling facilities to enhance urban amenity and support public transport
Providing for inter-urban freight movements	• Improvements of capacity to meet increases in flows for logging and timber traffic. This is likely to be focussed on rail and on the connections from Kawerau to cope with the movement of logs and possibly more sophisticated products but would also include improvements to the highway network particularly in the east, where there are issues of network resilience and the capacity to meet potential conflicting demands • Improvements of capacity to meet the likely increases in production of kiwifruit again especially in the east • Provision of infrastructure for the movement of aquaculture products again especially from Opotiki. In

	principle there may be options for transporting material by sea but the feasibility of this would need to be demonstrated. • Improvement of the rail network supporting the inter-regional movement of products to and from the Port of Tauranga to ensure that there is sufficient capacity to meet the increased demands resulting from the overall growth of this traffic and from the changes in the patterns of demand resulting from the introduction of larger ships. Work is already being progressed on upgrading the capacity of the ECMT but this process will probably have to be continued as likely traffic flows continue to increase.
Providing for improved inter-regional movements of passenger traffic, particularly for the connections to Auckland	• This could probably most advantageously take advantage of the proposed construction of the Waikato Expressway, and include an improved route across the Kaimai Ranges, which would also improve the connections to Hamilton. • Other modes such as air or rail may also play a part in the longer term.
Providing for improved connections for inter-urban passenger movements within the Bay of Plenty	• To some extent the construction of the Tauranga Eastern Link provides a major improvement to the east which will benefit passenger movements both within and to and from Tauranga, as well as a number of the freight movements identified above. In part, these should aim to address issues of rural isolation, and allow the training and entry to the workforce of potential workers living in remote communities.
Addressing issues of rural isolation	• Possibly by the development of some form of public transport services shared between different groups of users.

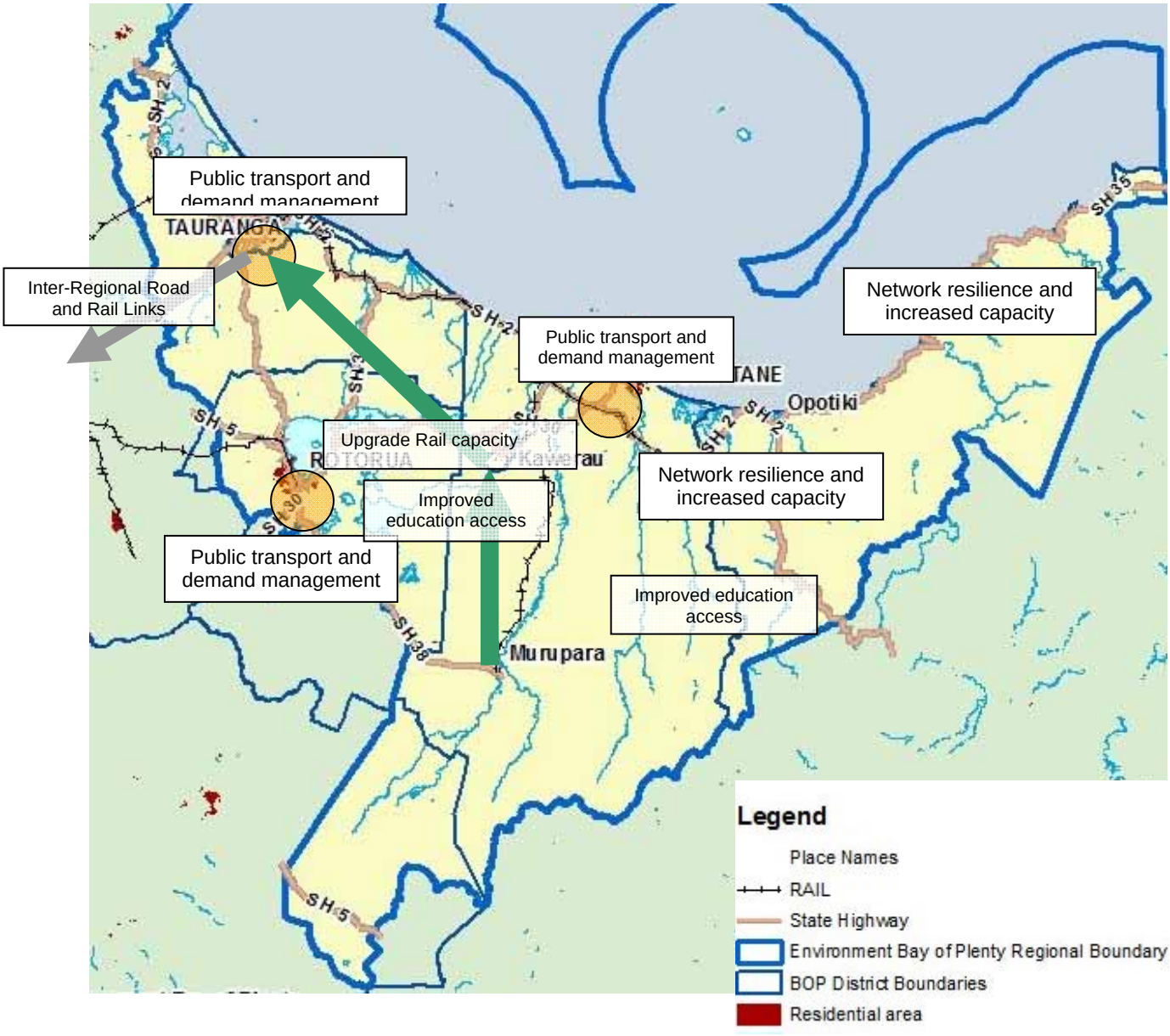


Figure E.1 Focus for future transport investment

Contents

Part 1: Introduction and background

1.1 Overview of the study

The Bay of Plenty is one of New Zealand's fastest growing regions and with Waikato and Auckland, forms part of what is often termed the 'Golden Triangle' in the upper North Island. Although economic activity in the region has traditionally been focused strongly on the exploitation and export of primary resources, particularly dairy products, logs and timber and other agricultural products, and on tourism in Rotorua, with the increasing growth of the urban population there are opportunities emerging for higher value added activities serving the region from local sources. Transport's role in the regional economy is underlined by the importance of the Port of Tauranga, both as an export hub for bulk primary commodities and as a viable alternative to Auckland for containerised imports and exports from the upper north island.

The policy context within which this study is being undertaken now widely recognizes the importance of transport as an enabler of economic growth (e.g. GPS, 2009, *Bay of Connections,* 2008). However, this is a complex relationship and there remain significant knowledge gaps in the nature of this relationship, particularly at the local level. The evidence indicates that in a region with a well-developed economy and a substantially complete transport network, such as the Bay of Plenty, investment in transport infrastructure cannot be automatically assumed to lead to economic growth. Rather, the economic growth potential of transport improvements will depend critically on the presence of other pre-conditions for growth at the national, and most importantly, regional and local level. Specifically, this will be the case where transport improvements can resolve isolation and bottleneck issues and a sound economic basis already exists for growth at the local level. Recent developments within the economic geography literature have done much to provide a framework within which these factors can be analysed.

This study addresses some of these gaps and given the nature of the economy of the Bay of Plenty region, will cover both freight links to support primary and manufacturing sectors and the movement of people, both for commuting and for work trips.

The study also builds on a number of recent, complementary studies, including the Ministry of Economic Development's investigation of the economic linkages between Auckland, Hamilton and Tauranga[4] and the Bay of Plenty Regional Freight Study.[5]

1.2 Background economic structure

The region contains a population of about 275,000 as at mid-2009. A substantial part of this population is located in the western areas with Tauranga, the key urban centre, having a population of about 120,000 in 2009 or around 45% of the

[4]Ascari Partners, Richard Paling Consulting and BERL (2010) Economic Linkages between New Zealand Cities (2010) for MED (unpublished)
[5] Richard Paling Consulting (2010 a) Bay of Plenty Regional Freight Study for Environment Bay of Plenty

population of the region. The other important urban centres are Rotorua (56,000) accounting for around 21% of the region's population and to a lesser extent Whakatane (19,000) with Kawerau and Opotiki, the other main settlements each comprising around 3% of the region's population.

The Bay of Plenty region as a whole has been growing strongly in recent years with increases in population and employment above the averages for the country as a whole. Much of this growth has however occurred in the west of the region where Tauranga and western Bay of Plenty district have recorded particularly large increases in population and employment. By way of contrast, for areas further east including Rotorua and Whakatane, growth has been much slower or there has even been decline. As a result, the relative importance within the region of Tauranga in both population and employment terms has grown and economic growth in the east has been fairly limited.

1.3 Transport issues

1.3.1 The transport network

Tauranga, the main urban area in the Bay of Plenty is located at a fairly large distance from the other major urban settlements in the upper North Island. It is situated about 200-220 kms from Auckland with a typical city centre-city centre travel time of between about two hours, 45 minutes to three hours depending on the route chosen. Tauranga is also about 100 kms or 1-1.5 hours away from Hamilton. The location of Tauranga in relation to the rest of the upper North Island is set out in Figure 1.1 below.

Figure 1.1 Bay of Plenty in relation to neighbouring cities

The size of the region is also quite substantial with a distance of 320 kms from Waihi Beach in the west of the region to Potaka in the east and an associated travel time of about four hours and even between the "neighbouring "cities of Tauranga and Rotorua the distance is about 70-80 kms with a travel time of about one hour, 15 minutes. The size of the region and the distances between the major areas acts as an important determinant of its economic structure.

The region is served by a number of state highways which are set out in Figure 1.2. These include State Highway 2 which forms the main spinal route from west to east, connecting Katikati, Tauranga, Te Puke, Whakatane and Opotiki, State Highway 29 which provides the main link to Tauranga from Hamilton, and State Highway 5 which provides the main links to Rotorua. The region is also serviced by rail links from Auckland and Waikato, which enter in the west of the region and a rail connection also to Tauranga from Murupara and Kawerau to the east.

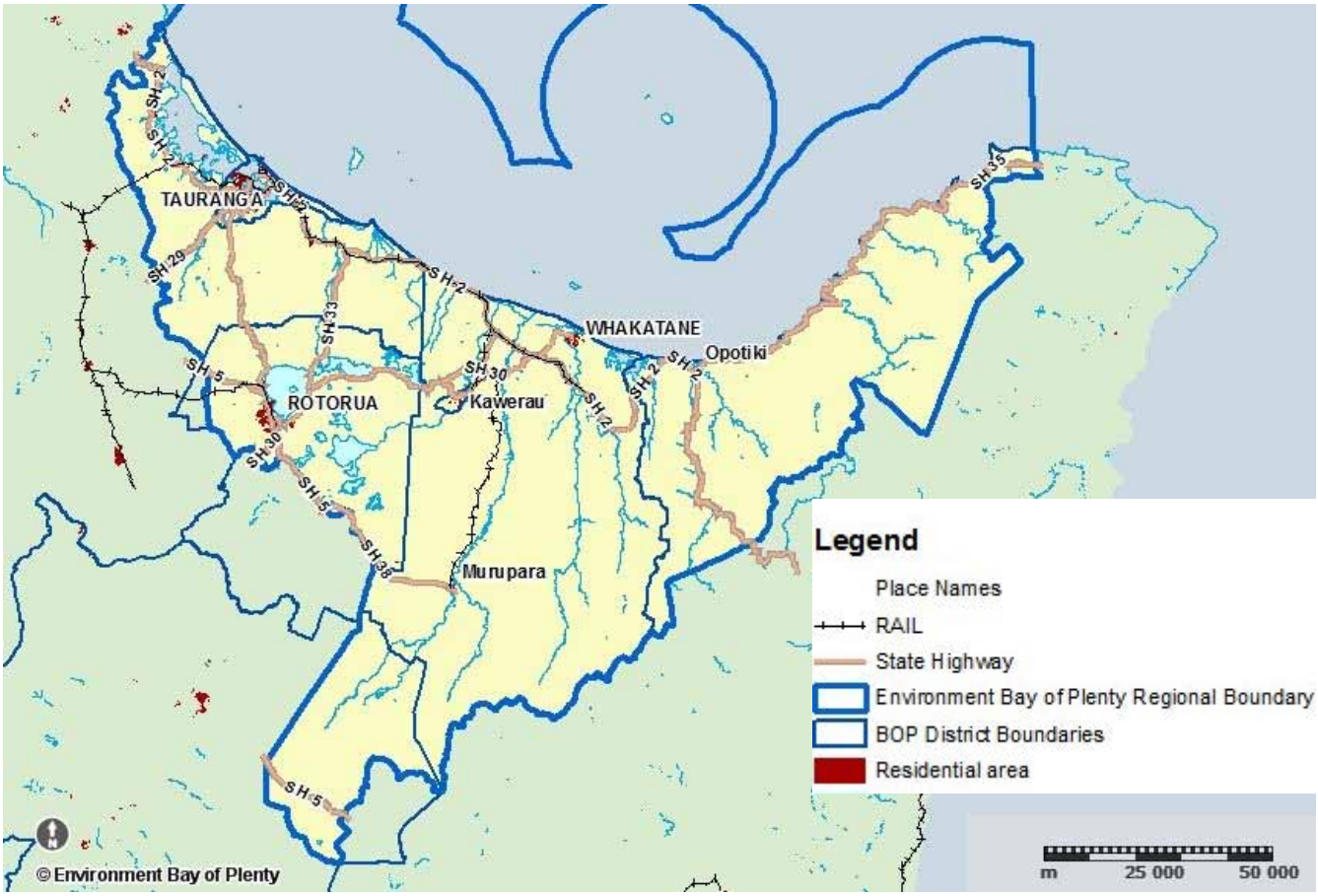


Figure 1.2 Road and rail links in the Bay of Plenty

Public transport services in the region are mainly confined to the main urban centres of Tauranga and Rotorua, with a more limited service in Whakatane and other urban centres. The usage of public transport is low but has typically been growing strongly on a per capita basis.

1.3.2 Patterns of use of the transport network

In terms of the movements of freight, the most notable transport feature in the region is the Port of Tauranga, the largest port in New Zealand in terms of the volumes handled. Tauranga is particularly important as an export port handling 26% of the national total by volume in 2006-07 but is also an important import port for a range of bulk products and containers, many of which are bound for the Auckland area.

A significant issue affecting the road transport network is the connection between Tauranga and Auckland for which there are two alternative routes, both of which have significant constraints particularly for heavy traffic. In general, however, the transport network provided by the links within and to the region is regarded as

acceptable. Tauranga has benefited recently from considerable investment in new roading capacity, aligned with the Smart Growth initiative.

The commuting flows in 2006 display a range of patterns. At one extreme Rotorua, Whakatane, and Opotiki are relatively self-contained (with 93%, 89%, and 89% of the workforce living in the area) with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga. Tauranga has about 85% of its workforce living in the city with much of the balance (12%) travelling in from western Bay of Plenty.

Key highlights of the freight patterns impacting on the region include:

- The importance of Bay of Plenty as a major producer of a range of basic commodities, often focussed on supplying export markets. These include logs and timber products, horticultural products mainly kiwifruit, and some dairy products.
- The role of Port of Tauranga as a major export and import port serving much of the upper North Island for a range of basic products. The links with the Waikato are important for a range of export and import products mainly fairly basic materials, typically transported in bulk and these generate substantial freight flows through the Bay of Plenty region.
- The port is also an important gateway for a range of products to or from the Auckland region, either exported manufactured and agricultural products from Auckland producers or imported goods bound for the large market in the region or for warehouses and distribution centres for onward transport throughout the country. As such, it provides a complement to the services provided within the Auckland region by Ports of Auckland, with the movement of containers to and from the MetroPort inland port in Southdown forming an important component.

1.4 Purpose and objectives of the study

The primary purpose of this study is to develop a better understanding of the relationship between economic development and transport in the Bay of Plenty and have this embedded in regional transportation policy, including the review of the regional Land Transport Strategy.[6] The study seeks to understand how the development of the transport network can help support a high level of economic growth and help to encourage and sustain growth in those sectors which are likely to sustain the longer term growth of the region, especially in respect of high value added activities, and therefore how the transport network needs to be developed to achieve these objectives. This will in turn enable future transport investment in the region to be better targeted at those activities most likely to provide positive economic development spin-offs.

[6] Our study area will be the Bay of Plenty Regional Land Transport Programme area (Tauranga city, Western Bay of Plenty district, Rotorua district, Whakatane district, Kawerau district, Opotiki district). Inter-regional and international movements of people and goods will also be considered where they are identified as critical to supporting economic development within the region.

The study has combined data analysis, theory and modelling to satisfy the three principal objectives. These are:

- To identify and assess the relative importance of the critical transport-related factors contributing to economic development in the Bay of Plenty
- To quantify the future economic impacts of different high-level regional transport investment options (using an appropriate analytical framework)
- To make policy recommendations on the types of transport activities and levels of investment that should be considered in the regional Land Transport Strategy (2011-2014)

In addressing these objectives some of the key questions investigated in the study include:

- What are the critical transport related factors underpinning economic development in the region?
- What will be the relative importance of these factors in the future?
- What deficiencies in the region's transport system need to be addressed to respond to these factors?
- What future transport system will provide the enabling conditions most likely to achieve the 'step change' in economic development that the Government is seeking?
- What pattern of future transport investment will make the greatest contribution to this desired transport system?

We have also taken into consideration a range of relevant influences, issues and relationships including:

- The role of each urban centre within the regional economy and the connections between them
- The connections between urban centres, national and international 'gateways' and areas of production
- The relative importance of transport connections as a factor in attracting high value-added activities and skills to the region
- The relationship between transport modes and benefits of modal integration
- Economic issues identified in the Draft Regional Land Transport Strategy (RLTS) (2011-2014)
- The wider economic costs and benefits of different transport investment options, including indirect/external costs and benefits and the applicability and potential benefits of agglomeration to the region
- Potential for actual economic gains versus transfers

- An appropriate 'mix' of future transport investment across activity classes to 2040

1.5 A framework grounded in economic geography

Economic geography is now recognised as providing a very powerful framework for undertaking the analysis of regional economic development and the role of transport within this process. The framework demonstrates the importance of concentrating knowledge intensive activities but also indicates that where primary production takes place, a focus on spatial transactions costs will be important, although these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value, higher knowledge intensive outputs. Also important will be opportunities to broaden and diversify the economic base of a region and also to seek opportunities to move production processes higher up the value chain.

We will use this framework as a core component of this study, both to explain the region's current situation and to assist in painting a picture of the future opportunities and constraints for the region.

1.6 Structure of this report

This report sets out the analysis undertaken and the key findings from our investigation of the linkages between transport and economic development in the Bay of Plenty region.

This report starts by outlining our methodology in Section 2. Section 3 sets out the background position in relation to population and employment, and Section 4 looks at the hierarchy and roles of the different areas within the region. Section 5 identifies the key transport flows and connections between the areas. Having defined the current position in Sections 3 to 6, Section 6 then investigates the possible linkages between transport and economic growth, starting off with a review of the literature and then analysing the data for Bay of Plenty and developing simple commuting and agglomeration models. Section 7 looks at the future growth of population and employment and considers the way in which the likely growth of employment by sector will impact on the demand for transport. Section 8 considers the way in which freight would be needed to support growth in output of a number of basic commodities, the likely patterns of commuting flows and finally the ways in which different emphases in the transport system are likely to give rise to different levels of economic growth. Section 9 identifies specific possible deficiencies in the region's transport system in relation to the growing demands, Section 10 considers issues of modal integration and Section 11 discusses appropriate focuses for future transport investments.

A feature of the Study was the undertaking of two days of workshops in Tauranga, Whakatane and Rotorua in mid October 2010. While our report has taken cognisance of the issues raised at these, notes of the proceedings are attached in Appendix A.

Part 2: Methodology

2.1 Introduction

Our task is to investigate the critical transport factors underpinning economic development in the region. To achieve this it is important to look in detail at the local situation but to ensure we place our analysis within a broader national context.

At the local level we have examined the drivers of projected production increases around the region, population growth, industrial and urban expansion and intensification. These provide projections of the levels of demand for transport modes, and thus deficiencies in the present system. This is essentially a 'bottom-up' approach to the growth of the region's settlement hierarchy based upon production and population growth. This builds on our existing wide and deep knowledge of regional transport and economic modeling, databases and structures. We have also investigated the extent to which particular characteristics of the transport network are required to provide support for the economic development aspirations of the region, particularly in the development of higher value added activities.

As a second approach to explore the implications of Bay of Plenty's place in national economic development, we have undertaken a 'top-down' assessment of transport factors that may facilitate greater economic development in the region. This will help to ensure that the development of inter-regional transport links complement the transport network within Bay of Plenty and support economic development.

It has been the intention throughout the study to take a flexible and pragmatic approach to the work required, using the initial analysis of the data to help identify and refine the avenues of investigation, rather than impose an approach developed at the outset of the work.

The specific methodology we have used for the study consists of three stages aiming to address the questions raised in Section 1. These comprise:

- Understanding the existing position – including profiling the region, identification of existing urban centres (and their roles) and key transport flows and connections
- Identifying key linkages and drivers - where we investigate the importance of transport connections and identify transport deficiencies within the region
- Developing options for the future

Each of these is discussed in more detail below.

2.2 Stage 1: Understanding the existing position

Our analysis of existing position of the region is used to provide a broad profile of the key indicators, a description of the existing urban centres (and their roles) and data on the key transport flows and connections. The existing position has been investigated using a wide range of published statistics and studies both for the Bay of Plenty region and upper North Island area but also more widely for New Zealand as a whole. The work has also benefitted from the data collection and analysis undertaken for the economic linkages between New Zealand Cities Study which focuses on Auckland, Hamilton and Tauranga. The key sources of information include:

- Statistics from Statistics New Zealand and the Ministry of Tourism
- Bay of Plenty Freight Study
- National Freight Demands Study
- Port statistics for Port of Tauranga
- Road transport flows from New Zealand Transport Agency (NZTA)

Following a review of the published statistics, a range of additional tailored statistics has been purchased from Statistics New Zealand to allow particular elements to be investigated in greater detail.

The specific statistics collected to date for this study include:

Data category	**Specific data/statistics sourced**
Demographic	Population in 1996, 2001 and 2006
	Migration patterns by age and education
Economic	Employment in 1996, 2001 and 2006 both in total and by type of employment
	Earnings by area of employment by sector in 1996, 2001 and 2006
Transport	Journey to work movements in 1996, 2001 and 2006
	Journey to work movements by education level
	Journey to work movements by earnings
	Freight flows by commodity and mode
	Road traffic flows for a number of key sites by all and heavy vehicles
	Movements through the Port of Tauranga
Tourism	Tourist visits and expenditure

In Section 3 we provide an overview of the key data relating to population and employment primarily on a region-wide basis and transport. In Section 4 we profile the key urban centres and identify their roles within the Bay of Plenty and the upper North Island. In Section 5 we identify key transport flows and connections within the Bay of Plenty by examining:

- Commuting flows, including changes in commuting patterns from 1996 to 2006
- Key area to area movements including business travel and freight movements

Our understanding of the published data has also been enhanced by the results of the Stakeholder Workshops undertaken in mid October 2010 and also the interviews we have undertaken as part of the recent complementary studies in the region including the Economic Linkages Study and the Bay of Plenty Freight Study.

2.3 Stage 2: Identifying key linkages and drivers

In the second stage of the analysis we focus on identifying the key transport and economic linkages and drivers in the region. This includes investigating the importance of transport connections and identifying transport deficiencies within the region.

The economic, demographic and transport data we have sourced has been analysed to provide a description of the existing economic position and also to identify the important underlying trends which emerge over time and the key drivers behind these trends, particularly where these relate to components of the transport network and transport services serving the region. To some extent, this has been undertaken using pragmatic approaches deriving key relationships and linkages, but the analysis has been supplemented by more formal and structured models developed to describe the present situation and provide a basis for forecasting developments in the future. These include:

- A model to describe the patterns of commuting movements within the region and with neighbouring areas
- A regional agglomeration model identifying potential spatial interactions and the way in which the transport network supports the wider patterns of economic activity between areas within the region and neighbouring areas
- Analysis of the economic structure of the region and its potential to generate transport demands of different types

We have also undertaken a literature review that has been used to provide a sound theoretical basis for our analysis and recommendations.

2.4 Stage 3: Developing options for the future

Having defined the current position and identified the key drivers and linkages between transport and economic growth in Stage 2, the final step was to consider potential future economic growth scenarios for the region. These have taken into account the current pattern of economic activity and trends and the opportunities likely to be available in the future, both in total and by key sector.

Using both the pragmatic and more formal relationships identified in Stage 2, the extent to which the planned development of the transport network would be able to support future levels of economic activity in the region has been examined and deficiencies in this identified. Alternative approaches which address these deficiencies have then been assessed and this has been used to identify an appropriate set of focuses for future transport expenditure in the region.

Part 3: Understanding the current position: overview of the region

In this section we provide a brief overview of the region which then sets the context for the more detailed material which follows in this report. Many of the statistics on which this analysis is based are derived from Census data. The most recent of this in 2006 is now quite old and in a number of instances we have used statistics from other sources to identify broad trends that have occurred since 2006.

3.1 Population – distribution and growth

The Bay of Plenty region contains a population of about 275,000 as at mid-2009. A substantial part of the population in the region is located in the western areas with Tauranga, the key urban centre, having a population of about 120,000 in 2009 or around 45% of the population of the region. The other important urban centres are Rotorua (56,000) accounting for around 21% of the region's population and to a lesser extent Whakatane (19,000) with Kawerau and Opotiki, the other main settlements each comprising around 3% of the region's population. The distribution of population in 2009 is set out in Figure 3.1.

The population of the Bay of Plenty and growth over the period from 1996 by local authority is set out in Table 3.1.

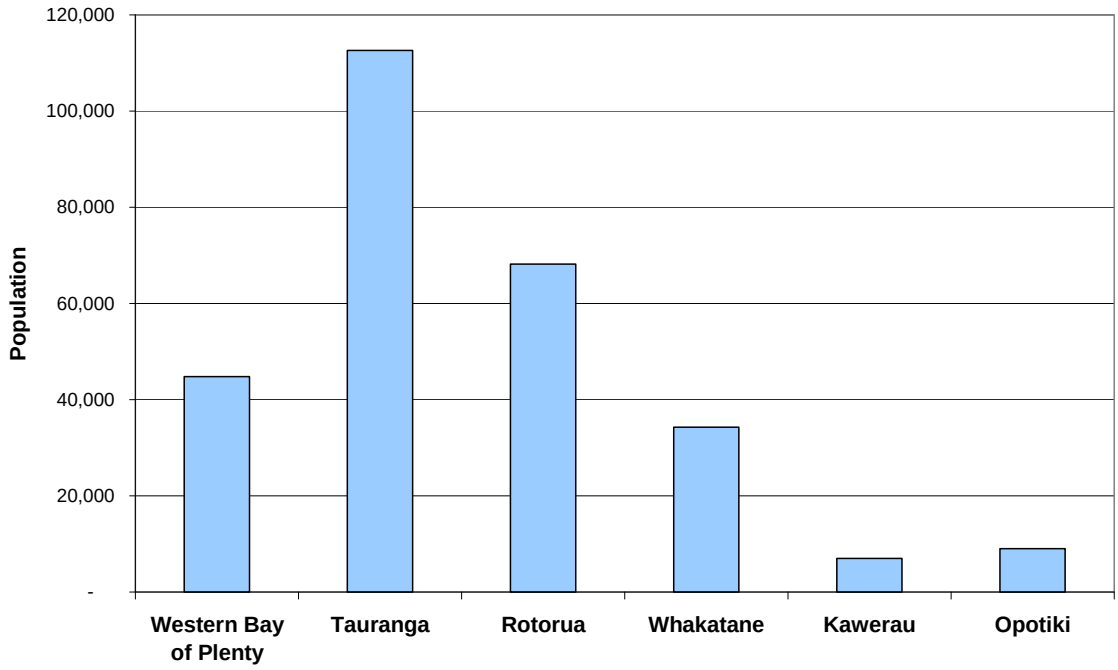


Figure 3.1 Population in Bay of Plenty region 2009

Table 3.1 Population and growth

Territorial Authority	Mid year population estimates						Growth 1996-2006	Growth 2006-2009
	1996	2001	2006	2007	2008	2009		
western Bay of Plenty	35,700	39,100	43000	43600	44200	44800	20.4%	4.2%
Tauranga	80,200	93,800	106,900	109100	110700	112600	33.3%	5.3%
Rotorua	66,700	66,600	68100	68000	68100	68200	2.1%	0.1%
Whakatane	34,400	34,100	34500	34400	34400	34300	0.3%	-0.6%
Kawerau	8,100	7,200	7150	7070	7050	7010	-11.7%	-2.0%
Opotiki	9,600	9,400	9200	9140	9060	9020	-4.2%	-2.0%
Bay of Plenty region	234,600	250,100	268850	271310	273510	275930	14.6%	2.6%
Total New Zealand	**3,758,900**	**3,882,500**	**4184500**	**4228120**	**4268920**	**4315320**	**11.3%**	**3.1%**

Source : Statistics New Zealand and Richard Paling Consulting. Figures are consistent with Sub national Population Estimates

After substantial population growth in the region over the 10 years to 2006, when an increase in population of 15% was recorded over the period compared to a New Zealand wide figure of just over 11%, the relative growth has now moderated. For the region as a whole, the population has increased at about 0.9% per year over the last three years somewhat behind the average for the country as a whole which has averaged about 1.0%.

However, within the region there are substantial differences in the pattern of population growth. Typically population growth in the west in Tauranga and western Bay of Plenty district has been relatively rapid. For these areas the population has grown at about 1.4% to 1.7% per annum between 2006 and 2009, significantly above the average for the country as a whole. In Rotorua on the other hand, population has remained virtually static and in the areas further east the population has declined. In population terms therefore there is a strong contrast between the large and rapidly growing areas to the west and the smaller areas to the east with little or no growth.

A notable feature of the population of the region is its age structure, shown in Table 3.2 and Figure 3.2 below.

Table 3.2 Bay of Plenty age distribution

Area	Age group			
	0-14 years	**15-39 years**	**40-64 years**	**65 years and over**
Western Bay of Plenty	21.2%	25.9%	37.0%	15.7%
Tauranga	**20.6%**	**30.9%**	**31.0%**	**17.3%**
Rotorua	25.0%	33.0%	30.8%	11.2%
Whakatane	24.9%	30.1%	32.2%	12.5%
Kawerau	27.7%	30.5%	29.2%	12.4%
Opotiki	27.0%	27.3%	31.8%	13.9%
Bay of Plenty region	**22.7%**	**30.4%**	**32.1%**	**14.8%**
Hamilton	21.6%	41.1%	27.3%	10.0%
Auckland City	18.4%	42.8%	29.3%	9.4%
Whangarei	22.8%	29.4%	33.0%	14.9%
New Zealand Average	21.2%	35.0%	31.6%	12.2%

Source Statistics NZ and Consultants Analysis

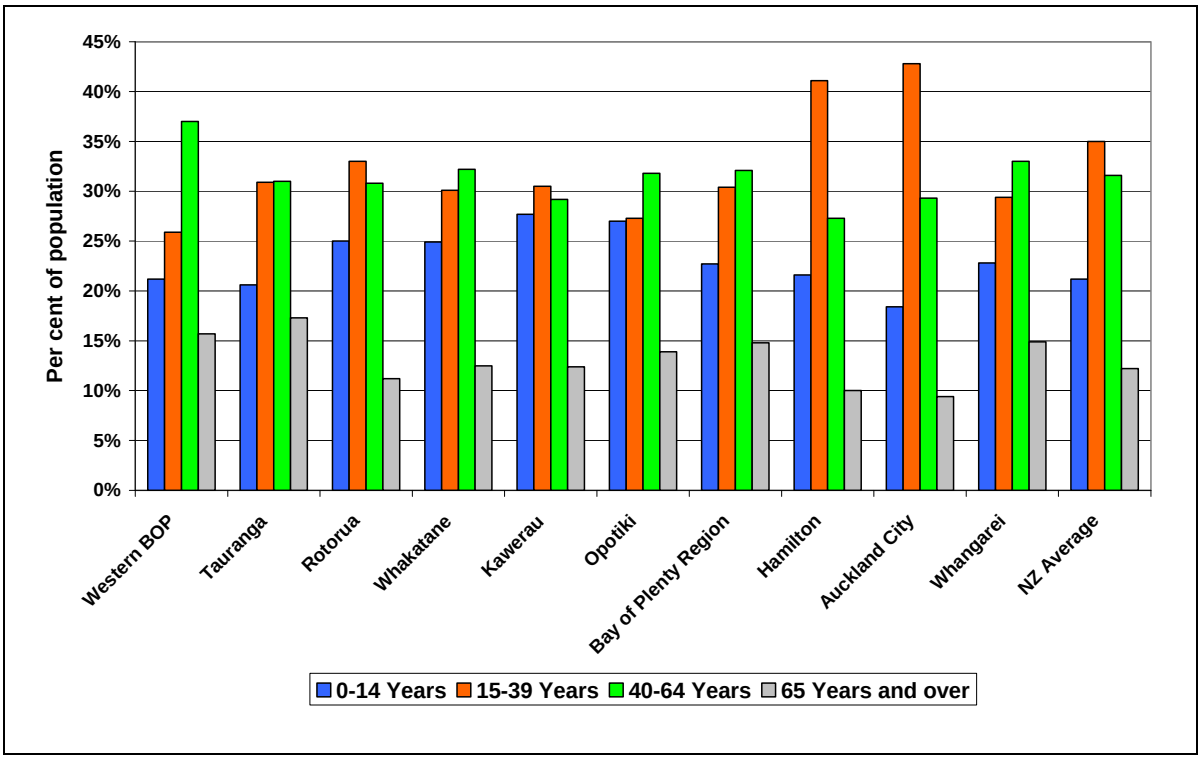


Figure 3.2 Age distribution of Bay of Plenty population 2006

Compared to the country as a whole, the region has a high proportion of residents aged 65 or over and a relatively low proportion in the 15-39 year age bracket. Within the region, Tauranga has a particularly high proportion in the over 65 age bracket (making up 17% of the population, compared to 15% for the region as whole and 12% for the country as whole). Balancing this, especially compared to the national position is a relative low proportion in the 15-39 age group, 31% compared to 35% nationally and 41 to 43% in Auckland and Hamilton. This may have implications for development of local economy with potential shortage of young, skilled workers.

There are however, strong contrasts between Tauranga and Rotorua, the second largest urban area in the region which has a relatively small share of the population over 65 and a relatively high share of younger residents.

Across the rest of the region, western Bay of Plenty has a high proportion over 65 and a low proportion aged 15-39. For the other districts, the younger population represents a relatively high share of the total and the over 65s have a low share. Again this emphasises the differences between the different parts of the region.

The patterns of population by age have implication for the potential for economic development. The relatively high share for the oldest population group represents a segment of the population with a limited degree of participation in the workforce, although because of their age they have a higher demand for health and other support services. In addition to the extent that this age group does or aspires to participate in the work force, there may issues in providing the transport for these people.

3.2 Employment

Broadly in line with the distribution of population, the main employment areas in the region are in Tauranga and Rotorua and the distribution of employment is set out in Table 3.3.

Table 3.3 Employment in the Bay of Plenty

Area	Total Employment in the Bay of Plenty				Growth 1996-2006	
	1996	2001	2006		Number	Percent
			Total	Percent of total		
western Bay of Plenty	11151	11853	13,293	13.2%	2,142	19.2%
Tauranga	29679	34527	44,127	43.8%	14,448	48.6%
Rotorua	24723	23910	26,334	26.2%	1,611	6.5%
Whakatane	10074	10131	11271	11.2%	1197	11.9%
Kawerau	3111	2850	3048	3.0%	-63	-2.0%
Opotiki	2379	2388	2622	2.6%	243	10.2%
Total Bay of Plenty	81117	85659	100,695	100%	19578	24.1%

Source: Statistics NZ Census data

Employment in Tauranga in 2006 was estimated at about 43,000 and in Rotorua 25,000. These represent about 70% of total employment in the region. Again, reflecting the patterns of population growth, employment in Tauranga has been growing rapidly increasing by about 46% between 1996 and 2006. The strong growth in employment in Tauranga represents about 80% of total employment growth for the whole region between 1996 and 2006.

Employment also grew in the western Bay of Plenty at almost 20% but growth further east was much more modest with Rotorua growing by 2.9% over the period, although this has accelerated recently. Employment in Whakatane grew by 10% and Opotiki by 7% but Kawerau experienced a loss of employment opportunities, declining by 5%.

The shares of each area in the total employment in the Bay of Plenty are set out in Table 3.4.

Table 3.4 Employment shares in the Bay of Plenty

Area	Share of total Bay of Plenty employment		
	1996	2001	2006
western Bay of Plenty district	13.7%	13.8%	13.2%
Tauranga city	36.6%	40.3%	43.8%
Rotorua district	30.5%	27.9%	26.2%
Whakatane district	12.4%	11.8%	11.2%
Kawerau district	3.8%	3.3%	3.0%
Opotiki district	2.9%	2.8%	2.6%
Total Bay of Plenty	100%	100%	100%

An observable trend from the data is that Tauranga has increased its proportion of region's total employment over the period, with western Bay of Plenty district retaining a broadly constant share probably because of interactions with Tauranga. There has been a drop in the Rotorua proportion of region's total employment over the period and also a very marked drop in Rotorua's level of employment relative to Tauranga, which dropped from 85% of Tauranga employment levels in 1996 to 60% in 2006.

Information is available from an alternative statistical source (LEED) on the growth of employment between 2006 and 2009 and the growth observed is set out in Table 3.5.

Table 3.5 Employment growth in Bay of Plenty 2006-2009

Area	Growth June 2006 - June 2009	
	Total	Annual average
western Bay of Plenty	13.5%	4.3%
Tauranga	3.9%	1.3%
Rotorua	-2.6%	-0.9%
Whakatane	7.0%	2.3%
Kawerau	-5.6%	-1.9%
Opotiki	12.5%	4.0%
Total Bay of Plenty region	3.9%	1.3%
Total New Zealand	1.8%	0.6%

Source: Statistics NZ LEED Database

Over the past three years growth in employment has typically slowed down although reasonably high growth has been achieved in western Bay of Plenty and although from a small base in Opotiki. However, to some extent, this is balanced by recorded employment decreases in Rotorua and Kawerau. For the region as a whole, employment growth amounted to about twice that for the country.

The details of employment by sector are set out below in Section 5.6.

3.3 Educational attainment

The level of educational attainment of the workforce is a key factor in its productivity and the position for the districts in the Bay of Plenty in 2006 is set out in Table 3.6 and Figure 3.3.

Table 3.6 Educational attainment for the workforce 2006 (percent of employed residents)

Education level	Western BOP	Tauranga	Rotorua	Whakatane	Kawerau	Opotiki	Total region	Total NZ
No qualification	22%	19%	21%	22%	30%	29%	21%	18%
Level 1-4 Certificate	51%	53%	50%	50%	49%	45%	51%	49%
Level 5-6 Diploma	12%	11%	10%	10%	8%	9%	10%	10%
Level 7 and above	11%	13%	13%	11%	5%	8%	12%	18%
Not elsewhere Included	5%	4%	6%	6%	8%	8%	5%	4%
Total	100%	100%	100%	100%	100%	100%	100%	100%

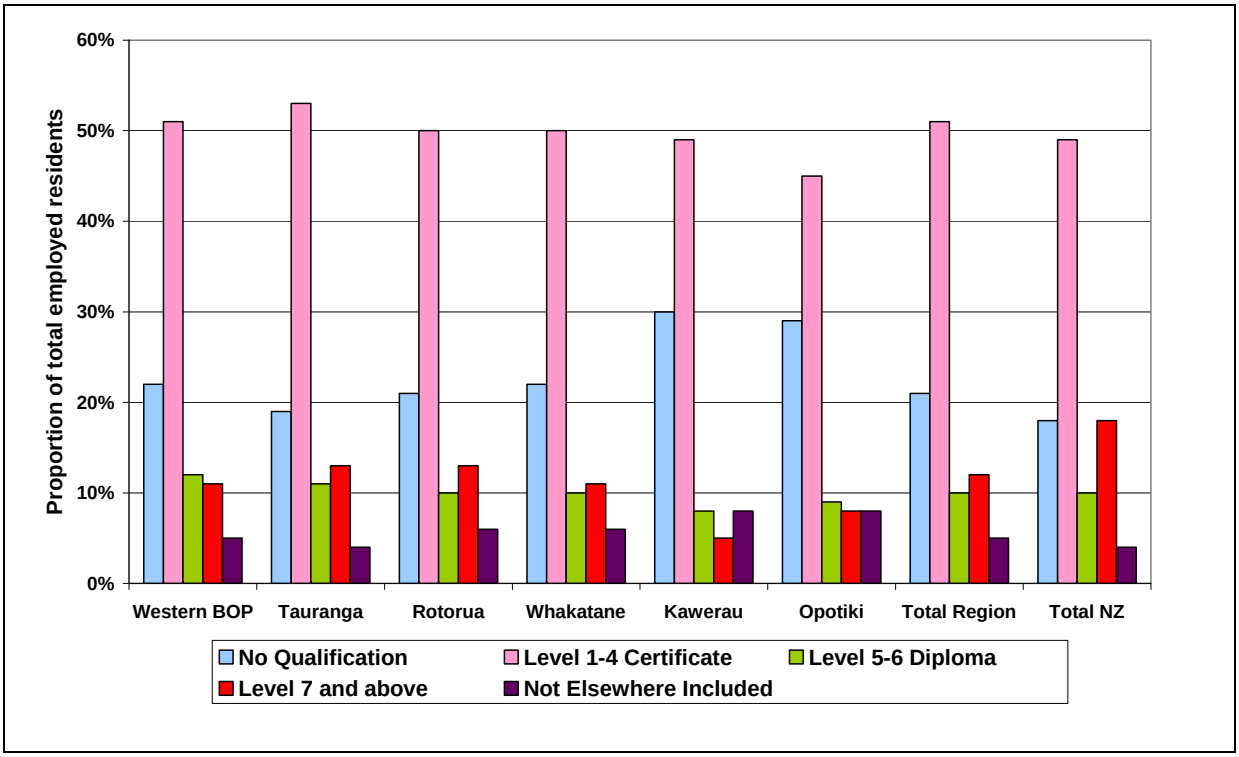


Figure 3.3 Educational attainment for the Bay of Plenty workforce

Compared to the national average, the districts in the region have a high proportion of the workforce with no or only basic (Level 1-4) qualifications and a relatively low proportion with degrees or equivalent (Level 7 or above). The proportion of workers with no qualifications is particularly high in the more remote areas to the east of the region and as we discuss later, this may reflect the difficulty of accessing higher educational establishments for people living in these areas.

The different levels of educational attainment are also linked with differences in average income levels and this is set out in Table 3.3.

Table 3.3 Earnings by educational attainment for the Bay of Plenty workforce 2006 ($ pa)

Education levels	Average earnings							
	WBOP	**Tauranga**	**Rotorua**	**Whakatane**	**Kawerau**	**Opotiki**	**Total region**	**Total NZ**
No Qualification	30,200	29,800	28,900	29,400	31,400	24,600	29,400	29,800
Level 1-4 Certificate	33,800	34,400	34,300	34,600	34,900	30,600	34,200	35,300
Level 5-6 Diploma	39,900	41,900	42,500	45,300	47,600	39,400	42,100	44,200
Level 7 and above	53,600	53,900	54,200	56,500	47,600	45,800	54,000	55,600
Not elsewhere included	28,200	28,200	27,600	29,400	30,300	26,300	28,200	28,100
Total	35,700	36,800	36,400	37,000	35,200	30,700	36,300	38,900

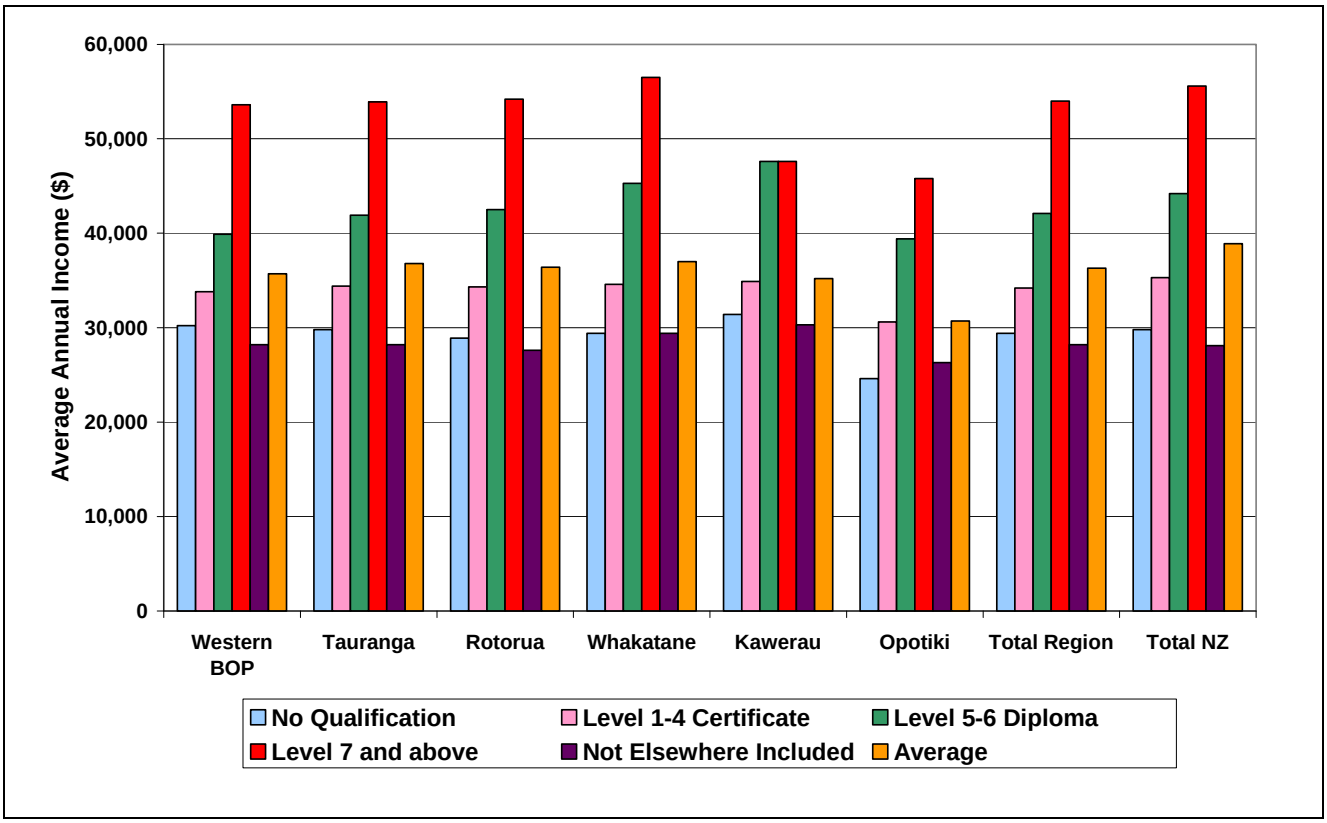


Figure 3.1 Earnings by educational attainment for the Bay of Plenty workforce 2006 ($ pa)

There are clear links between earnings and educational attainment for almost all the districts, although for each level of educational attainment there is some variation between the districts. Opotiki for example, has low earnings in each educational category, possibly reflecting the lack of opportunity for all types of workers. For all districts the average wage rate for residents is below that of the country as a whole.

For western Bay of Plenty, Tauranga, Rotorua and Opotiki, the relatively low average earnings reflect a combination of low earnings for each educational category above unqualified, together with relatively high proportions of the resident workforce in the lower education categories. For Whakatane and Kawerau, there are still high proportions in the lower educational categories but because of the particular industrial structures of the areas, earnings for those educated to Level 5-6 are above national averages and for Whakatane, average earnings for those with a Level 7 or above education are also above the national average.

In education terms, improving wages and output therefore would benefit both from improving general education levels, although this would need to be balanced by an increase in suitable jobs for a better qualified workforce. The current structure of the area with a strong emphasis on the production and simple processing of primary products is not particularly conducive to such changes and this would therefore need to be supported by a switch to higher value added activities.

An important factor in constraining the levels of educational attainment in the more remote areas, particularly those in the east of the region, is the reported difficulty of

accessing higher educational facilities for those who may not have access to private transport. This is reported to be a particular issue for individuals, particularly Maori who have a strong attachment to their home environment and for whom the costs or difficulty of accessing facilities which might provide further education or training, are in effect, prohibitive.

Part 4: Understanding the current position: identification of the key urban centres and their roles within the Bay of Plenty and the upper North Island

4.1 The settlement hierarchy in the Bay of Plenty

With the large number of settlements within the Bay of Plenty, particularly of the smaller ones, the inter-relationships between the settlements of the region become important. This is particularly the case for smaller settlements which are reliant on larger settlements for a range of activities. A settlement hierarchy for the Bay of Plenty region is presented in Figure 4.1.

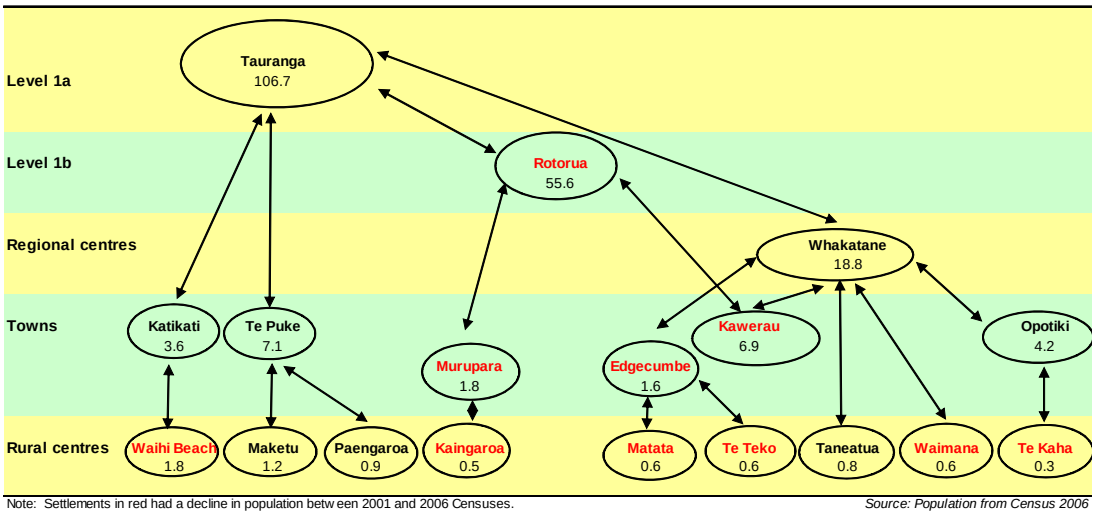


Figure 4.1 Bay of Plenty settlement hierarchy (for the census Usually Resident Population Count 2006 (000's))

Tauranga is the main centre for the region, with Rotorua a secondary centre and Whakatane a regional centre. Tauranga is the alpha city in the region and has direct links to four other settlements including two of the three regional centres (Rotorua and Whakatane).

The geography of the region suggests that smaller centres also play key roles. For example, Whakatane also has five links and towns such as Te Puke support two smaller rural centres (Maketu and Paengaroa). Effective transport is essential to provide these economic linkages.

4.2 Functions of cities and activities by sector

4.2.1 Introduction

Reflecting the hierarchy we have defined above, we have examined employment in a number of sectors to gain an indication of the types of sectors which appear to be particularly interconnected and the scale of this connection. This has been undertaken for employment in:

4.2.2 Social services

- Retail and hospitality
- Business and property services
- Primary Industries
- Processing and manufacturing employment
- Social services

A large share of workers in all communities is employed in the provision of social services to people. The share of employment in providing social services reflects the position of the settlement on the hierarchy. These shares for Bay of Plenty TLA's are shown in Figure 4.2.

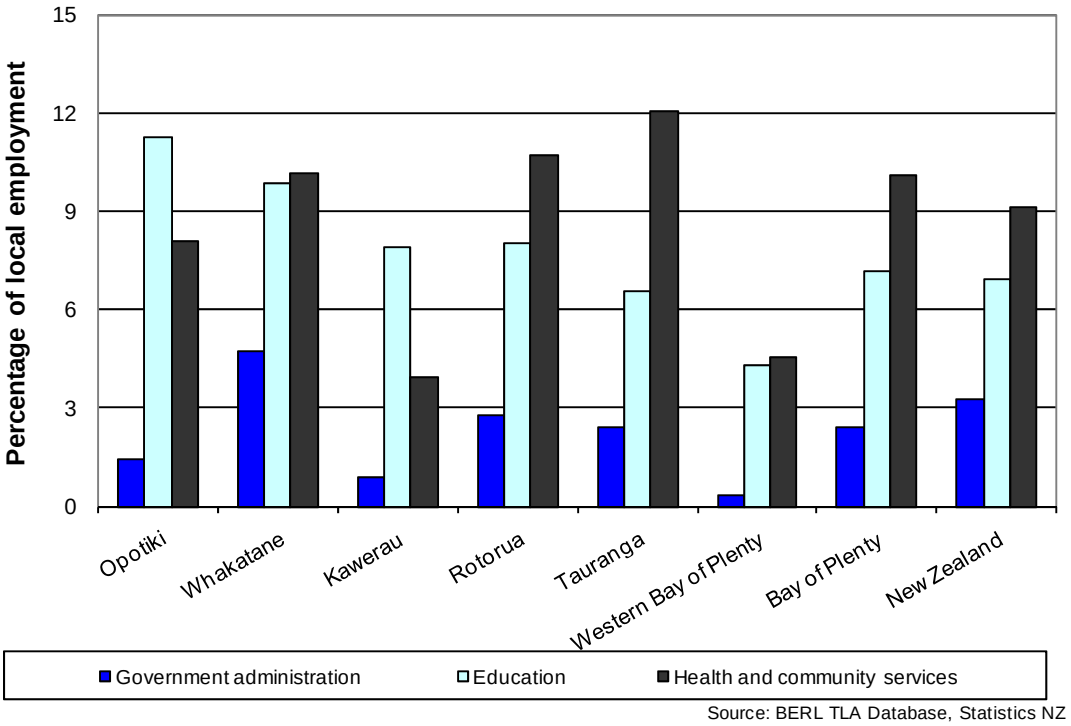


Figure 4.2 Social Services employment 2009

Figure 4.2 shows that employment in the health and community services is more concentrated in the areas with larger settlements, with Tauranga as the main centre having 12% employed in these services. Rotorua at the next level has 10.7% and the Whakatane regional centre has 10.2% of employed in health and community services. All three main centres have over 9% employed in these services, a figure that is higher than the average for the country as a whole.

This high share is balanced by a lower share in the smaller communities indicating their dependence on the larger settlements for these types of services. There is a relatively high share of employment in the health sector for the region as a whole with an overall share of 10.1% of employment. This high share probably reflects the age structure of those living in the Bay of Plenty with a relatively high share of older residents, whose demands for health care services are relatively high.

The distribution of employment in Government administration displays a different spatial pattern whereby Tauranga has a slightly lower share than Rotorua at 2.4% and 2.8% respectively. Whakatane at 4.8% has a much higher share than either of the other two, and this undoubtedly reflects the fact that at the time the statistics were collected a major Local Government entity, Environment Bay of Plenty had much of its staff located there.

The education share across the country is generally 6% to 7%, with main cities having about 8% of employment in education. TLA's with higher shares than 9% are generally those with strong tertiary institutions of some type, such as Dunedin, Porirua (with a polytechnic and Wananga), and Selwyn district with Lincoln University. The pattern in the Bay of Plenty has an average 6.6% in Tauranga, and a slightly higher 8% in Rotorua. There is a high share due to strong educational training institutions in Opotiki (11%) and Whakatane (10%) and a relatively low share in the more rapidly growing areas to the west of the region.

The main implication of the spatial pattern of supply of social services for the transport requirement, is the need for a high level of route security for access to health services for people travelling from rural areas and the smaller settlements to Opotiki, Whakatane, Rotorua and Tauranga. The pattern of education and training also indicates a need for transport, and in some cases, increased passenger transport from rural areas or small centres to the main training institutions and facilities. These are in all of the main settlements.

4.2.3 **Retail and hospitality**

In the Bay of Plenty the spatial patterns of retail and hospitality employment reflect not only the pattern of population distribution and tourism demand, but also aspects of rural industry servicing functions carried out by retail outlets.

The distribution of employment across the region is shown in Figure 4.3

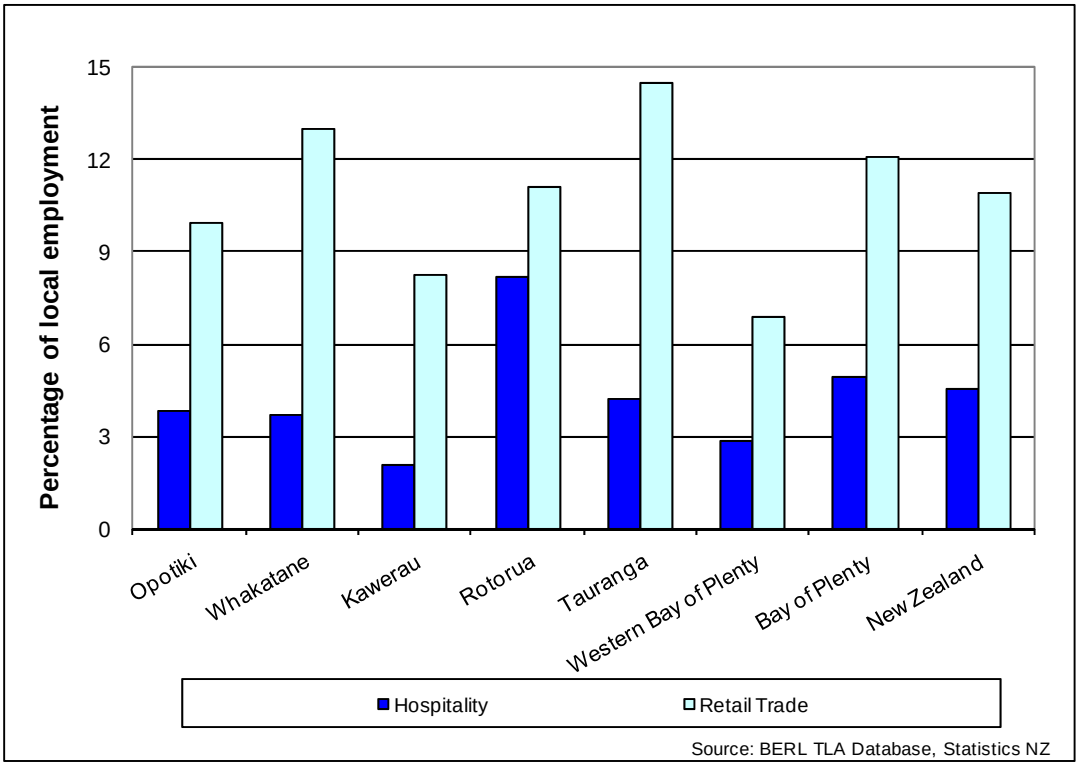


Figure 4.3 Retail and hospitality employment 2009

Retail trade employment across the country averages 11% of employment, and it is generally the cities and also the districts with a strong rural production base that have employment shares of 12% to 14%. The Bay of Plenty pattern is consistent, with Tauranga having 14.5% and Whakatane district having 13% indicating that it services much of the rural activity in the eastern Bay of Plenty.

The hospitality employment in most Bay of Plenty TLA's is close to the national average of about 4%, but Rotorua, with its strong tourism activity is about double that at 8.2%.

4.2.4 Business and property services

Employment in business and property services in the Bay of Plenty region is set out in Figure 4.4.

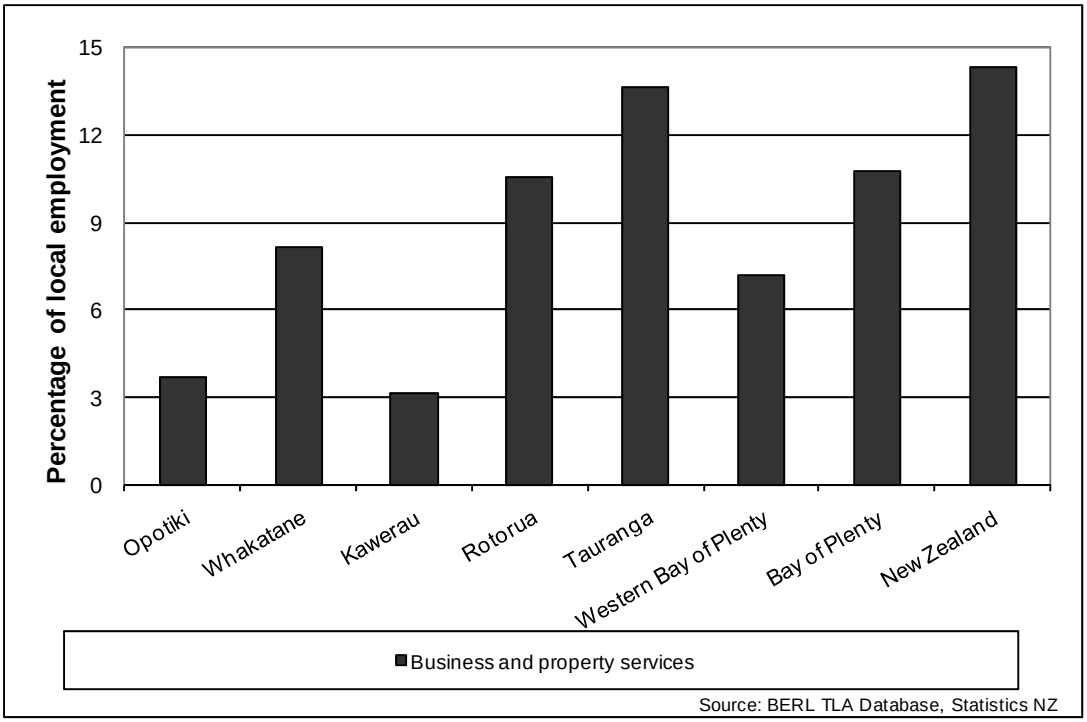


Figure 4.4 Business and property services employment 2009

The figure shows that the highest level business services are supplied by Tauranga city which has 13.6% of employment in business services. This is a share only exceeded by some of the larger cities like Hamilton and North Shore. The New Zealand average of 14.3% is lifted significantly by Auckland having a 25% share and Wellington a 23% share. Most TLA's have about 8% share.

Tauranga probably enjoys a large share for two main reasons - firstly it is the main centre of a strong production region, so for that reason has a share similar to Napier and New Plymouth. The second factor is that it is an attractive place to live, and so it has a share as high as two other pleasant locations at Queenstown and Central Otago.

Rotorua has 10.6% of the local employment in business and property services which is about par as a second tier centre in the region, and Whakatane is a little below that at 8%, Opotiki and Kawerau have much lower employment shares indicating that these services are supplied to their businesses from settlements higher up the hierarchy. They both have under 4% of local employment in business and property services.

There is thus a consistent settlement hierarchy of business services, whereby Tauranga and Rotorua act as service hubs for the other settlements within the Bay of Plenty. Compared to the national average, Tauranga and Rotorua and Bay of Plenty as a whole, has however, a relatively low share of employment in this sector. As we noted, Auckland and Wellington have a much higher share, and so the highest level of services to Bay of Plenty businesses will come from these centres, outside the region. This dependence has been identified in a number of the interviews we have undertaken.

The main transport implications of these business services patterns is the need for rural businesses to be able to access the three main centres for first tier and second tier business services. Access to the highest level business services relies on effective broadband access and effective daily air transport access to Auckland and Wellington.

4.2.5 Primary industries

The share of the employment in primary industries in the TLA's in 2009 is set out in Figure 4.. We note that the scale on this chart is much larger than on the other charts. These high shares are characteristic of employment in the smaller TLA's in New Zealand. In fact TLA's with total employment levels below 25,000 FTE's have primary industry employment shares evenly distributed between about 1% and 50%.

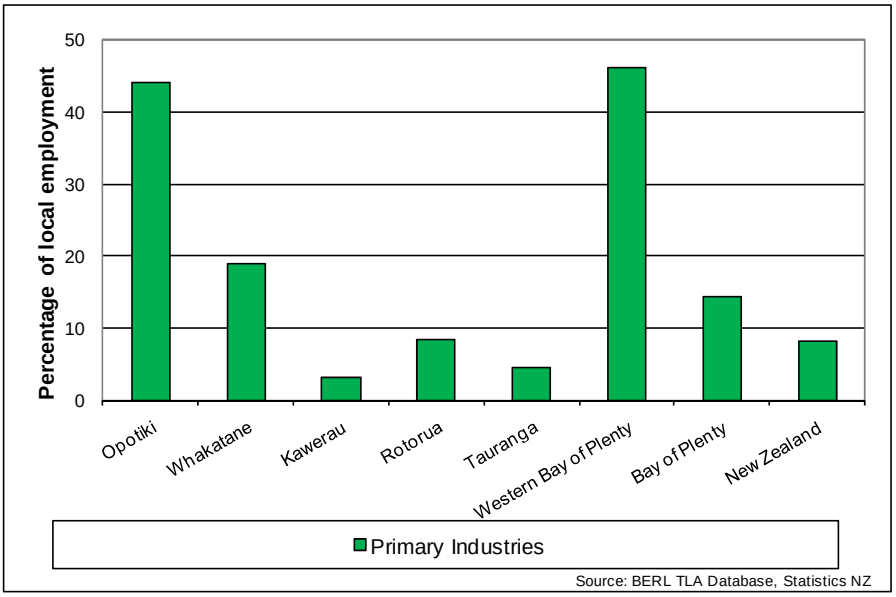


Figure 4.5 Employment in primary industries 2009

The employment shares in western Bay of Plenty at 46% and Opotiki at 44% are among the five highest TLA's in the country joined by Southland, and in Canterbury, Waimate and Hurunui. The New Zealand average is only 8%, pulled down by the large urban TLA's, but the most-often occurring median is 20%. This shows that many TLA's have primary industry employment shares similar to Whakatane.

The high employment in primary industries be they dairy, other agriculture, horticulture, forestry or fishing, generate large volumes of output per employee. The very high employment share in primary industries in Bay of Plenty is reflected in the freight task in the region.

Looking at the composition of activity within the primary sector, in Bay of Plenty this is comprised of the horticulture and agriculture industry, forestry, fishing and mining (mainly for aggregate). The composition of employment in those four industries within the primary sector is shown in Figure 4.6.

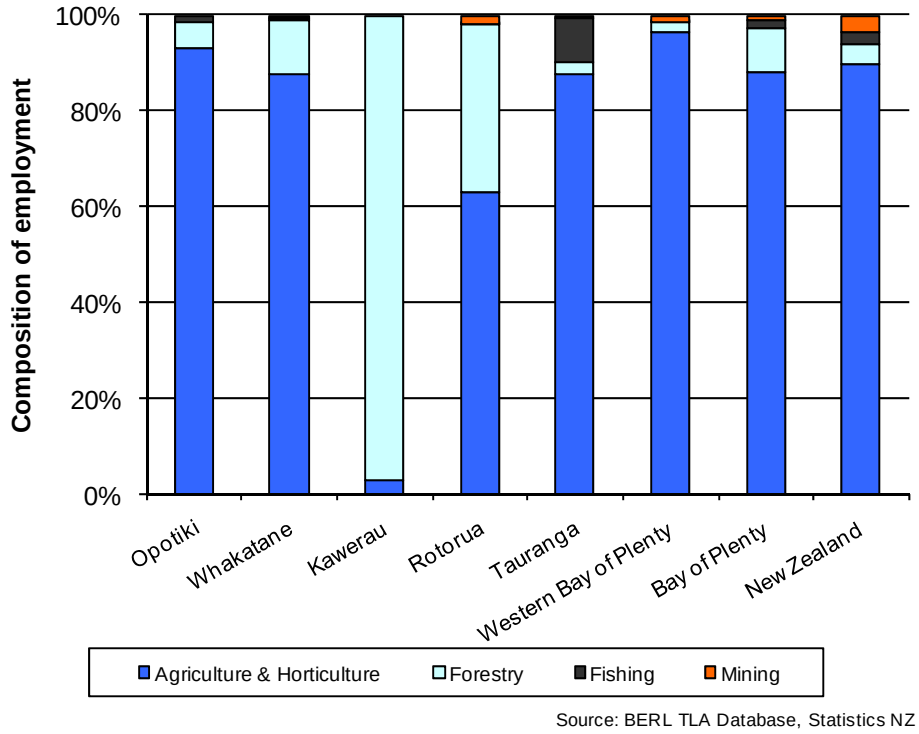


Figure 4.6 Employment composition in primary industries 2009

The composition is fairly similar for all TLA's except for Kawerau and Rotorua. For all the TLA's except for Kawerau, agriculture and horticulture is the main employer of workers in the primary sectors.

The employment in the primary sector is generally about 90% in the horticulture and agriculture industries with smaller shares in forestry, fishing and mining. By contrast, Kawerau and Rotorua have much larger shares in forestry. In Kawerau, employment in primary industries is almost completely dominated by forestry with over 90 % of workers; Rotorua also has a significant portion of its primary employment in forestry. Rather surprisingly, Opotiki does not. There are a number of forests in the eastern Bay of Plenty either at or near harvesting stage, and presumably the share of employment in forestry in Opotiki and Whakatane will increase over time, although for Opotiki, at least this may be moderated by the likely increases in kiwifruit production and in aquaculture.

Tauranga is the only local authority with a sizable proportion of its primary employment currently in the fishing industry to date. However, Opotiki and possibly Whakatane are likely to experience increased employment in this industry as the aquaculture developments there get underway.

The implication of these high employment figures for horticulture, agriculture and forestry are that the economy of the region is crucially dependent upon effective transport within the region, to carry primary product to processing plants in or near the region. It is also dependent upon an effective freight link for the direct export of the primary products as well as processed and manufactured product.

The present pattern of high shares of the economy in the primary sector is likely to remain and possibly increase in the eastern Bay of Plenty. This will reflect ongoing expansion of kiwifruit production, as well as more of the forests there being harvested, and the increase in scale of the aquaculture.

4.2.6 Processing and manufacturing

Employment in processing and manufacturing is set out in Figure 4.7.

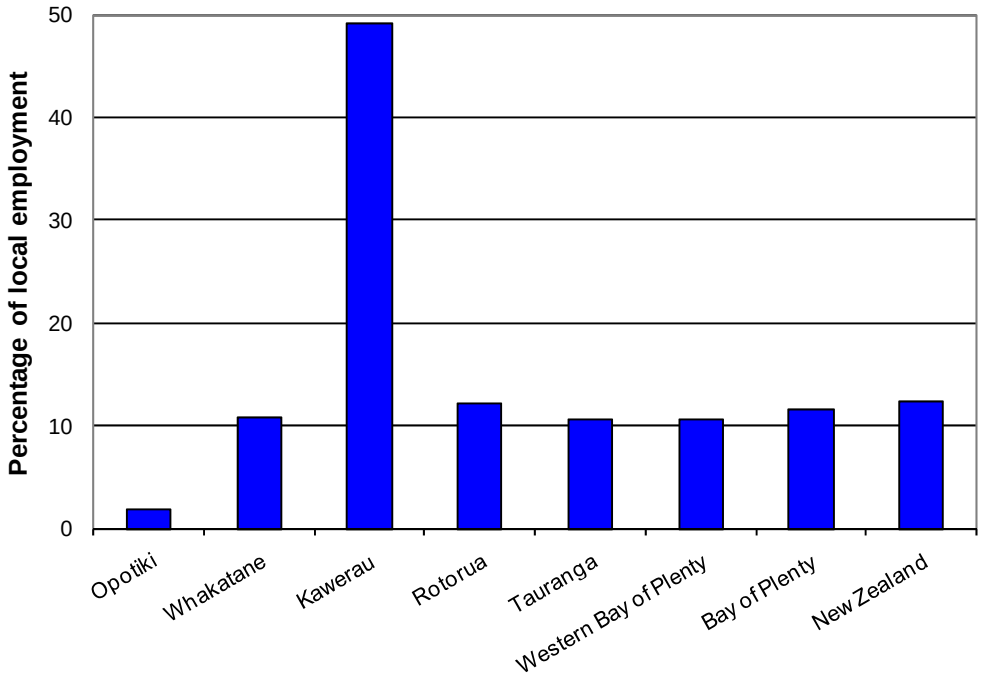


Figure 4.7 Processing and manufacturing employment 2009

Figure 4.7 shows the percentage of local employment in the manufacturing and processing sectors for each of the TLA's. Again, the scale of this graph is higher than for many of the earlier figures because the importance of manufacturing to the Kawerau district. Employment in this sector amounts to almost 50% of all FTE's in the district, reflecting its role as a major New Zealand wood product and timber processing town. The only other TLA in New Zealand with a processing and manufacturing employment share near this is South Taranaki, home to the very large Fonterra plant, where 31% of the TLA's FTEs are employed in processing and manufacturing.

Fourteen of the TLA's in New Zealand with employment levels of up to 20,000 FTE's have employment in processing of 20% to 30%, which seems to typify TLA's in pastoral areas. It is therefore a little surprising that the shares in none of the TLA's apart from Kawerau are higher than the 12% in Rotorua. In part, this reflects the nature of much of the agricultural production, in particular in horticulture which is exported as fresh product, with limited need for processing and other value added activities. It also reflects the dominance of Kawerau as a timber processing centre receiving product from the surrounding areas.

There is also the potential for the development of industries using the waste from timber processing to create biofuels, and the availability this waste, renewable energy and heavy engineering skills in the Kawerau area would probably provide a particular focus for this. This would need to be supported by good transport links required for the movements of the raw materials if they are sourced at a distance and of the finished products and also to allow the increased workforce necessary to support these activities to be drawn from a wide area.

The very low processing component in Opotiki may also change if the aquaculture processing is located there. However, while plans for this processing are not yet finalised, there is a strong likelihood that this will be undertaken in Tauranga, where there is already a nucleus of activity in this sector.

4.2.7 Other industries supporting the primary sectors in the region

The discussion above has considered to some extent the strength of other sectors in supporting the primary industry in the region.

4.2.8 Conclusions

Given the distribution of population and economic activities, the pattern of spatial connectedness and the settlement hierarchy in the Bay of Plenty region, a wide range of transport linkages are needed to support the requirements and aspirations of the population and economic activity in the area. For the movements of people, these comprise a combination of linkages between rural areas and the urban areas, serving them for a range of relatively low level requirements to linkages between the main areas for more sophisticated requirements and between the region and external centres such as Auckland and Wellington and international destinations for the highest level of services. For the movements of freight, of which the volumes generated are substantial, there is the need for reliable and effective linkages between the point of production or import and the point of consumption or export. The Port of Tauranga as an important link between the region's producers and international markets plays a key role in this.

At a summarised level, the patterns of transport linkages required for the movement of people for different types of services is set out in Table 4.1.

Table 4.1 Transport linkages required for movements of people for service activities

	To local urban area	To major regional centres in BOP	Inter-regional (including international)
Health	XXX	XX	X
Education	XXX	X	X
Business services (including retail)			
First and second tier	X	XXX	XX
Third tier		X	XXX
Tourism (mainly external visitors)		X	XXX

Notes. The higher the number of X's the greater the importance of the transport linkage

The primary production employment intensity in the Bay of Plenty as a whole is high in relation to the national average and in the western Bay of Plenty and Opotiki districts is among the highest in the country. Primary industries, which in the Bay of Plenty include the production of logs kiwifruit, aggregates and milk, typically have a high volume of output per employee, so the primary industry generates a high freight task for the transport system. The freight demands generated by the production of these primary commodities are discussed below in Section 5.

In the Bay of Plenty, the output of the kiwifruit industry is particularly demanding in terms of timeliness, requiring access to export in an unprocessed fresh state and the methods of export in shiploads place particular demands on the transport network when the vessels are being loaded This contrasts with most other primary production regions, where the primary product (milk, livestock or logs) requires timely access to an in-region processing plant and thereafter is a largely non-perishable commodity for export at leisure, or as in the case of chilled meat is exported in small units in containers, rather than by the complete ship load.

The processing and manufacturing in Bay of Plenty is over-shadowed by the wood processing in Kawerau. This capacity itself relies on road and rail transport for logs, processed and manufactured product. Other primary processing plants in the dairy and meat industries also generate significant internal freight, though probably are less demanding of transport than the fresh horticulture products.

There is likely to be a requirement for increased capacity and resilience for the surface access from Opotiki to Tauranga if and when the substantial aquaculture scheme in the Eastern Bay of Plenty comes into production or if Tauranga is the port of export for the timber currently growing in the east of the region and in parts of Gisborne. A further key piece of transport infrastructure for the aquaculture scheme is the development of landing facilities at Opotiki which may be extendable to act as a small local port.

Part 5: Understanding the current position: identifying key transport flows and connections

5.1 Introduction

The importance of transport connections between the major centres in the Bay of Plenty is in part a reflection of their use for the movement of passengers and for the movement of freight.

Information on some of the journeys undertaken by passengers in the form of their journeys to work is available from Census data, which not only indicates the numbers moving but also gives indications of their educational attainment and their personal incomes. It should be noted that much of the most recent information is derived from the 2006 Census and is now quite old. Where possible, we have attempted to supplement this data with more recent information derived from other sources such as traffic counts.

Traffic count information is available for total vehicle movements. While this does not give a breakdown by trip purposes or by the origins and destinations of the trips, it does give an indication of total flows at particular points on the road network and the ways in which these have been changing and thus helps in building up the general pattern of movements within the region and between the Bay of Plenty region and surrounding areas.

Detailed information on freight movements within the Bay of Plenty region is less comprehensive, since the main source of information on this is only available at a regional level. However, some of the key flows can be highlighted and as in the case of passengers, information from traffic counts can be used to assist in understanding the position at a more detailed level.

5.2 The Transport network

The key transport feature in the region is possibly the Port of Tauranga, the largest port in New Zealand in terms of the volumes handled. Tauranga is particularly important as an export port handling 26% of total New Zealand exports by volume in 2009 and acts as a key link between the region's producers and overseas markets particularly in Asia and America. It is also an important import port for a range of bulk products and also containers, the majority of which are bound for the Auckland area.

The port is supported by the east coast main trunk rail line providing a connection with Hamilton and to the main route between Auckland and Wellington. The Port of Tauranga is also served by a rail line from further east, particularly providing connections for logs and timber products from Kawerau and Murupara.

The key road connections in the region are State Highway 2 which provides a link to Auckland via the Karangahake Gorge and State Highway 29 over the Kaimai Ranges which provides the link to Hamilton and an alternative link to Auckland. Tauranga is linked to areas further east in the region by State Highway 2, part of which is to be upgraded to the Tauranga Eastern Link and the connection to Rotorua is provided by State Highway 30/State Highway 33 or alternatively State Highway 36 via Pyes Pa.

A significant issue affecting the road transport network is the connection between Tauranga and Auckland, for which there are two alternative routes, both of which have significant constraints particularly for heavy traffic. In general, however, the transport network provided by the links within and to the region is regarded as acceptable. Tauranga has benefited recently from considerable investment in new roading capacity, aligned with the Smart Growth initiative. As indicated above, the planned construction of the Tauranga Eastern Link, one of the Government's RoNS will provide an upgraded route and help relieve congestion to the east of Tauranga and provide better connections with Te Puke, Rotorua and Whakatane. Further east there are concerns with the resilience of the road network, especially given the potential for wash-outs and other closures and the limited alternative network in the area. Projected traffic growth along State Highway 30 (Te Ngae Road) in Rotorua due to population growth, freight traffic and tourism is also identified as an issue.

The region also contains three regional airports at Tauranga, Whakatane and Rotorua. A limited range of international flights is offered from Rotorua, providing connections with the east coast of Australia, but the main international gateway is Auckland airport. There are frequent flight connections between Tauranga and Auckland currently operating at seven per day in each direction. The numbers of passengers are estimated from the SABRE database used by travel agents to be up to about 135,000 per year, although confidential information from the operator Air New Zealand suggests that these may be high. The passengers on these flights comprise a broadly equal share of those terminating or starting their journeys in Auckland itself and those transiting Auckland airport for other domestic or international destinations. The frequent flights between Tauranga and Auckland combined with the large number of international destinations served from Auckland, mean that Tauranga has reasonable international accessibility and for outbound flights luggage can be checked through directly to its international destination.

5.3 Commuting flows

5.3.1 Commuting in 2006

The commuting patterns in the Bay of Plenty region in 2006 as recorded in the census of that year are set out in Table 5.1.

Table 5.4 Commuting patterns in the Bay of Plenty 2006

	Workplace										
Residence of Workers	**WBOP**	**TGA**	**ROT**	**WHK**	**KEU**	**OP**	**Total BOP**	**HN**	**Other Waikato**	**Auckland region**	**Total defined**
Western Bay	**10,551**	**5,286**	**234**	**129**	**30**	**6**	**16,236**	69	621	144	17,316
Tauranga	**2,091**	**37,554**	**348**	**219**	**60**	**12**	**40,284**	174	435	438	41,841
Rotorua	**105**	**267**	**24,543**	**150**	**198**	**12**	**25,275**	78	582	186	26,577
Whakatane	**69**	**123**	**243**	**10,005**	**1,176**	**168**	**11,784**	27	63	105	12,156
Kawerau	**21**	**24**	**57**	**360**	**1,473**	**6**	**1,941**	6	12	18	2,010
Opotiki	**9**	**9**	**18**	**195**	**24**	**2,343**	**2,598**	6	6	21	2,670
Total BOP	**12,846**	**43,263**	**25,443**	**11,058**	**2,961**	**2,547**	**98,118**	360	1719	912	102,570
Hamilton	24	90	81	15	6	9	225	46,890	4659	672	53,118
Other Waikato	249	261	486	39	39	21	1,095	12,693	75,132	1,761	91,920
Other	117	294	174	93	30	24	732	366	1005	4701	884,826
Auckland region	57	219	150	66	12	21	525	507	813	528,870	534,849
Total	13,293	44,127	26,334	11,271	3,048	2,622	100,695	60,816	83,328	536,916	1,667,283

Source : Statistics NZ

The commuting flows in 2006 display a range of patterns in terms of the extent to which areas are self-contained or attract or generate commuters from elsewhere. At one extreme, Rotorua, Whakatane, and Opotiki are relatively self-contained with 93%, 89%, and 89% of the workforce living in the area and with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting

from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga.

Tauranga itself has about 85% of its workforce living in the city with much of the balance (12%) travelling in from western Bay of Plenty. Of the balance, the rest of the Bay of Plenty region including Rotorua, contributes about 1%, Waikato region about 0.8% and Auckland region about 0.4%.

The detailed position for Tauranga in 2006 is illustrated in Figure 5.1 below.

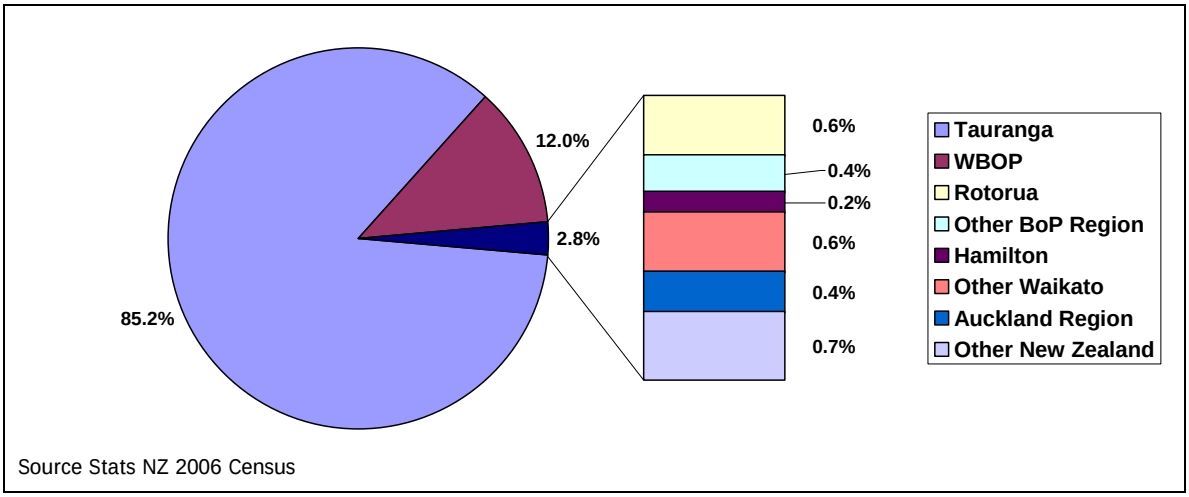


Figure 5.1 Sources of workers employed in Tauranga 2006

For western Bay of Plenty, a similar position holds with 79% of jobs being filled by local residents and 16% being filled by residents of Tauranga. This can be compared to the position for Rotorua which is set out in Figure 5.2. As discussed, this displays a much more self-contained pattern of commuting flows.

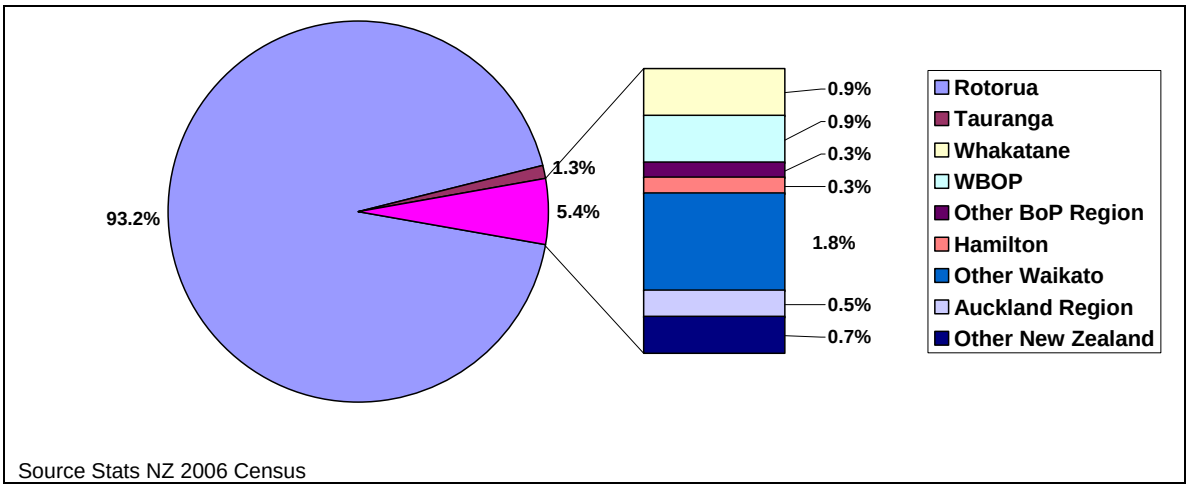


Figure 5.2 Sources of workers employed in Rotorua 2006

The level of commuting from outside the region is fairly small, with only about 2.6% of the total jobs in the region filled by workers from outside. While in all cases the share of outside workers is small, that of Tauranga is about the lowest with only 2%. This compares with about 3.5% for western Bay of Plenty and Rotorua, where access from the neighbouring areas outside the region is probably easier and about 3% for Kawerau and Opotiki.

5.3.2 Changes in commuting patterns from 1996 to 2006

With the growth in employment in the Bay of Plenty region, there have been changes in the patterns of commuting over the period from 1996 to 2006 and these are set out in Table 5.2.

Table 5.2 Growth in commuting in the Bay of Plenty region 1996-2006

Residence of Workers	Workplace										
	Western BOP	**TGA city**	**ROT**	**WHK**	**KEU**	**OPO**	**Total BOP**	HN	Other Waikato	AK region	Total defined
Western Bay of Plenty	**1,413**	**1,893**	**93**	**75**	**15**	**3**	**3,492**	39	108	75	3,780
Tauranga	**456**	**11,841**	**201**	**165**	**18**	**0**	**12,681**	93	270	252	13,428
Rotorua	**39**	**186**	**951**	**42**	**57**	**6**	**1,281**	30	138	78	1,767
Whakatane	**24**	**84**	**90**	**609**	**159**	**93**	**1,059**	18	27	57	1,197
Kawerau	**18**	**15**	**18**	**120**	**-369**	**3**	**-195**	3	6	-3	-171
Opotiki	**6**	**-6**	**6**	**87**	**12**	**117**	**222**	3	3	9	213
Total BOP	**1,956**	**14,013**	**1,359**	**1,098**	**-108**	**222**	**18,540**	186	552	468	20,214
Hamilton	-6	-9	-15	-3	-3	3	-33	6,381	1,128	129	7,890
Other Waikato	129	123	159	21	27	12	471	3,930	648	771	6,339
Auckland region	18	120	57	39	6	3	243	282	387	98,304	100,860
Other	45	201	51	42	15	3	357	183	333	1,956	75,963
Total	2,142	14,448	1,611	1,197	-63	243	19,578	10,962	3,048	101,628	211,266

Source Statistics NZ and Consultants Analysis

Within the region, total employment as derived from the Journey to Work data in the Census has increased by about 19,500 or by about 24% in total. Of this, 74% has been accounted for by growth in Tauranga City and a further 11% from western Bay of Plenty. Of the increase in Tauranga, much of the growth has been filled either by workers living in the city (82% of the total growth) or by workers from western Bay of Plenty (13%).

The position is somewhat different for other areas within the region as can be seen in Table 5.3. For these, a relatively high share of the increase in employment has been met by increased commuting from other areas, although these are typically the

neighbouring districts. For Kawerau, the level of employment has fallen but there has been a much greater fall in commuting within the district and again commuting from outside the area has grown.

Table 5.3 Total growth in employment in Bay of Plenty 1996-2006 and contribution of internal commuting

Workplace	Total growth in employment 1996-2006	Total met from within area	Percentage met from within area
Western Bay of Plenty	2142	1413	66%
Tauranga	14448	11841	82%
Rotorua	1611	951	59%
Whakatane	1197	609	51%
Kawerau	-63	-369	(1)
Opotiki	243	117	48%

Notes (1) The decline from within the area is greater than the total decline

The changes in commuting patterns by area are also summarised in Figure 5.3.

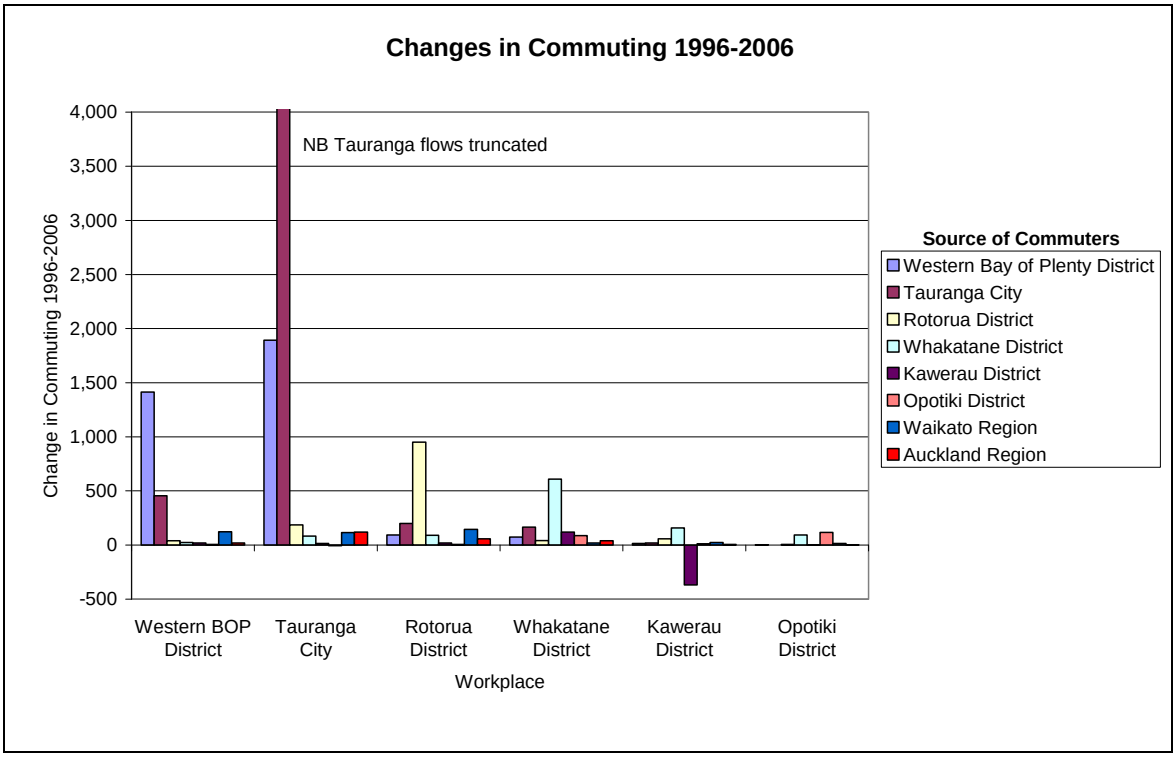


Figure 5.3 Changes in commuting patterns in Bay of Plenty districts 1996-2006

There have been very substantial increases in employment over the period from 1996-2006 in Tauranga and to a lesser extent in western Bay of Plenty, but these have typically been supported by an increased local workforce. For Tauranga,

commuters from within the city account for 82% of the growth in employment, with increased flows from the adjacent western Bay of Plenty a further 13%. The reliance on workers from outside these two areas is therefore relatively small although this has grown slightly from 1996.

For the smaller areas where growth has been much more limited, the picture is more mixed with higher proportions commuting from outside the areas. For both Rotorua and Whakatane however, the majority of the growth in commuting has been met from workers within the area, and in Opotiki, where the major settlement is very close to the boundary of the area, almost all the growth is from the area itself or the neighbouring district.

5.3.3 Key city to city movements

From the data set out above, it is possible to identify some of the key area to area commuting movements within the Bay of Plenty region and these are set out in 5.4.

Table 5.4 Key commuting flows between city or district pairs within the Bay of Plenty region 2006

Route	Inbound flow	Outbound flow	Total
WBOP-Tauranga	5286	2091	7377
Whakatane-Kawerau	1176	360	1536
Tauranga-Rotorua	348	267	615
Whakatane-Rotorua	243	150	393
WBOP-Rotorua	234	105	339
Tauranga-Whakatane	219	123	342
Opotiki-Whakatane	195	168	363

The biggest flows are between western Bay of Plenty and Tauranga reflecting to a large extent the function of parts of western Bay of Plenty as an extension of the residential areas of Tauranga, although there are a number of more free-standing areas further afield for example in Katikati and Te Puke. The next largest flows are between Whakatane district and Kawerau, although again these are adjoining areas. Flows between Tauranga and Rotorua amount to about 600 per day out of a combined employment in the two areas of about 70,000 and so represent a very small proportion of the total workforce. The level of longer distance interaction within the Bay of Plenty region is low and to large extent, the different cities and districts are largely self-contained.

The flows to and from the major centres outside the region are set out in Table 5.5.

Table 5.5 Key commuting flows between city or district pairs with one end outside the Bay of Plenty region 2006

Route	Inbound flow	Outbound flow	Total
WBOP-Hauraki	432	183	615
Tauranga-Auckland	363	174	537
Rotorua-Taupo	246	210	456
Rotorua-South Waikato	234	168	402
Rotorua-Auckland	165	135	300
Tauranga-Hamilton	174	90	264
Rotorua-Hamilton	76	81	157

While there are some relatively large longer distance flows particularly involving journeys to and from Auckland, in general the larger inter-regional flows are experienced by adjoining districts.

5.3.4 Changes from 2006

It is recognised that the patterns of commuting traffic are evolving over time. While detailed information is only available at five year intervals with the most recent reflecting the position in 2006, we have reviewed alternative sources of information to attempt to identify any significant trends in later years. The best source of readily available information is probably in the traffic counts conducted by NZTA on the state highway network, although it is recognised that these represent all day and movements for all purposes rather than just commuting flows. A summary of the changes in the observed flows between 2006 and 2009 is set out in Table 5.6Table . In general, while the information in the table is based on the continuous Telemetry data, this has been supplemented by short term counts where appropriate and these are set out in italics.

Table 5.6 Growth in traffic on the road network in Bay of Plenty 2006-2009

Site	AADT 2006	AADT 2009	Total growth 2006-2009
SH2 Te Puna	15730	15995	1.7%
SH2 Te Puke	18196	19273	5.9%
SH2 Ohinepanea	4725	4792	1.4%
SH2 Paerata Ridge Road before Opotiki	*3923*	*3947*	*0.6%*
SH5 Tarukenga	5376	5226	-2.8%
SH29 Kaimai	8735	9164	4.9%
SH30 Te Ngae	36441	34252	-6.0%
SH30 (Junction with SH33)	*9930*	*10504*	*5.8%*
SH30 Lake Rotoma	2999	2928	-2.4%
SH33 Paengaroa	4085	5100	24.8%
SH33 Okawa Bay Road	*5750*	*5900*	*2.6%*
SH36 Te Matai Road	*2320*	*2317*	*0.0%*

The patterns of change are quite mixed. In general, with the exception of the count at Paengaroa, the changes are all fairly small, with slow growth in the east and somewhat higher growth in the west. While growth at Paengaroa has been rapid, examination of the counts at neighbouring locations where growth has been much slower, suggests that this high growth may be due to particular local factors rather than growth in longer distance flows. This would therefore suggest that there have been no major changes in commuting patterns since 2006 and the general conclusions reached about the patterns observed in that year continue to apply.

5.4 Business travel

There is some limited information on business travellers by car from the transport models developed by the Auckland and Waikato regional councils, although this is primarily focussed on movements within these regions. From the Auckland transport model, the numbers of car based business trips between the Auckland region and the main centres in the Bay of Plenty are set out in Table 5.7.

Table 5.7 Car based business trips from Auckland to Bay of Plenty 2006

Destination in Bay of Plenty	Number of trips per day	Trips per Bay of Plenty employee	Per cent of total road based business trips from Auckland
Tauranga	96	0.2	15%
Rotorua	15	0.1	2%
Opotiki	7	0.3	1%
Whakatane	11	0.1	2%
WBOP	6	0.0	1%
Total	**134**	**0.1**	**21%**

This suggests that there is a limited degree of interaction with the Auckland region, with Tauranga having a slightly higher rate per employee. For Tauranga and possibly other locations, it should be noted that the scale of business travel may be underestimated because of the use of air transport for a proportion of the trips between the two regions. This issue is currently being investigated.

Movements to and from the Bay of Plenty from the Waikato region are estimated at about 1400 per day but there is no breakdown available of the distribution of these trips within Bay of Plenty. Although potentially there would be greater interaction between the Waikato and Bay of Plenty regions because of their greater proximity, the very substantial difference between the two totals may reflect differences in the way in which the data has been collected and the numbers estimated.

5.5 Freight movements

5.5.1 Introduction

Freight movements in the Bay of Plenty are heavily influenced by movements through the Port of Tauranga, which as well as acting as a gateway for movements to and from the Bay of Plenty also supports substantial movements to and other regions in the upper North Island. Total freight movements impacting on the Bay of Plenty in 2006-07 were estimated to amount to about 32 m tonnes with traffic through the port of Tauranga amounting to about 12.5 m tonnes or about 40% of the total. Flows to and from the port in Tauranga from outside the Bay of Plenty in 2006-07 are estimated at about 5-6 m tonnes or almost half of the throughput.

Although there are substantial volumes of freight on the road and rail networks, this comprises a mixture of long distance freight primarily and from the database in the National Freight Demands Study (NFDS) and Bay of Plenty Freight Study (BOPFS) there is relatively little information available on the detailed patterns of movements within the region. Some information on total heavy vehicle flows is available from the road traffic counts undertaken by NZTA at a number of sites on the highway network.

The key flows within the region identified in the Bay of Plenty Freight Study within the region itself are milk and dairy products, logs and timber products, and aggregates, which with the exception of some logs and timber products are mainly transported by road. It should be noted that the figures in the Bay of Plenty Freight Study are derived from those from the more comprehensive National Freight Demand Study and are for 2006-07. There have however, been some changes since that date. In particular, there has been substantial growth in log exports and continued growth in kiwifruit exports, whereas volumes of aggregates have fallen in the economic downturn.

To analyse the patterns of freight movements within the region, the flows have been divided into those which are wholly within the region, those between the region and upper North Island regions and those which are between Bay of Plenty and the rest of New Zealand. The volumes of these are set out in table 5.8.

Table 5.8 Freight traffic impacting on Bay of Plenty region in 2006-07 - total flows (million tonnes)

Type of flow	**Tonnes (millions)**	**Percent of total**
Internal	17.4	55%
Movements to and from other upper North Island (UNI) regions	11.2	35%
Movements to and from other regions	3.2	10%
Total	31.8 (1)	**100%**

5.5.2 Internal freight movements

The overall pattern of freight movements within the region in 2006-07 is set out in Figure 5.4.

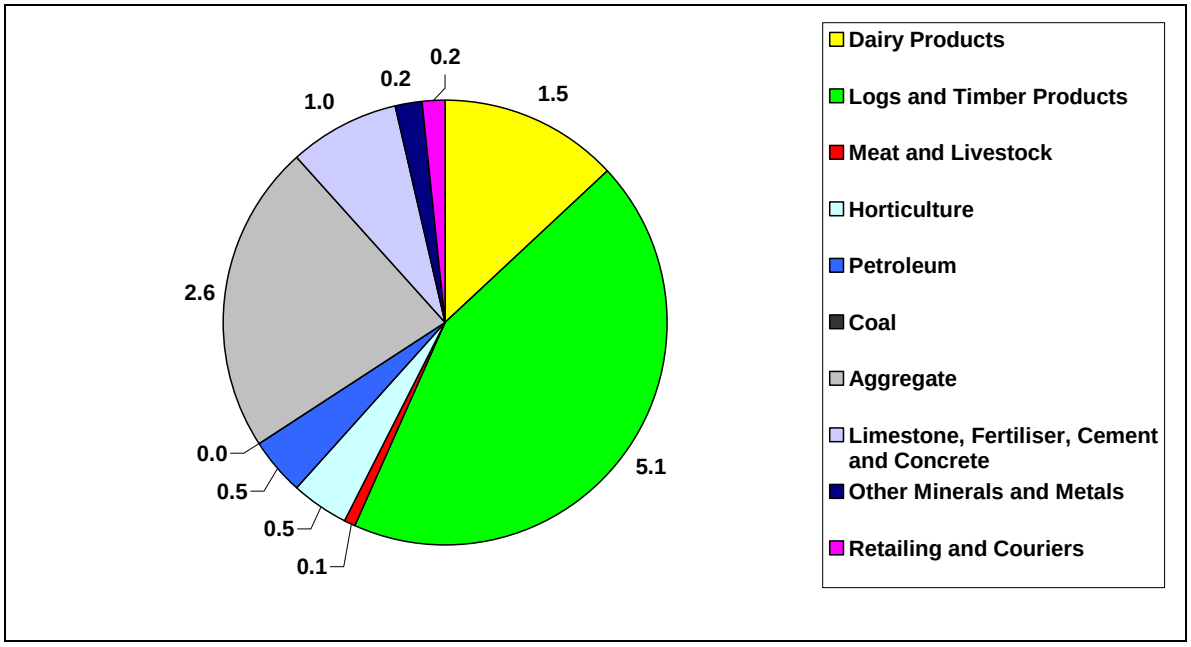


Figure 5.4 Internal freight flows within the Bay of Plenty 2006-07 - identified commodities only (million tonnes)

The flows are dominated by the movements of logs and timber products, milk and dairy products, both of which are focussed on export markets and aggregates and limestone and other building materials which are primarily focussed on domestic markets.

Liquid milk is moved from the farms to the main dairy factory within the region at Edgecumbe, from which finished product is moved mainly for export through the port of Tauranga. Other milk is moved to processing plants in the Waikato, primarily at Reporoa and at Matamata.

Logs are moved from a variety of locations either for processing in the plants mainly focussed round Kawerau and Rotorua or for export as logs again through Tauranga. The volumes of this traffic have fluctuated substantially are currently at a high level.

There is also substantial movement of kiwifruit from the farms to the pack houses and then from the pack houses to the port.

Typically, movements within the region are a shorter distance and so tend to be largely carried by road. There is however, a substantial movement of logs and timber products into the port by rail from Kawerau and this traffic has been growing.

5.5.3 Connections with the upper North Island

As well as serving the Bay of Plenty, the port also serves much of the upper North Island and is particularly important for the movement of export commodities from Waikato, including logs and timber products and dairy products. The pattern of movement between Bay of Plenty and the other upper North Island regions is set out in Figure 5.5.

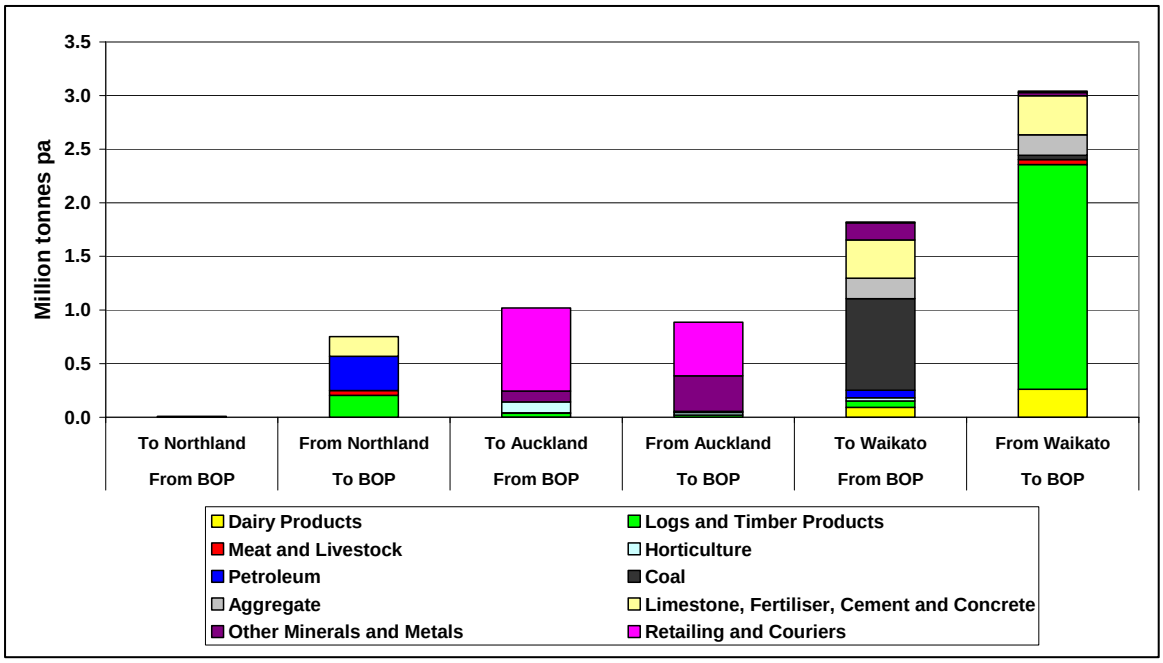


*Figure 5.2 Freight flows between Bay of Plenty and other upper North Island regions 2006-07 (million tonnes)**

There are fairly small flows of bulk materials from Northland (petroleum, cement and some timber products) which primarily feed into the local economy. The petroleum and cement are transported by sea from plants based on the coast round Whangarei.

For Auckland, the traffic is dominated in both directions by manufactured goods which primarily travel through the Port of Tauranga. These include the export of steel from the steel mill at Glenbrook as well as goods to and from the main Auckland markets.

For the Waikato, there are substantial movements to the Bay of Plenty region of a range of basic products, primarily for export through Tauranga. These include logs, some of which are processed in the Bay of Plenty, particularly at Kawerau, other timber products, dairy products, and limestone. In the reverse direction, the flows are dominated by movements of coal for local consumption in the power station at Huntly and by movements of cement and petroleum to a large extent originally sourced from Northland.

5.5.4 Other external flows

The movements of freight to and from the lower North Island and the South Island in 2006-07 are set out in Table 5.9 and Figure 5.6. Movements to or from the neighbouring regions comprise a large part of the total and as Figure 5.6 indicates these flows largely consist of logs and timber products, moving between forests and processing plants and the movement of petroleum inbound from Tauranga. The flows to the more distant regions are small.

Table 5.9 Freight flows between Bay of Plenty and external regions 2006-07. All commodities (million tonnes)

Origin-destination elsewhere in New Zealand	Million tonnes
Gisborne/Hawkes Bay	1.0
Taranaki/Manawatu-Wanganui	1.5
Wellington	0.4
Canterbury	0.3
Other South Island	0.1
Total	3.2
Total for UNI regions	*11.2*

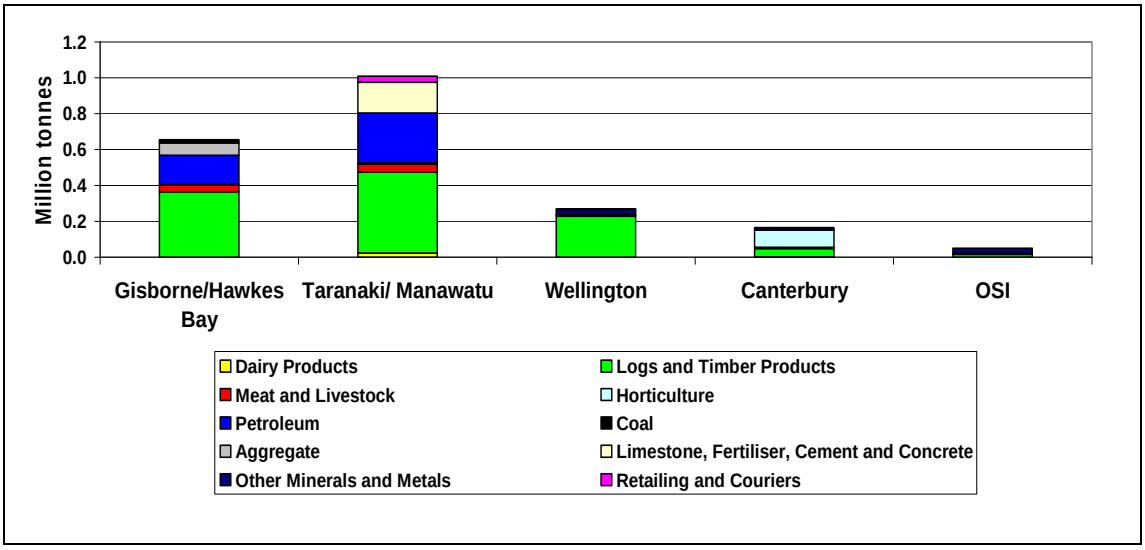


Figure 5.6 Freight movements between Bay of Plenty and regions outside the upper North Island - selected commodities 2006-07 (million tonnes)

5.5.5 Movements through the Port of Tauranga

The volume of traffic through the Port of Tauranga over recent years is set out in Table 5.10 and Figure 5.7.

Table 5.10 Changes in International imports and exports through Port of Tauranga 2002-2009 (million tonnes)

Year	Imports	Exports	Total
2002	3.06	8.34	11.40
2003	3.16	8.94	12.10
2004	4.35	7.89	12.24
2005	5.30	7.32	12.62
2006	4.93	7.35	12.28
2007	4.98	7.66	12.65
2008	5.60	7.92	13.52
2009	4.98	8.48	13.46

Source : Port of Tauranga, Port Trade and Statistic Information, August 2009

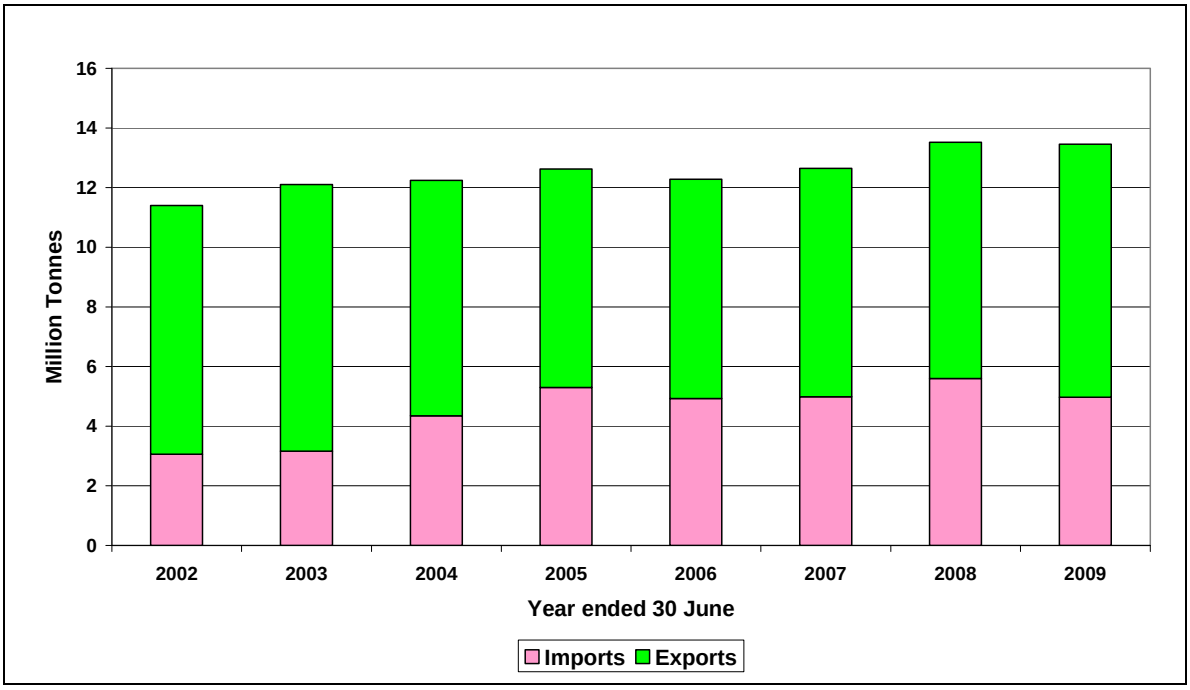


Figure 5.7 International traffic through the Port of Tauranga (million tonnes)

The breakdown of traffic by commodity is set out in Table 5.11.

Table 5.11 Exports and imports through the Port of Tauranga by commodity 2003-2009 (million tonnes)

Commodity	2003	2004	2005	2006	2007	2008	2009
Exports							
Logs	3.89	2.88	2.30	2.22	2.34	2.45	3.09
Other forest products	2.37	2.12	2.12	1.94	1.97	2.11	2.00
Dairy products	0.76	0.82	0.78	0.84	0.78	0.46	0.58
Meat	0.18	0.21	0.23	0.31	0.38	0.32	0.38
Kiwifruit	0.51	0.60	0.65	0.66	0.62	0.78	0.75
Other horticultural	0.09	0.09	0.08	0.12	0.09	0.11	0.09
All other	1.14	1.17	1.17	1.24	1.48	1.68	1.58
Total	**8.94**	**7.89**	**7.32**	**7.34**	**7.66**	**7.92**	**8.46**
Imports							
Oil products	0.85	0.97	1.12	1.08	1.15	1.17	1.10
Cement	0.12	0.12	0.15	0.17	0.16	0.16	0.14
Fertilisers	0.48	0.52	0.61	0.45	0.58	0.53	0.41
Chemicals salt and bulk liquids	0.29	0.36	0.31	0.29	0.30	0.36	0.34
Grain	0.22	0.21	0.23	0.26	0.24	0.28	0.24
Palm Kernel	0.00	0.00	0.00	0.00	0.15	0.46	0.43
Coal	0.04	0.66	0.88	1.13	0.93	0.39	0.66
Other goods	1.20	1.61	2.08	1.66	1.56	2.31	1.72
Total	**3.20**	**4.45**	**5.38**	**5.05**	**5.06**	**5.68**	**5.05**
Total Imports plus exports	12.13	12.34	12.70	12.39	12.73	13.60	13.51
Total TEUs (000s) (1)	349.8	394.4	438.2	423.1	466.2	582.1	546.5

Note (1) - TEU = twenty foot equivalent units a standard measure used to combine containers of different sizes

The volumes of both imports and exports have fluctuated over the period. This reflects:

- Changes in both the volumes of commodities harvested or produced, particularly for logs and timber which accounts for 60% of exports and which have been affected by the costs and availability of shipping services to the main markets and changes in the level of demand in these.
- Demand for imports of basic commodities such as coal.
- Growth of imports of palm kernels from nothing in 2006 to 0.4-0.5 m tonnes in 2008 and 2009.
- Changes in the patterns of shipping services, particularly affecting the balance between the ports of Auckland and Tauranga and which has affected the volumes of dairy products and other containerised cargo through the port.
- The effects of the economic downturn particularly for manufactured goods reflected in the reduction of TEU's in 2009 and also for fertiliser bases.

It should be noted that the numbers of TEU's handled includes transhipment containers, estimated at 129,000 in 2008, and empty containers, estimated at about 130,000 in 2008.[7] The breakdown of traffic by commodity in 2009 for exports and imports is set out in Figure 8 and Figure 5.9.

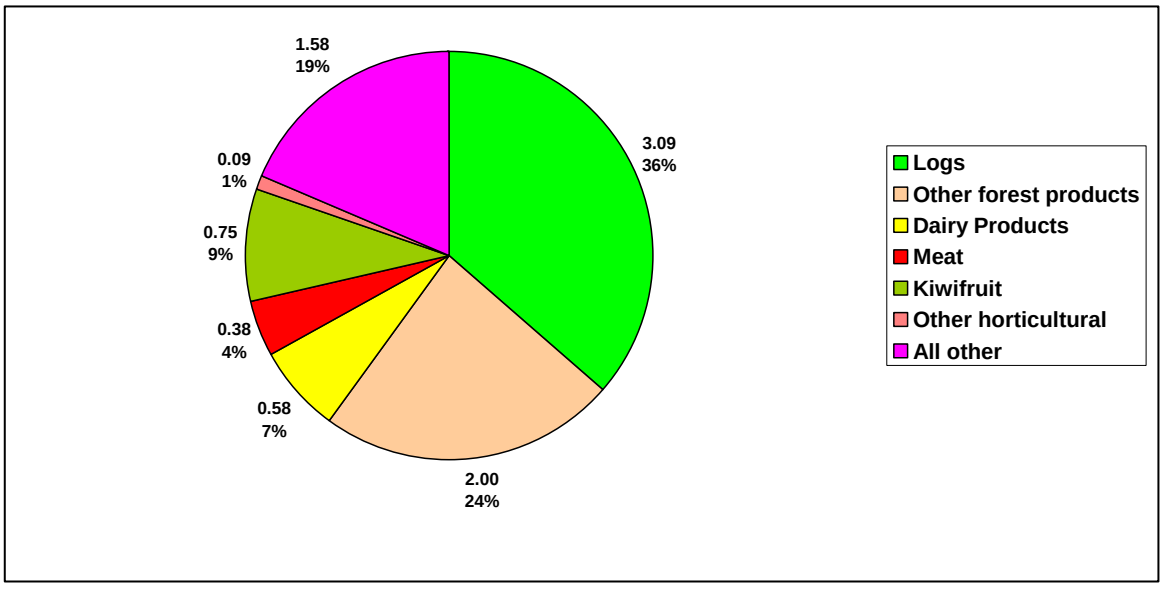


Figure 5.8 Breakdown of Port of Tauranga exports by commodity 2009 (million tonnes)

[7] Rockpoint Corporate Finance in association with Richard Paling Consulting and IPC & Associates, 2009, "Coastal Shipping and Mode Freight Choice".

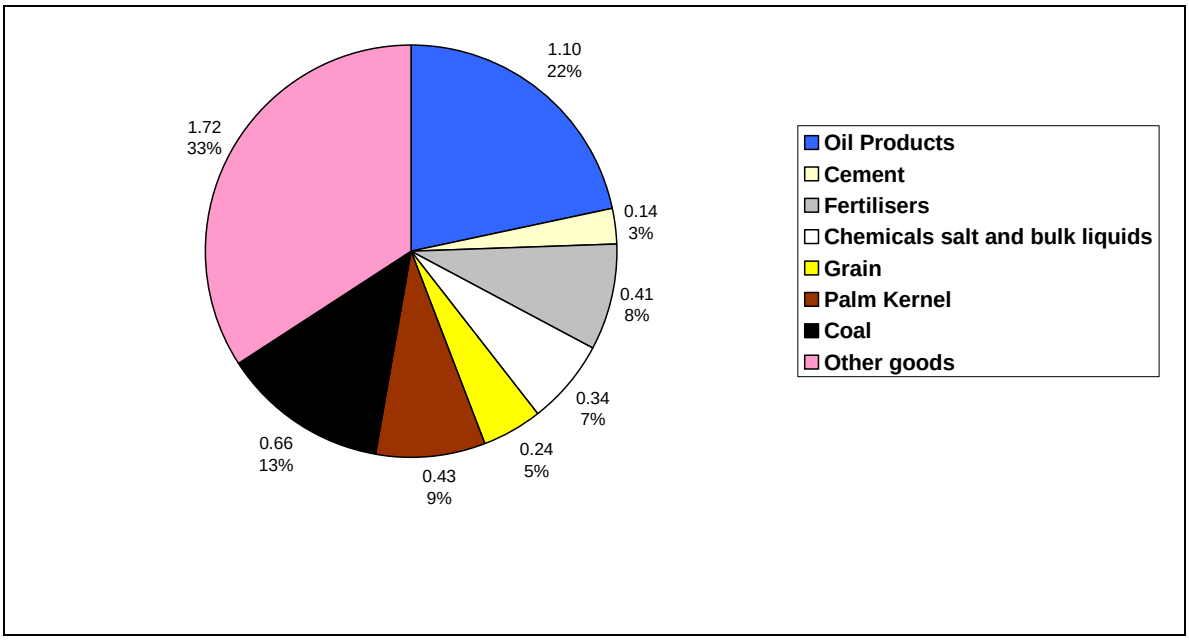


Figure 5.9 Breakdown of Port of Tauranga imports by commodity 2009 (million tonnes)

In both directions, the volume of trade is dominated by basic products although there are substantial movements of “other goods" which include imported and exported manufactured goods. For exports, the basic products include logs and timber products, dairy products meat and horticultural products. Imports are dominated by oil products, coal, agricultural inputs of fertilisers and palm kernel, although there are substantial volumes of “other goods” which make up about a third of the total.

A significant proportion of the container traffic is handled by the Metroport inland port in Auckland and transferred to and from Tauranga by rail. The volumes of containers handled in this way are set out in Table 12.

Table 5.12 Container volumes through Metroport 2003-2009 (TEU’s)

Year	Containers handled at Metroport
2003	82,500
2004	132,000
2005	134,000
2006	119,147
2007	138,200
2008	170,000
2009	140,000 (1)

Notes (1) Consultants estimates

As in the case of the overall shipping totals, the volumes handled through Metroport have generally been growing but have fluctuated from year to year. This reflects both changes in shipping patterns and also most recently the general economic downturn which has had a particular impact on the volumes of manufactured goods imported or exported to and from the Auckland region which represent a high proportion of Metroport traffic.

5.5.6 Road traffic flows

Information is available on the movement of heavy vehicles on the state highway network within the bay are set out in Table 5.13 and in Figure 5.10.

Table 5.13 Heavy vehicle flows on state highways in Bay of Plenty 2002-2009 AADT

SH	Count location	2002	2003	2004	2005	2006	2007	2008	2009
SH2	Te Puna	974	1180	1072	1089	1038	1189	1167	1131
SH2	Te Puke	1719	1601	1480	1458	1510	1521	1918	1792
SH2	Ohinepanea	660	684	659	717	605	631	704	726
SH5	Tarukenga	506	724	583	606	543	567	573	556
SH5	Waipa	703	1016	671	753	724	742	794	798
SH29	Kaimai	468	1039	1072	969	1022	1141	1284	1144
SH30	Te Ngae	1368	2111	1718	1857	1676	1799	1812	1992
SH30	Lake Rotoma	288	325	300	281	282	304	329	331
SH33	Paengaroa	609	741	605	464	470	507	560	577
Average flow all sites		**811**	**1047**	**907**	**910**	**875**	**933**	**1016**	**1005**

Source: Transit/NZTA Traffic Counts

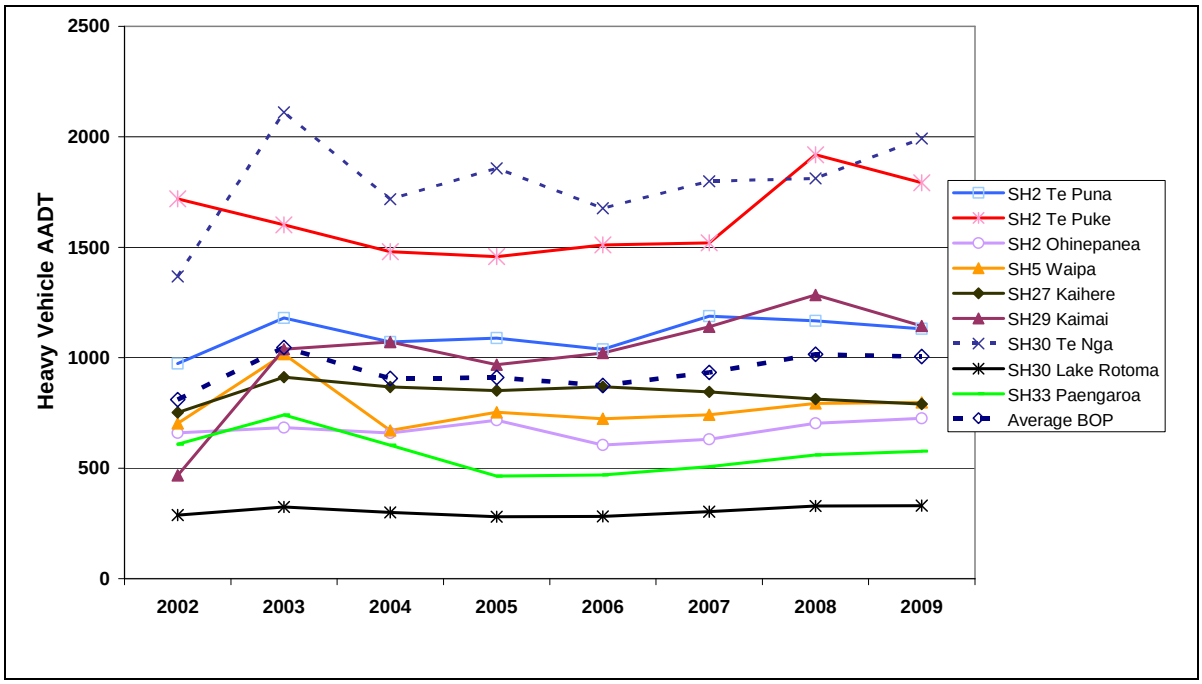


Figure 5.10 Heavy Vehicle flows on state highways in Bay of Plenty region 2002-2009 (AADT)

As the analysis earlier in this section has indicated, much of the freight within and to and from the Bay of Plenty region is composed of basic commodities, in particular logs and timber and milk and dairy products. Although the period from 2003-2008 was one of economic growth, movements of these bulk commodities were very much affected by other factors. These included the weather (where drought conditions can have a significant impact on the production and movement of liquid milk) and the availability of shipping capacity which has had an impact on the trade in logs and hence on the volumes harvested. As a result, with the possible exception of the flows through Te Puke possibly reflecting growth in the kiwifruit harvest, heavy vehicle movements on the individual components of the state highway network in the Bay of Plenty and on the network as a whole typically increased only very modestly.

5.5.7 Summary of transport movements

The commuting flows in 2006 display a range of patterns. At one extreme Rotorua, Whakatane, and Opotiki are relatively self-contained (with 93%, 89%, and 89% of the workforce living in the area) with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga.

Tauranga has about 85% of its workforce living in the city with much of the balance (12%) travelling in from western Bay of Plenty.

The movements of freight reflect a number of useful and important observations including:

- The importance of Bay of Plenty as a major producer of a range of basic commodities, often focussed on supplying export markets. These include logs and timber products, horticultural products mainly kiwifruit, and some dairy products.

- The role of Port of Tauranga as a major export and import port serving much of the upper North Island for a range of basic products. The links with the Waikato are important for a range of export and import products mainly fairly basic materials typically transported in bulk and these generate substantial freight flows within the Bay of Plenty region.

- The port is also an important gateway for a range of products to or from the Auckland region, either exported manufactured and agricultural products from Auckland producers or imported goods bound for the large market in the region or for warehouses and distribution centres for onward transport throughout the country. As such, it provides a complement to the services provided within the Auckland region by Ports of Auckland, with the movement of containers to and from the MetroPort inland port in Southdown forming an important component.

5.6 Region wide patterns of employment and the demand for transport

In addition to the analysis of the position for individual employment sectors, the position has also been considered on an area-wide basis, and this is set out in Table 5.14. Table 5.15 Growth in Employment by Sector 1996-2006, sets out the growth in these over the period from 1996-2006.

Table 5.14 Breakdown of employment by sector and area 2006

	Ag and Mining	Manu-facturing	Const and gas and Water	W'lesale and Trans-port	Retail	Accom.	Comms finance and property	Govt Health and Edc.	Other support svs	NES	Total
Total employment											
Western BOP	4686	1284	990	708	1149	435	1422	1656	549	411	13296
Tauranga	753	5292	4092	4611	7269	2046	7629	9135	2595	711	44127
Rotorua	1959	3024	1584	2025	3687	2322	3498	5691	2076	468	26331
Whakatane	1671	924	858	576	1677	480	1239	2922	627	288	11274
Kawerau	51	1476	240	126	252	60	240	414	126	57	3048
Opotiki	729	105	162	102	351	156	228	549	135	105	2625
Total BOP	9849	12105	7926	8148	14385	5499	14256	20367	6108	2040	100701
Total NZ	141954	226137	153636	182925	238107	94575	342183	367368	127758	111093	1985790
Proportion of total by area											
Western BOP	35.2%	9.7%	7.4%	5.3%	8.6%	3.3%	10.7%	12.5%	4.1%	3.1%	100.0%
Tauranga	1.7%	12.0%	9.3%	10.4%	16.5%	4.6%	17.3%	20.7%	5.9%	1.6%	100.0%
Rotorua	7.4%	11.5%	6.0%	7.7%	14.0%	8.8%	13.3%	21.6%	7.9%	1.8%	100.0%
Whakatane	14.8%	8.2%	7.6%	5.1%	14.9%	4.3%	11.0%	25.9%	5.6%	2.6%	100.0%
Kawerau	1.7%	48.4%	7.9%	4.1%	8.3%	2.0%	7.9%	13.6%	4.1%	1.9%	100.0%
Opotiki	27.8%	4.0%	6.2%	3.9%	13.4%	5.9%	8.7%	20.9%	5.1%	4.0%	100.0%
Total BOP	9.8%	12.0%	7.9%	8.1%	14.3%	5.5%	14.2%	20.2%	6.1%	2.0%	100.0%
Total NZ	7.1%	11.4%	7.7%	9.2%	12.0%	4.8%	17.2%	18.5%	6.4%	5.6%	100.0%

Table 5.15 Growth in employment by sector 1996-2006

	Ag and Mining	Manu-facturing	Const. and gas and Water	W'lesale and Transport	Retail	Accom.	Comms finance and property	Govt Health and Educ.	Other support services	NES	Total
Western BOP	1.040	1.126	1.542	1.129	1.088	1.933	1.711	1.456	1.317	0.725	1.192
Tauranga	0.866	1.201	1.624	1.406	1.370	1.561	1.835	1.680	1.393	1.339	1.487
Rotorua	0.791	1.078	1.195	0.953	1.050	1.017	1.124	1.173	1.218	0.891	1.065
Whakatane	0.803	0.817	1.521	1.231	1.020	1.280	1.337	1.412	1.237	0.932	1.119
Kawerau	0.739	0.908	1.455	1.235	0.866	0.870	0.860	1.150	1.167	1.583	0.980
Opotiki	1.025	1.029	1.588	1.172	0.873	1.733	1.382	1.102	1.324	0.921	1.105
Total BOP	0.919	1.080	1.490	1.218	1.178	1.263	1.505	1.419	1.299	0.980	1.241
Total NZ	0.921	0.972	1.493	1.168	1.191	1.363	1.435	1.312	1.336	1.099	1.218

In order to help analyse the relative importance of transport related factors in supporting economic development, we have developed a simple breakdown of economic activity in terms of employment, by its potential use of freight and other transport services.

For this purpose, employment has been defined in terms of three main groups:

- Employment in sectors which generate major flows of bulk commodities often carried in large freight vehicles or on dedicated trains (agriculture and mining)

- Employment in sectors which typically are less freight intensive but which still make substantial use of transport in supporting their activities, using a range of vehicle types ranging from courier vans to very large vehicles. For these sectors, access to a large and skilled labour force is in general moderately important (manufacturing, construction, gas, electricity and water, wholesaling and transport)

- Employment in other sectors typically in the service industries, where freight uses are more limited and are often accommodated in courier vans and small freight vehicles. For these activities the ability to attract staff and customers and the provision of good transport links for these is more important than the movement of freight (all other sectors).

The breakdown of employment into these three sectors is set out in Table 5.16.

Table 5.16 Employment and GDP by transport generating category in the Bay of Plenty 2006

Transport generating category	Employment in 2006		GDP in 2006	
	Workers	Percent	$bn	Percent
High	13236	13%	1,325	13%
Medium	38898	39%	3,896	37%
Low	48567	48%	5,224	50%
Total	100701	100%	10,445	100%

Source : Statistics NZ and Consultants Analysis. BERL (2007)

Using these categories, the position in 2006 would suggest that using employment as a base, a relatively small proportion 13% is associated with intensive freight 39%, with medium freight and almost half (48%) with relatively low freight using activities.

It is also possible to break down employment in each of these transport using categories by district and this is set out in Table 5.17.

Table 5.17 Employment by district and transport generating category 2006

	Transport generating category			
	High	**Medium**	**Low**	**Total**
Western Bay of Plenty	4900	3900	4500	13300
Tauranga	2800	19200	22200	44100
Rotorua	2700	9500	14200	26300
Whakatane	1900	3700	5700	11300
Kawerau	100	2000	900	3000
Opotiki	800	700	1200	2600
Total Bay of Plenty region	13200	38900	48600	100700

The main urban areas of Tauranga, Rotorua and Whakatane all have over half their employment in the "low" transport generating capacity. Western Bay of Plenty and Opotiki have substantial shares of employment in the "high" category reflecting their emphasis on agricultural production, particularly kiwifruit and dairying. Kawerau has a high "medium" share reflecting the high proportion of employment in manufacturing associated with the timber processing in the town.

Over the period from 1996-2006, the pattern of employment and hence of potential freight use has changed, and this is set out in Table 5.18.

Table 5.18 Changes in employment by transport generating category 1996-2006

Transport generating category	**Employment**		
	1996	**2006**	**Growth**
High	13446	13236	-210
Medium	32214	38898	6684
Low	35460	48567	13107
Total	81120	100701	19581

Growth in activity has been concentrated in "low" transport generating category comprising the service type activities with relatively low freight demands but high demands for good worker access. In addition, on a spatial basis much of the growth for both medium and low freight using sectors has been focussed in Tauranga, accounting for 80% and 65% respectively of the regional growth in these categories. This then sets the background against which future changes in the demand for the movement of freight and of passengers can be considered.

5.7 Tourism in the Bay of Plenty region

5.7.1 Employment in tourism

Tourism plays an important role in the Bay of Plenty and impacts on a number of sectors. Direct employment in "accommodation, cafes and restaurants", the main tourism related employment category, is particularly important in Rotorua where it amounts to about 10% of the workforce and across the region as a whole, where it accounts for about 6.5% of the workforce. This can be compared with a national average of 6%.

The growth of employment in tourism over the recent past is set out in Table 5.19.

Table 5.19 Employment in tourism (accommodation, cafes and restaurants) (1) in Bay of Plenty region 2001-2006

	2001		2006		
	Total	**Percent of total employment**	**Total**	**Percent of total employment**	**Growth 2001-2006**
western Bay of Plenty	456		600	3.8%	31.6%
Tauranga	1,674		2,157	5.6%	28.9%
Rotorua	2,334		2,445	9.9%	4.8%
Whakatane	456		507	5.3%	11.2%
Kawerau	66		81	2.8%	22.7%
Opotiki	123		159	6.9%	29.3%
Bay of Plenty region	5109		5949	6.4%	16.4%
New Zealand			89,055	6.0%	

Notes (1) As defined by ANZSIC96

This indicates relatively strong growth in the west and east of the region but with only relatively modest growth in the key centre of Rotorua. At a regional level employment in the sector has continued to grow, increasing by about 7% or 3.5% per year between 2006 and 2008, slightly faster than the average rate of 3.1% achieved between 2001 and 2006. This demonstrates the ongoing importance of the sector to the regional economy at an aggregate level.

5.7.2 Tourism activity

Information on the level of tourism activity is available for the three Regional Tourism Organisations (RTO's) for Rotorua, Kawerau-Whakatane and Bay of Plenty which cover the Bay of Plenty region. Summary statistics for the last available year 2009 are presented in Table 5.20.

Table 5.20 Tourism activity in the Bay of Plenty by RTO in 2009

	Overnight visits	Day visits	Total visits	Visitor nights	Expenditure ($NZ m)
Bay of Plenty RTO	1,455,130	2,369,666	3,824,796	4,318,236	435
Kawerau-Whakatane	347,155	637,800	984,955	966,985	86
Rotorua RTO	1,511,699	1,672,814	3,184,513	3,394,585	537
Bay of Plenty Total	3,323,984	4,680,280	8,004,264	8,679,806	1,058
New Zealand	35,029,570	53,589,256	88,618,826	104,760,979	15,103
BOP as % of New Zealand	9.5%	8.7%	9.0%	8.3%	7.0%

Source : Forecasts of regional Tourism Activity in New Zealand, Ministry of Tourism

In total in 2009 the three RTO's attracted about 8 m visitors with an expenditure of just over $1 b. This expenditure can be compared with the total GDP for the region of about $10 b. Tourist visits in the Bay of Plenty account for about 8-9% of New Zealand totals but their expenditure is somewhat smaller at about 7% of the national total.

Within the region, the Bay of Plenty RTO accounts for about half the total day visits and visitor nights. Although Rotorua attracts a higher number of overnight visitors, on average these stay for a shorter time (2.2 nights) compared to Bay of Plenty (3.0 nights) or to Kawerau-Whakatane (2.8 nights) or to New Zealand as a whole (3.0 nights). However, the availability of the range of formal tourist attractions in Rotorua means that the average expenditure per visit at $355 is higher than in Bay of Plenty $300 but is below the national average of $430 per night.

The origins of tourist visits to the region are set out in Table 5.21

Table 5.21 Origins of tourist visits to the Bay of Plenty 2009 (million tourist visits)

	Auckl'd and Northl'd	Waikato	BOP	Other North Island	South Island	Total NZ	Australia/ Oceania	Other Intl	Total Intl	Total	Per Cent NZ	Per cent BOP
Bay of Plenty	1.02	1.19	0.90	0.34	0.09	3.55	0.12	0.16	0.28	3.82	92.7%	23.6%
Kawerau-Whakatane	0.18	0.15	0.44	0.14	0.02	0.92	0.03	0.04	0.06	0.98	93.4%	44.3%
Rotorua	0.71	0.66	0.66	0.31	0.06	2.40	0.24	0.55	0.79	3.18	75.3%	20.6%
Total	1.91	2.00	2.00	0.79	0.17	6.87	0.38	0.75	1.13	7.99	85.9%	25.0%

Source : Forecasts of regional Tourism Activity in New Zealand, Ministry of Tourism

The majority of tourist visits are from either residents of Bay of Plenty itself or from Waikato or Auckland and these three areas supply about three quarters of the total. International visitors of whom about a third are from Australia, account for just less than 15% of the total. Rotorua attracts a relative high proportion of international visitors (70% of the total international visitors to the region), possibly reflecting the particular nature of the tourist attractions in the area and it also attracts these from a

wider area with Australia having a smaller share of the total. To a significant extent, overseas tourists may visit Rotorua in the course of organised tours rather than the rather more independent holiday more typical of Bay of Plenty and this may be particularly attractive to tourists from Asia.

The relatively high share of domestic tourists from Auckland and Waikato emphasises the need for good road communications with these areas and the construction of the Waikato Expressway would improve the links to all three RTOs from their major markets outside the region.

For international travellers, the development of direct air services to Rotorua would help to support the Australian market, but much of the rest of the international visitor market is likely to be focussed on Auckland and improved surface links again would help to support this traffic.

The recent growth in tourist visits from 2004 to 2009 is set out in Table 5.22.

Table 5.22 Growth in tourist visits to the Bay of Plenty by origin 2004-2009 (million tourist nights)

RTO	Auckl'd and Northl'd	Waikato	BOP	Other North Island	South Island	Total NZ	Australia/ Oceania	Other Intl.	Total Intl.	Total
Bay of Plenty	2.7%	3.7%	4.1%	-0.4%	1.4%	3.0%	36.2%	1.3%	13.4%	3.7%
Kawerau-Whakatane	2.7%	3.2%	3.6%	-0.9%	-1.0%	2.6%	31.6%	-0.7%	10.3%	3.0%
Rotorua	7.1%	4.9%	4.1%	1.7%	4.1%	4.9%	30.1%	-11.0%	-1.7%	3.2%
Total	4.3%	4.0%	4.0%	0.7%	2.1%	3.6%	32.0%	-8.1%	2.3%	3.4%

The numbers of tourist visits as a whole have grown in total by about 3 to 3.5% over the five years from 2004 to 2009, in part reflecting the effects of the economic downturn. While the domestic market as a whole has grown from between 2.5% to 5% with Rotorua experiencing particularly high growth, the position for international visitors is more mixed. Typically, visitors from Australia have grown strongly but this has been offset to varying degrees by a slow growth or in the case of Rotorua a significant decline in visitors from other destinations. This may reflect the particular impacts of the downturn which has influenced the demand from more distant destinations and also for the more formal type of holiday more typical for Rotorua.

5.7.3 **Tourist expenditure**

Patterns of tourist expenditure in the area over the period for domestic and international visitors are set out in Table 5.23.

Table 5.23 Annual expenditure by type of visitor ($ millions per year)

Area/RTO	2004	2006	2008	2009
	Total expenditure			
Bay of Plenty RTO	394	403	413	435
Kawerau-Whakatane	77	82	82	86
Rotorua RTO	520	512	509	537
Total BOP	991	997	1,004	1,058
New Zealand	13,525	14,146	14,321	15,103
BOP as % of NZ	7.3%	7.0%	7.0%	7.0%
Expenditure by domestic visitors				
Bay of Plenty RTO	311	314	321	340
Kawerau-Whakatane	64	68	67	71
Rotorua RTO	266	268	276	296
Total BOP	640	650	665	707
New Zealand	7,803	8,234	8,374	8,915
BOP as % of NZ	8.2%	7.9%	7.9%	7.9%
Expenditure by international visitors				
Bay of Plenty RTO	83	89	92	95
Kawerau-Whakatane	13	14	15	15
Rotorua RTO	254	243	233	242
Total BOP	350	346	339	351
New Zealand	5,723	5,911	5,947	6,187
BOP as % of NZ	6.1%	5.9%	5.7%	5.7%

Bay of Plenty region accounts for about 7% of all visitor expenditure in New Zealand, although the share for both domestic and international visitors has been declining. Rotorua accounts for about 69% of expenditure by international tourists ahead of Bay of Plenty RTO with 27%. However, for domestic tourist expenditure, the position is reversed with Bay of Plenty having the largest share with about 48% of the total compared to about 42% for Rotorua.

5.7.4 Trips by purpose

The breakdown of visitor trips by purpose is set out in Table 5.24.

Table 5.24 Total tourist visits to the Bay of Plenty region by purpose 2009 (million trips or percent of total for area)

	Total trips					
	Holiday	**VFR**	**Business**	**Education**	**Other**	**Total**
Auckland RTO	5.6	4.8	2.5	0.3	0.4	13.6
Waikato RTO	3.0	3.4	1.7	0.1	0.3	8.6
Bay of Plenty RTO	1.5	1.6	0.6	0.0	0.1	3.8
Kawerau-Whakatane	0.4	0.4	0.2	0.0	0.0	1.0
Rotorua RTO	1.7	0.8	0.5	0.1	0.1	3.2
Total Bay of Plenty region	3.6	2.8	1.3	0.1	0.2	8.0
New Zealand	41.6	28.8	14.0	1.4	2.8	88.6
	Percent of total					
Auckland RTO	41%	35%	18%	2%	3%	100%
Waikato RTO	35%	40%	20%	2%	4%	100%
Bay of Plenty RTO	40%	41%	15%	1%	3%	100%
Kawerau-Whakatane	37%	45%	16%	1%	2%	100%
Rotorua RTO	53%	26%	15%	2%	3%	100%
Total Bay of Plenty region	45%	35%	16%	1%	3%	100%
New Zealand	47%	33%	16%	2%	3%	100%

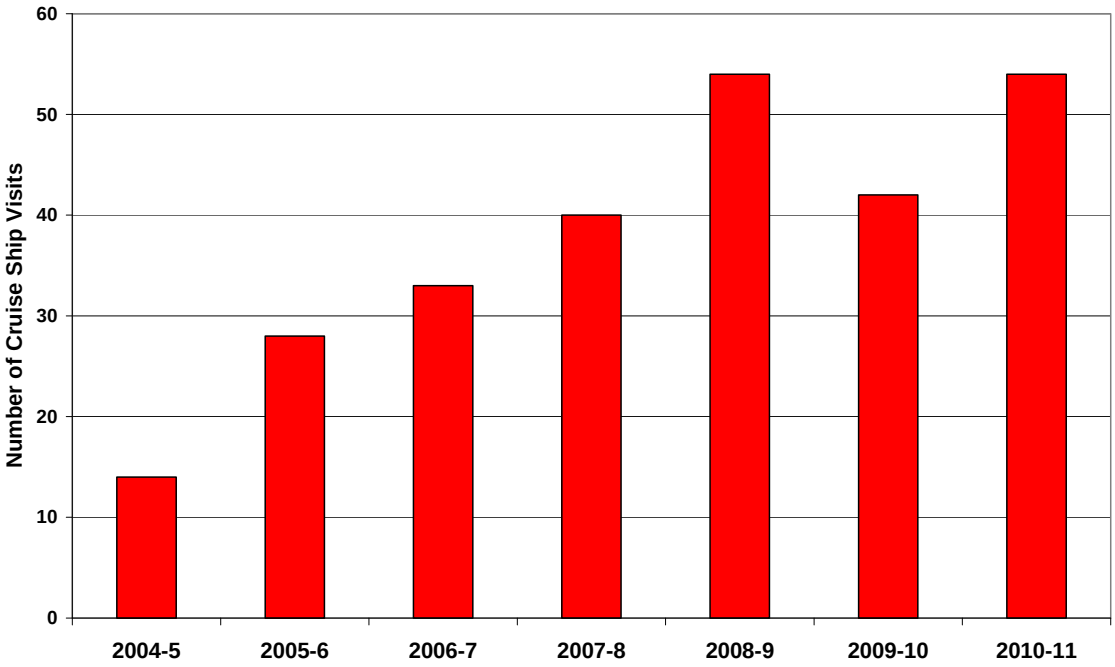


Figure 5.11 Cruise ship visits to Tauranga

The great majority of tourist visits are holidays or visiting friends and relations (VFR), although the balance between these two categories varies widely from Rotorua which has a high proportion of holiday visits and Bay of Plenty and Kawerau – Whakatane where VFR is more important. Again, this reflects the availability of recognised tourist activities in Rotorua, possibly the higher migration levels into Bay of Plenty. Business trips account for about 15-16% of the total with the share being similar for each of the RTO's.

5.7.5 Cruise ships

Cruise ships, although not normally contributing to the use of accommodation in the region, do provide a large number of visitors to the region and their numbers have been growing rapidly. This growth is set out in Figure 5.11.

It was estimated that each visit of a cruise passenger to a port would generate additional value added in the New Zealand economy of about $300[8] although not all of this would accrue to the region in which the port was located. For the planned visits to Tauranga in 2010/11, this would therefore generate an increase in value added in the economy as a whole of about $25-30 m and possibly supporting up to 300-400 jobs.

The extent of the exact figure and the distribution of the value added will depend in part, on the range of tourist activities available and on the structure of the local industry but it is likely that the contribution of passengers calling at Tauranga will be fairly substantial. Again, this is likely to benefit Rotorua but we understand that with

[8] New Zealand Cruise Industry Study

the growth of the potential numbers of passengers, other options for tourist activity with an increased focus on Tauranga are being considered. Increasing numbers of passengers seeking independent tours are likely to reinforce this trend.

5.7.6 Summary of tourism activities

Tourism plays an important role in the economy of the Bay of Plenty, providing direct employment for about 6.5% of the workforce overall and a rather higher share for the key tourist destination of Rotorua. Employment in most areas has grown steadily since 2001, although growth in Rotorua has been relatively slow. In part this reflects the different nature of tourism in Rotorua with an emphasis on international travellers and on more formal holiday activities, which may have been affected both by the recent economic downturn and by the earlier SARS outbreak. Tourism in other parts of the Bay of Plenty relies more on domestic tourism and less formal activities which appears to have been less affected by the downturn.

Domestic tourism is dominated by visitors both from within the Bay of Plenty and from Auckland and Waikato. Land based links to the bay of Plenty are therefore important to sustain these movements. International tourism is split between visitors from Australia for which the airport at Rotorua and possibly Hamilton may provide a regional gateway and those from further afield which are likely to route through Auckland and require land based modes for their onward journey. There has also been substantial growth in cruise passengers through Tauranga. These are typically dominated by Australians. The transport needs for these passengers depend on the tourist destinations they are likely to visit, but again would need to be supported either by good short distance links for travel within Tauranga or good longer distance connections for travel to Rotorua or further destinations such as Waitomo, Hamilton or Auckland.

Part 6: Identifying key linkages and drivers: investigating the importance of transport connections

6.1 Introduction

In investigating the potential linkages between transport and economic development, we have employed a variety of approaches to help our understanding of the connections and the ways in which changes in the level of transport accessibility and level of service might impact on economic development. The first part of this section sets out background findings from other studies and the second describes our examination of the linkages, building on the background research and on the analysis of the data for the region as described in the preceding sections.

6.2 Theoretical background – literature review

6.2.1 Introduction

The purpose of this review of the literature is to firstly, consider the relationship between transport and the economy and secondly to highlight the importance of economic geography as the theoretical basis of our study.

It is sometimes assumed that investment in transport infrastructure will automatically lead to the promotion of economic development. Nevertheless, the literature on this subject paints a more equivocal picture which suggests that although plausible, it should not be assumed that such outcomes will automatically occur. Two broad camps can be identified in the research literature (discussed in the following sub-sections):

- Some authors claim that national programmes of public investment, including road construction, lead to high rates of social return measured in terms of economic growth and productivity improvement.

- Others claim that effects do occur but any contribution to the sustainable rate of economic growth in a mature economy, with well-developed transport systems, is likely to be modest and will depend critically on the underlying conditions for growth.

The following sections discuss these perspectives in more detail and identify their relevance to our study.

6.2.2 The case for a positive relationship between transport investment and economic growth

Looking at the literature supporting high rates of economic growth related to transport investments, it has been observed that there is clear historical evidence of a connection between transport improvements and economic development. At the macro-economic level, historical data confirms this close correlation between transport growth, and in particular road transport growth, and economic growth

(SACTRA 1999). Critics have, however, pointed out that this data on its own does not help clarify the direction of cause and effect – whether increased movement is a sign of economic growth stimulated by other factors, whether traffic growth, facilitated by transport improvements, itself stimulates economic activity, or whether there is some iteration of the two (SACTRA 1999).

The main theoretical research supporting this view comprises a number of macro-economic studies, focused on the link between investment and productivity growth (e.g. Aschauer 1989). Aschauer argued that public investment in infrastructure leads to increases in firms' profitability or return on private capital such as the capital invested in a vehicle fleet. Firms respond by increasing the rate of capital investment leading to higher labour productivity and output, so perpetuating a further virtuous spiral of investment. The result, according to Aschauer, is a return on the public funds invested in public infrastructure that is significantly higher than the return on private capital.

These studies were initially very influential due to the strong links identified in early work. However, recently this approach has been heavily criticised for a number of reasons:

- Firstly, critics have again noted a lack of attention to causality – that the approach used does not demonstrate causality but presupposes it (Banister and Berechman 2000). It is pointed out that the empirical evidence used by Aschauer could imply a different relationship of cause and effect – higher transport investment not causing economic growth but being made more affordable by growth in income (SACTRA 1999).

- Secondly, critics argue that the suggested high rates of return on public capital defy experience. For example, and the empirical findings of Aschauer in relation to the United States of America experience do not appear to have been borne out by the United Kingdom (McKinnon 1996).

A further point is that the work of Aschauer is concerned with impacts on total factor productivity, i.e. the impact on overall productivity of all factors of production, rather than just the narrower measure of output per worker. It has been observed that much of the work undertaken in this context appears more suited to questions around the general level of transport investment which is economically warranted, than to the assessment of the relative merits of particular schemes.

6.2.3 The case for a weaker relationship between transport investment and economic growth

Although it is widely accepted that the contribution of transport improvements to economic development will be significant in a developing country, for a developed country with a well-developed transport network the question arises as to whether further transport network improvements can have anything more than marginal benefits to the national economy? The second broad camp within the literature includes a number of international studies that have concluded that there is not a clear and automatic link between transport investment and economic development.

In one influential publication, Banister and Berechman (2000) argued that: "In developed countries, where there is already a well-connected transportation network of high quality, further investment in that infrastructure will not on its own, result in economic growth. Transportation investment acts as a complement to other more important underlying conditions, which must also be met if further economic development is to take place." Breheny (1995) similarly argued that roading investment will not necessarily be a sufficient condition for economic growth and may not even be a necessary condition. He concluded that roading investment would only make a significant difference where it is the only missing feature of a strong regional economy. In a depressed regional economy where other conditions for growth were missing roading investment appears to have made only a limited difference to economic development.

BERL's (2004) investigation of the potential economic impact of Auckland's proposed Eastern Corridor supported the approach of Breheny and argued that transport infrastructure will make a positive contribution to economic development when it resolves isolation and bottleneck issues and a sound economic basis already exists for growth. Work undertaken for NZTA in connection with the development impact of the RoNS by Richard Paling Consulting suggested that based on experience from overseas there was evidence that new roads which provided significant accessibility benefits appeared to generate increased economic activity.[9] However this needed to be viewed in the context of the existing local development patterns and potential for economic development in the corridors served.

This raises the critical question: How might transport investment stimulate economic development? Rather than assuming the existence of an automatic link, the more recent studies emphasise the importance of supporting pre-conditions being present in order for economic development spin-offs to occur from transport investments. Banister and Berechman (2000) conclude that the necessary conditions relate to economic externalities, investment factors, and political factors:

- Economic conditions: The presence of underlying positive economic externalities, such as agglomeration[9] and labour market economies including the availability of a good quality (well trained and highly skilled) labour force, adequate supply of suitable land etc.

- Transport investment conditions, including the availability of funds for the investment, the scale of the investment and its location, the network effects (e.g. are there missing links in the network), and the actual timing of the investment.

- Political and institutional conditions related to the broader policy environment within which transport decisions must be taken, such as supportive land-use planning policies.

Individually, these conditions may have very little or no impact on economic development, and it is only when all three necessary sets of conditions are present and operating together that economic growth will ensue (Banister and Berechman 2000). Banister and Berechman also argue that transport infrastructure

[9] See next section.

improvements are location related. Thus, they concluded that the identification and measurement of the economic impact of transport improvements must take place at the local level. Aggregating the analysis will fail to capture these local impacts within the analysis.

Other recent papers support the conclusion that transport improvements, by themselves, are insufficient to ensure that economic development. SACTRA (1999) concluded that although transport improvements could positively affect economic growth, it is specific local conditions and circumstances that influence the effects of transport improvements, such that no particular outcome can be guaranteed.

The European Conference of Ministers of Transport (ECMT 2001) found that overall, transport systems improvements could not be said to systematically improve productivity in a region. Improvements to the transport network may increase the pool of available labour but alternatively may promote urban sprawl and have little impact where other constraints prevent an uptake of the improvements.

6.2.4 Relevance to our study

On balance, the evidence from the literature tends to support the view that in the case of a region with a developed economy and arguably a substantially complete transport network, such as the Bay of Plenty, investment in transport infrastructure cannot be assumed to automatically lead to economic growth. Rather, the economic growth potential of transport improvements will depend critically on the presence of other pre-conditions for growth at the national, and most importantly, regional and local level. Specifically this will be the case where transport improvements can resolve isolation and bottleneck issues and a sound economic basis already exists for growth at the local level.

Recent developments within the economic geography literature have done much to provide a framework within which these factors can be analysed.

6.2.5 Economics and geography

This economic framework that we will be using is grounded in the field of economic geography. Economic geography is a broad area of study, explaining economic development patterns from the broadest global trends to specific local economic features.

At the broader level a recent paper by McCann (2009, p280) argues that “a coherent understanding of New Zealand’s current economic predicament can be gained by examining the modern interrelationships between geographical location, economies of scale, and the diversity of production and trade.” By focusing debate on these key themes of economic geography, New Zealand’s productivity performance can be considered within the context of “a much fuller and systematic account of geographical factors” than has been the case to date (McCann, 2009).

It is useful to firstly summarise the key interrelationships of economic geography; scale, location and economic diversity.

- Scale is important at both the national and regional level. Large domestic markets can provide economies of scale far beyond those achievable within a small, isolated market (NZIER 2006).

- Location matters for countries, cities and regions. Analysis from the OECD and World Bank finds that New Zealand and Australia suffer the greatest adverse effects of geographical isolation on productivity of any advanced economy (World Bank 2009). The IMF has found that the effect of distance is to reduce labour productivity in Australia and New Zealand by just over 10% (IMF 2004).

- Finally, according to McCann, economic diversity in production and trade supports a more productive economy (OECD 2008).

Within this vein, previous research has demonstrated that New Zealand is becoming increasingly characterised as an economic region of Australasia, with Auckland the dominant economic centre of this region (Grimes 2005).[10] Maré (2008) demonstrated that the size distribution of New Zealand's cities reasonably reflects the results that would be expected if Australia and New Zealand were treated as one economic region. When looking at regional performance, only Tasmania exhibits lower regional productivity than New Zealand and interestingly, the age distribution patterns of labour migration to Australia from both New Zealand and Tasmania are very similar (McCann 2009).

Confirming the relevance of the key themes of economic geography is the observable trend towards an increasing concentration of economic activity taking place in relatively small geographical areas. In approximately half of OECD countries, more than 40% of the national GDP is produced in less than 10% of all regions (OECD, 2009). In the United States of America 40% of employment is currently located in areas constituting just 1.5% of its total land mass (Scott and Storper, 2007 p576). As Scott and Storper observed, "the most striking forms of agglomeration in evidence today are the super- agglomerations or city-regions that have come into being all over the world in the last few decades,"

McCann's paper is useful in demonstrating how reductions in spatial transactions costs benefit low knowledge-intensive and low value outputs but these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value higher knowledge intensive outputs.

Importantly for this study, the evidence clearly demonstrates that cities and city-regions have reaped the benefits of a structural transformation that has taken place in most modern economies. Cities now thrive through the concentration and provision of high value added service activities. A key factor underpinning the structural economic transformation and growth of modern cities is agglomeration, the clustering of people and economic activity in larger, denser urban agglomerations generating higher levels of productivity and higher returns to businesses and workers.

[10] See also MED 2007 and McCann 2009 (p296).

Agglomeration theory postulates that the congregation of businesses and workers is caused by the existence of positive externalities (or benefits which are external to firms) that are generated through close spatial proximity and that these serve to raise the efficiency of firms. The literature emphasises three sources of agglomeration economies, roughly following three examples given by Marshall (1920), which explain the effects on productivity of concentrating economic activities in urban areas. Marshall's classification of externalities are as follows (see Crawford, 2006).

- **Input-output linkages** promoting more efficient provision of intermediate inputs to firms in greater variety and at lower cost. Here a "concentration of producers using particular inputs allows increased specialisation and greater economies of scale in the production of inputs."

- **Larger labour markets.** With increased urban size, deeper labour markets are likely to arise. This "may allow greater specialisation in human capital, by reducing the risks to workers of firm specific employment shocks. Similarly it will be easier for firms to find new employees, should current employees quit."

- **Technological or knowledge spill-overs** between firms. In this regard, agglomeration facilitates faster communication and transfer of information across firms.

However, it is also important to understand the channels through which the process of agglomeration happens in practice. Duranton & Puga, (2004) suggest that the Marshallian externalities can be better understood through an awareness of sharing, matching and learning mechanisms as follows:

- Sharing which refers to "indivisible facilities" (e.g. machinery with high fixed costs that few firms would buy individually), the "gains from a wider variety of input suppliers that can be sustained by a larger final-goods industry", the "gains from the narrower specialisation that can be sustained with larger production, and risks"

- Matching which refers to an ability to improve quality (e.g. improving the match between the skills demanded by business and the skills available in the workforce) and alleviate "hold-up problems"

- Learning which refers to the "generation", "diffusion" and "accumulation of knowledge"

6.2.6 Observations relevant to this study

Economic geography is now recognised as providing a very powerful framework for undertaking the analysis of regional economic development and the role of transport within this process. The framework demonstrates the importance of concentrating knowledge intensive activities which typically occurs in urban areas but also indicates that where primary production takes place, a focus on spatial transactions costs will be important, although these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value higher knowledge intensive outputs. So too will be opportunities to broaden and diversify the economic base of a region and also to seek opportunities to move production processes higher up the value chain.

Within this framework we will use this study as an opportunity to profile the composition and changes within the Bay of Plenty economy and relate these to the observable trends in the wider national and international economy and to assist in painting a picture of the future opportunities and constraints this may reveal.

6.3 Linkages between the movements of freight and economic development

The efficient movement of freight clearly plays a role in facilitating a wide range of economic activity in the region, especially the movement of basic agricultural materials and minerals where the cost of transport may be a large proportion of the total delivered cost to the customer. The movement of freight links the producers of basic materials with processing facilities and export markets. This is particularly the case for the movement of milk and dairy products, logs and timber products and kiwifruit which are sold extensively on world markets. Effective freight links are also particularly important for supporting activities in the more remote areas of the region to the east and may therefore support a geographical broadening of the region's economic base. This may have particular impact on the extension of kiwifruit growing, the development of aquaculture round Whakatane and Opotiki and the timber industry and its links with the port of Tauranga.

It should be noted however, that in many cases, improving freight levels of service mainly contribute to reducing the costs of transport as broadly defined for the movement of products but the volumes of these may be constrained by other factors. Examples of these within the Bay of Plenty region are a range of agricultural products such as meat and milk and dairy products where the output is largely constrained by the productive capacity of the land and climatic conditions and where the levels of production do not have the potential to increase substantially, even if the transport system is improved.

However, where output has the potential to increase sharply, the expansion of the capacity of the transport system will be required to ensure that the economic potential of these increases is achieved. Examples where this is likely to be important include the expansion of the logging and timber industry, with the potential for increased harvesting as trees currently growing are harvested, the expansion of the kiwifruit industry into new areas, particularly to the east and the expansion of aquaculture. However, the opportunities for expansion of this type are probably limited. Where these opportunities are not present, while good freight transport generally allows existing activities to be undertaken more efficiently and thus improves the returns from these, it may only have a limited impact on the gross value of the output produced.

The Port of Tauranga is a key freight node for the upper North Island. However, the extent of additional economic activity generated by the port is sensitive to the measurement approach being used. A number of studies undertaken in New Zealand and Australia over the past ten years have examined the economic impacts of ports. A key point of difference between these studies is in the treatment of 'trade facilitation' which is related to the value of trade being undertaken as a result of cargo flowing through the port. A study of the economic impact of the Ports of Auckland undertaken by Market Economics in 2005 is an example of an approach which included a value for trade facilitation within the overall estimate of the economic impact of the port. However, in our view, trade facilitation is clearly

important but not something that can be seen to directly increase the value of output in a given area. Therefore, while the Port of Tauranga is an important component of the local economy, the level of spin off into other locally based activities is seen to be relatively limited.

Our view is consistent with the approach used in Covec's re-estimation of the extent of economic impact attributable to the Ports of Auckland (Covec 2008). This study did not include the value of trade facilitation. Covec argued that although "the port is an important facilitator of trade, we consider it tenuous to assign the underlying value as a port impact." This was based on the view that although the port provides infrastructure through which goods are traded, the port itself is not responsible for their production (and hence any associated impacts). This position is also consistent with the port impact framework established by the Australian Bureau of Transport Economics.

There are some examples of the development of locally based distribution centres and manufacturing activities in close proximity to the Port of Tauranga, such as the production of fertiliser, but in general for value added activities, the port acts as an Auckland gateway rather than one generating high levels of increased activity outside the transport sector for the Bay of Plenty region itself. It does carry out an important role in providing routes for Auckland importers and exporters and in reducing the pressure on the limited space available on the quayside in Auckland.

Given the data that is available, it is not feasible to develop a formal model to link the movements of freight with levels of economic development and a more pragmatic two part approach will be developed. This derives the general background from the conclusions of the Bay of Plenty Freight Study and then supplements this with a consideration of key flows where these are likely to impact particularly on economic development.

6.4 Modelling key drivers of economic development: commuting flows and agglomeration benefits

6.4.1 Introduction

The movement of people forms an important component of economic development, especially for the development of skill-based value-added activities which benefit from the clustering of activity. Commuting flows match the resident workforces with the jobs available and the easy movement of people in the course of their work gives rise to range of activities which contribute further to the productivity of the workforce and the value of the output that might be produced.

The ability to access the outputs and skills available both in a particular area itself and in other areas is also important and lies at the heart of agglomeration modelling. This links levels of accessibility with the scale of economic output. The basis of this is understanding the range of opportunities which are available at a particular location which is typically and for this study measured in the form of the "effective density" a combination of employment level and the costs of accessing or interacting with these. Building on the approach developed by NZTA for the assessment of agglomeration benefits, we have estimated the effective densities for each of the districts within the Bay of Plenty region, and have also considered how the totals are built up with contributions from each area. This then provides a measure of the

extent to which areas may potentially interact and also gives a baseline against which any future changes can be assessed.

6.4.2 Commuting flows

While the pattern of observed commuting flows has been discussed earlier in Section 5.3, to explore future patterns we have developed a simple gravity model based on the levels of attraction and generation and the measure of separation between these. This allows us to look at differences in commuting patterns between the different areas on a structured basis and also to identify the importance of the travel costs of their connection. It additionally allows an assessment to be made of the effects of the changes in population over time on patterns of commuting to be assessed.

For the base position in 2006, Figure 1 to Figure 6.3 illustrate the observed position and results obtained from the gravity model for Tauranga, Rotorua and Whakatane.

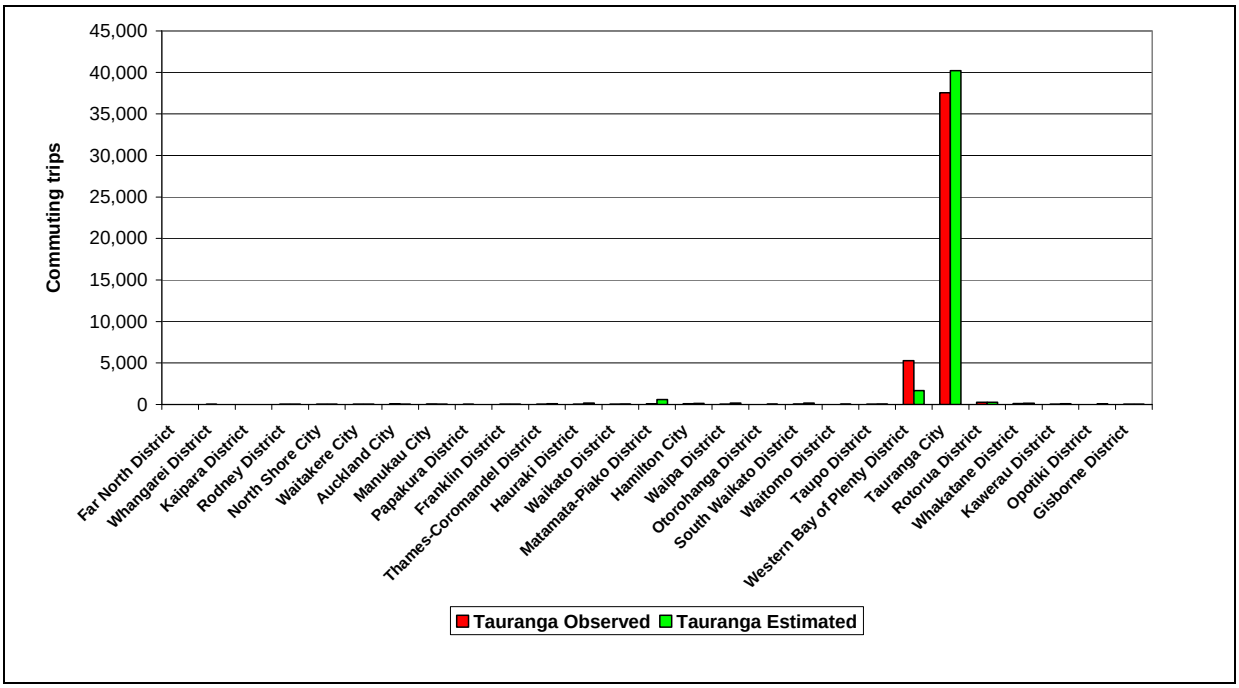


Figure 6.1 Observed and predicted commuting movements to Tauranga 2006

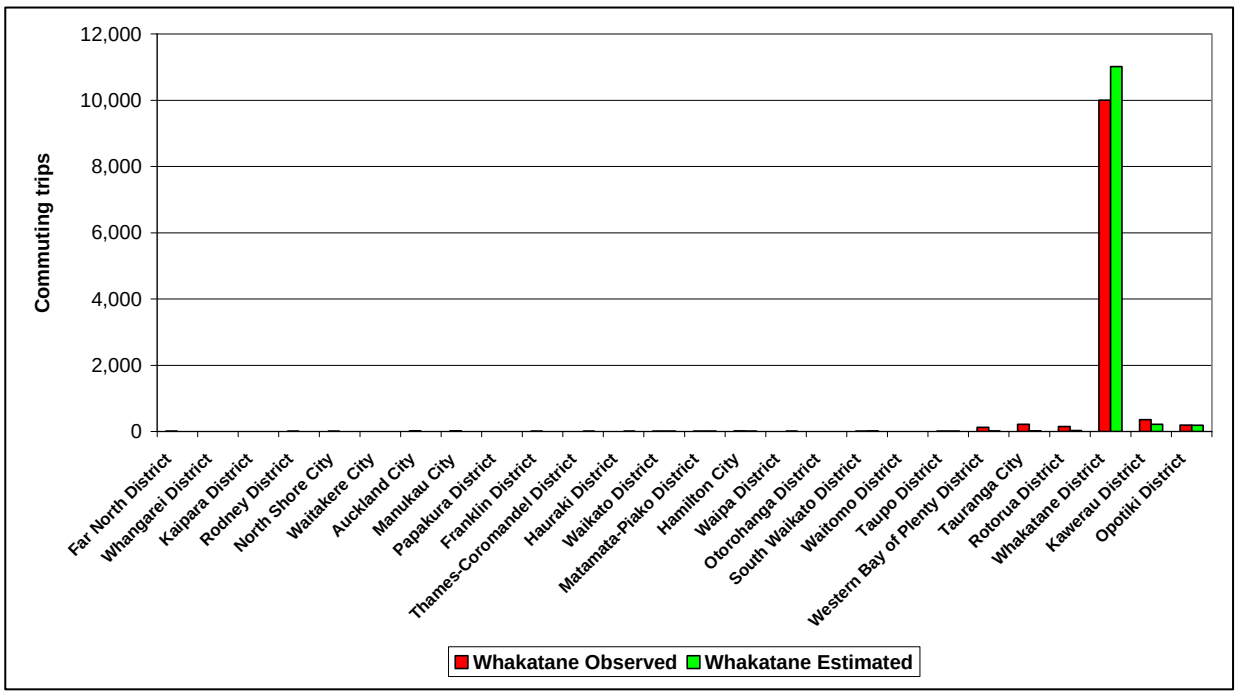


Figure 6.2 Observed and predicted commuting movements to Rotorua 2006

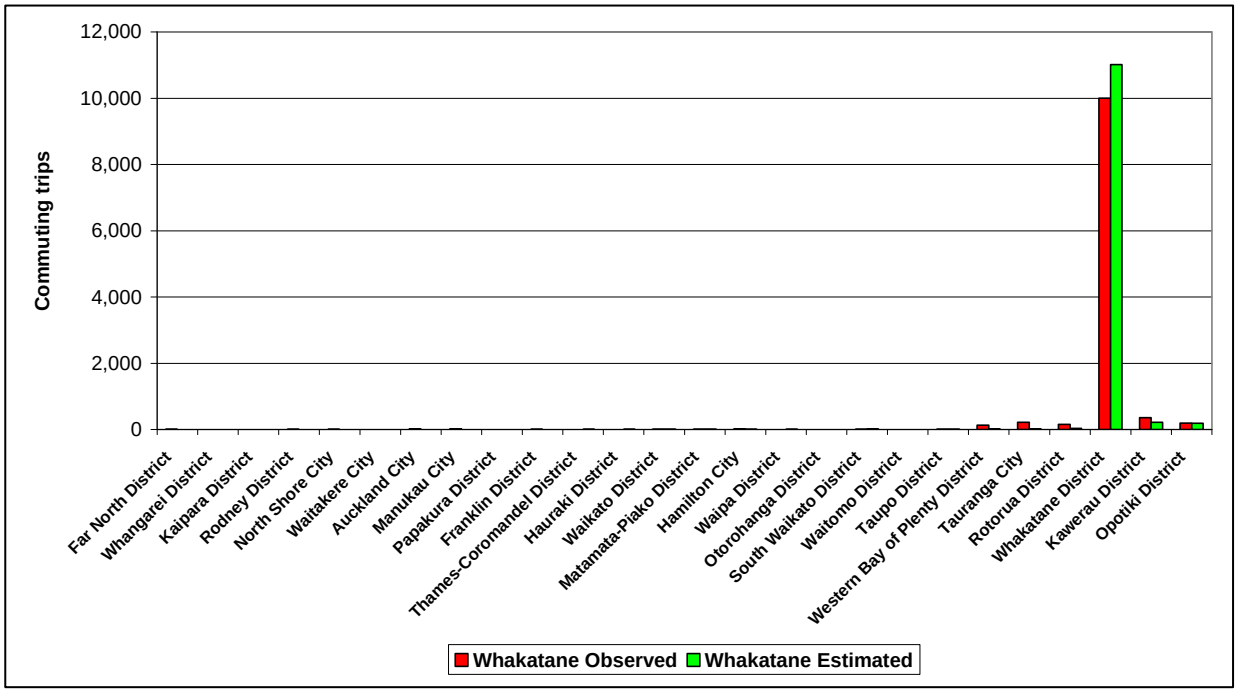


Figure 6.3 Observed and predicted commuting movements to Whakatāne 2006

All three examples demonstrate the high proportion of jobs that are filled from workers resident in the area itself or in the case of Tauranga from the immediately surrounding area. However, while the model provides good estimates of the key commuting flows, it provides less precise estimates of the more minor movements. As a result, there are some issues with the smaller flows from neighbouring areas, where while the total differences between observed and predicted flows tend to be small, the proportional differences may be substantial. For these, the gravity model typically but not always under-predicts the flows. While this does not affect the main conclusions about the high proportion of commuter trips being satisfied locally, it does mean that care needs to be taken when considering the predictions of longer distance movements. This is considered further in Section 7 which considers the results of the modelling for future years.

6.4.3 Agglomeration benefits

As noted earlier in this section, agglomeration benefits measure the impacts that arise when economic activities become more closely clustered and the level of interaction between these increases. The ease of interaction can be changed either by the physical relocation of activities or alternatively by other changes in the costs of the links between them and in particular, by altering the journeys times along these.

New Zealand Transport Agency has undertaken considerable work on the assessment of these potential benefits which come under the category of Strategic Benefits in the Economic Evaluation Manual. Research has been undertaken looking at the position nationally within New Zealand for a range of activities and from this parameters have developed which assess the effects of changes in employment and in the measures of separation between areas. While this approach is still evolving and may not fully take into account the strength of the factors affecting productivity within Auckland (as for example described in earlier work by the consultants) it does represent a base position for considering agglomeration impacts at a regional level.

The approach developed by NZTA and the agglomeration elasticities estimated have therefore been used in the appraisal for this work. It should also be noted that, in principle, agglomeration benefits only form part of the wider economic benefits resulting from major transport schemes, and the approaches developed only reflect changes in productivity of the labour force rather than changes in the locational pattern of employment. In addition, they relate only to interactions between workers at their place of work and do not take into account the benefits of improved matching of the skills of the workforce resident in an area with opportunities elsewhere. However, agglomeration benefits as defined here have proved amenable to investigation in some detail and sufficient confidence in their estimation has been derived to allow this process to be included in standard transport evaluation methodologies in New Zealand and the United Kingdom.

In New Zealand, agglomeration benefits have been determined for a number of schemes including the Waterview Connection, the central component of the Waikato Expressway around Hamilton, the Tauranga Eastern Link, the urban components of the Wellington Urban RoNS, Christchurch Motorways RoNS and the Rail Development Plan in Auckland.

Although in general agglomeration, benefits have been considered within the context of single urban areas, work undertaken for the Northern Way in the United Kingdom used a similar approach to look at agglomeration benefits as links between free-standing towns and cities were improved. The analysis developed to estimate agglomeration elasticities in New Zealand was also based on a nationwide assessment of impacts. While the development of a regional agglomeration model is therefore innovative, the approach underlying this is soundly based. This approach has been used in the recent Economic Linkages Study, looking at the connections between Auckland Hamilton and Tauranga.

The approach to the assessment of agglomeration benefits is based on the concept of the "effective density", a measure of the accessibility to employment (as a proxy for economic activity) of an area. This reflects the level of employment potentially accessible to the location in question, weighted by the measure of separation between them, typically the inverse of the distance or generalised cost of travel. Using this approach, employment further afield has a lower impact than employment closer which reflects the different levels of potential interaction between them. By looking at the way in which the effective density of an area is built up and the ways in which different areas contribute to this, it is possible to gain an indication of the relative influence of these and the importance of the interactions between the areas. The approach that has been developed in New Zealand uses generalised costs which combines the time and distance of a journey and this approach is therefore followed in this study.

This analysis has been undertaken for each of the local authority areas within the upper North Island and the results for the Bay of Plenty region for 2006 are set out in Table 6.1. It should be noted that while this model is relatively coarse and as a consequence the results should be regarded as broadly illustrative, it does provide useful insights into the interactions between different areas.

Table 6.1 Effective densities (1) for Bay of Plenty districts in 2006

Source of weighted employment	Bay of Plenty district					
	WBOP	**Tauranga**	**Rotorua**	**Whakatane**	**Opotiki**	**Kawerau**
	Weighted employment (effective density)					
Western BP	1,859	430	162	123	90	120
Tauranga	1,429	6,169	748	557	371	529
Rotorua	321	446	3,681	368	239	568
Whakatane	133	181	200	2,004	366	511
Opotiki	18	22	24	67	367	39
Kawerau	27	37	66	109	46	426
Auckland Metro	3,564	2,826	2,548	1,970	1,694	2,052
Other Auckland	441	345	310	238	204	249
Hamilton	592	669	651	399	304	444
Total inc. other	10313	13129	10507	7307	4984	6532
	Percent of total for area					
Western BP	18%	3%	2%	2%	2%	2%
Tauranga	14%	47%	7%	8%	7%	8%
Rotorua	3%	3%	35%	5%	5%	9%
Whakatane	1%	1%	2%	27%	7%	8%
Opotiki	0%	0%	0%	1%	7%	1%
Kawerau	0%	0%	1%	1%	1%	7%
Auckland Metro	35%	22%	24%	27%	34%	31%
Other Auckland	4%	3%	3%	3%	4%	4%
Hamilton	6%	5%	6%	5%	6%	7%

Source Consultants Analysis and Model
Notes (1) Defined as employment weighted by the inverse of the costs of travel

The table indicates that the accessibility (effective density) varies across the region. The highest levels of accessibility are achieved in Tauranga, in part reflecting its size, with much lower levels of accessibility being experienced in the smaller and more remote areas in the east of the region.

The table also indicates the strength of the potential interactions between the different areas within the region and with key external areas. In general, this indicates that while the Auckland area has a strong influence mainly reflecting the

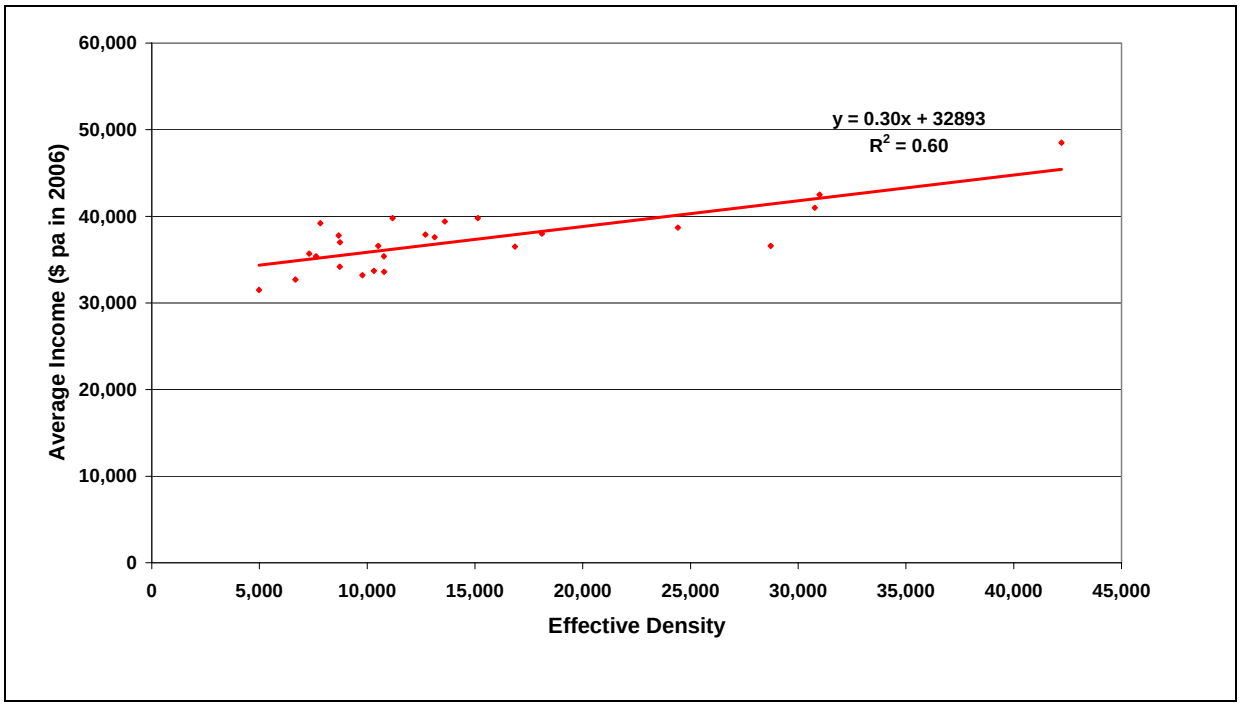
sheer size of employment in the area, the interactions between the different areas within the region are typically more muted except for the links between western Bay of Plenty and Tauranga. Thus, taking the example of Rotorua, the employment in Auckland Metro contributes about a quarter of the total effective density, with employment in Rotorua itself about 35%. The contribution of other areas within the Bay of Plenty amounts to about 12%. A similar position exists for Tauranga where other areas within Bay of Plenty contribute 7% to the total effective density. For the smaller districts to the east, where the total effective density is much lower because of their lower levels of employment, other areas within the Bay of Plenty make a larger contribution to the total (up to 28% for Kawerau) but the total is still dominated by the size of Auckland.

The conclusions from this are that in general, the potential business linkages generated by the different areas within the Bay of Plenty only make a relatively limited contribution to each other's effective density, reflecting the distances between the areas and the relatively low levels of employment. The presence of Auckland is important with the sheer size of its employment outweighing the distance between it and the Bay of Plenty.

The position defined for the effective density within the region supports the conclusions from the analysis of commuting flows, which indicated that in these terms linkages between the different areas within the Bay of Plenty were relatively modest, except for western Bay of Plenty and Tauranga. While Auckland is in general, too distant for significant volumes of day to day commuting to and from locations in the Bay of Plenty, its size means that it has a substantial influence on the individual areas, a finding that has been supported by a number of the stakeholder interviews.

Effective density is also fairly strongly correlated with income and for a broad study area comprising the upper North Island, the relationship between these is set out in Figure 6.4.

Figure 6.1 Relationship between effective density and average earnings by TLA in the upper North Island 2006



While effective density is clearly only one of the factors which affect average earnings, there is fairly strong relationship between the two. As areas get more accessible and their effective density increases, their productivity also tends to rise.

Part 7: Future growth in the Bay of Plenty

7.1 Introduction

The analysis set out above has built up a picture of the current position in the Bay of Plenty in terms of the movements of goods and people and the economic structure of the area. In this section, we develop forecasts for the future up to 2041 and then using the models developed earlier consider how these might affect patterns of economic activity in the region.

7.2 Population forecasts

Population growth is a key driver of economic activity in the region as it affects both the scale of the workforce and the size of the market for a wide range of goods and services. Estimates of population growth for the study area have been made based on projections published by Statistics NZ. For this study (as for the AHT Economic Linkages Study) we have used the high growth forecasts which are available from Statistics NZ for the period to 2031 and have then assumed that the growth predicted for the final five years within this period between 2026 and 2031 continues at the same linear rate to 2041. The use of the high forecasts is considered appropriate particularly for the study area in light of the substantial growth that has occurred over the past, which has typically been higher than the Statistics NZ medium forecasts. The increases in population that result for future years are set out in Table 7.1.

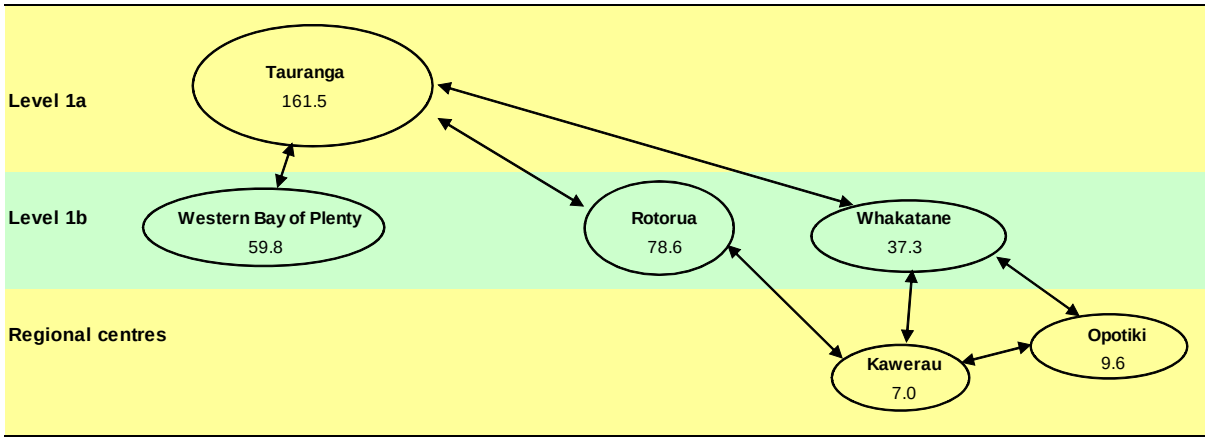
Table 7.1 Forecast population growth for the Bay of Plenty 2006-2041

Area	Population in					Average growth rate pa 2006-2041
	2006	2011	2021	2031	2041	
Western Bay of Plenty	43000	47300	51500	55700	59800	1.5%
Tauranga	106900	120100	133500	147300	161500	1.9%
Rotorua	68100	70800	73400	76000	78600	0.7%
Whakatane	34500	35300	36100	36800	37300	0.3%
Kawerau	7150	7180	7160	7110	7010	-0.3%
Opotiki	9200	9320	9440	9550	9640	0.2%
Total Bay of Plenty region	**268850**	**290000**	**311100**	**332460**	**353850**	**1.3%**
Auckland Metro	1187600	1311400	1441600	1577200	1715500	1.7%
Hamilton	134400	148600	162100	175900	189900	1.6%
Total NZ	**4184080**	**4522720**	**4848550**	**5176160**	**5503290**	**1.2%**
Bay of Plenty region as% of NZ	**6%**	**6%**	**6%**	**6%**	**6%**	

Continuing existing trends, the areas in the west of the region are forecast to grow strongly at a rate well above the national average but further east the rate of growth is typically more modest with a decline forecast for Kawerau. High growth rates are also projected for the two main centres of Hamilton and Auckland potentially influencing the region. Our forecast for 2041 is slightly lower than that of 370,000 for 2040 made in the Bay of Plenty Transport Futures Study, although as discussed above, it is consistent with that for the AHT Economic Linkages Study.

These 2041 population forecasts for the districts in the region are shown in Figure 7.1.

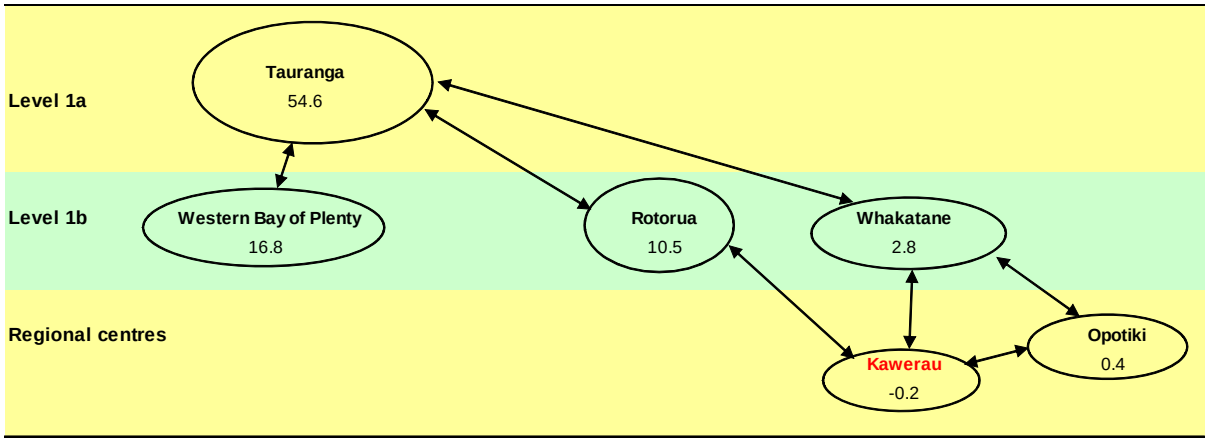
Figure 7.1 Bay of Plenty region. High level district hierarchy (for the projected usually resident population count 2041 (000's)



Source: Statistics NZ population forecasts, BERL

The total population in Tauranga and western Bay of Plenty in 2041 will be over 220,000, and the rest of the region about 132,000. This means Tauranga and western bay in 2041 will be two-thirds larger than the rest of the region. This is in contrast to the situation in 2006, where the population in Tauranga and the western bay was 150,000, one and a quarter times the population of 120,000 in the rest of the Bay of Plenty.

The pattern of that projected population increase in the districts across the region as between 2006 and 2041 is shown Figure 7.2.



Note: Settlements in red have a projected decline in population between 2006 Census and 2041 forecast. *Source: Statistics NZ population forecasts, BERL*

Figure 7.2 Bay of Plenty region: Change in population for the High Level district Hierarchy (for the projected usually resident population count 2041 (000's)

This graphic shows that there is projected to be strong population growth in both Tauranga and the western Bay of Plenty. From a transport viewpoint, this will be a key driver of the need for expansion of passenger transport in that part of the region. We note that the projections of the population growth in Opotiki district could well be exceeded by 2041 if the aquaculture industry in the eastern Bay of Plenty expands as presently expected. This could have some spin-off to increased population in Whakatane district also.

7.3 Employment forecasts

A similar approach has been used to the development of employment forecasts and for these we have assumed the same rates of growth as for population. This therefore assumes that overall participation rates would remain broadly the same as they are today.

While employment has grown faster than the population in general over the past, it is assumed that the scope for additional participation in the labour force is now more limited, particularly as the population ages and as a consequence population and employment would therefore grow at the same rates. On this basis the employment in the Bay of Plenty is forecast to increase as set out in Table 7.2, although it should be recognised that given the period over which forecasts are made, the results are subject to considerable margins of error.

Table 7.2 Forecast growth in employment 2006-2041

Area	Employment in		Forecast growth
	2006 (1)	2041	
Western BP	13300	22200	67%
Tauranga	44100	84400	91%
Rotorua	26300	33100	26%
Whakatane	14300	15900	11%
Opotoki	2600	2800	6%
Kawerau	3000	2800	-10%
Total Bay of Plenty region	103600	161200	56%
Auckland Metro	478,900	842,784	76.0%
Hamilton	60,800	105,212	73.0%
Total New Zealand			

Note: There are a number of definitions of the numbers employed. This table is based on the numbers employed as recorded in the 2006 Census and therefore includes full and part time workers. The numbers derived are therefore slightly different to those set out elsewhere in this report which reflect alternative measures.

By assuming a continuation of existing trends we have also made forecasts of the distribution of employment by type and this is set out in Table 7.3.

Table 7.3 Forecast changes in employment by industry in the Bay of Plenty 2006-2041

Employment sector (1)	2006	2041	Growth from 2006-2041
Agriculture and Mining	9800	9800	0%
Manufacturing	12100	14000	16%
Construction and gas and Water	7900	15500	96%
Wholesale	4800	6700	40%
Transport	3400	5000	47%
Retail	14400	19400	35%
Accommodation	5500	8300	51%
Communications finance and business and property services	14300	28400	99%
Government health and education	20400	37100	82%
Other support services	6100	9700	59%
NES	2000	2000	0%
Total	100700	155900	55%

Notes (1) Based on ANZSIC96

The division of this growth in employment into the different categories affecting transport demand is set out in Table 7.4.

Table 7.4 Breakdown of forecast employment growth by potential freight usage types

	2006	2041	Growth from 2006-2041
Heavy freight using industries	13200	14800	12%
Moderate freight using industries	39200	55600	42%
Minor freight using industries	48300	85500	77%
Total	100700	155900	55%

About two thirds of the projected growth will occur in those sectors which have a relatively low usage of freight but where the movement of people both as workers and as suppliers and customers is important. Growth in employment in the higher freight generating activities is expected to limited.

To the extent to which increased value added can be obtained from the primary commodities produced in the region, it is likely that much of this activity will be

located in the urban areas, either in the centres in the Bay of Plenty or further afield in New Zealand or even overseas. To some extent the work of Scion in the forestry industry provides an example of this where the agency is based in Rotorua but where it collaborates with a range of other research institutions mainly in other urban areas.

From the information available it is difficult to be certain of the scale of this activity and its importance to the urban economies in the region, although anecdotally it is probably typically quite small. However, increasing the scale and amenities of the urban areas will assist in attracting the workforces and support activities necessary to underpin the expansion of activities of this type albeit typically from a fairly low base.

7.4 Freight traffic

Forecasts of the growth in freight traffic up to 2041 have been made as part of the Bay of Plenty Freight Study.

There is forecast to be substantial growth in the freight movements impacting on the Bay of Plenty, driven in part by the growth in log and timber products and in part by growth in the demand for aggregates and building materials. At a more local level, the growth of the kiwifruit production will also have some impacts and could particularly affect flows from the east of the region. There is also forecast to be growth in the movement of retail goods, but the scale of this is expected to be attenuated by changes in distribution patterns with more direct delivery to destinations in the South Island and to some extent the lower North Island rather than routing through distribution centres in Auckland. Growth in freight in the Bay of Plenty is also expected to be affected by the decline in coal imports transported from Tauranga to Huntly.

A characteristic of the freight movements in the Bay of Plenty is that these are dominated by a relatively small number of bulk products for which the demands can fluctuate considerably. These fluctuations can reflect climatic conditions as is particularly the case for milk and dairy products, and also international market conditions and competition for shipping space, as is the case for logs and timber. The market for aggregates, another important contributor to regional traffic flows, can also fluctuate with the demands from the construction sector. In addition, the routing of export traffic can have an impact on the area, with the potential for large fluctuations in traffic from the east and also from Waikato. Waikato, which is an important source of traffic through Tauranga port is located approximately equidistantly from Auckland and Tauranga ports and the traffic from this area may therefore shift, in response to relatively small changes in the patterns or costs of international shipping services.

The forecasts made in the NFDS assumed a ‘business as usual’ approach for the future and also did not take into account short-term fluctuations. It is however, recognised that providing precise forecasts for the future can be a particularly difficult process, given the particular nature of the commodities transported and the potential for change over and above what has been forecast. This is particularly the case for the movement of overseas cargoes which dominates much of the traffic in the Bay of Plenty and also for movements of some commodities like logs and timber. However, by considering forecasts on a commodity basis and developing separate approaches for each of these can help to limit any possible issues that might arise.

The NFDS made forecasts for 2031, reflecting a 25 year forecasting horizon. However, given the economic downturn, it is considered that these forecasts are now probably more applicable to 2035, although to maintain consistency with the NFDS and the UNIFS work currently being undertaken concurrently, these are still labelled as "2031". A set of forecasts have also been made for 2040, a forecasting year used for the RLTS, and in developing these it has been assumed that growth over the five year period from 2035 to 2040 would represent 20% of the growth forecast for 2006-07 to 2031 made in the NFDS.

The growth by geographical type of traffic is set out in Table 7.5.

Table 7.5 Forecast growth of Bay of Plenty traffic movements 2006-07 to 2031 and 2040 all commodities (million tonnes)

Type of movement	2006-07	2031	Growth to 2031	2040	Growth to 2040
Internal	17.4	29.1	67%	31.4	80%
To and from other upper North Island (UNI) regions	11.2	15.2	36%	16.0	43%
To and from other regions	3.2	4.3	35%	4.5	41%
Total	31.8	48.6	53%	51.9	64%

Growth of the shorter distance movements within the Bay of Plenty is expected to be particularly large, with increases in the longer distance inter-regional movements being more modest. As indicated above, the growth of freight movements to and from the other UNI regions is affected by the decline in coal traffic and the change in patterns of retail distribution.

The growth by commodity over the period to 2031 (2035) and 2040 is set out in Table 7.6.

Table 7.6 Forecast growth of freight movements to 2031 and 2040 for identified commodities (million tonnes)

Commodity group	2006-07	NFDS growth to 2031		Growth to 2040	
	Tonnes (m)	Tonnes (m)	Percent	Tonnes (m)	Percent
Dairy products	1.9	0.0	0%	0.0	0%
Logs and timber products	8.6	4.3	50%	5.2	60%
Meat and livestock	0.3	0.0	0%	0.0	0%
Horticulture	0.8	2.0	260%	2.4	311%
Petroleum	1.3	0.5	38%	0.6	46%
Coal	0.9	-0.9	-100%	-0.9	-100%
Aggregate	3.1	3.0	99%	3.7	119%
Limestone, fertiliser, cement and concrete	2.1	1.6	76%	1.9	90%
Other minerals and metals	0.9	0.0	0%	0.0	0%
Retailing and couriers	1.5	0.8	53%	0.9	61%
Total	**21.4**	**11.3**	**53%**	**13.6**	**64%**

Forecast growth is expected to be dominated by the movements of the key basic commodities produced in the region, particularly those related to logs and timber products, horticulture with a strong focus on kiwifruit and aggregates and other building materials and chemicals. The forecast shares of freight traffic by mode for the Bay of Plenty region are set out in Table 7.7 and Figure 7.3.

Table 7.7 Forecasts of growth to 2040 - total flows by mode (million tonnes)

Year	Total	Rail		Coastal shipping		Road	
	M tonnes	M tonnes	Modal share	M tonnes	Modal share	M tonnes	Modal share
2006-07	31.8	4.8	15%	0.6	2%	26.4	83%
NFDS to 2031	48.6	6.9	14%	1.3	3%	40.4	83%
2040	52.0	7.3	14%	1.5	3%	43.2	83%

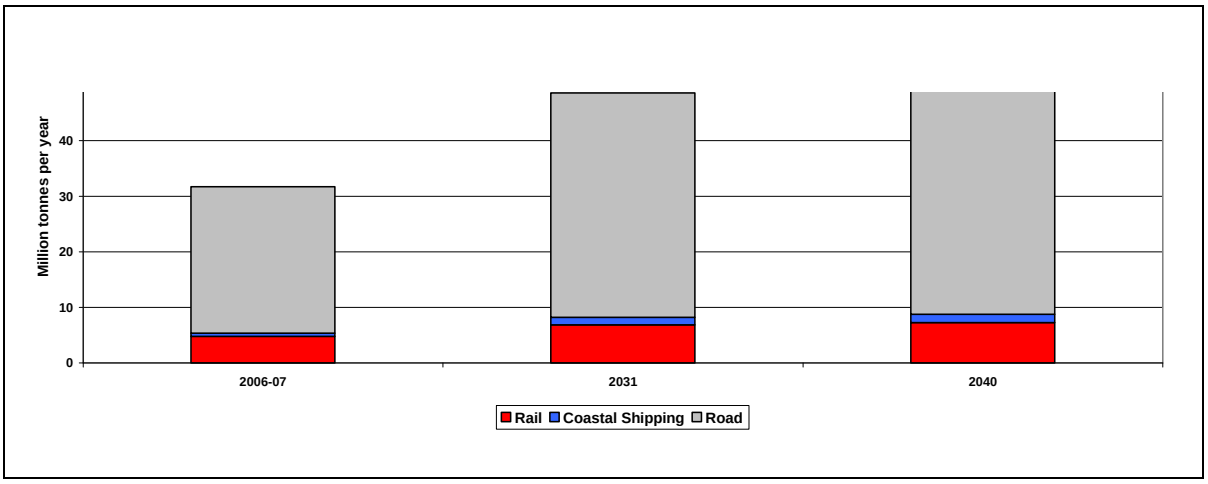


Figure 7.3 Forecasts of freight traffic impacting on Bay of Plenty to 2040 – total flows (million tonnes)

Over the forecast periods, the shares of the three modes in total freight movements are expected to remain broadly constant with the rail share decreasing slightly and that of coastal shipping increasing also slightly. Although the rail share is forecast to decline, the underlying growth in the level of demand means that the volumes transported by rail are forecast to increase substantially by over 50%, despite the reduction in coal traffic and limited growth in the movements of imports of retail and manufactured goods between Tauranga and Auckland.

There is therefore a need for the transport network, including both road and rail to provide sufficient capacity support to the potential growth in the output of a number of key industries in the region. We have in particularly highlighted the importance of the links with the areas to the east of the region, to cater for the flows associated with increased outputs of logs and timber, of kiwifruit and possibly of aquaculture products. The role of the port in serving more distant markets, particularly in Waikato and Auckland also emphasises the importance of the provision of sufficient capacity, for these longer distance flows, again with both road and rail playing a part.

7.5 Changes in commuting patterns

The substantial growth forecast in population and employment will impact on the possible patterns of commuting and the gravity model developed as discussed in Section 6 has been used to assess these impacts. On the initial assumption that the level of accessibility offered by the transport network stays at current levels, except for the major urban areas where some increase in travel time has been assumed, the forecast changes in commuting flows are set out in Table 7.8.

Table 7.8 Initial gravity model forecasts of commuting in the Bay of Plenty 2006-2041

Residence of workers	Workplace									
	WBOP	**Tauranga**	**Rotorua**	**Whakatane**	**Kawerau**	**Opotiki**	**Total BOP**	Hamilton	Other Waikato	Auckland region
WBOP	**6,900**	**5,000**	**50**	**0**	**0**	**0**	**11,950**	**50**	**100**	**100**
Tauranga	**1,350**	**34,400**	**50**	**0**	**0**	**0**	**35,750**	**100**	**50**	**350**
Rotorua	**100**	**300**	**6,100**	**0**	**0**	**0**	**6,500**	**50**	**100**	**150**
Whakatane	**50**	**150**	**50**	**950**	**-50**	**0**	**1,150**	**0**	**0**	**100**
Kawerau	**0**	**0**	**0**	**0**	**-250**	**0**	**-200**	**0**	**0**	**0**
Opotiki	**0**	**0**	**0**	**0**	**0**	**50**	**50**	**0**	**0**	**0**
Total BOP	**8,450**	**39,800**	**6,300**	**900**	**-300**	**50**	**55,200**	**250**	**250**	**750**
Hamilton	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**34,650**	**2,250**	**550**
Other Waikato	**100**	**250**	**100**	**0**	**0**	**0**	**450**	**8,900**	**18,100**	**750**
Auckland region	**50**	**200**	**50**	**0**	**0**	**0**	**300**	**400**	**300**	**419,200**

The pattern forecast for the future very much reflects that currently observed with a high proportion of employment satisfied from within each of the districts and only limited growth in the commuting from other areas. Although as noted earlier in the discussion that the gravity modelling did tend to under-predict the longer distance flows, the effects of this on the overall patterns of commuting are small and do not affect the broader conclusions on the high level of employment, which is satisfied by workers living in the same area. While there will be considerable proportional growth in longer distance commuting, the flows will remain small.

The forecast growth in employment in the Bay of Plenty will increase the dominance of Tauranga and the western Bay of Plenty in general. The increased movements of workers will however bring greater pressure onto the local transport systems and in turn bring increasing congestion with the increased level of activity. Ways to manage this potential congestion will therefore be important in ensuring that the areas are able to function most effectively and this is considered below in later sections of this report.

Part 8: Relative importance of transport related factors in the future

8.1 Introduction

Section 7 has set the background to the likely increases in population and employment in the Bay of Plenty over the period to 2041 and the increases in key transport demands that are likely to arise. This section considers the importance of transport related factors in supporting this economic growth and identifies some of the implications of improvements to different components of the region's transport system.

8.2 Freight

8.2.1 Introduction

Although as Section 7 indicates, employment growth in the activities generating high levels of freight is likely to be relatively muted, the volume of freight traffic in the region will continue to grow. In part, this will be in response to particular tasks and opportunities generated by the increased production of a range of basic agricultural and aquaculture products and in part, to support activities servicing the growing population. Forecasts from the Bay of Plenty Freight Study indicate that the scale of the freight task in the region, including both flows within, and to and from the region will increase by about 60-65% including substantial growth for both road and rail. This growth combined with the growth of commuting and other private travel will result in growing pressure on the transport network especially in and around the major urban centres.

8.2.2 Specific freight issues

A number of specific areas have been identified which will require enhanced levels of service and capacity from the freight sector if the full economic potential is to be met. These include:

The movement of logs and timber products

The logs available for harvesting within the Bay of Plenty or adjacent in the central North Island and Eastland are likely to increase substantially and additional capacity will be required to move these for processing or export via Tauranga. This will put particular pressure on the transport links from Murupara and Kawerau to the port, both for road and rail and possibly also from Opotiki if the logs from Gisborne and the Te Kaha areas are routed in this direction. Other logs are likely to be processed at locations within the Bay of Plenty, primarily around Rotorua before being exported and this will also require the establishment of reliable transport links to support this expansion. This could also result in some demand for the movement of containerised products from Kawerau to support these activities, for which rail may be able to play a part.

In addition, there are proposals to develop an industrial hub at Kawerau to make use of the timber resources available there and possibly including the production of biofuels. This would need to be supported by high quality and reliable transport links, both for the movement of products to markets and also to allow the site to draw on a large workforce with the skills needed.

The movement of kiwifruit

Although the majority of kiwifruit is currently produced in the western and central parts of the Bay of Plenty, there are proposals to expand substantially, the volumes harvested in the east of the region, particularly in and around Opotiki. This traffic is fairly peaked with a concentration of activity between March and October. The road network in this area is vulnerable to natural disasters, particularly in the winter months and there is only very limited network resilience in the case of any disruptions.

Aquaculture

There are well advanced proposals for the very substantial development of aquaculture in the sea off Opotiki. This would result in large movements of shellfish and possibly other products between Opotiki and processing plants likely to be located in Tauranga. There are proposals to develop a small port at Opotiki to land the product which could also possibly be used for the movement of aquaculture products and possibly other products, particularly logs by coastal barge.

The aquaculture operation could readily produce 20,000 to 25,000 tonnes per annum at an early stage, and employ 900 people. This aquaculture development is likely to have a demand for workers greater than available in Opotiki at present. It will therefore increase the demand for local transport, either for commuters to travel in to Opotiki from nearby areas, or the increased transport needed to support an enlarged population in Opotiki.

While the volumes that might transfer are potentially large, especially if this route is used to timber from Gisborne and Te Kaha is exported via Tauranga, the economics of such an operation are uncertain, and it is likely that the majority of this traffic will be moved by road.

Supporting the needs of the local population

As the population grows, the demand for a wide range of commodities both for personal and commercial use will also grow and have to be supported by the freight transport system. However, in general, while these demands are important, they are probably less sensitive to the level of service provided. While the level of performance of the transport system affects the ways in which these demands would be met, it is unlikely to act as a serious constraint on their expansion. Much of this increased demand is likely to arise in the main urban areas and it is this and its combination with growing flows of commuters and other travellers which raises significant issues.

The role of the port

While there is likely to be an increasing focus on value added activities in the main urban areas, the production of basic materials and commodities for export will remain important and as discussed above, is likely to grow, both for the region and for the other areas in the hinterland of the port of Tauranga. The role of the port in supporting economic activity in Auckland and mitigating the pressure on operational land utilised by the Port of Auckland may also grow.

The planning undertaken by the port indicates that it appears to be well placed to meet the overall growth in traffic likely to arise. However, the efficient servicing of the needs of exporters and importers means that the provision of high quality access links between it and the producers or consumers of the goods moving through the port, will remain important and that potential conflicts between freight to the port and the general traffic supporting accessibility in the city need to be managed.

The port also supports other activities such as the manufacturing of fertiliser and some distribution type activities. However, for much of the traffic there will be little or no value added or transformation in the port of its environs, reflecting the nature of much of the cargo transported and the distance of Tauranga from the main markets in New Zealand.

8.3 Movements of passengers

As Table 7.4 indicates, much of the forecast growth in economic activity is in the services sectors which will increasingly be focussed in the main urban areas, particularly Tauranga, where population and employment are forecast to grow strongly. Satisfying the needs of these industries to attract workers and allow them to operate most effectively and in particular, to gain from the agglomeration benefits gained when firms operate in close proximity to one another, will be important to allow the best use to be made of the potential generated. This will require the provision of a high level of accessibility to the main urban centres, and will need to be achieved in a way which supports the high level of urban amenity that such workers expect. This would be especially the case in a centre like Tauranga where lifestyle and quality of life may be particularly important. This would indicate a major role for quality public transport in supporting these movements and providing a high level of accessibility in the urban cores as well as a well managed system for the movement of private car traffic.

8.4 Impacts of transport changes on levels of economic output

Using the regional Agglomeration Model, an assessment has been undertaken of the impacts of transport changes and also population changes in the levels of economic output in the region. The RAM has been used to forecast the base position for 2041, which takes into account the growth in employment forecast for the region and also the extent to which the increasing employment densities would themselves generate additional agglomeration benefits.

The examination of possible future commuting patterns has indicated that much of the growth will be concentrated within the main urban areas in the region and a nominal allowance for the additional congestion that might result has been included in the base case forecasts for the future. Three additional transport scenarios have then been developed to assess the relative impacts on economic output of different transport options. These are as follows:

- Scenario 1 - Reduction of typical travel times within the three urban areas of about 30%

- Scenario 2 - Reduction of travel times of all other movements within the Bay of Plenty region of 30%

- Scenario 3 - Improvement of inter-regional links, based on the assumed journey time savings, resulting from the construction of the Waikato Expressway and a notional improvement in travel times across the Kaimai Ranges

In addition, a further test **(Scenario 4)** was also undertaken of the effects of reducing in employment in Tauranga in 2041 by 10,000, matched by increases in Rotorua of 7,500 and in Whakatane of 2,500. This allowed the effects of alternative levels of employment concentration to be assessed.

The forecasts that result are set out in Table 8.1. It should be noted that because of the nature of the modelling, these should be regarded as indicative of the position that might result rather than providing precise forecasts. Nevertheless, the approach gives an indication of the scale of the impacts that might be expected and allows the different options to be considered.

Table 8.1 Applying the regional Agglomeration Model, impacts of changes in the transport network and changed distribution of employment in the region 2041 ($bn in 2009 prices)

Scenario	**Impact on base case regional GDP**	
	$bn	**Percent**
Base Case regional GDP in 2041 ($bn)	22.2	
Scenario 1 - Impact of reducing travel times by 30% within the three main cities	0.15	0.7%
Scenario 2 - Impact of reducing all other travel times within region by 30%	0.08	0.4%
Scenario 3 - Improving inter-regional connections - Impact of Waikato Expressway and Kaimai improvement	0.05	0.2%
Scenario 4 - Changes in balance of employment	-0.02	-0.1%

Although the impacts on regional GDP of the scenarios identified are fairly small in proportional terms, in absolute terms, the impacts could be substantial. The greatest impact is achieved with improving accessibility within the three towns. There would be benefits from improving the other links within the Bay of Plenty and between the Bay of Plenty and the rest of the country but given the more limited interactions between the main areas, the effects of this are much smaller.

The results are also sensitive to the distribution of population within the region. Rebalancing population growth away from Tauranga to Rotorua and Whakatane would reduce the scale of the major urban area within the region. As a result, this scenario is predicted to lead to an overall loss of economic output, because of the lower agglomeration benefits achieved.

Although the largest benefits are predicted to be achieved with improvements to accessibility within the three major towns, the modelling and more general analysis undertaken has demonstrated that improving interregional accessibility and particularly accessibility to Auckland is important, despite the substantial distance between the two. Improved links to Auckland would allow employers in the Bay of Plenty to interact more effectively with firms and workers in Auckland, although because of the distances the effects of the improved transport links may be fairly limited. Improving the connections to Auckland Airport as an international gateway would also give better connections to the rest of the world, although in part, this market is addressed with the air services from Tauranga and Rotorua to Auckland.

Tourism plays an important role in the Bay of Plenty, although much of this is focussed in trips from Auckland and Waikato, either from residents or international travellers routing through these. Improving the links from Auckland and Waikato would therefore act to boost tourism in the Bay of Plenty. There are issues with mixing tourist traffic with other types of road traffic and measures which improved the capacity of the transport network would help to alleviate these.

Another growing source of tourists is from cruise vessels of which 54 are expected to berth in Tauranga over the 2010-2011 season. Each of these typically carries about 1500-1600 passengers of whom about 85% are likely to go ashore. These tourists undertake a mixture of types of activities including trips to Rotorua, more local tours within Tauranga or just spend time independently in Mount Maunganui and Tauranga. Again, this last group would probably particularly benefit from bus services and walking and cycling facilities within the urban area allowing them to experience and spend money on a wider range of activities.

Part 9: Deficiencies in the region's transport infrastructure

The main current and potentially emerging future deficiencies in the region's transport network which are likely to impact on economic growth include:

Network resilience

Network resilience is particularly an issue to the east of the region, where there is a very constrained transport network which is also particularly vulnerable to disruption from natural disasters.

Capacity of transport network for freight within the region

There are possible constraints by the vulnerability of the transport network in the east of the region, where this could impact on proposals to expand the production of kiwifruit and also the scale of the proposals for aquaculture. In addition, there are also likely to be issues associated with the increased movement of logs and also processed timber, especially by rail from Murupara and especially Kawerau, where traffic flows are likely to grow strongly as the existing forests are harvested. There may also be a requirement to support a more diverse industrial base in Kawerau if proposals for the production of bio-fuels and other wood-based products eventuate. For all of these, the lack of transport capacity may act to constrain development and thus detract from the levels of economic growth that might be achieved, although quantifying these effects is challenging.

Congestion and interactions in urban areas

There are also issues with the increased volumes of freight through the port and in particular, the way in which this interacts with the movement of travellers within Tauranga. The problem of increased traffic is likely to be compounded with the likely increase in big ships which would increase the peakiness of freight flows into and out of the port and also service rationalisation by the international shipping companies, which may result in international traffic being diverted to Tauranga from other ports. All of these are likely to put pressure on the connections to the port where they will be competing with increased flows of commuter and other traffic, wanting to share the same networks. Congestion on these links will reduce the effectiveness of Tauranga as a compact urban centre, able to again the benefits of clustering of a range of economic activities and measures to protect the accessibility of the town centre are likely to be needed.

Inter-regional links

While some increases in inter-regional capacity will be necessary to support higher flows of some basic commodities, such as logs from the central North Island and from Eastland, the main function is probably to increase the scope for interactions between firms and agencies, provide better connections with customers and suppliers and expand the work force available. For this, a key link is probably the connection between Tauranga and Hamilton where the Kaimai Ranges impose a substantial barrier to movement between Hamilton and Tauranga.

Rural isolation

Many parts of the Bay of Plenty region, particularly in the east are relatively lightly populated and remote from the main urban centres. For these areas, accessibility to a range of facilities is difficult, especially for those who have no or only limited options for travel by car. The difficulty of securing post school education for those who wish to remain in these communities, many of which have high proportions of Maoris, may restrict their choices and economic potential, and may limit opportunities to establish or expand employment, especially in industries using local raw materials. While the overall impact on economic output may be limited, the local social benefits from measures to provide better connections with education facilities may be substantial. The ways in which these might be achieved would include the development of remote learning facilities or probably more satisfactorily, the development of some form of shared public transport. These are illustrated schematically in Figure 9.1.

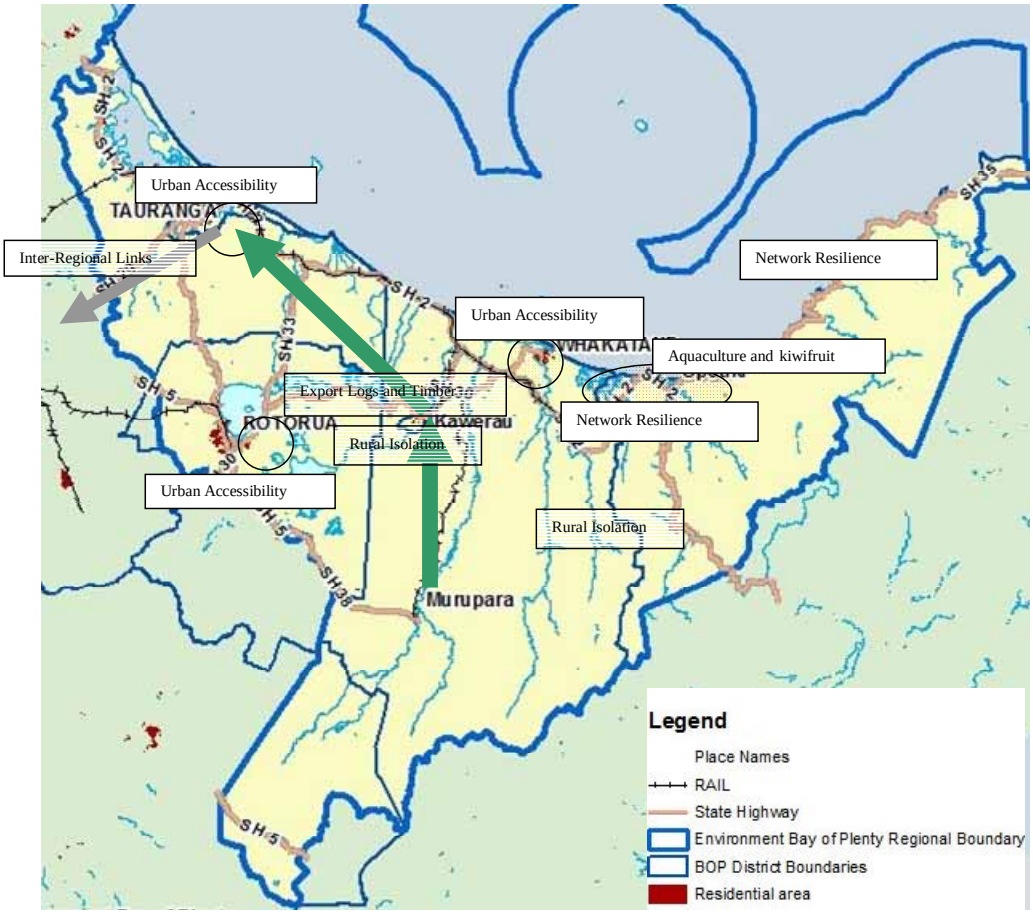


Figure 9.1 Transport issues in the Bay of Plenty

Part 10: The relationship between transport modes and the benefits of improved modal integration

10.1 Introduction

Within the Bay of Plenty, the key drivers of future economic development are likely to comprise increases in the production of a range of basic materials, coupled with the expansion of value added knowledge based activities which generally flourish in concentrated urban centres. For both of these, transport links are important. In the first case, there is the need to move the commodities from where they are produced through the supply chains to where they are consumed or exported. In the case of value added activities, the key factors are to provide employers with access to the skills of the workforce and the potential for interaction between workers, and also to provide the range of commodities required to support these workers at work and at home.

10.2 Freight intermodal terminals and issues

Increases in the volumes on freight on the transport network will arise both because of increased production of primary and manufactured products and because of the increased demands associated with the growing population in the region. The Bay of Plenty Freight Study forecast an increase in freight volumes of about 60-65% by 2041, although in part this reflects the cessation of coal traffic from Tauranga to the Waikato and excluding this, the rate of increase would be larger.

Both road and rail play a significant role in the movement of freight in the Bay of Plenty region. Rail has a significant share of the log and paper traffic between Murupara, Kawerau and the port of Tauranga. It is in principle, well positioned to take advantage of the increased flows of logs expected from the central North Island, although to some extent this would be offset by the reduction in the coal traffic to Huntly. However, accommodating the additional log traffic will require increases in both the capacity of the lines and also additional rolling stock. KiwiRail are currently progressing both of these, although the timing of any improvements will depend on the development of an attractive business case for the investment and on competition from proposals for investment elsewhere in the rail network. Some expansion of the facilities at Kawerau and at Murupara would also be required to support this traffic.

Much of the other traffic currently carried by rail and likely to form the basis of future freight flows is port -related to or from locations outside of the region. This comprises a mixture of bulk traffic and the movement of containerised or other manufactured goods between Auckland and Tauranga. Increasing the volumes carried by rail will therefore require the development or expansion of intermodal facilities in other locations, particularly Auckland, to receive or despatch traffic from or to the port of Tauranga. These would be outside the Bay of Plenty.

There are proposals to develop Kawerau as an industrial hub, primarily related to the processing of logs in some form. This may generate the need for the movement of containers from here to the port supported by a handling facility at Kawerau. Suitable trains would be required for this. At present there appear to be no firm plans to develop rail services for this type of traffic on this route, but if the demand grew to the point where it appeared to be commercially viable, KiwiRail would review the position.

As well as developing some form of timber processing facilities, there are also proposals to develop a form of inland port where logs would be marshalled at Kawerau before despatch to Tauranga. This would help relieve the pressure on space on or near the wharf in Tauranga. The development of such a facility would require that the rail connection between the inland port with Tauranga would provide a reliable link.

Other opportunities for the development of freight intermodal terminals in the Bay of Plenty appear to be limited and the key issues within the region are more likely to be about track capacity and rolling stock availability as the volume of rail traffic grows.

These issues are likely to be compounded by the impacts of changes in international ship calling patterns and also of the introduction of bigger container vessels. The forecasts in the Bay of Plenty Freight Study were based on a 'business as usual' assumption about shipping patterns in part, because of the considerable uncertainty as to the ways in which these may evolve over both the short and longer term. While there have been some moves to rationalise services, the volatility of the industry means that it is difficult to predict longer term trends and the balance of services between the ports. Reducing vessel calls at other North Island ports could be to the advantage of Tauranga in terms of increasing the volumes of traffic through the port and rail, if it had sufficient capacity should be well placed to handle these cargoes. There are however, issues with the speed in which the land transport network both road and rail can respond to major changes in the patterns of flows. This issue also arises with respect to the introduction of larger international container vessels. While not necessarily increasing the volumes of traffic through the port they will increase the peakiness of the traffic and put pressure on Quay space and on the land-side transport links to cater for the very large cargo exchanges. However, discussions with the port have indicated that they consider that the port itself should have sufficient capacity to cope with the exchanges. Steps are being undertaken to improve the capacity of the rail link between Tauranga and Auckland using JOG money but greater investment in rail rolling stock may be required. Additional investment in terminal capacity in Auckland may also be required to accommodate these increased flows.

The development of aquaculture in the eastern Bay of Plenty may generate significant volumes of traffic and the option of transferring the catch to Tauranga for processing by barge is being considered, using the proposed harbour facilities at Opotiki. This could provide an opportunity for transferring some traffic away from road, particularly over a particularly vulnerable part of the road network, although the need to transfer the product to Tauranga fairly quickly may militate against the use of a relatively infrequent barging service.

Overall therefore, apart from some possible development in and around Kawerau associated with the movements of logs and logging products, the potential for developing intermodal terminals for the movement of freight in the Bay of Plenty appears limited. Where there are opportunities, these lie in other regions.

10.3 Movements of passengers

The movement of passengers is likely to become of increasing importance to support the switch of the economy towards higher value added activities especially in the larger cities. The forecasts we have developed in Sections Part 1: and Part 1: highlight these growing trends and the increasing importance of the major urban areas, particularly Tauranga. This will require the development of an attractive, high capacity transport system to cater for passenger flows which are increasing and becoming more concentrated.

To meet these objectives and in particular the delivery of substantial numbers of workers to the main urban centres in a way that as far as possible avoids congestion it is likely that public transport of some form will play an increasingly important role. This will reduce the pressure for new road building in urban areas, which in practice may be difficult or even impossible to achieve within a liveable urban structure and will also allow better use to be made of the highway capacity that is available. By providing a reasonable level of accessibility in a way which is consistent with good urban amenity, public transport can therefore play an important role in supporting economic development.

Within the context of the main centres in the Bay of Plenty, particularly Tauranga and Rotorua it is likely that in general public transport services will provided by bus and increasingly the regional Council is supporting the development of these services. There are possibly some limited opportunities for the use of rail in Tauranga but the potential for this is probably over the longer term and would need to be supported by an appropriate planning regime encouraging the development of the higher density nodes both of employment and residential development which are more supportive of high capacity public transport.

Bus and possible future rail services will also need to be supported by the development of quality terminals and stations and may also be supported by the development of priority measures allowing improved access to the central areas possibly supported by the development of suitable park and ride or interchange facilities at suitable locations. For these it will be necessary for the various agencies concerned with the management of the road network, the provision of public transport infrastructure and the provision of public transport services to work together to produce integrated outcomes.

Improved public transport may also help to retain older workers within the workforce, allowing their experience and expertise to continue contributing to the economy. Analysis of the education levels of the older residents of the areas in the Bay of Plenty indicates that these tend to be higher in the urban areas where there is greater potential for the development of public transport services which may enhance the accessibility of this age group.

Part 11: Conclusions and an appropriate 'mix' of future transport investment across activity classes to 2040

Overall, we have reached the following conclusions in regard to the overarching connections between transport and economic development:

- In a developed economy with a substantially complete transport system, the impact of transport investments cannot be automatically assumed to lead to economic growth.

- In practice, the economic growth potential of transport improvements will depend critically on the presence of other pre-conditions for growth at the national, and most importantly, regional and local level. Specifically, this will be the case where transport improvements can resolve isolation and bottleneck issues and a sound economic basis already exists for growth at the local level.

- It is our view that the current transport network provided by the links within and to the region can be regarded as acceptable. However, future economic and population growth will be likely to impose pressures at certain points across the network.

- Agglomeration benefits are a consequence of urban scale and density and are not universal across the transport network. Therefore, transport investments which facilitate increased employment density in urban centres, can be expected to significantly contribute towards the potential for productivity growth. In a modern economy it is these types of accessibility improvements that can be expected to have the greatest impact on economic development, through the improved access for people. Currently, most areas of the region are self-contained in terms of commuting flows with very little movement between main centres. This is unlikely to change in the future.

- There are limits to the potential for higher densities to be achieved through reliance on private vehicle access alone. An integrated approach to land use and transport planning, with increasing emphasis on passenger transport and alternative modes will become more of a necessity to support further intensification in areas of higher density.

The report has identified a set of potential or actual network deficiencies, currently impacting on the transport system or likely to arise with future population and economic growth. Addressing these deficiencies will require a balance of investment across transport modes and locations, specific to the deficiencies identified. Our analysis suggests that in terms of the potential impact on economic activity, the priorities for investment should sit in the categories defined below.

- Improving urban accessibility to accommodate population growth and achieve higher residential and employment densities, in order to seek productivity gains from further agglomeration and providing opportunities for travel while maintaining the amenity of the urban areas. This includes:

  - Public transport services and infrastructure which will be increasingly important in facilitating increased employment density in main urban areas, in conjunction with land use planning intended to deliver higher residential and employment densities.

- Improving the effective capacity of the highway network through demand management and limited provision of new capacity, to the extent that this can be incorporated without impacting on the amenity of the areas affected.
- Provision of walking and cycling facilities in urban areas in conjunction with supportive land use planning and development.

- Providing for inter-urban freight movements to support the continued growth and viability of the primary sector within the region through:
  - Improvements of capacity to meet increased flows of logging and timber traffic. This is likely to be focussed on rail and on the connections from Kawerau to cope with the movement of logs and possibly more sophisticated products but would also include improvements to the highway network, particularly in the east where there are issues of both network capacity and network resilience.
  - Improvements of capacity to meet the likely doubling in production of kiwifruit again, especially in the east, in order to facilitate the transport of primary produce via packhouses to the port for export.
  - Provision of infrastructure for the movement of aquaculture products, especially from the Opotiki area. In principle, there may be options for transporting material by sea but the feasibility of this would need to be demonstrated.
  - Improvement of the rail network supporting the inter-regional movement of products to and from the Port of Tauranga, to ensure that there is sufficient capacity to meet the increased demands resulting from the overall growth of this traffic and from the changes in the patterns of demand, resulting from the introduction of larger ships. Work is already being progressed on upgrading the capacity of the East Coast Main Trunk railway but this process will probably have to be continued further as it is likely that traffic flows will continue to increase. This will be driven in part by the increasing importance of the Port of Tauranga as a port serving Auckland as well as other parts of the upper North Island.
- Providing improved inter-regional movements of passenger traffic, particularly connections to Auckland. This could take advantage of the proposed construction of the Waikato Expressway, and include an improved route across the Kaimai Ranges, which would also have the advantage of improving the connection to Hamilton.
- Providing improved connections for inter-urban passenger movements within the Bay of Plenty. To some extent, the construction of the Tauranga Eastern Link provides a major improvement to the east which will benefit passenger movements both within and to and from Tauranga, as well as a number of the freight movements identified above. In part, these should aim to address issues of rural isolation, and allow the training and entry to the workforce of potential workers living in remote communities.

The key requirements for future investment are set out in Figure 11.1.

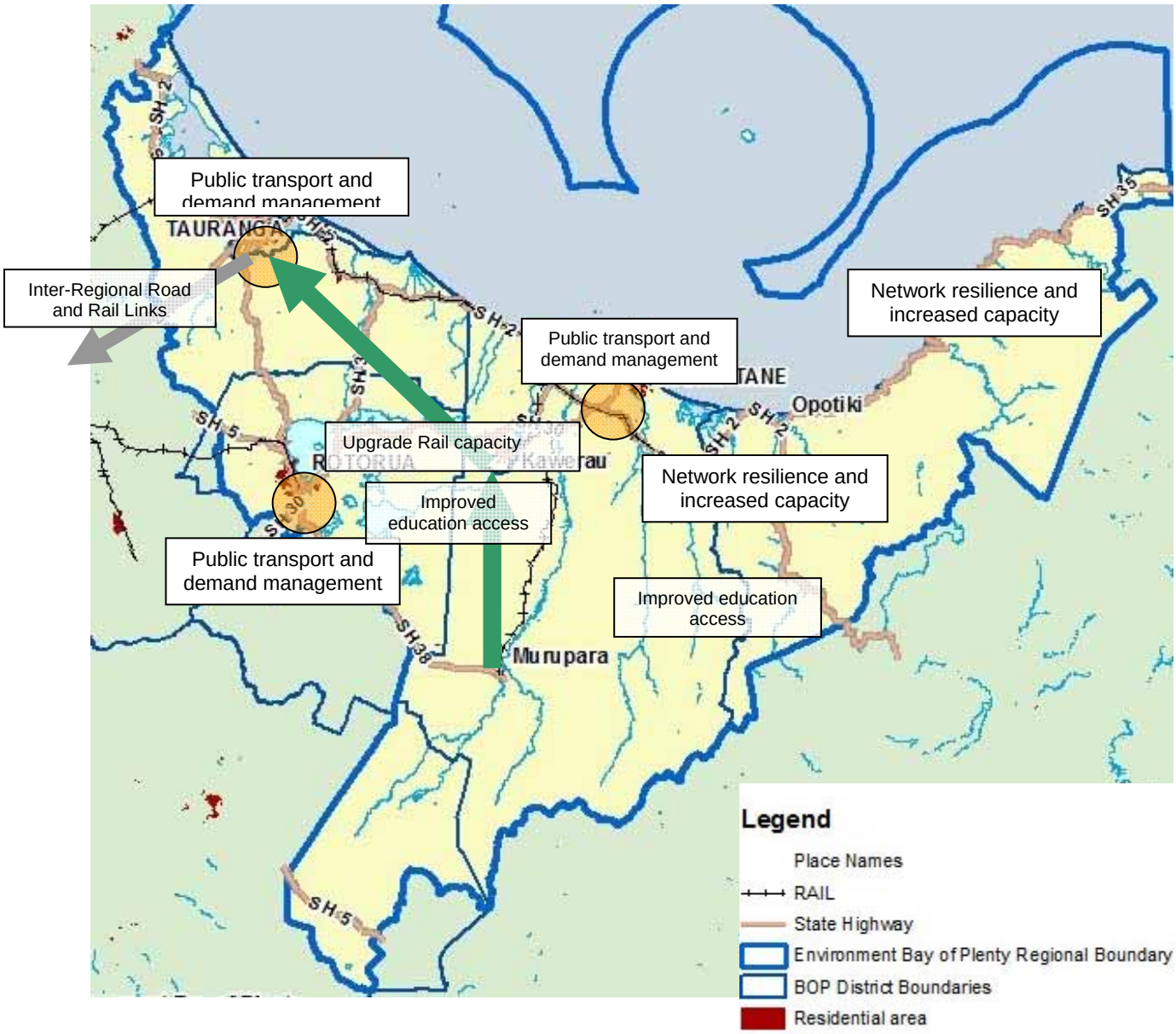


Figure 11.1 Focus for future transport investment

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Appendices

Appendix A - Stakeholder workshop notes

Workshop notes: Transport and the economy in the Bay of Plenty

October 2011

- Workshops were held in Tauranga (a.m., pa 12 October 2011), Whakatane (a.m. 13 October 2011) and Rotorua (p.m. 13 October 2011).
- Discussion was structured around a briefing paper and key questions circulated prior to the workshops.
- Workshops were facilitated by Rawinia Kamau, Richard Paling, Kel Sanderson and John Williamson.

The tables below record key comments and observations from participants.

	Transport and economy in the Bay of Plenty Workshop – Tauranga, 12 October 2011 - a.m.
Theme	**Key comments**
Industry	• **Steel and coal** as a key item to transport. Distance from quarries a restraint. Affects price and cost of road building and maintenance. Shortage of material? – more about where the material is, rather than the shortage. No constraints on getting aggregate where we want it • **Tourism opportunities** - More season type tourism activities around the summer when population grows from holiday makers • Western Bay of Plenty – Key sectors - **forestry, kiwifruit, dairy** • Foster existing and emerging (**aquaculture, titanium**) industries • **Geothermal energy** is an emerging industry • **Iwi development** key part of future - Iwi/trust coming together to get better leverage off that land • **Wood processing** - what is needed to get further value add. Need technology to add value. Big players tend to source their product and sell to Chinese market versus smaller players? • **Added value** issue - cost of processing here costly, so taken overseas, e.g. China more economically sound, e.g. Timaru – leather manufacturer. Wellington – architect designing and exporting houses. Co that are further processing are usually. Sawmill in Katikati – export to USA • **Weather** – key factor, driven avocado and kiwifruit industries. Good weather and rainfall. Good soil • **Forestry** – Key industry for the region, transport constraints, particularly distance. East Coast forests due for harvest, problem with roads and distance • **Kiwifruit -** Economy 20% of GDP kiwi fruit, treble in 10 years – improve on orchards…make it more mechanical versus labour intensive. Opportunities in varieties versus added value • Primary production is limited, dairying limited. Not much growth, but will need

	to do much more efficiently • **Aquaculture** – Will they transport to process? • **Marine servicing industry** might relocate to Opotiki as a result of the harbour development
Demographics	• Population a driver for western Bay of Plenty • Population growth key economic driver • Lifestyle is a key driver, Waikato farmers come to Tauranga to retire • Changing demographic. Locate first and then look for the job. Set up a base here, versus have employment – commute out, but live here • Resistance to intensification by general public. Older residents are bit more open to it as long as it's been done

Theme	Transport and economy in the Bay of Plenty Workshop – Tauranga, 12 October 2011 - p.m. Key comments
Industry	• Aquaculture key industry for Bay of Plenty, specifically for Bay of Plenty Regional Council. Need funding for harbour entrance • Key industries for eastern bay include kiwifruit, eco-tourism, river aggregate and forestry • Maori economy significant – JV for aquaculture venture, offshore opportunities being investigated • Geothermal new industry – key driver for future growth • Biofuel opportunities – wastage from forest floor • Recycling and Zero Waste opportunities • Titanium - poses threat to stainless steel • Tourism key industry
Transport/ infrastructure	• Roading isn't economic development, an enabler. Harbour entrance like road bridge – economic enabler. Transport responding to. Transport needs in the Bay – 4000 fertiliser from wharf to Opotiki for kiwifruit. Potential of barges; if oil price get to point where some of it is more economic. Five thousand on barge versus 40 tonne on a truck. River aggregate. Sixty truck/trailers/month of Opotiki aggregate. Eco tourism, charter boat fishing and other stuff from harbour. Other benefits, but cost effective • Whakatane not option for harbour entrance, unworkable 140 to 150 days per year • Rail link from Kawerau a big constraint for wood processing • Skill workers commute, therefore need route to be secure • Under investment in infrastructure, in catch-up mode versus (particularly Te Puke), also examples in Katikati • Karangahake Gorge a bottleneck. Tauranga urban area – still bottleneck, still need funding • Most SME – lost time due to congestion – stuck in traffic, lots have relocated out of CBD • Proximity to residential areas might be an issue later as port movement increases. Kawerau – putting on more trains, makes it more difficult at Tauranga end • Dual conflict – more people living in CBD as well as more trains. Protect rail and road corridors. Keep them open and have multiple uses • **Air transport** – inland airport (customs broker in Tauranga airfreight/air service) – similar to Christchurch. Transport logistic support industries
Route security	• Routine Security for Opotiki. All routes closed. Issue with emergency services. Six hundred thousand dollars for all weather access.
Educations/skills development	• **Education** key driver for Bay of Plenty's economy. More specific to industry needs - retain students and attract others. Stimulates community. **Su** – commuting a problem. Opportunities for public transport. Same for Opotiki. Bay of Plenty Polytechnic – Waikato Strategic Partnership. (includes Awanuiarangi) – possible rationalisation. (e.g. Tairawhiti and EIT, Hawkes Bay). Aligning/predicting to grow and diversification • **Skilled workforce** – Having the right skill set to meet demand. Public transport doesn't enable people to come in to get some skills. Accessibility issues. PT and technology. Deprived communities don't have access and/or public

	transport
Public transport	• Access to PT. Buses to sites; possible seasonal work. Bottleneck – Bayfair • Parking big issue, cost of parking. Pressure on economic viability on CBD Dispersion to malls and Cameron Road. • Changes people's attitude and culture – going from A to B, door to door

	Transport and economy in the Bay of Plenty Workshop – Whakatāne, 12 October 2011 - p.m.
Theme	**Key comments**
Public transport	• Students need transport to main centre (Whakatane). Have to put on transport to bring in students. Lack of transport Kawerau, Whakatane and Opotiki. More trade training have to 'attend' in person versus remote login. Socio-economic situation prohibits transport • Primary/secondary; large network of schools. Large number of kids coming to town ($10/day) – intermediate and high school • Focus on PT is more Tauranga and Rotorua – need more in eastern bay. Social and economic drivers for PT in the eastern bay • Have ageing populations that have difficulty accessing health care services due to limited PT available
Industry	• **Maori** key factor to economic growth – huge potential in Maori land development • **Primary industry + tourism important**. How can primary industries add value • **Land values** here in the eastern Bay of Plenty more affordable than other parts of the Bay of Plenty • Need all **linkages to work** in order for the eastern Bay of Plenty to remain sustainable • Need to think about **fuel and gas**; possible big driver for economy in the future • **Geothermal**, Hydrodams, power demands in the big picture • **Commodity prices** main driver for logs. Need to be high enough. Only harvest when high. Can be harvested on demand and prices versus kiwifruit and milk that need to be harvested • **Chemical extraction out of wood** – new range of product from wood source. Need to get it OUT of the eastern Bay of Plenty. Opotiki as a possible port for logs • Individuals create businesses in the places that they want to retire. • **Fifteen charter boats** in Whakatane (were 23) – possible relocation to Opotiki
Demographics	• **Eastern Bay of Plenty unique within the Bay of Plenty** – Maori living in Maori communities and wanting to remain there rather than all live in CBD and other urban areas • **Low income** – transport needs to support social and economic needs in small communities
Transport infrastructure	• Logs reliant on Tauranga port. Opotiki could be alternative • State Highway 2 and 29 not suitable infrastructure route • Link of rail and road for eastern Bay of Plenty – economic port/road link along Matata straits. Economic development in the eastern Bay of Plenty not limited by needed to 'get it out'. Eastern Bay of Plenty not compounded issue of migration of populations. Keep our economy alive. Have to have the link there • Route is a 'jewel' that needs to be protected • Airport has potential. Unrestrained protected airspace. Enable it to be used for larger aircraft without restrictions of Tauranga. Airport as a possible route for freight transport. Capacity for 737,1200 m sealed.

	Projected extension to 737 • Second most popular place for motorhomes – good for tourism. How this can benefit economic 200,000 days of motor home hire per annum in New Zealand. How do we manage that? What transport needed? Money spent on activities versus accommodation • Issues with local road and state highways; the relationship mixture of local and state highway roads. Is there a way to protect heavy traffic from coastal route, improve efficiency around the back
Internet/connectivity	• Impact of the internet, **faster broadband** – GoNET (iwi owned) attracts individuals to live here and not in the city • Face to face contact still important though – may be the next generation is a bit more open to not having face to face. Technology a life line but people still wanting to drive, so still need the link
Attracting new business	• How do we determine how many large companies will relocate by 2041. Big or small?
Planning/regulation	• TLA's need to be better at recognising the value of those organisations – partnering • Land use planning, proper management of land – RMA enabled improved land use
Route security	• One bridge serving eastern bay • Major problems with State Highway 35 and Waioeka Gorge • $40 m cost; only 1200 using that route, 15% heavies. Port cost $30-$35 m. Possible to transport aggregate and/or forestry

Theme	Transport and economy in the Bay of Plenty Workshop – Rotorua, 13 October 2011 a.m. Key comments
Industry	• **Forestry.** Critical to have current investment in forestry, sawmilling/processing. Long standing forestry industry in the district, up to third and fourth rotation • **Tourism.** Change in tourism industry with impact rest of the Bay of Plenty, not just Rotorua. Same transport routes. Rotorua as a spoke – creation of considerable number of tourism services. Currently a point on the journey, could be a hub in the future • **Iwi** – Iwi as key play for future economic growth • **Adding value**. Need to identify industries where value add is going to take place. (Bay of Plenty forestry and wood processing strategy a key economic driver) • **Look after the existing industries.** Agriculture, forestry and tourism key industries for the district. Need to recognise other industries and their contribution, e.g. manufacturing and emerging geothermal • **Diversification** Must diversify from three core sectors) and attract new as well as grow existing industries. Need infrastructure for business to have confidence. What kind of diversification?? – aquaculture (eastern), geothermal, tourism (high value). Grow in boutique business (brewery, cheesemakers). Geothermal is a possible future industry – issues around district plan (e.g. solid energy re: pellets). KT highly mechanized, maximised technology in forestry already. Areas for better value add. Services within region. Manufacturing to support is good • **Land Use.** Consider land use change of existing dairy properties into other areas. Conversion from forestry to diary. Carbon farming opportunities
Internet/connectivity	• **Fibre networks** will change in the structure of the economy. High speed broadband in the regions will encourage people to stay and or attract others to the region
Labour force and education	• Labour skills need to match existing and future industries. Workers for diversification, (chicken and egg work or workers?). (EG MRP – bring workforce), forestry workers (100 km long). They will stay in the urban areas if they can good access to stuff like broadband • One of the biggest knowledge generators at (SCION – 300 scientists) • Waiariki, Wananga key players in **education** and industry/economic development
Transport infrastructure	• **Three ports**: airport, seaport, IT port • **Roading** - discussion re: freight movements within the region • Key routes identified to avoid having to go through Rotomas for example. Main freight routes into and out of the regions. High productivity routes • Conflictive usage for tourism and forestry – needs to be managed • **Rotorua airport** – two months ahead of target

Executive summary

Background to the study

It is widely assumed that there are strong connections between transport provision and economic growth. However, the nature of this relationship is complex and subject to the interplay of a wide range of socio-economic and spatial factors. This report examines economic development and transport in the Bay of Plenty and identifies ways in which the transport network could be developed to support economic development in the region. The report is an input into the development of an updated Bay of Plenty regional Land Transport Strategy.

Main findings

In short, the main findings of the study is that the future transport system best able to support economic development in the region, will be one with a strong focus on providing for access to jobs in the main urban areas, as this is where a step change in economic activity is most likely to be achieved and supported by transport improvements.

However, the continued importance of the primary sector will also necessitate improvements to inter-urban transport networks including:

- Improving the capacity and resilience of the key transport links in the east of the region.
- Improving the capacity of the road and rail links to Kawerau and points further south.
- Improving the links to Hamilton and Auckland to allow better connectivity with these cities. This would be important both for the movement of freight and of passengers.

Achieving an appropriate balance of investment between these areas must be a key focus for future transport policies.

Linkages between transport and economic development

To provide a sound basis for the study, a review of the relevant literature was undertaken. This confirmed that transport infrastructure can make a positive contribution to economic development when:

- It resolves isolation and bottleneck issues, and
- a sound economic basis already exists for growth.

Without these preconditions, investment in transport infrastructure and services cannot be assumed automatically to lead to economic growth. This may be an issue for much of the Bay of Plenty. Arguably, a reasonably well developed network already exists providing a reasonable level of services for freight transport. Therefore, while improvements will reduce transport costs as resources can be used more efficiently, they will not necessarily alter the level of output which may be determined to a large extent by production constraints or the demands of the market. Furthermore, improvements in transport efficiency may alter the distribution of the value added from the product between producers and transporters, but may not alter total value added.

Secondly, there is an observable trend towards an increasing concentration of economic activity taking place in relatively small geographical areas.[1] The economic geography literature demonstrates the importance of concentrating knowledge intensive activities, but also indicates that for primary production, a focus on spatial transactions costs will be important, although these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value, knowledge intensive outputs. Also important are opportunities to broaden and diversify the economic base of a region and to move production processes higher up the value chain.

Based on these considerations, we have therefore distinguished between:

- The requirements for improved transport links which are necessary to support specific flows, allowing increases in production of basic and in some cases, processed commodities to be moved to ports or domestic markets; and
- More general improvements to transport accessibility which will support increases in value added activities, by increasing the interactions between firms and the sizes of the work forces on which they are able to draw.

Transport and economic activity in the Bay of Plenty

The region is a substantial producer of a range of basic commodities many of which are exported through the Port of Tauranga. Accordingly the Port is New Zealand's largest in terms of volumes, accounting for almost 25% of all imports and exports. The Port also handles considerable volumes of import and export cargoes for other regions. Consequently, the region's road network has greatest intensity of use by freight vehicles in the country (215,000 net tonnes per kilometre in 2002), over twice the national average of 105,000 net tonnes per kilometre.

The region has also experienced considerable growth in population and employment, notably in and around Tauranga placing pressures on the urban transport network. To help to alleviate the problems arising from this, there has been considerable expansion in the public transport services, although these only account for a relatively small proportion of the total traffic movements.

The western parts of the region are also characterised by large and growing proportions of people over 65 and meeting the transport needs of these people is becoming a greater problem, especially if it is desired to retain their skills in the workforce. There are also emerging issues of community access to work opportunities and education and health facilities in the east of the region, where there are a number of relatively isolated communities.

The role of transport as an input in the region's economy

To analyse the relative importance of transport related factors in supporting economic development we developed a simple breakdown of economic activity in terms of employment by its potential use of freight and other transport services. Employment was

[1] OECD, 2009, Regions at a Glance. The report finds that in approximately half of OECD countries, more than 40% of the national GDP is produced in less than 10% of all regions.

defined in terms of three main categories, classified as high, medium and low transport intensity.[2] The breakdown of employment into these three categories is set out in Table E.1.

Table E.1 Employment and GDP by transport generating category in the Bay of Plenty 2006

Transport generating category	Employment in 2006		GDP in 2006	
	Workers	Percent	$bn	Percent
High intensity	13236	13%	1,325	13%
Medium intensity	38898	39%	3,896	37%
Low intensity	48567	48%	5,224	50%
Total	100701	100%	10,445	100%

Source : Statistics NZ and Consultants Analysis. BERL (2007)

Using these categories, in 2006 only 13% of employment is associated with intensive transport use, 39% with medium transport use and almost half (48%) with relatively low transport using activities.

Breaking down employment in the transport using categories by district, reveals that the main urban areas of Tauranga, Rotorua and Whakatane all have over half their employment in the "low" transport generating capacity. Western Bay of Plenty and Opotiki have high shares in the "high" category. Kawerau has a high "medium" share reflecting the high proportion of employment in manufacturing associated with the timber processing in the town.

Over the period from 1996-2006, the pattern of employment and potential transport use changed, with growth concentrated in service type activities with relatively low freight demands but high demands for good worker access, as shown in Table E.2:

Table E.2 Changes in Employment by transport generating category 1996-2006

Transport generating category	Employment		
	1996	2006	Growth
High	13446	13236	-210
Medium	32214	38898	6684
Low	35460	48567	13107
Total	81120	100701	19581

In addition, on a spatial basis, much of the growth for both medium and low freight using sectors has been focussed in Tauranga, accounting for 80% and 65% respectively of the regional growth in these categories.

[2] A detailed definition of the employment categories is provided in Section 5.6

The role of commuter transport in the region's economy

The commuting flows in 2006, display a range of patterns in terms of the extent to which areas are self-contained or attract or generate commuters from elsewhere. At one extreme Rotorua, Whakatane, and Opotiki are relatively self-contained with 93%, 89%, and 89% of the workforce living in the area and with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga.

Tauranga itself has about 87% of its workers living in the city with much of the balance (12%) travelling in from western Bay of Plenty. Of the balance, the rest of the Bay of Plenty region including Rotorua contributes about 1% and areas outside the region, less than 1%.

The analysis of the journey to work data, emphasises the importance of the links within the individual areas as the routes that commuters use. The numbers making longer distance commuting trips between the areas or into and out of the region are relatively small.

The importance of transport related factors in the future

Over the period to 2041, population and employment in the Bay of Plenty are forecast to grow strongly. Continuing the trends observed in the past, it is anticipated that the majority of growth in employment will be in the service type activities, with relatively low usage of freight but with a greater emphasis on the movement of people and with a tendency to concentrate in and around Tauranga.

Movement of freight

Although employment growth in the activities generating high levels of freight is likely to be relatively muted, the volume of freight traffic in the region will continue to grow. In part, this will be in response to particular tasks and opportunities, and in part to support activities servicing the growing population. Forecasts from the Bay of Plenty Freight Study indicate that the scale of the freight task in the region including both flows within and to and from the region will increase by about 60-65%.

A number of specific areas have been identified which require enhanced levels of service and capacity from the freight sector if the full economic potential of the activities it serves is to be met.

Table E.3 Areas requiring enhanced freight provision in the future

Forestry	Log supply in the Bay of Plenty, central North Island and Eastland is likely to increase substantially and additional capacity will be required to move these for processing or export via Tauranga. This will put pressure on the road and rail links from Murupara, Kawerau and possibly Opotiki to the port. Logs processed at other locations within the region, primarily Rotorua before being exported will also require transport links able to accommodate this expansion. This could also result in some movement of containerised products from Kawerau.

	In addition, proposals to develop an industrial hub at Kawerau to make use of the timber resources available there and possibly including the production of biofuels would need to be supported by high quality and reliable transport links, both for the movement of products to markets and also to allow the site to draw on a large workforce with the skills needed.
Kiwifruit	Although the majority of kiwifruit is produced in the western and central parts of the Bay of Plenty, there are proposals to expand substantially the volumes harvested in the east of the region, particularly in and around Opotiki. This traffic is fairly peaked with a concentration of activity between March and October. The road network in this area is vulnerable to natural disasters particularly in the winter months and there is only very limited network resilience in the case of any disruptions.
Aquaculture	There are proposals for the substantial development of aquaculture at Opotiki. This could result in large movements of products between Opotiki and processing plants likely to be located in Tauranga. Coupled with this development, there are proposals to develop a small port at Opotiki to land the product which could also be used for other products particularly logs by coastal barge. While the volumes that might transfer are potentially large, especially if this route is used to export timber from Gisborne, the economics of such an operation are uncertain, and it is likely that the majority of this traffic will be moved by road.
Supporting the needs of the local population	As population grows, the demand for commodities both for personal and commercial use will also grow and have to be supported by the freight transport system. However, in general, while these demands are important, they are probably less sensitive to the level of service provided and while transport supports these demands, it is unlikely to act as a serious constraint on their expansion.

Movements of passengers

With much of the forecast growth in economic activity in the service sectors and focussed in the main urban areas, particularly Tauranga, satisfying the needs of these firms to attract workers will require the provision of a high level of accessibility to the main urban centres. This will need to be achieved in a way which also supports the high level of urban amenity that such workers expect especially in a centre like Tauranga, where lifestyle and quality of life may be particularly important. This would indicate a major role for quality public transport in supporting these movements and providing the necessary high level of accessibility in the urban cores.

Impacts of possible changes in accessibility

A simple regional Agglomeration Model was developed to test the potential benefits from improving accessibility within and to and from the region and the effects of changes in the balance of employment in the main urban centres. Four hypothetical scenarios were considered:

Table E.4 Future scenarios

Scenario 1	Reducing travel times within three major urban areas by 30%
Scenario 2	Reducing travel times within the Bay of Plenty outside the three major urban areas by 30%
Scenario 3	Improving inter-regional connections with Auckland and Hamilton. Construction of the Waikato Expressway and notional upgrading of the link across the Kaimai Ranges
Scenario 4	Changes in the balance of employment between Tauranga, Rotorua and Whakatane, with the total for Tauranga being reduced by 10,000 balanced by increases in Rotorua (7,500) and Whakatane (2,500).

The impacts of each scenario on the level of output in the Bay of Plenty region are fairly small in proportional terms, but in absolute terms the impacts could be substantial. The greatest impact is achieved with improving accessibility within the three towns. There would be benefits from improving the other links within the Bay of Plenty and between the Bay of Plenty and the rest of the country but given the more limited interactions between the main areas, the effects of this are much smaller.[3]

Table E.5 Impacts transport and employment changes in 2041 ($bn 2009$s)

	Impact on regional GDP	
	$bn	**Percent**
Base Case regional GDP in 2041 ($bn)	22.2	
Scenario 1	0.15	0.7%
Scenario 2	0.08	0.4%
Scenario 3	0.05	0.2%
Scenario 4	-0.02	-0.1%

The results are sensitive to the distribution of population within the region. Scenario 4 would reduce the scale of the major urban area within the region. As a result, this scenario is predicted to lead to an overall loss of economic output, because of the lower agglomeration benefits achieved.

Although the largest benefits are predicted to be achieved with improvements to accessibility within the three major towns, the modelling and analysis has demonstrated that improving interregional accessibility (particularly to Auckland) is important. This would allow employers in the Bay of Plenty to interact more effectively with firms and workers in Auckland, although because of the distances the effects of the improved transport links may be fairly limited. Improving the connections to Auckland Airport as an international gateway would also give better connections to the rest of the world, although in part this market is addressed with the air services from Tauranga and Rotorua to Auckland.

[3] It should be noted that given the nature of the modelling these figures should be considered as illustrative of the general trends rather than as precise forecasts.

Deficiencies in the region's transport infrastructure

The current and potentially emerging future deficiencies in the region's transport network likely to impact on economic growth are as follows:-

Table E.6 Network deficiencies

Network resilience	This is an issue to the east of the region. There is a very constrained transport network which is vulnerable to disruption from natural disasters. Past interruptions have had significant impact on the horticulture, agriculture, tourism and forestry industries in this part of the region. The impact on the economy of the eastern district will continue to compound as the aquaculture industry develops if issues of route security are not addressed. The vulnerability of the transport network in the east of the region could impact on proposals to expand the production of kiwifruit and also the scale of the proposals for aquaculture
Capacity of transport network for freight within the region	There are likely to be issues with the increased movement of logs and processed timber by road and rail from Murupara and Kawerau, where traffic flows are likely to grow strongly as the existing forests are harvested. There may also be a requirement to support a more diverse industrial base in Kawerau if proposals for the production of bio-fuels and other wood-based products eventuate. A lack of transport capacity may act to constrain development and thus detract from the levels of economic growth that might be achieved, although quantifying these effects is challenging.
Congestion and interactions in urban areas	There are issues with the increased volumes of freight through the port and in particular, the way in which this interacts with the movement of travellers within Tauranga. The problem of increased traffic is likely to be compounded with the likely increase in big ships which would increase the peakiness of freight flows into and out of the port and also service rationalisation by the international shipping companies which may result in international traffic being diverted to Tauranga from other ports. This will be likely to put pressure on connections to the port where they will be competing with increased flows of commuter and other traffic wanting to share the same networks. Congestion on these links will reduce the effectiveness of Tauranga as a compact urban centre able to again the benefits of clustering of a range of economic activities.
Inter-regional links	While some increases in inter-regional capacity will be necessary to support higher flows of some basic commodities (e.g. logs), the main function is to increase the scope for interactions between firms, to provide better connections with customers and suppliers and expand the work force available. For this, a key link is the connection between Tauranga and Hamilton where the Kaimai

	Ranges impose a substantial barrier to movement between Hamilton and Tauranga.
Rural Isolation	The east of the region is relatively remote from the main urban centres. For these areas access to a range of facilities is difficult, especially for those who have no or only limited options for travel by car. The difficulty of securing post school education for those who wish to remain in these communities, many of which have high Maori population may restrict their choices and economic potential, and may limit opportunities to establish or expand employment especially in industries using local raw materials. This area currently represents a significant portion of the employees for both the kiwifruit and forestry industries and having access to transport is imperative. The solution provided to date has been the provision of private transport supported by the employees and/or education providers. Improving the availability of transport not only impacts on the overall level of economic output and in addition the local social benefits from measures to provide better connections with education facilities could be substantial. The ways in which these might be achieved would include the development of remote learning facilities (which have been tested somewhat to date) or more favourably, the development of some form of shared public transport.

Enabling conditions for a 'step change'

A "step change" in economic development really calls for the substantial expansion of highly productive value added activities, primarily focussed in the service or high level manufacturing sectors. Experience from around the world and New Zealand indicates that these are most likely to be achieved in the key urban clusters where a substantial economic base exists or can be readily developed.

Here, the benefits of agglomeration arising from the interactions of firms and the availability of a large labour force can best be achieved. Using improvements in transport networks and services to increase the critical mass of cities therefore forms an important component of this strategy. The introduction or expansion of urban transport systems to allow higher levels of accessibility while seeking as far as possible to preserve urban amenity form the cornerstone of this approach.

Future patterns of transport development that would support 'step change'

The transport system likely to make the greatest contribution to the desired patterns of economic development is one with a substantial focus within the main urban areas of Tauranga and to a lesser extent Rotorua. This would aim to provide good connections between residential suburbs and central areas and take advantage of measures for traffic demand management to minimise the effects of congestion.

The transport system will still need to recognise the importance of freight movements which are often required to share roads and corridors with cars and passenger transport and should seek to minimise conflicts between heavy vehicles and other road users. This will

have both highway and public transport components to give a balanced investment for all modes.

The future transport system will need to be accompanied by appropriate planning measures. These should aim to develop urban forms which provide the densities to support public transport schemes and which also encourage the development of an attractive urban form for the central areas and for those surrounding these. Improvements to walking and cycling may form part of these, particularly in providing enhanced urban amenity but their role in stimulating economic development is likely to be small.

The emphasis within the cities will need to be supported by a range of measures across the region to support the movements of freight including:

- Improving the capacity and resilience of the key transport links in the east of the region.
- Improving the capacity of the road and rail links to Kawerau and points further south.
- Improving the links to Hamilton and Auckland to allow better connectivity with these cities. This would be important both for the movement of freight and of passengers.

An appropriate 'mix' of future transport investments across to 2040

Addressing the economic opportunities and the network deficiencies identified will require a balance of investment across transport classes. The analysis we have set above suggests that in terms of the potential impact on economic activity, the priorities for investment would be as set out in the following table and map:

Table E.7 Investment priorities to 2041

Outcome	Investment priority
Improving urban accessibility while maintaining the amenity of the urban areas	• Public transport services and infrastructure • Improving the effective capacity of the highway network through demand management and limited provision of new capacity, to the extent that this can be incorporated without impacting on amenity • Provision of walking and cycling facilities to enhance urban amenity and support public transport
Providing for inter-urban freight movements	• Improvements of capacity to meet increases in flows for logging and timber traffic. This is likely to be focussed on rail and on the connections from Kawerau to cope with the movement of logs and possibly more sophisticated products but would also include improvements to the highway network particularly in the east, where there are issues of network resilience and the capacity to meet potential conflicting demands • Improvements of capacity to meet the likely increases in production of kiwifruit again especially in the east • Provision of infrastructure for the movement of aquaculture products again especially from Opotiki. In

	principle there may be options for transporting material by sea but the feasibility of this would need to be demonstrated. • Improvement of the rail network supporting the inter-regional movement of products to and from the Port of Tauranga to ensure that there is sufficient capacity to meet the increased demands resulting from the overall growth of this traffic and from the changes in the patterns of demand resulting from the introduction of larger ships. Work is already being progressed on upgrading the capacity of the ECMT but this process will probably have to be continued as likely traffic flows continue to increase.
Providing for improved inter-regional movements of passenger traffic, particularly for the connections to Auckland	• This could probably most advantageously take advantage of the proposed construction of the Waikato Expressway, and include an improved route across the Kaimai Ranges, which would also improve the connections to Hamilton. • Other modes such as air or rail may also play a part in the longer term.
Providing for improved connections for inter-urban passenger movements within the Bay of Plenty	• To some extent the construction of the Tauranga Eastern Link provides a major improvement to the east which will benefit passenger movements both within and to and from Tauranga, as well as a number of the freight movements identified above. In part, these should aim to address issues of rural isolation, and allow the training and entry to the workforce of potential workers living in remote communities.
Addressing issues of rural isolation	• Possibly by the development of some form of public transport services shared between different groups of users.

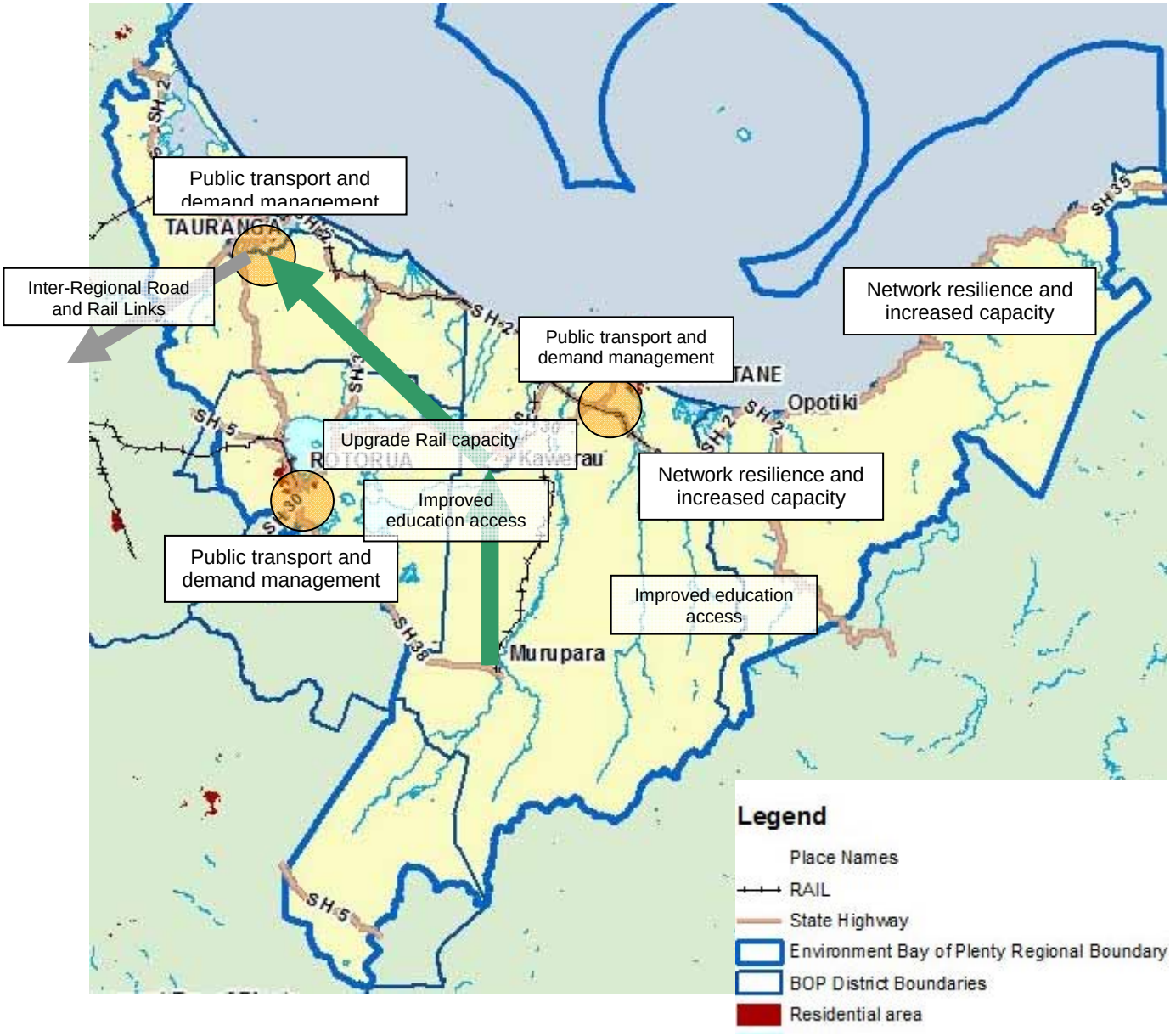


Figure E.1 Focus for future transport investment

Contents

Part 1: Introduction and background

1.1 Overview of the study

The Bay of Plenty is one of New Zealand's fastest growing regions and with Waikato and Auckland, forms part of what is often termed the 'Golden Triangle' in the upper North Island. Although economic activity in the region has traditionally been focused strongly on the exploitation and export of primary resources, particularly dairy products, logs and timber and other agricultural products, and on tourism in Rotorua, with the increasing growth of the urban population there are opportunities emerging for higher value added activities serving the region from local sources. Transport's role in the regional economy is underlined by the importance of the Port of Tauranga, both as an export hub for bulk primary commodities and as a viable alternative to Auckland for containerised imports and exports from the upper north island.

The policy context within which this study is being undertaken now widely recognizes the importance of transport as an enabler of economic growth (e.g. GPS, 2009, *Bay of Connections,* 2008). However, this is a complex relationship and there remain significant knowledge gaps in the nature of this relationship, particularly at the local level. The evidence indicates that in a region with a well-developed economy and a substantially complete transport network, such as the Bay of Plenty, investment in transport infrastructure cannot be automatically assumed to lead to economic growth. Rather, the economic growth potential of transport improvements will depend critically on the presence of other pre-conditions for growth at the national, and most importantly, regional and local level. Specifically, this will be the case where transport improvements can resolve isolation and bottleneck issues and a sound economic basis already exists for growth at the local level. Recent developments within the economic geography literature have done much to provide a framework within which these factors can be analysed.

This study addresses some of these gaps and given the nature of the economy of the Bay of Plenty region, will cover both freight links to support primary and manufacturing sectors and the movement of people, both for commuting and for work trips.

The study also builds on a number of recent, complementary studies, including the Ministry of Economic Development's investigation of the economic linkages between Auckland, Hamilton and Tauranga[4] and the Bay of Plenty Regional Freight Study.[5]

1.2 Background economic structure

The region contains a population of about 275,000 as at mid-2009. A substantial part of this population is located in the western areas with Tauranga, the key urban centre, having a population of about 120,000 in 2009 or around 45% of the

[4]Ascari Partners, Richard Paling Consulting and BERL (2010) Economic Linkages between New Zealand Cities (2010) for MED (unpublished)
[5] Richard Paling Consulting (2010 a) Bay of Plenty Regional Freight Study for Environment Bay of Plenty

population of the region. The other important urban centres are Rotorua (56,000) accounting for around 21% of the region's population and to a lesser extent Whakatane (19,000) with Kawerau and Opotiki, the other main settlements each comprising around 3% of the region's population.

The Bay of Plenty region as a whole has been growing strongly in recent years with increases in population and employment above the averages for the country as a whole. Much of this growth has however occurred in the west of the region where Tauranga and western Bay of Plenty district have recorded particularly large increases in population and employment. By way of contrast, for areas further east including Rotorua and Whakatane, growth has been much slower or there has even been decline. As a result, the relative importance within the region of Tauranga in both population and employment terms has grown and economic growth in the east has been fairly limited.

1.3 Transport issues

1.3.1 The transport network

Tauranga, the main urban area in the Bay of Plenty is located at a fairly large distance from the other major urban settlements in the upper North Island. It is situated about 200-220 kms from Auckland with a typical city centre-city centre travel time of between about two hours, 45 minutes to three hours depending on the route chosen. Tauranga is also about 100 kms or 1-1.5 hours away from Hamilton. The location of Tauranga in relation to the rest of the upper North Island is set out in Figure 1.1 below.

Figure 1.1 Bay of Plenty in relation to neighbouring cities

The size of the region is also quite substantial with a distance of 320 kms from Waihi Beach in the west of the region to Potaka in the east and an associated travel time of about four hours and even between the "neighbouring "cities of Tauranga and Rotorua the distance is about 70-80 kms with a travel time of about one hour, 15 minutes. The size of the region and the distances between the major areas acts as an important determinant of its economic structure.

The region is served by a number of state highways which are set out in Figure 1.2. These include State Highway 2 which forms the main spinal route from west to east, connecting Katikati, Tauranga, Te Puke, Whakatane and Opotiki, State Highway 29 which provides the main link to Tauranga from Hamilton, and State Highway 5 which provides the main links to Rotorua. The region is also serviced by rail links from Auckland and Waikato, which enter in the west of the region and a rail connection also to Tauranga from Murupara and Kawerau to the east.

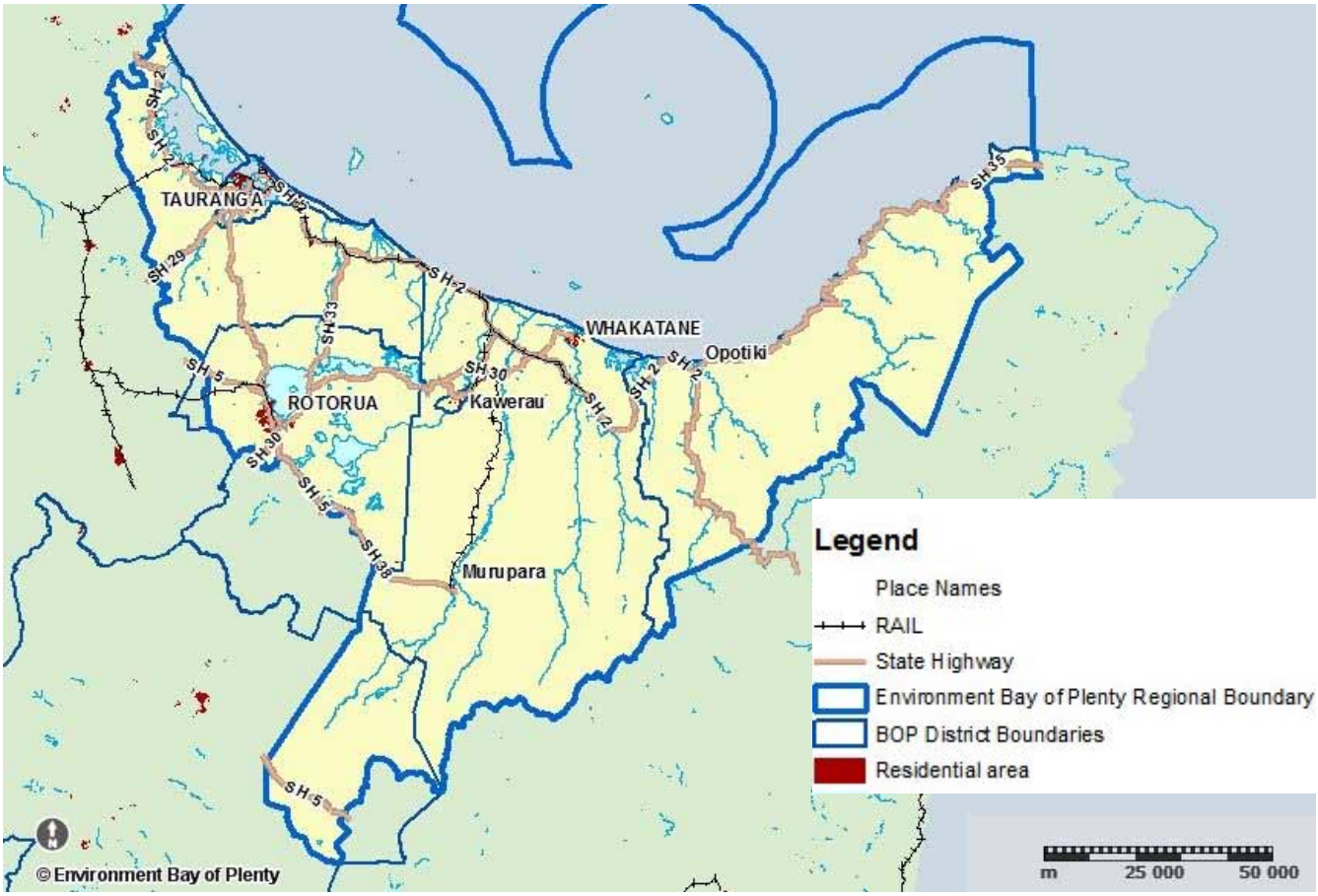


Figure 1.2 Road and rail links in the Bay of Plenty

Public transport services in the region are mainly confined to the main urban centres of Tauranga and Rotorua, with a more limited service in Whakatane and other urban centres. The usage of public transport is low but has typically been growing strongly on a per capita basis.

1.3.2 Patterns of use of the transport network

In terms of the movements of freight, the most notable transport feature in the region is the Port of Tauranga, the largest port in New Zealand in terms of the volumes handled. Tauranga is particularly important as an export port handling 26% of the national total by volume in 2006-07 but is also an important import port for a range of bulk products and containers, many of which are bound for the Auckland area.

A significant issue affecting the road transport network is the connection between Tauranga and Auckland for which there are two alternative routes, both of which have significant constraints particularly for heavy traffic. In general, however, the transport network provided by the links within and to the region is regarded as

acceptable. Tauranga has benefited recently from considerable investment in new roading capacity, aligned with the Smart Growth initiative.

The commuting flows in 2006 display a range of patterns. At one extreme Rotorua, Whakatane, and Opotiki are relatively self-contained (with 93%, 89%, and 89% of the workforce living in the area) with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga. Tauranga has about 85% of its workforce living in the city with much of the balance (12%) travelling in from western Bay of Plenty.

Key highlights of the freight patterns impacting on the region include:

- The importance of Bay of Plenty as a major producer of a range of basic commodities, often focussed on supplying export markets. These include logs and timber products, horticultural products mainly kiwifruit, and some dairy products.
- The role of Port of Tauranga as a major export and import port serving much of the upper North Island for a range of basic products. The links with the Waikato are important for a range of export and import products mainly fairly basic materials, typically transported in bulk and these generate substantial freight flows through the Bay of Plenty region.
- The port is also an important gateway for a range of products to or from the Auckland region, either exported manufactured and agricultural products from Auckland producers or imported goods bound for the large market in the region or for warehouses and distribution centres for onward transport throughout the country. As such, it provides a complement to the services provided within the Auckland region by Ports of Auckland, with the movement of containers to and from the MetroPort inland port in Southdown forming an important component.

1.4 Purpose and objectives of the study

The primary purpose of this study is to develop a better understanding of the relationship between economic development and transport in the Bay of Plenty and have this embedded in regional transportation policy, including the review of the regional Land Transport Strategy.[6] The study seeks to understand how the development of the transport network can help support a high level of economic growth and help to encourage and sustain growth in those sectors which are likely to sustain the longer term growth of the region, especially in respect of high value added activities, and therefore how the transport network needs to be developed to achieve these objectives. This will in turn enable future transport investment in the region to be better targeted at those activities most likely to provide positive economic development spin-offs.

[6] Our study area will be the Bay of Plenty Regional Land Transport Programme area (Tauranga city, Western Bay of Plenty district, Rotorua district, Whakatane district, Kawerau district, Opotiki district). Inter-regional and international movements of people and goods will also be considered where they are identified as critical to supporting economic development within the region.

The study has combined data analysis, theory and modelling to satisfy the three principal objectives. These are:

- To identify and assess the relative importance of the critical transport-related factors contributing to economic development in the Bay of Plenty
- To quantify the future economic impacts of different high-level regional transport investment options (using an appropriate analytical framework)
- To make policy recommendations on the types of transport activities and levels of investment that should be considered in the regional Land Transport Strategy (2011-2014)

In addressing these objectives some of the key questions investigated in the study include:

- What are the critical transport related factors underpinning economic development in the region?
- What will be the relative importance of these factors in the future?
- What deficiencies in the region's transport system need to be addressed to respond to these factors?
- What future transport system will provide the enabling conditions most likely to achieve the 'step change' in economic development that the Government is seeking?
- What pattern of future transport investment will make the greatest contribution to this desired transport system?

We have also taken into consideration a range of relevant influences, issues and relationships including:

- The role of each urban centre within the regional economy and the connections between them
- The connections between urban centres, national and international 'gateways' and areas of production
- The relative importance of transport connections as a factor in attracting high value-added activities and skills to the region
- The relationship between transport modes and benefits of modal integration
- Economic issues identified in the Draft Regional Land Transport Strategy (RLTS) (2011-2014)
- The wider economic costs and benefits of different transport investment options, including indirect/external costs and benefits and the applicability and potential benefits of agglomeration to the region
- Potential for actual economic gains versus transfers

- An appropriate 'mix' of future transport investment across activity classes to 2040

1.5 A framework grounded in economic geography

Economic geography is now recognised as providing a very powerful framework for undertaking the analysis of regional economic development and the role of transport within this process. The framework demonstrates the importance of concentrating knowledge intensive activities but also indicates that where primary production takes place, a focus on spatial transactions costs will be important, although these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value, higher knowledge intensive outputs. Also important will be opportunities to broaden and diversify the economic base of a region and also to seek opportunities to move production processes higher up the value chain.

We will use this framework as a core component of this study, both to explain the region's current situation and to assist in painting a picture of the future opportunities and constraints for the region.

1.6 Structure of this report

This report sets out the analysis undertaken and the key findings from our investigation of the linkages between transport and economic development in the Bay of Plenty region.

This report starts by outlining our methodology in Section 2. Section 3 sets out the background position in relation to population and employment, and Section 4 looks at the hierarchy and roles of the different areas within the region. Section 5 identifies the key transport flows and connections between the areas. Having defined the current position in Sections 3 to 6, Section 6 then investigates the possible linkages between transport and economic growth, starting off with a review of the literature and then analysing the data for Bay of Plenty and developing simple commuting and agglomeration models. Section 7 looks at the future growth of population and employment and considers the way in which the likely growth of employment by sector will impact on the demand for transport. Section 8 considers the way in which freight would be needed to support growth in output of a number of basic commodities, the likely patterns of commuting flows and finally the ways in which different emphases in the transport system are likely to give rise to different levels of economic growth. Section 9 identifies specific possible deficiencies in the region's transport system in relation to the growing demands, Section 10 considers issues of modal integration and Section 11 discusses appropriate focuses for future transport investments.

A feature of the Study was the undertaking of two days of workshops in Tauranga, Whakatane and Rotorua in mid October 2010. While our report has taken cognisance of the issues raised at these, notes of the proceedings are attached in Appendix A.

Part 2: Methodology

2.1 Introduction

Our task is to investigate the critical transport factors underpinning economic development in the region. To achieve this it is important to look in detail at the local situation but to ensure we place our analysis within a broader national context.

At the local level we have examined the drivers of projected production increases around the region, population growth, industrial and urban expansion and intensification. These provide projections of the levels of demand for transport modes, and thus deficiencies in the present system. This is essentially a 'bottom-up' approach to the growth of the region's settlement hierarchy based upon production and population growth. This builds on our existing wide and deep knowledge of regional transport and economic modeling, databases and structures. We have also investigated the extent to which particular characteristics of the transport network are required to provide support for the economic development aspirations of the region, particularly in the development of higher value added activities.

As a second approach to explore the implications of Bay of Plenty's place in national economic development, we have undertaken a 'top-down' assessment of transport factors that may facilitate greater economic development in the region. This will help to ensure that the development of inter-regional transport links complement the transport network within Bay of Plenty and support economic development.

It has been the intention throughout the study to take a flexible and pragmatic approach to the work required, using the initial analysis of the data to help identify and refine the avenues of investigation, rather than impose an approach developed at the outset of the work.

The specific methodology we have used for the study consists of three stages aiming to address the questions raised in Section 1. These comprise:

- Understanding the existing position – including profiling the region, identification of existing urban centres (and their roles) and key transport flows and connections
- Identifying key linkages and drivers - where we investigate the importance of transport connections and identify transport deficiencies within the region
- Developing options for the future

Each of these is discussed in more detail below.

2.2 Stage 1: Understanding the existing position

Our analysis of existing position of the region is used to provide a broad profile of the key indicators, a description of the existing urban centres (and their roles) and data on the key transport flows and connections. The existing position has been investigated using a wide range of published statistics and studies both for the Bay of Plenty region and upper North Island area but also more widely for New Zealand as a whole. The work has also benefitted from the data collection and analysis undertaken for the economic linkages between New Zealand Cities Study which focuses on Auckland, Hamilton and Tauranga. The key sources of information include:

- Statistics from Statistics New Zealand and the Ministry of Tourism
- Bay of Plenty Freight Study
- National Freight Demands Study
- Port statistics for Port of Tauranga
- Road transport flows from New Zealand Transport Agency (NZTA)

Following a review of the published statistics, a range of additional tailored statistics has been purchased from Statistics New Zealand to allow particular elements to be investigated in greater detail.

The specific statistics collected to date for this study include:

Data category	**Specific data/statistics sourced**
Demographic	Population in 1996, 2001 and 2006
	Migration patterns by age and education
Economic	Employment in 1996, 2001 and 2006 both in total and by type of employment
	Earnings by area of employment by sector in 1996, 2001 and 2006
Transport	Journey to work movements in 1996, 2001 and 2006
	Journey to work movements by education level
	Journey to work movements by earnings
	Freight flows by commodity and mode
	Road traffic flows for a number of key sites by all and heavy vehicles
	Movements through the Port of Tauranga
Tourism	Tourist visits and expenditure

In Section 3 we provide an overview of the key data relating to population and employment primarily on a region-wide basis and transport. In Section 4 we profile the key urban centres and identify their roles within the Bay of Plenty and the upper North Island. In Section 5 we identify key transport flows and connections within the Bay of Plenty by examining:

- Commuting flows, including changes in commuting patterns from 1996 to 2006
- Key area to area movements including business travel and freight movements

Our understanding of the published data has also been enhanced by the results of the Stakeholder Workshops undertaken in mid October 2010 and also the interviews we have undertaken as part of the recent complementary studies in the region including the Economic Linkages Study and the Bay of Plenty Freight Study.

2.3 Stage 2: Identifying key linkages and drivers

In the second stage of the analysis we focus on identifying the key transport and economic linkages and drivers in the region. This includes investigating the importance of transport connections and identifying transport deficiencies within the region.

The economic, demographic and transport data we have sourced has been analysed to provide a description of the existing economic position and also to identify the important underlying trends which emerge over time and the key drivers behind these trends, particularly where these relate to components of the transport network and transport services serving the region. To some extent, this has been undertaken using pragmatic approaches deriving key relationships and linkages, but the analysis has been supplemented by more formal and structured models developed to describe the present situation and provide a basis for forecasting developments in the future. These include:

- A model to describe the patterns of commuting movements within the region and with neighbouring areas
- A regional agglomeration model identifying potential spatial interactions and the way in which the transport network supports the wider patterns of economic activity between areas within the region and neighbouring areas
- Analysis of the economic structure of the region and its potential to generate transport demands of different types

We have also undertaken a literature review that has been used to provide a sound theoretical basis for our analysis and recommendations.

2.4 Stage 3: Developing options for the future

Having defined the current position and identified the key drivers and linkages between transport and economic growth in Stage 2, the final step was to consider potential future economic growth scenarios for the region. These have taken into account the current pattern of economic activity and trends and the opportunities likely to be available in the future, both in total and by key sector.

Using both the pragmatic and more formal relationships identified in Stage 2, the extent to which the planned development of the transport network would be able to support future levels of economic activity in the region has been examined and deficiencies in this identified. Alternative approaches which address these deficiencies have then been assessed and this has been used to identify an appropriate set of focuses for future transport expenditure in the region.

Part 3: Understanding the current position: overview of the region

In this section we provide a brief overview of the region which then sets the context for the more detailed material which follows in this report. Many of the statistics on which this analysis is based are derived from Census data. The most recent of this in 2006 is now quite old and in a number of instances we have used statistics from other sources to identify broad trends that have occurred since 2006.

3.1 Population – distribution and growth

The Bay of Plenty region contains a population of about 275,000 as at mid-2009. A substantial part of the population in the region is located in the western areas with Tauranga, the key urban centre, having a population of about 120,000 in 2009 or around 45% of the population of the region. The other important urban centres are Rotorua (56,000) accounting for around 21% of the region's population and to a lesser extent Whakatane (19,000) with Kawerau and Opotiki, the other main settlements each comprising around 3% of the region's population. The distribution of population in 2009 is set out in Figure 3.1.

The population of the Bay of Plenty and growth over the period from 1996 by local authority is set out in Table 3.1.

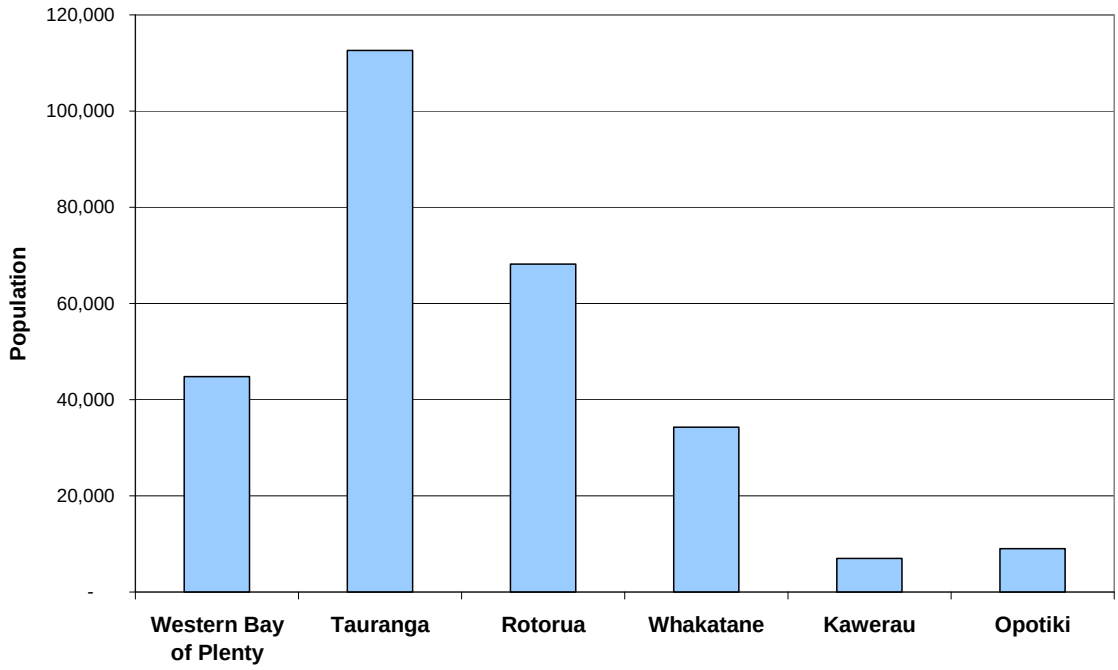


Figure 3.1 Population in Bay of Plenty region 2009

Table 3.1 Population and growth

Territorial Authority	Mid year population estimates						Growth 1996-2006	Growth 2006-2009
	1996	2001	2006	2007	2008	2009		
western Bay of Plenty	35,700	39,100	43000	43600	44200	44800	20.4%	4.2%
Tauranga	80,200	93,800	106,900	109100	110700	112600	33.3%	5.3%
Rotorua	66,700	66,600	68100	68000	68100	68200	2.1%	0.1%
Whakatane	34,400	34,100	34500	34400	34400	34300	0.3%	-0.6%
Kawerau	8,100	7,200	7150	7070	7050	7010	-11.7%	-2.0%
Opotiki	9,600	9,400	9200	9140	9060	9020	-4.2%	-2.0%
Bay of Plenty region	234,600	250,100	268850	271310	273510	275930	14.6%	2.6%
Total New Zealand	**3,758,900**	**3,882,500**	**4184500**	**4228120**	**4268920**	**4315320**	**11.3%**	**3.1%**

Source : Statistics New Zealand and Richard Paling Consulting. Figures are consistent with Sub national Population Estimates

After substantial population growth in the region over the 10 years to 2006, when an increase in population of 15% was recorded over the period compared to a New Zealand wide figure of just over 11%, the relative growth has now moderated. For the region as a whole, the population has increased at about 0.9% per year over the last three years somewhat behind the average for the country as a whole which has averaged about 1.0%.

However, within the region there are substantial differences in the pattern of population growth. Typically population growth in the west in Tauranga and western Bay of Plenty district has been relatively rapid. For these areas the population has grown at about 1.4% to 1.7% per annum between 2006 and 2009, significantly above the average for the country as a whole. In Rotorua on the other hand, population has remained virtually static and in the areas further east the population has declined. In population terms therefore there is a strong contrast between the large and rapidly growing areas to the west and the smaller areas to the east with little or no growth.

A notable feature of the population of the region is its age structure, shown in Table 3.2 and Figure 3.2 below.

Table 3.2 Bay of Plenty age distribution

Area	Age group			
	0-14 years	**15-39 years**	**40-64 years**	**65 years and over**
Western Bay of Plenty	21.2%	25.9%	37.0%	15.7%
Tauranga	**20.6%**	**30.9%**	**31.0%**	**17.3%**
Rotorua	25.0%	33.0%	30.8%	11.2%
Whakatane	24.9%	30.1%	32.2%	12.5%
Kawerau	27.7%	30.5%	29.2%	12.4%
Opotiki	27.0%	27.3%	31.8%	13.9%
Bay of Plenty region	**22.7%**	**30.4%**	**32.1%**	**14.8%**
Hamilton	21.6%	41.1%	27.3%	10.0%
Auckland City	18.4%	42.8%	29.3%	9.4%
Whangarei	22.8%	29.4%	33.0%	14.9%
New Zealand Average	21.2%	35.0%	31.6%	12.2%

Source Statistics NZ and Consultants Analysis

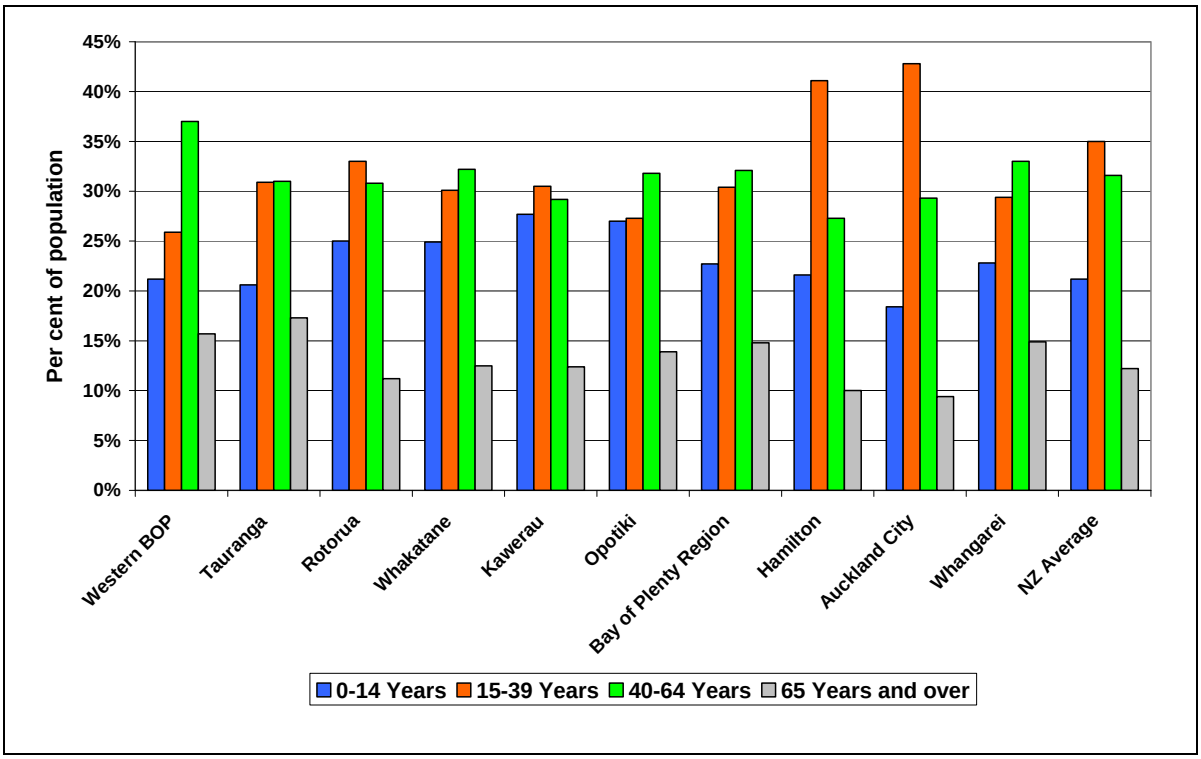


Figure 3.2 Age distribution of Bay of Plenty population 2006

Compared to the country as a whole, the region has a high proportion of residents aged 65 or over and a relatively low proportion in the 15-39 year age bracket. Within the region, Tauranga has a particularly high proportion in the over 65 age bracket (making up 17% of the population, compared to 15% for the region as whole and 12% for the country as whole). Balancing this, especially compared to the national position is a relative low proportion in the 15-39 age group, 31% compared to 35% nationally and 41 to 43% in Auckland and Hamilton. This may have implications for development of local economy with potential shortage of young, skilled workers.

There are however, strong contrasts between Tauranga and Rotorua, the second largest urban area in the region which has a relatively small share of the population over 65 and a relatively high share of younger residents.

Across the rest of the region, western Bay of Plenty has a high proportion over 65 and a low proportion aged 15-39. For the other districts, the younger population represents a relatively high share of the total and the over 65s have a low share. Again this emphasises the differences between the different parts of the region.

The patterns of population by age have implication for the potential for economic development. The relatively high share for the oldest population group represents a segment of the population with a limited degree of participation in the workforce, although because of their age they have a higher demand for health and other support services. In addition to the extent that this age group does or aspires to participate in the work force, there may issues in providing the transport for these people.

3.2 Employment

Broadly in line with the distribution of population, the main employment areas in the region are in Tauranga and Rotorua and the distribution of employment is set out in Table 3.3.

Table 3.3 Employment in the Bay of Plenty

Area	Total Employment in the Bay of Plenty				Growth 1996-2006	
	1996	2001	2006		Number	Percent
			Total	Percent of total		
western Bay of Plenty	11151	11853	13,293	13.2%	2,142	19.2%
Tauranga	29679	34527	44,127	43.8%	14,448	48.6%
Rotorua	24723	23910	26,334	26.2%	1,611	6.5%
Whakatane	10074	10131	11271	11.2%	1197	11.9%
Kawerau	3111	2850	3048	3.0%	-63	-2.0%
Opotiki	2379	2388	2622	2.6%	243	10.2%
Total Bay of Plenty	81117	85659	100,695	100%	19578	24.1%

Source: Statistics NZ Census data

Employment in Tauranga in 2006 was estimated at about 43,000 and in Rotorua 25,000. These represent about 70% of total employment in the region. Again, reflecting the patterns of population growth, employment in Tauranga has been growing rapidly increasing by about 46% between 1996 and 2006. The strong growth in employment in Tauranga represents about 80% of total employment growth for the whole region between 1996 and 2006.

Employment also grew in the western Bay of Plenty at almost 20% but growth further east was much more modest with Rotorua growing by 2.9% over the period, although this has accelerated recently. Employment in Whakatane grew by 10% and Opotiki by 7% but Kawerau experienced a loss of employment opportunities, declining by 5%.

The shares of each area in the total employment in the Bay of Plenty are set out in Table 3.4.

Table 3.4 Employment shares in the Bay of Plenty

Area	Share of total Bay of Plenty employment		
	1996	2001	2006
western Bay of Plenty district	13.7%	13.8%	13.2%
Tauranga city	36.6%	40.3%	43.8%
Rotorua district	30.5%	27.9%	26.2%
Whakatane district	12.4%	11.8%	11.2%
Kawerau district	3.8%	3.3%	3.0%
Opotiki district	2.9%	2.8%	2.6%
Total Bay of Plenty	100%	100%	100%

An observable trend from the data is that Tauranga has increased its proportion of region's total employment over the period, with western Bay of Plenty district retaining a broadly constant share probably because of interactions with Tauranga. There has been a drop in the Rotorua proportion of region's total employment over the period and also a very marked drop in Rotorua's level of employment relative to Tauranga, which dropped from 85% of Tauranga employment levels in 1996 to 60% in 2006.

Information is available from an alternative statistical source (LEED) on the growth of employment between 2006 and 2009 and the growth observed is set out in Table 3.5.

Table 3.5 Employment growth in Bay of Plenty 2006-2009

Area	Growth June 2006 - June 2009	
	Total	Annual average
western Bay of Plenty	13.5%	4.3%
Tauranga	3.9%	1.3%
Rotorua	-2.6%	-0.9%
Whakatane	7.0%	2.3%
Kawerau	-5.6%	-1.9%
Opotiki	12.5%	4.0%
Total Bay of Plenty region	3.9%	1.3%
Total New Zealand	1.8%	0.6%

Source: Statistics NZ LEED Database

Over the past three years growth in employment has typically slowed down although reasonably high growth has been achieved in western Bay of Plenty and although from a small base in Opotiki. However, to some extent, this is balanced by recorded employment decreases in Rotorua and Kawerau. For the region as a whole, employment growth amounted to about twice that for the country.

The details of employment by sector are set out below in Section 5.6.

3.3 Educational attainment

The level of educational attainment of the workforce is a key factor in its productivity and the position for the districts in the Bay of Plenty in 2006 is set out in Table 3.6 and Figure 3.3.

Table 3.6 Educational attainment for the workforce 2006 (percent of employed residents)

Education level	Western BOP	Tauranga	Rotorua	Whakatane	Kawerau	Opotiki	Total region	Total NZ
No qualification	22%	19%	21%	22%	30%	29%	21%	18%
Level 1-4 Certificate	51%	53%	50%	50%	49%	45%	51%	49%
Level 5-6 Diploma	12%	11%	10%	10%	8%	9%	10%	10%
Level 7 and above	11%	13%	13%	11%	5%	8%	12%	18%
Not elsewhere Included	5%	4%	6%	6%	8%	8%	5%	4%
Total	100%	100%	100%	100%	100%	100%	100%	100%

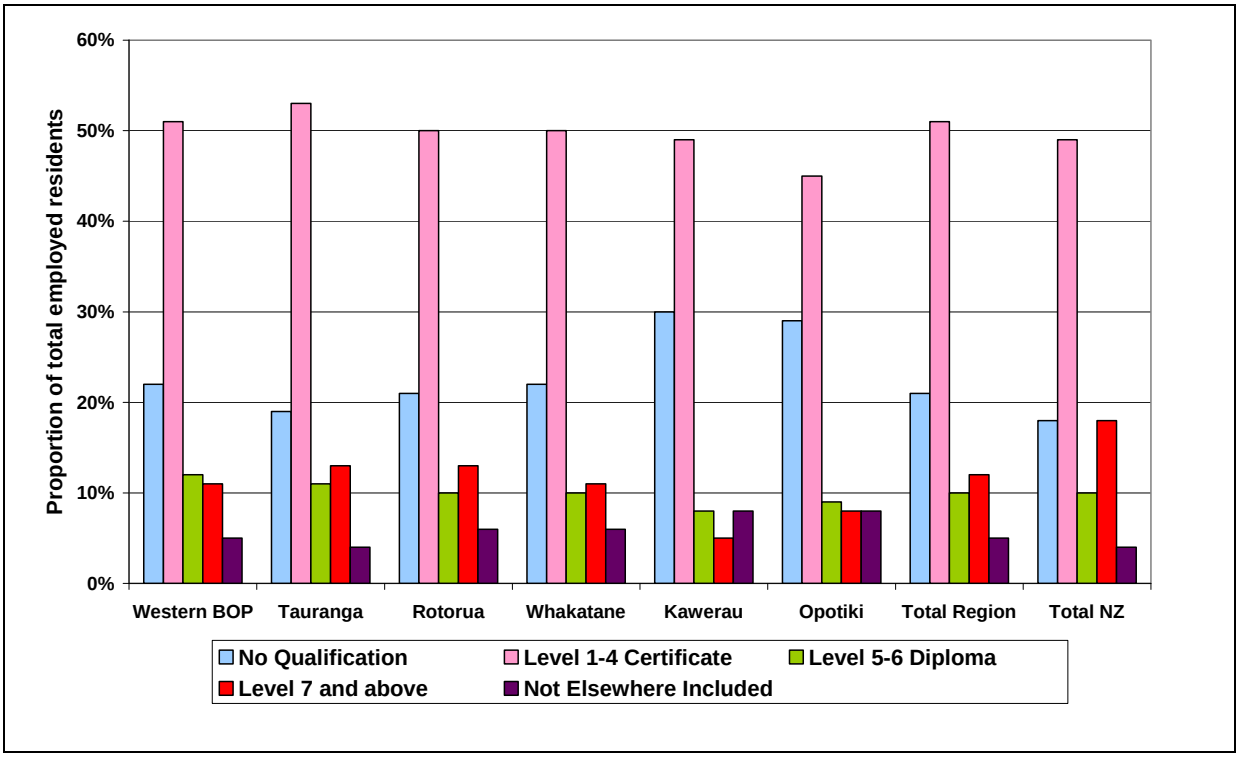


Figure 3.3 Educational attainment for the Bay of Plenty workforce

Compared to the national average, the districts in the region have a high proportion of the workforce with no or only basic (Level 1-4) qualifications and a relatively low proportion with degrees or equivalent (Level 7 or above). The proportion of workers with no qualifications is particularly high in the more remote areas to the east of the region and as we discuss later, this may reflect the difficulty of accessing higher educational establishments for people living in these areas.

The different levels of educational attainment are also linked with differences in average income levels and this is set out in Table 3.3.

Table 3.3 Earnings by educational attainment for the Bay of Plenty workforce 2006 ($ pa)

Education levels	Average earnings							
	WBOP	**Tauranga**	**Rotorua**	**Whakatane**	**Kawerau**	**Opotiki**	**Total region**	**Total NZ**
No Qualification	30,200	29,800	28,900	29,400	31,400	24,600	29,400	29,800
Level 1-4 Certificate	33,800	34,400	34,300	34,600	34,900	30,600	34,200	35,300
Level 5-6 Diploma	39,900	41,900	42,500	45,300	47,600	39,400	42,100	44,200
Level 7 and above	53,600	53,900	54,200	56,500	47,600	45,800	54,000	55,600
Not elsewhere included	28,200	28,200	27,600	29,400	30,300	26,300	28,200	28,100
Total	35,700	36,800	36,400	37,000	35,200	30,700	36,300	38,900

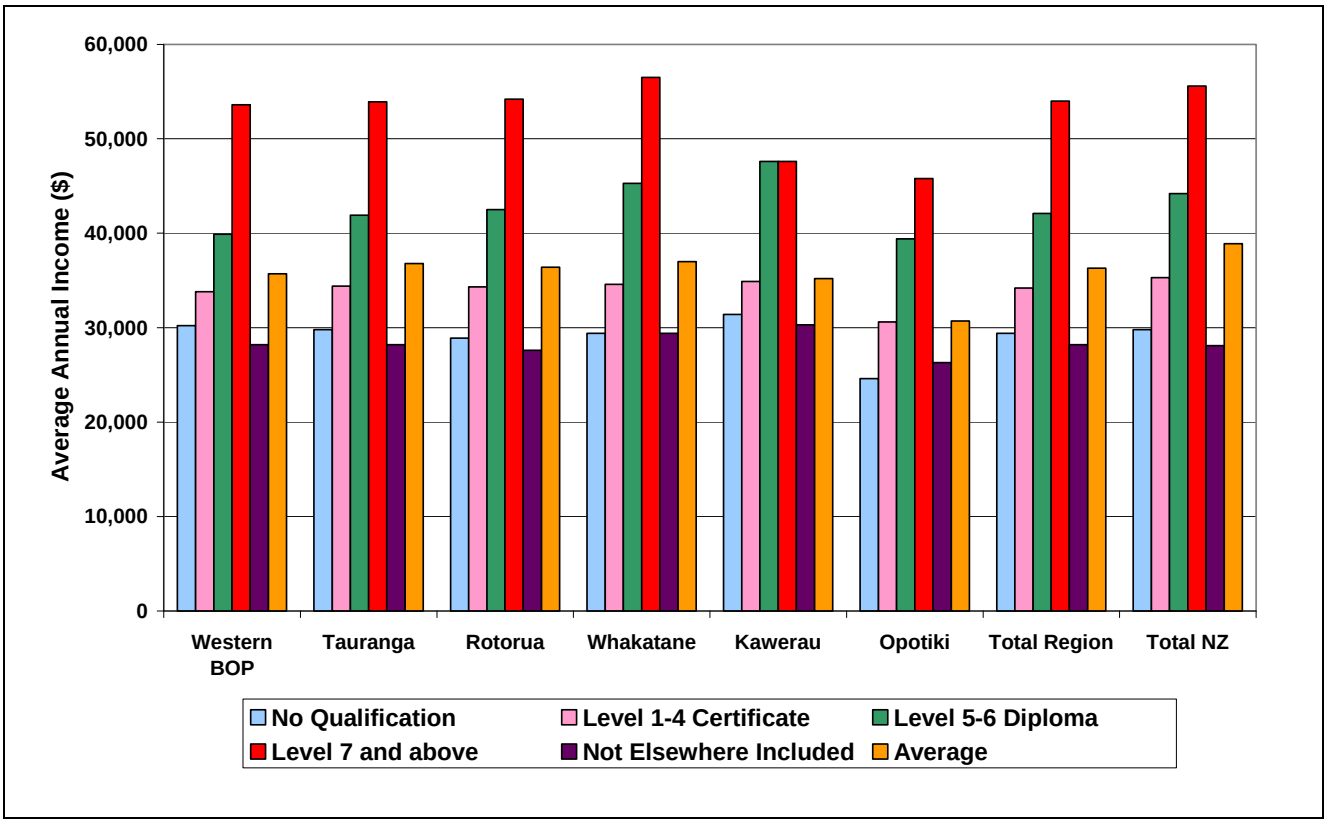


Figure 3.1 Earnings by educational attainment for the Bay of Plenty workforce 2006 ($ pa)

There are clear links between earnings and educational attainment for almost all the districts, although for each level of educational attainment there is some variation between the districts. Opotiki for example, has low earnings in each educational category, possibly reflecting the lack of opportunity for all types of workers. For all districts the average wage rate for residents is below that of the country as a whole.

For western Bay of Plenty, Tauranga, Rotorua and Opotiki, the relatively low average earnings reflect a combination of low earnings for each educational category above unqualified, together with relatively high proportions of the resident workforce in the lower education categories. For Whakatane and Kawerau, there are still high proportions in the lower educational categories but because of the particular industrial structures of the areas, earnings for those educated to Level 5-6 are above national averages and for Whakatane, average earnings for those with a Level 7 or above education are also above the national average.

In education terms, improving wages and output therefore would benefit both from improving general education levels, although this would need to be balanced by an increase in suitable jobs for a better qualified workforce. The current structure of the area with a strong emphasis on the production and simple processing of primary products is not particularly conducive to such changes and this would therefore need to be supported by a switch to higher value added activities.

An important factor in constraining the levels of educational attainment in the more remote areas, particularly those in the east of the region, is the reported difficulty of

accessing higher educational facilities for those who may not have access to private transport. This is reported to be a particular issue for individuals, particularly Maori who have a strong attachment to their home environment and for whom the costs or difficulty of accessing facilities which might provide further education or training, are in effect, prohibitive.

Part 4: Understanding the current position: identification of the key urban centres and their roles within the Bay of Plenty and the upper North Island

4.1 The settlement hierarchy in the Bay of Plenty

With the large number of settlements within the Bay of Plenty, particularly of the smaller ones, the inter-relationships between the settlements of the region become important. This is particularly the case for smaller settlements which are reliant on larger settlements for a range of activities. A settlement hierarchy for the Bay of Plenty region is presented in Figure 4.1.

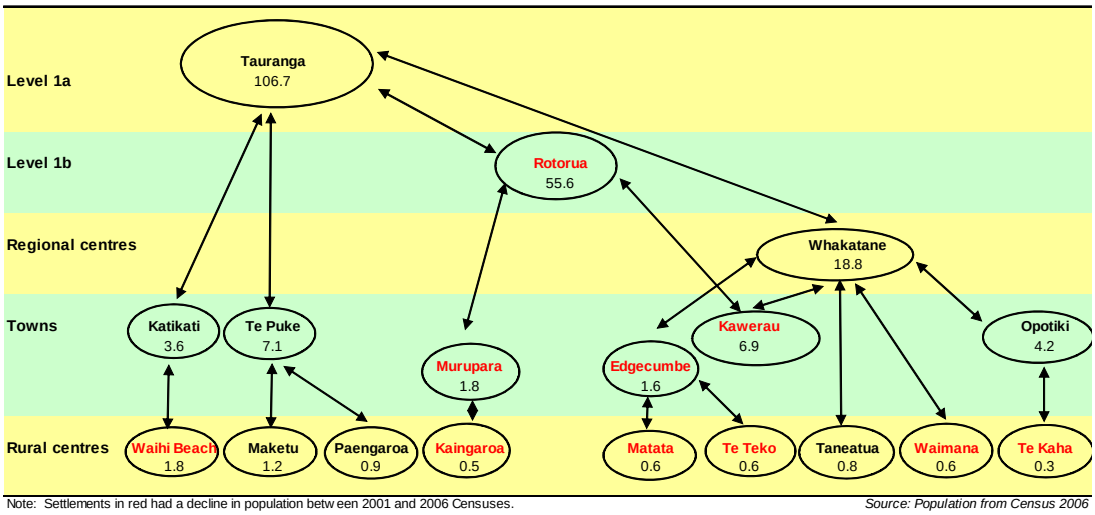


Figure 4.1 Bay of Plenty settlement hierarchy (for the census Usually Resident Population Count 2006 (000's))

Tauranga is the main centre for the region, with Rotorua a secondary centre and Whakatane a regional centre. Tauranga is the alpha city in the region and has direct links to four other settlements including two of the three regional centres (Rotorua and Whakatane).

The geography of the region suggests that smaller centres also play key roles. For example, Whakatane also has five links and towns such as Te Puke support two smaller rural centres (Maketu and Paengaroa). Effective transport is essential to provide these economic linkages.

4.2 Functions of cities and activities by sector

4.2.1 Introduction

Reflecting the hierarchy we have defined above, we have examined employment in a number of sectors to gain an indication of the types of sectors which appear to be particularly interconnected and the scale of this connection. This has been undertaken for employment in:

4.2.2 Social services

- Retail and hospitality
- Business and property services
- Primary Industries
- Processing and manufacturing employment
- Social services

A large share of workers in all communities is employed in the provision of social services to people. The share of employment in providing social services reflects the position of the settlement on the hierarchy. These shares for Bay of Plenty TLA's are shown in Figure 4.2.

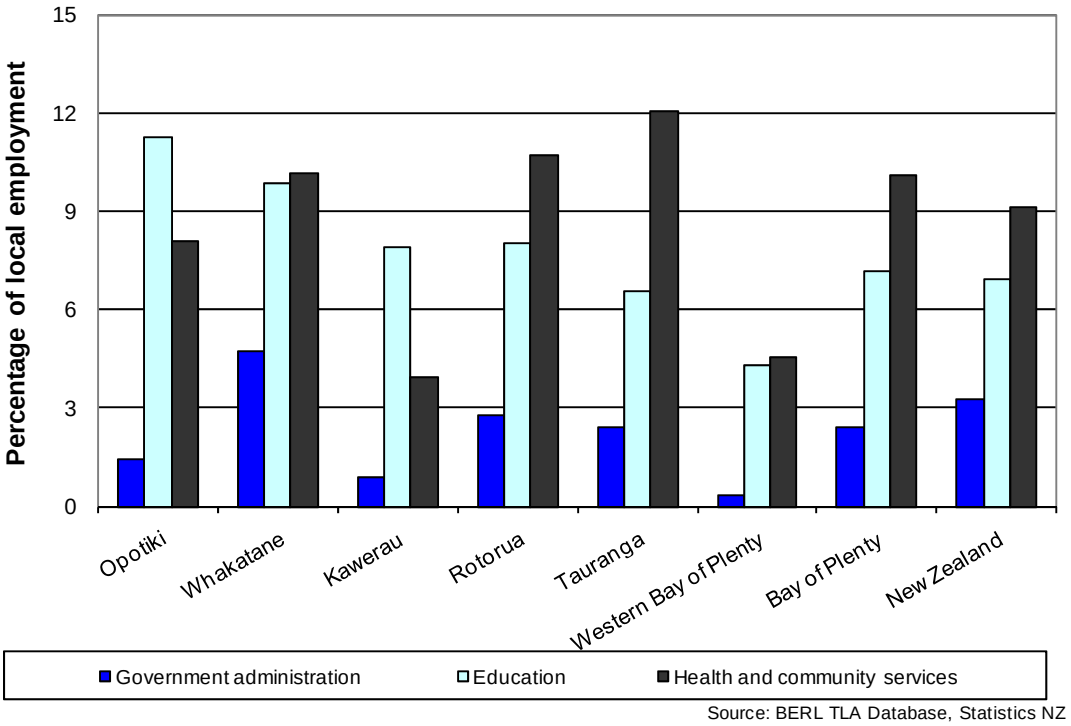


Figure 4.2 Social Services employment 2009

Figure 4.2 shows that employment in the health and community services is more concentrated in the areas with larger settlements, with Tauranga as the main centre having 12% employed in these services. Rotorua at the next level has 10.7% and the Whakatane regional centre has 10.2% of employed in health and community services. All three main centres have over 9% employed in these services, a figure that is higher than the average for the country as a whole.

This high share is balanced by a lower share in the smaller communities indicating their dependence on the larger settlements for these types of services. There is a relatively high share of employment in the health sector for the region as a whole with an overall share of 10.1% of employment. This high share probably reflects the age structure of those living in the Bay of Plenty with a relatively high share of older residents, whose demands for health care services are relatively high.

The distribution of employment in Government administration displays a different spatial pattern whereby Tauranga has a slightly lower share than Rotorua at 2.4% and 2.8% respectively. Whakatane at 4.8% has a much higher share than either of the other two, and this undoubtedly reflects the fact that at the time the statistics were collected a major Local Government entity, Environment Bay of Plenty had much of its staff located there.

The education share across the country is generally 6% to 7%, with main cities having about 8% of employment in education. TLA's with higher shares than 9% are generally those with strong tertiary institutions of some type, such as Dunedin, Porirua (with a polytechnic and Wananga), and Selwyn district with Lincoln University. The pattern in the Bay of Plenty has an average 6.6% in Tauranga, and a slightly higher 8% in Rotorua. There is a high share due to strong educational training institutions in Opotiki (11%) and Whakatane (10%) and a relatively low share in the more rapidly growing areas to the west of the region.

The main implication of the spatial pattern of supply of social services for the transport requirement, is the need for a high level of route security for access to health services for people travelling from rural areas and the smaller settlements to Opotiki, Whakatane, Rotorua and Tauranga. The pattern of education and training also indicates a need for transport, and in some cases, increased passenger transport from rural areas or small centres to the main training institutions and facilities. These are in all of the main settlements.

4.2.3 **Retail and hospitality**

In the Bay of Plenty the spatial patterns of retail and hospitality employment reflect not only the pattern of population distribution and tourism demand, but also aspects of rural industry servicing functions carried out by retail outlets.

The distribution of employment across the region is shown in Figure 4.3

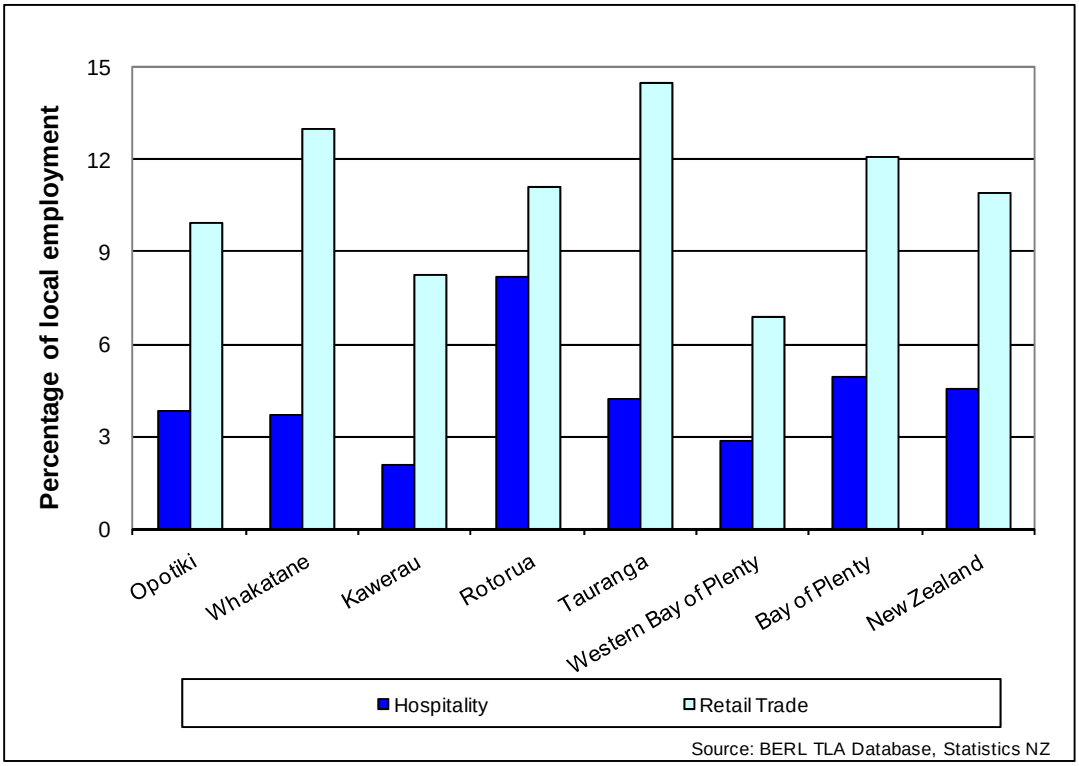


Figure 4.3 Retail and hospitality employment 2009

Retail trade employment across the country averages 11% of employment, and it is generally the cities and also the districts with a strong rural production base that have employment shares of 12% to 14%. The Bay of Plenty pattern is consistent, with Tauranga having 14.5% and Whakatane district having 13% indicating that it services much of the rural activity in the eastern Bay of Plenty.

The hospitality employment in most Bay of Plenty TLA's is close to the national average of about 4%, but Rotorua, with its strong tourism activity is about double that at 8.2%.

4.2.4 Business and property services

Employment in business and property services in the Bay of Plenty region is set out in Figure 4.4.

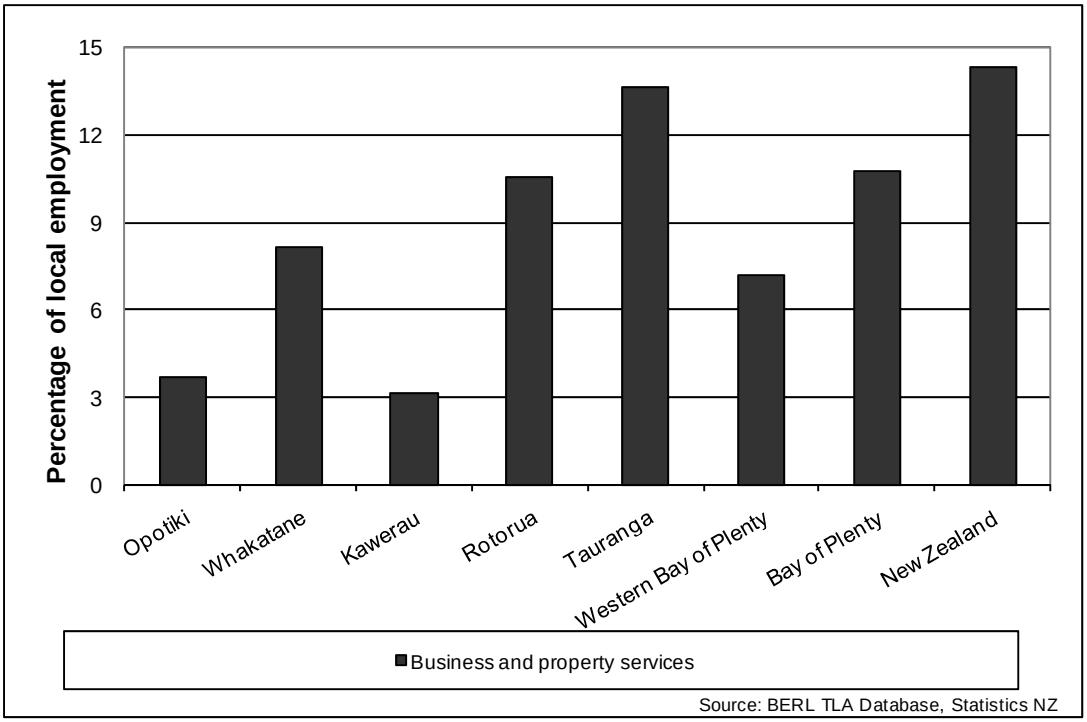


Figure 4.4 Business and property services employment 2009

The figure shows that the highest level business services are supplied by Tauranga city which has 13.6% of employment in business services. This is a share only exceeded by some of the larger cities like Hamilton and North Shore. The New Zealand average of 14.3% is lifted significantly by Auckland having a 25% share and Wellington a 23% share. Most TLA's have about 8% share.

Tauranga probably enjoys a large share for two main reasons - firstly it is the main centre of a strong production region, so for that reason has a share similar to Napier and New Plymouth. The second factor is that it is an attractive place to live, and so it has a share as high as two other pleasant locations at Queenstown and Central Otago.

Rotorua has 10.6% of the local employment in business and property services which is about par as a second tier centre in the region, and Whakatane is a little below that at 8%, Opotiki and Kawerau have much lower employment shares indicating that these services are supplied to their businesses from settlements higher up the hierarchy. They both have under 4% of local employment in business and property services.

There is thus a consistent settlement hierarchy of business services, whereby Tauranga and Rotorua act as service hubs for the other settlements within the Bay of Plenty. Compared to the national average, Tauranga and Rotorua and Bay of Plenty as a whole, has however, a relatively low share of employment in this sector. As we noted, Auckland and Wellington have a much higher share, and so the highest level of services to Bay of Plenty businesses will come from these centres, outside the region. This dependence has been identified in a number of the interviews we have undertaken.

The main transport implications of these business services patterns is the need for rural businesses to be able to access the three main centres for first tier and second tier business services. Access to the highest level business services relies on effective broadband access and effective daily air transport access to Auckland and Wellington.

4.2.5 Primary industries

The share of the employment in primary industries in the TLA's in 2009 is set out in Figure 4.. We note that the scale on this chart is much larger than on the other charts. These high shares are characteristic of employment in the smaller TLA's in New Zealand. In fact TLA's with total employment levels below 25,000 FTE's have primary industry employment shares evenly distributed between about 1% and 50%.

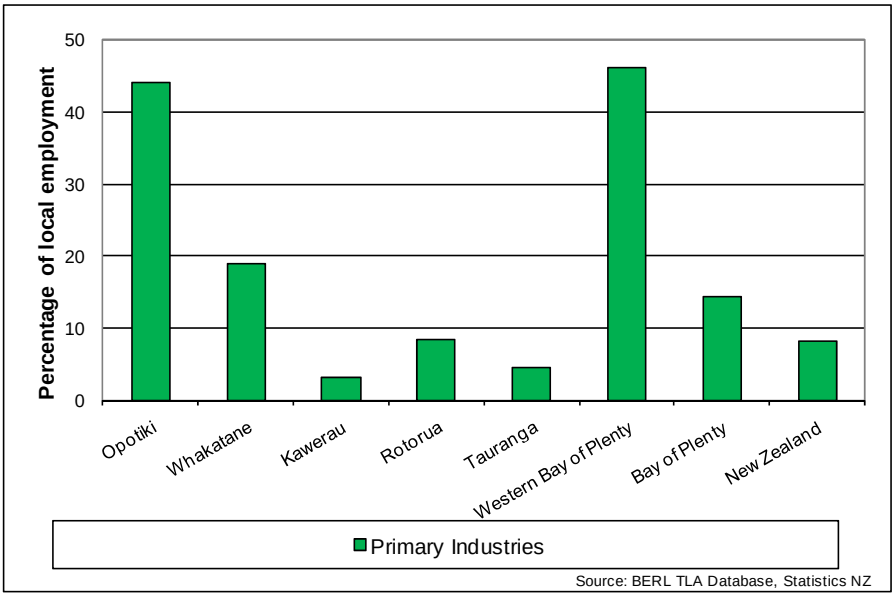


Figure 4.5 Employment in primary industries 2009

The employment shares in western Bay of Plenty at 46% and Opotiki at 44% are among the five highest TLA's in the country joined by Southland, and in Canterbury, Waimate and Hurunui. The New Zealand average is only 8%, pulled down by the large urban TLA's, but the most-often occurring median is 20%. This shows that many TLA's have primary industry employment shares similar to Whakatane.

The high employment in primary industries be they dairy, other agriculture, horticulture, forestry or fishing, generate large volumes of output per employee. The very high employment share in primary industries in Bay of Plenty is reflected in the freight task in the region.

Looking at the composition of activity within the primary sector, in Bay of Plenty this is comprised of the horticulture and agriculture industry, forestry, fishing and mining (mainly for aggregate). The composition of employment in those four industries within the primary sector is shown in Figure 4.6.

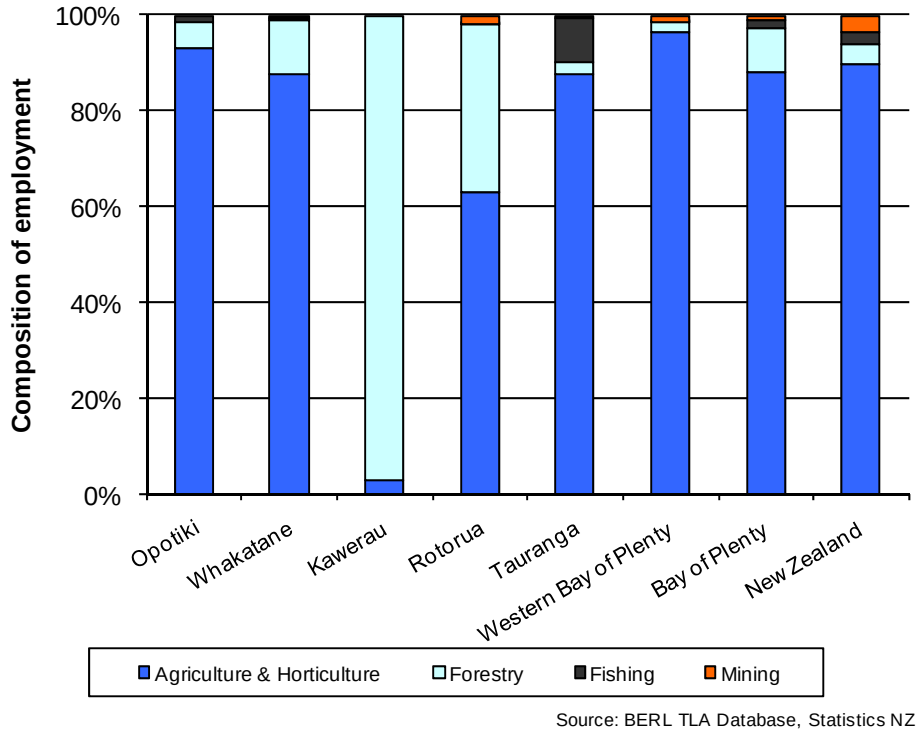


Figure 4.6 Employment composition in primary industries 2009

The composition is fairly similar for all TLA's except for Kawerau and Rotorua. For all the TLA's except for Kawerau, agriculture and horticulture is the main employer of workers in the primary sectors.

The employment in the primary sector is generally about 90% in the horticulture and agriculture industries with smaller shares in forestry, fishing and mining. By contrast, Kawerau and Rotorua have much larger shares in forestry. In Kawerau, employment in primary industries is almost completely dominated by forestry with over 90 % of workers; Rotorua also has a significant portion of its primary employment in forestry. Rather surprisingly, Opotiki does not. There are a number of forests in the eastern Bay of Plenty either at or near harvesting stage, and presumably the share of employment in forestry in Opotiki and Whakatane will increase over time, although for Opotiki, at least this may be moderated by the likely increases in kiwifruit production and in aquaculture.

Tauranga is the only local authority with a sizable proportion of its primary employment currently in the fishing industry to date. However, Opotiki and possibly Whakatane are likely to experience increased employment in this industry as the aquaculture developments there get underway.

The implication of these high employment figures for horticulture, agriculture and forestry are that the economy of the region is crucially dependent upon effective transport within the region, to carry primary product to processing plants in or near the region. It is also dependent upon an effective freight link for the direct export of the primary products as well as processed and manufactured product.

The present pattern of high shares of the economy in the primary sector is likely to remain and possibly increase in the eastern Bay of Plenty. This will reflect ongoing expansion of kiwifruit production, as well as more of the forests there being harvested, and the increase in scale of the aquaculture.

4.2.6 Processing and manufacturing

Employment in processing and manufacturing is set out in Figure 4.7.

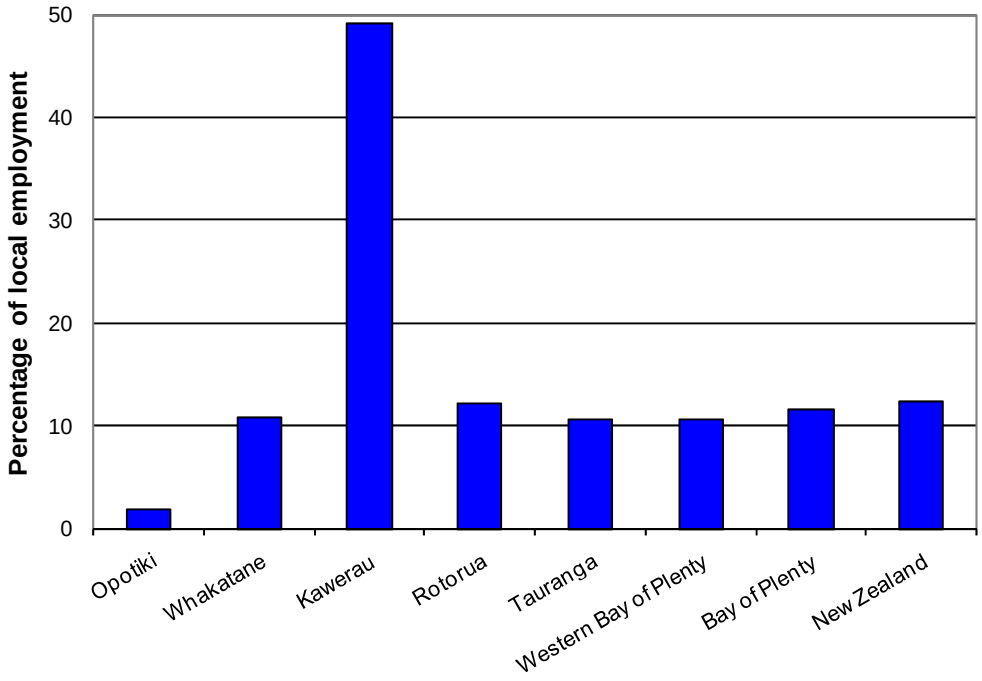


Figure 4.7 Processing and manufacturing employment 2009

Figure 4.7 shows the percentage of local employment in the manufacturing and processing sectors for each of the TLA's. Again, the scale of this graph is higher than for many of the earlier figures because the importance of manufacturing to the Kawerau district. Employment in this sector amounts to almost 50% of all FTE's in the district, reflecting its role as a major New Zealand wood product and timber processing town. The only other TLA in New Zealand with a processing and manufacturing employment share near this is South Taranaki, home to the very large Fonterra plant, where 31% of the TLA's FTEs are employed in processing and manufacturing.

Fourteen of the TLA's in New Zealand with employment levels of up to 20,000 FTE's have employment in processing of 20% to 30%, which seems to typify TLA's in pastoral areas. It is therefore a little surprising that the shares in none of the TLA's apart from Kawerau are higher than the 12% in Rotorua. In part, this reflects the nature of much of the agricultural production, in particular in horticulture which is exported as fresh product, with limited need for processing and other value added activities. It also reflects the dominance of Kawerau as a timber processing centre receiving product from the surrounding areas.

There is also the potential for the development of industries using the waste from timber processing to create biofuels, and the availability this waste, renewable energy and heavy engineering skills in the Kawerau area would probably provide a particular focus for this. This would need to be supported by good transport links required for the movements of the raw materials if they are sourced at a distance and of the finished products and also to allow the increased workforce necessary to support these activities to be drawn from a wide area.

The very low processing component in Opotiki may also change if the aquaculture processing is located there. However, while plans for this processing are not yet finalised, there is a strong likelihood that this will be undertaken in Tauranga, where there is already a nucleus of activity in this sector.

4.2.7 Other industries supporting the primary sectors in the region

The discussion above has considered to some extent the strength of other sectors in supporting the primary industry in the region.

4.2.8 Conclusions

Given the distribution of population and economic activities, the pattern of spatial connectedness and the settlement hierarchy in the Bay of Plenty region, a wide range of transport linkages are needed to support the requirements and aspirations of the population and economic activity in the area. For the movements of people, these comprise a combination of linkages between rural areas and the urban areas, serving them for a range of relatively low level requirements to linkages between the main areas for more sophisticated requirements and between the region and external centres such as Auckland and Wellington and international destinations for the highest level of services. For the movements of freight, of which the volumes generated are substantial, there is the need for reliable and effective linkages between the point of production or import and the point of consumption or export. The Port of Tauranga as an important link between the region's producers and international markets plays a key role in this.

At a summarised level, the patterns of transport linkages required for the movement of people for different types of services is set out in Table 4.1.

Table 4.1 Transport linkages required for movements of people for service activities

	To local urban area	To major regional centres in BOP	Inter-regional (including international)
Health	XXX	XX	X
Education	XXX	X	X
Business services (including retail)			
First and second tier	X	XXX	XX
Third tier		X	XXX
Tourism (mainly external visitors)		X	XXX

Notes. The higher the number of X's the greater the importance of the transport linkage

The primary production employment intensity in the Bay of Plenty as a whole is high in relation to the national average and in the western Bay of Plenty and Opotiki districts is among the highest in the country. Primary industries, which in the Bay of Plenty include the production of logs kiwifruit, aggregates and milk, typically have a high volume of output per employee, so the primary industry generates a high freight task for the transport system. The freight demands generated by the production of these primary commodities are discussed below in Section 5.

In the Bay of Plenty, the output of the kiwifruit industry is particularly demanding in terms of timeliness, requiring access to export in an unprocessed fresh state and the methods of export in shiploads place particular demands on the transport network when the vessels are being loaded This contrasts with most other primary production regions, where the primary product (milk, livestock or logs) requires timely access to an in-region processing plant and thereafter is a largely non-perishable commodity for export at leisure, or as in the case of chilled meat is exported in small units in containers, rather than by the complete ship load.

The processing and manufacturing in Bay of Plenty is over-shadowed by the wood processing in Kawerau. This capacity itself relies on road and rail transport for logs, processed and manufactured product. Other primary processing plants in the dairy and meat industries also generate significant internal freight, though probably are less demanding of transport than the fresh horticulture products.

There is likely to be a requirement for increased capacity and resilience for the surface access from Opotiki to Tauranga if and when the substantial aquaculture scheme in the Eastern Bay of Plenty comes into production or if Tauranga is the port of export for the timber currently growing in the east of the region and in parts of Gisborne. A further key piece of transport infrastructure for the aquaculture scheme is the development of landing facilities at Opotiki which may be extendable to act as a small local port.

Part 5: Understanding the current position: identifying key transport flows and connections

5.1 Introduction

The importance of transport connections between the major centres in the Bay of Plenty is in part a reflection of their use for the movement of passengers and for the movement of freight.

Information on some of the journeys undertaken by passengers in the form of their journeys to work is available from Census data, which not only indicates the numbers moving but also gives indications of their educational attainment and their personal incomes. It should be noted that much of the most recent information is derived from the 2006 Census and is now quite old. Where possible, we have attempted to supplement this data with more recent information derived from other sources such as traffic counts.

Traffic count information is available for total vehicle movements. While this does not give a breakdown by trip purposes or by the origins and destinations of the trips, it does give an indication of total flows at particular points on the road network and the ways in which these have been changing and thus helps in building up the general pattern of movements within the region and between the Bay of Plenty region and surrounding areas.

Detailed information on freight movements within the Bay of Plenty region is less comprehensive, since the main source of information on this is only available at a regional level. However, some of the key flows can be highlighted and as in the case of passengers, information from traffic counts can be used to assist in understanding the position at a more detailed level.

5.2 The Transport network

The key transport feature in the region is possibly the Port of Tauranga, the largest port in New Zealand in terms of the volumes handled. Tauranga is particularly important as an export port handling 26% of total New Zealand exports by volume in 2009 and acts as a key link between the region's producers and overseas markets particularly in Asia and America. It is also an important import port for a range of bulk products and also containers, the majority of which are bound for the Auckland area.

The port is supported by the east coast main trunk rail line providing a connection with Hamilton and to the main route between Auckland and Wellington. The Port of Tauranga is also served by a rail line from further east, particularly providing connections for logs and timber products from Kawerau and Murupara.

The key road connections in the region are State Highway 2 which provides a link to Auckland via the Karangahake Gorge and State Highway 29 over the Kaimai Ranges which provides the link to Hamilton and an alternative link to Auckland. Tauranga is linked to areas further east in the region by State Highway 2, part of which is to be upgraded to the Tauranga Eastern Link and the connection to Rotorua is provided by State Highway 30/State Highway 33 or alternatively State Highway 36 via Pyes Pa.

A significant issue affecting the road transport network is the connection between Tauranga and Auckland, for which there are two alternative routes, both of which have significant constraints particularly for heavy traffic. In general, however, the transport network provided by the links within and to the region is regarded as acceptable. Tauranga has benefited recently from considerable investment in new roading capacity, aligned with the Smart Growth initiative. As indicated above, the planned construction of the Tauranga Eastern Link, one of the Government's RoNS will provide an upgraded route and help relieve congestion to the east of Tauranga and provide better connections with Te Puke, Rotorua and Whakatane. Further east there are concerns with the resilience of the road network, especially given the potential for wash-outs and other closures and the limited alternative network in the area. Projected traffic growth along State Highway 30 (Te Ngae Road) in Rotorua due to population growth, freight traffic and tourism is also identified as an issue.

The region also contains three regional airports at Tauranga, Whakatane and Rotorua. A limited range of international flights is offered from Rotorua, providing connections with the east coast of Australia, but the main international gateway is Auckland airport. There are frequent flight connections between Tauranga and Auckland currently operating at seven per day in each direction. The numbers of passengers are estimated from the SABRE database used by travel agents to be up to about 135,000 per year, although confidential information from the operator Air New Zealand suggests that these may be high. The passengers on these flights comprise a broadly equal share of those terminating or starting their journeys in Auckland itself and those transiting Auckland airport for other domestic or international destinations. The frequent flights between Tauranga and Auckland combined with the large number of international destinations served from Auckland, mean that Tauranga has reasonable international accessibility and for outbound flights luggage can be checked through directly to its international destination.

5.3 Commuting flows

5.3.1 Commuting in 2006

The commuting patterns in the Bay of Plenty region in 2006 as recorded in the census of that year are set out in Table 5.1.

Table 5.4 Commuting patterns in the Bay of Plenty 2006

	Workplace										
Residence of Workers	**WBOP**	**TGA**	**ROT**	**WHK**	**KEU**	**OP**	**Total BOP**	**HN**	**Other Waikato**	**Auckland region**	**Total defined**
Western Bay	**10,551**	**5,286**	**234**	**129**	**30**	**6**	**16,236**	69	621	144	17,316
Tauranga	**2,091**	**37,554**	**348**	**219**	**60**	**12**	**40,284**	174	435	438	41,841
Rotorua	**105**	**267**	**24,543**	**150**	**198**	**12**	**25,275**	78	582	186	26,577
Whakatane	**69**	**123**	**243**	**10,005**	**1,176**	**168**	**11,784**	27	63	105	12,156
Kawerau	**21**	**24**	**57**	**360**	**1,473**	**6**	**1,941**	6	12	18	2,010
Opotiki	**9**	**9**	**18**	**195**	**24**	**2,343**	**2,598**	6	6	21	2,670
Total BOP	**12,846**	**43,263**	**25,443**	**11,058**	**2,961**	**2,547**	**98,118**	360	1719	912	102,570
Hamilton	24	90	81	15	6	9	225	46,890	4659	672	53,118
Other Waikato	249	261	486	39	39	21	1,095	12,693	75,132	1,761	91,920
Other	117	294	174	93	30	24	732	366	1005	4701	884,826
Auckland region	57	219	150	66	12	21	525	507	813	528,870	534,849
Total	13,293	44,127	26,334	11,271	3,048	2,622	100,695	60,816	83,328	536,916	1,667,283

Source : Statistics NZ

The commuting flows in 2006 display a range of patterns in terms of the extent to which areas are self-contained or attract or generate commuters from elsewhere. At one extreme, Rotorua, Whakatane, and Opotiki are relatively self-contained with 93%, 89%, and 89% of the workforce living in the area and with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting

from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga.

Tauranga itself has about 85% of its workforce living in the city with much of the balance (12%) travelling in from western Bay of Plenty. Of the balance, the rest of the Bay of Plenty region including Rotorua, contributes about 1%, Waikato region about 0.8% and Auckland region about 0.4%.

The detailed position for Tauranga in 2006 is illustrated in Figure 5.1 below.

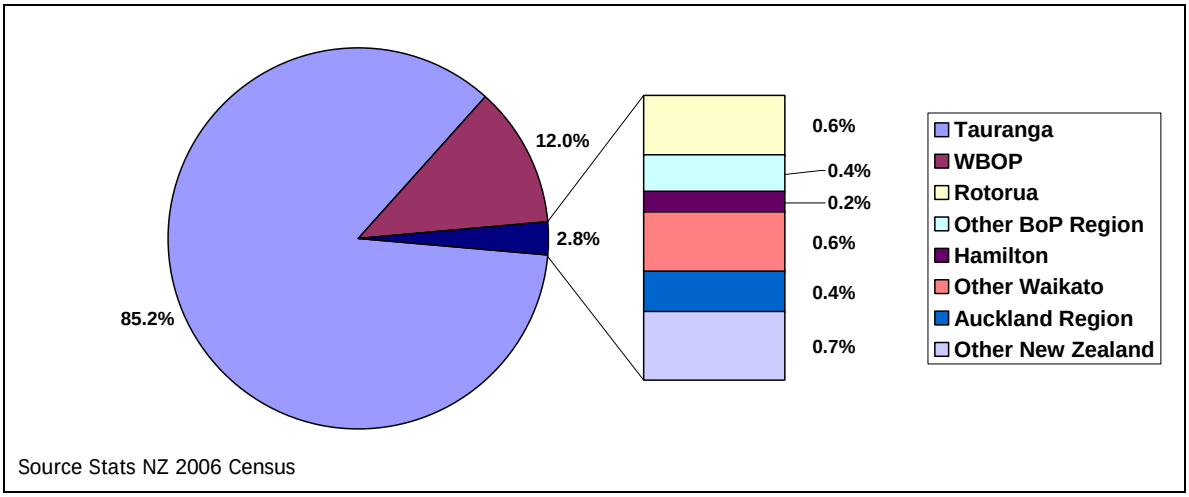


Figure 5.1 Sources of workers employed in Tauranga 2006

For western Bay of Plenty, a similar position holds with 79% of jobs being filled by local residents and 16% being filled by residents of Tauranga. This can be compared to the position for Rotorua which is set out in Figure 5.2. As discussed, this displays a much more self-contained pattern of commuting flows.

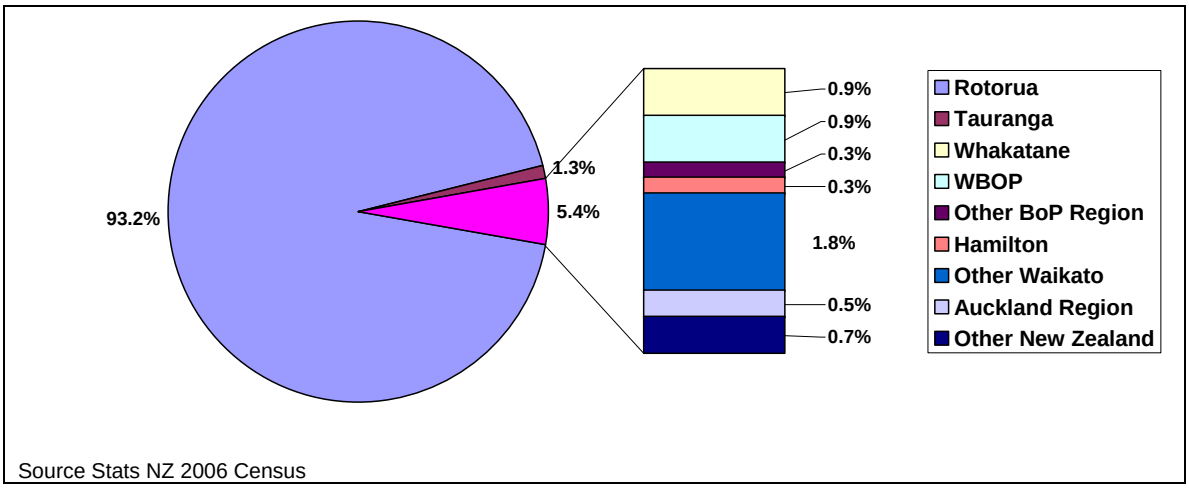


Figure 5.2 Sources of workers employed in Rotorua 2006

The level of commuting from outside the region is fairly small, with only about 2.6% of the total jobs in the region filled by workers from outside. While in all cases the share of outside workers is small, that of Tauranga is about the lowest with only 2%. This compares with about 3.5% for western Bay of Plenty and Rotorua, where access from the neighbouring areas outside the region is probably easier and about 3% for Kawerau and Opotiki.

5.3.2 Changes in commuting patterns from 1996 to 2006

With the growth in employment in the Bay of Plenty region, there have been changes in the patterns of commuting over the period from 1996 to 2006 and these are set out in Table 5.2.

Table 5.2 Growth in commuting in the Bay of Plenty region 1996-2006

Residence of Workers	Workplace										
	Western BOP	**TGA city**	**ROT**	**WHK**	**KEU**	**OPO**	**Total BOP**	HN	Other Waikato	AK region	Total defined
Western Bay of Plenty	**1,413**	**1,893**	**93**	**75**	**15**	**3**	**3,492**	39	108	75	3,780
Tauranga	**456**	**11,841**	**201**	**165**	**18**	**0**	**12,681**	93	270	252	13,428
Rotorua	**39**	**186**	**951**	**42**	**57**	**6**	**1,281**	30	138	78	1,767
Whakatane	**24**	**84**	**90**	**609**	**159**	**93**	**1,059**	18	27	57	1,197
Kawerau	**18**	**15**	**18**	**120**	**-369**	**3**	**-195**	3	6	-3	-171
Opotiki	**6**	**-6**	**6**	**87**	**12**	**117**	**222**	3	3	9	213
Total BOP	**1,956**	**14,013**	**1,359**	**1,098**	**-108**	**222**	**18,540**	186	552	468	20,214
Hamilton	-6	-9	-15	-3	-3	3	-33	6,381	1,128	129	7,890
Other Waikato	129	123	159	21	27	12	471	3,930	648	771	6,339
Auckland region	18	120	57	39	6	3	243	282	387	98,304	100,860
Other	45	201	51	42	15	3	357	183	333	1,956	75,963
Total	2,142	14,448	1,611	1,197	-63	243	19,578	10,962	3,048	101,628	211,266

Source Statistics NZ and Consultants Analysis

Within the region, total employment as derived from the Journey to Work data in the Census has increased by about 19,500 or by about 24% in total. Of this, 74% has been accounted for by growth in Tauranga City and a further 11% from western Bay of Plenty. Of the increase in Tauranga, much of the growth has been filled either by workers living in the city (82% of the total growth) or by workers from western Bay of Plenty (13%).

The position is somewhat different for other areas within the region as can be seen in Table 5.3. For these, a relatively high share of the increase in employment has been met by increased commuting from other areas, although these are typically the

neighbouring districts. For Kawerau, the level of employment has fallen but there has been a much greater fall in commuting within the district and again commuting from outside the area has grown.

Table 5.3 Total growth in employment in Bay of Plenty 1996-2006 and contribution of internal commuting

Workplace	Total growth in employment 1996-2006	Total met from within area	Percentage met from within area
Western Bay of Plenty	2142	1413	66%
Tauranga	14448	11841	82%
Rotorua	1611	951	59%
Whakatane	1197	609	51%
Kawerau	-63	-369	(1)
Opotiki	243	117	48%

Notes (1) The decline from within the area is greater than the total decline

The changes in commuting patterns by area are also summarised in Figure 5.3.

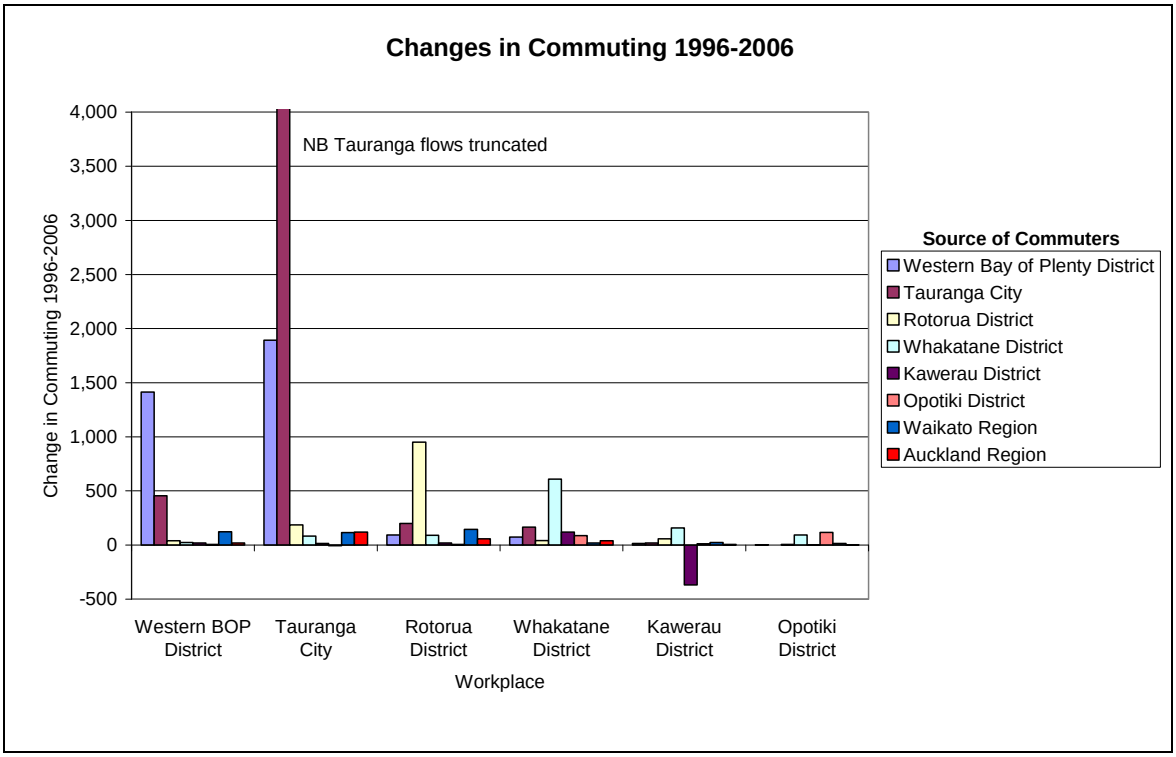


Figure 5.3 Changes in commuting patterns in Bay of Plenty districts 1996-2006

There have been very substantial increases in employment over the period from 1996-2006 in Tauranga and to a lesser extent in western Bay of Plenty, but these have typically been supported by an increased local workforce. For Tauranga,

commuters from within the city account for 82% of the growth in employment, with increased flows from the adjacent western Bay of Plenty a further 13%. The reliance on workers from outside these two areas is therefore relatively small although this has grown slightly from 1996.

For the smaller areas where growth has been much more limited, the picture is more mixed with higher proportions commuting from outside the areas. For both Rotorua and Whakatane however, the majority of the growth in commuting has been met from workers within the area, and in Opotiki, where the major settlement is very close to the boundary of the area, almost all the growth is from the area itself or the neighbouring district.

5.3.3 Key city to city movements

From the data set out above, it is possible to identify some of the key area to area commuting movements within the Bay of Plenty region and these are set out in 5.4.

Table 5.4 Key commuting flows between city or district pairs within the Bay of Plenty region 2006

Route	Inbound flow	Outbound flow	Total
WBOP-Tauranga	5286	2091	7377
Whakatane-Kawerau	1176	360	1536
Tauranga-Rotorua	348	267	615
Whakatane-Rotorua	243	150	393
WBOP-Rotorua	234	105	339
Tauranga-Whakatane	219	123	342
Opotiki-Whakatane	195	168	363

The biggest flows are between western Bay of Plenty and Tauranga reflecting to a large extent the function of parts of western Bay of Plenty as an extension of the residential areas of Tauranga, although there are a number of more free-standing areas further afield for example in Katikati and Te Puke. The next largest flows are between Whakatane district and Kawerau, although again these are adjoining areas. Flows between Tauranga and Rotorua amount to about 600 per day out of a combined employment in the two areas of about 70,000 and so represent a very small proportion of the total workforce. The level of longer distance interaction within the Bay of Plenty region is low and to large extent, the different cities and districts are largely self-contained.

The flows to and from the major centres outside the region are set out in Table 5.5.

Table 5.5 Key commuting flows between city or district pairs with one end outside the Bay of Plenty region 2006

Route	Inbound flow	Outbound flow	Total
WBOP-Hauraki	432	183	615
Tauranga-Auckland	363	174	537
Rotorua-Taupo	246	210	456
Rotorua-South Waikato	234	168	402
Rotorua-Auckland	165	135	300
Tauranga-Hamilton	174	90	264
Rotorua-Hamilton	76	81	157

While there are some relatively large longer distance flows particularly involving journeys to and from Auckland, in general the larger inter-regional flows are experienced by adjoining districts.

5.3.4 Changes from 2006

It is recognised that the patterns of commuting traffic are evolving over time. While detailed information is only available at five year intervals with the most recent reflecting the position in 2006, we have reviewed alternative sources of information to attempt to identify any significant trends in later years. The best source of readily available information is probably in the traffic counts conducted by NZTA on the state highway network, although it is recognised that these represent all day and movements for all purposes rather than just commuting flows. A summary of the changes in the observed flows between 2006 and 2009 is set out in Table 5.6Table . In general, while the information in the table is based on the continuous Telemetry data, this has been supplemented by short term counts where appropriate and these are set out in italics.

Table 5.6 Growth in traffic on the road network in Bay of Plenty 2006-2009

Site	AADT 2006	AADT 2009	Total growth 2006-2009
SH2 Te Puna	15730	15995	1.7%
SH2 Te Puke	18196	19273	5.9%
SH2 Ohinepanea	4725	4792	1.4%
SH2 Paerata Ridge Road before Opotiki	*3923*	*3947*	*0.6%*
SH5 Tarukenga	5376	5226	-2.8%
SH29 Kaimai	8735	9164	4.9%
SH30 Te Ngae	36441	34252	-6.0%
SH30 (Junction with SH33)	*9930*	*10504*	*5.8%*
SH30 Lake Rotoma	2999	2928	-2.4%
SH33 Paengaroa	4085	5100	24.8%
SH33 Okawa Bay Road	*5750*	*5900*	*2.6%*
SH36 Te Matai Road	*2320*	*2317*	*0.0%*

The patterns of change are quite mixed. In general, with the exception of the count at Paengaroa, the changes are all fairly small, with slow growth in the east and somewhat higher growth in the west. While growth at Paengaroa has been rapid, examination of the counts at neighbouring locations where growth has been much slower, suggests that this high growth may be due to particular local factors rather than growth in longer distance flows. This would therefore suggest that there have been no major changes in commuting patterns since 2006 and the general conclusions reached about the patterns observed in that year continue to apply.

5.4 Business travel

There is some limited information on business travellers by car from the transport models developed by the Auckland and Waikato regional councils, although this is primarily focussed on movements within these regions. From the Auckland transport model, the numbers of car based business trips between the Auckland region and the main centres in the Bay of Plenty are set out in Table 5.7.

Table 5.7 Car based business trips from Auckland to Bay of Plenty 2006

Destination in Bay of Plenty	Number of trips per day	Trips per Bay of Plenty employee	Per cent of total road based business trips from Auckland
Tauranga	96	0.2	15%
Rotorua	15	0.1	2%
Opotiki	7	0.3	1%
Whakatane	11	0.1	2%
WBOP	6	0.0	1%
Total	**134**	**0.1**	**21%**

This suggests that there is a limited degree of interaction with the Auckland region, with Tauranga having a slightly higher rate per employee. For Tauranga and possibly other locations, it should be noted that the scale of business travel may be underestimated because of the use of air transport for a proportion of the trips between the two regions. This issue is currently being investigated.

Movements to and from the Bay of Plenty from the Waikato region are estimated at about 1400 per day but there is no breakdown available of the distribution of these trips within Bay of Plenty. Although potentially there would be greater interaction between the Waikato and Bay of Plenty regions because of their greater proximity, the very substantial difference between the two totals may reflect differences in the way in which the data has been collected and the numbers estimated.

5.5 Freight movements

5.5.1 Introduction

Freight movements in the Bay of Plenty are heavily influenced by movements through the Port of Tauranga, which as well as acting as a gateway for movements to and from the Bay of Plenty also supports substantial movements to and other regions in the upper North Island. Total freight movements impacting on the Bay of Plenty in 2006-07 were estimated to amount to about 32 m tonnes with traffic through the port of Tauranga amounting to about 12.5 m tonnes or about 40% of the total. Flows to and from the port in Tauranga from outside the Bay of Plenty in 2006-07 are estimated at about 5-6 m tonnes or almost half of the throughput.

Although there are substantial volumes of freight on the road and rail networks, this comprises a mixture of long distance freight primarily and from the database in the National Freight Demands Study (NFDS) and Bay of Plenty Freight Study (BOPFS) there is relatively little information available on the detailed patterns of movements within the region. Some information on total heavy vehicle flows is available from the road traffic counts undertaken by NZTA at a number of sites on the highway network.

The key flows within the region identified in the Bay of Plenty Freight Study within the region itself are milk and dairy products, logs and timber products, and aggregates, which with the exception of some logs and timber products are mainly transported by road. It should be noted that the figures in the Bay of Plenty Freight Study are derived from those from the more comprehensive National Freight Demand Study and are for 2006-07. There have however, been some changes since that date. In particular, there has been substantial growth in log exports and continued growth in kiwifruit exports, whereas volumes of aggregates have fallen in the economic downturn.

To analyse the patterns of freight movements within the region, the flows have been divided into those which are wholly within the region, those between the region and upper North Island regions and those which are between Bay of Plenty and the rest of New Zealand. The volumes of these are set out in table 5.8.

Table 5.8 Freight traffic impacting on Bay of Plenty region in 2006-07 - total flows (million tonnes)

Type of flow	**Tonnes (millions)**	**Percent of total**
Internal	17.4	55%
Movements to and from other upper North Island (UNI) regions	11.2	35%
Movements to and from other regions	3.2	10%
Total	31.8 (1)	**100%**

5.5.2 Internal freight movements

The overall pattern of freight movements within the region in 2006-07 is set out in Figure 5.4.

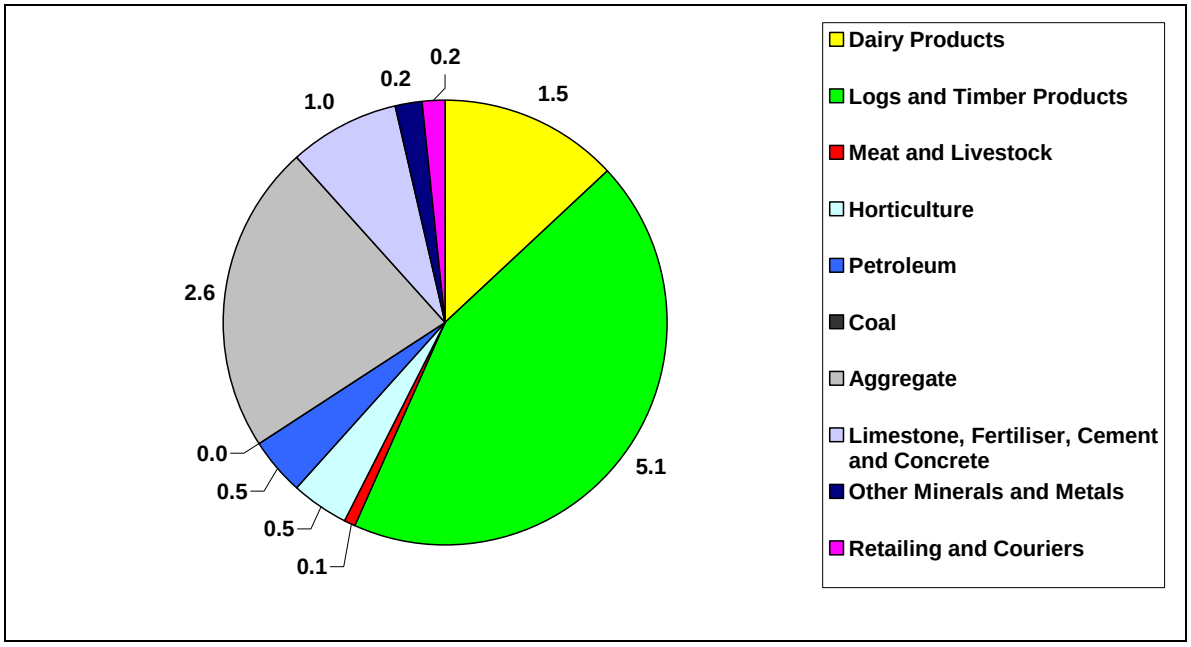


Figure 5.4 Internal freight flows within the Bay of Plenty 2006-07 - identified commodities only (million tonnes)

The flows are dominated by the movements of logs and timber products, milk and dairy products, both of which are focussed on export markets and aggregates and limestone and other building materials which are primarily focussed on domestic markets.

Liquid milk is moved from the farms to the main dairy factory within the region at Edgecumbe, from which finished product is moved mainly for export through the port of Tauranga. Other milk is moved to processing plants in the Waikato, primarily at Reporoa and at Matamata.

Logs are moved from a variety of locations either for processing in the plants mainly focussed round Kawerau and Rotorua or for export as logs again through Tauranga. The volumes of this traffic have fluctuated substantially are currently at a high level.

There is also substantial movement of kiwifruit from the farms to the pack houses and then from the pack houses to the port.

Typically, movements within the region are a shorter distance and so tend to be largely carried by road. There is however, a substantial movement of logs and timber products into the port by rail from Kawerau and this traffic has been growing.

5.5.3 Connections with the upper North Island

As well as serving the Bay of Plenty, the port also serves much of the upper North Island and is particularly important for the movement of export commodities from Waikato, including logs and timber products and dairy products. The pattern of movement between Bay of Plenty and the other upper North Island regions is set out in Figure 5.5.

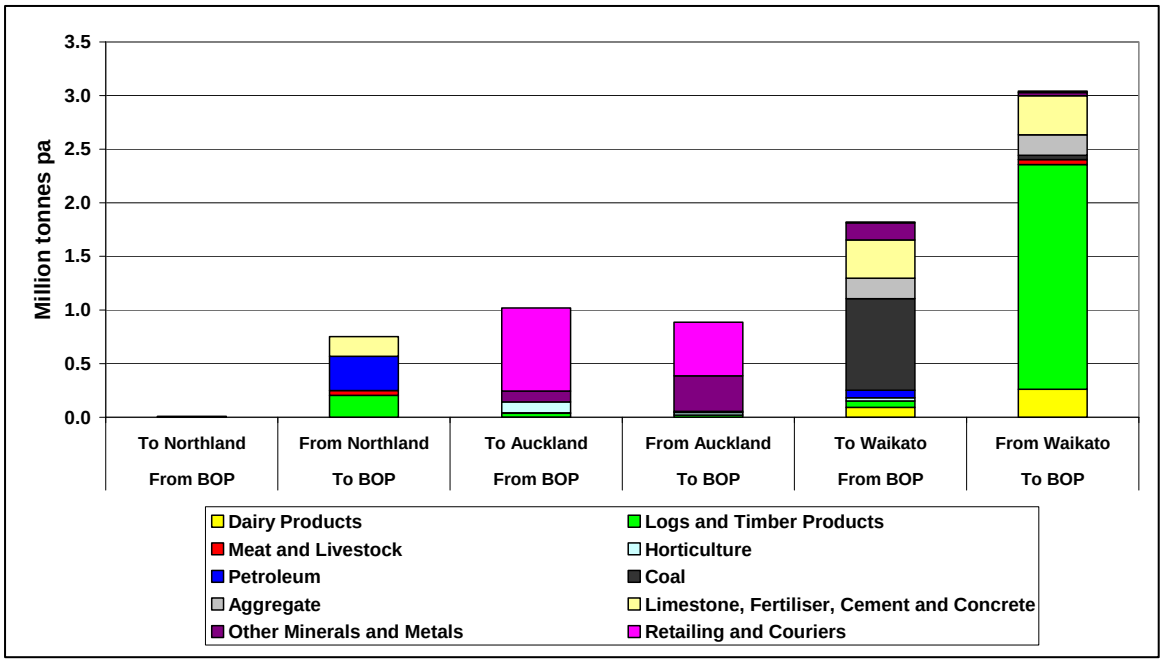


*Figure 5.2 Freight flows between Bay of Plenty and other upper North Island regions 2006-07 (million tonnes)**

There are fairly small flows of bulk materials from Northland (petroleum, cement and some timber products) which primarily feed into the local economy. The petroleum and cement are transported by sea from plants based on the coast round Whangarei.

For Auckland, the traffic is dominated in both directions by manufactured goods which primarily travel through the Port of Tauranga. These include the export of steel from the steel mill at Glenbrook as well as goods to and from the main Auckland markets.

For the Waikato, there are substantial movements to the Bay of Plenty region of a range of basic products, primarily for export through Tauranga. These include logs, some of which are processed in the Bay of Plenty, particularly at Kawerau, other timber products, dairy products, and limestone. In the reverse direction, the flows are dominated by movements of coal for local consumption in the power station at Huntly and by movements of cement and petroleum to a large extent originally sourced from Northland.

5.5.4 Other external flows

The movements of freight to and from the lower North Island and the South Island in 2006-07 are set out in Table 5.9 and Figure 5.6. Movements to or from the neighbouring regions comprise a large part of the total and as Figure 5.6 indicates these flows largely consist of logs and timber products, moving between forests and processing plants and the movement of petroleum inbound from Tauranga. The flows to the more distant regions are small.

Table 5.9 Freight flows between Bay of Plenty and external regions 2006-07. All commodities (million tonnes)

Origin-destination elsewhere in New Zealand	Million tonnes
Gisborne/Hawkes Bay	1.0
Taranaki/Manawatu-Wanganui	1.5
Wellington	0.4
Canterbury	0.3
Other South Island	0.1
Total	3.2
Total for UNI regions	*11.2*

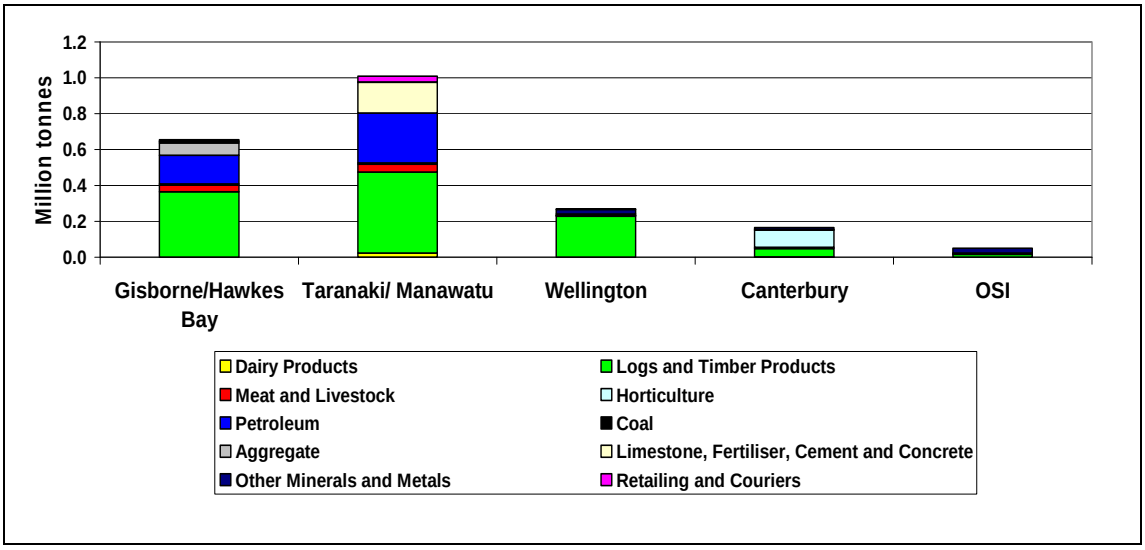


Figure 5.6 Freight movements between Bay of Plenty and regions outside the upper North Island - selected commodities 2006-07 (million tonnes)

5.5.5 Movements through the Port of Tauranga

The volume of traffic through the Port of Tauranga over recent years is set out in Table 5.10 and Figure 5.7.

Table 5.10 Changes in International imports and exports through Port of Tauranga 2002-2009 (million tonnes)

Year	Imports	Exports	Total
2002	3.06	8.34	11.40
2003	3.16	8.94	12.10
2004	4.35	7.89	12.24
2005	5.30	7.32	12.62
2006	4.93	7.35	12.28
2007	4.98	7.66	12.65
2008	5.60	7.92	13.52
2009	4.98	8.48	13.46

Source : Port of Tauranga, Port Trade and Statistic Information, August 2009

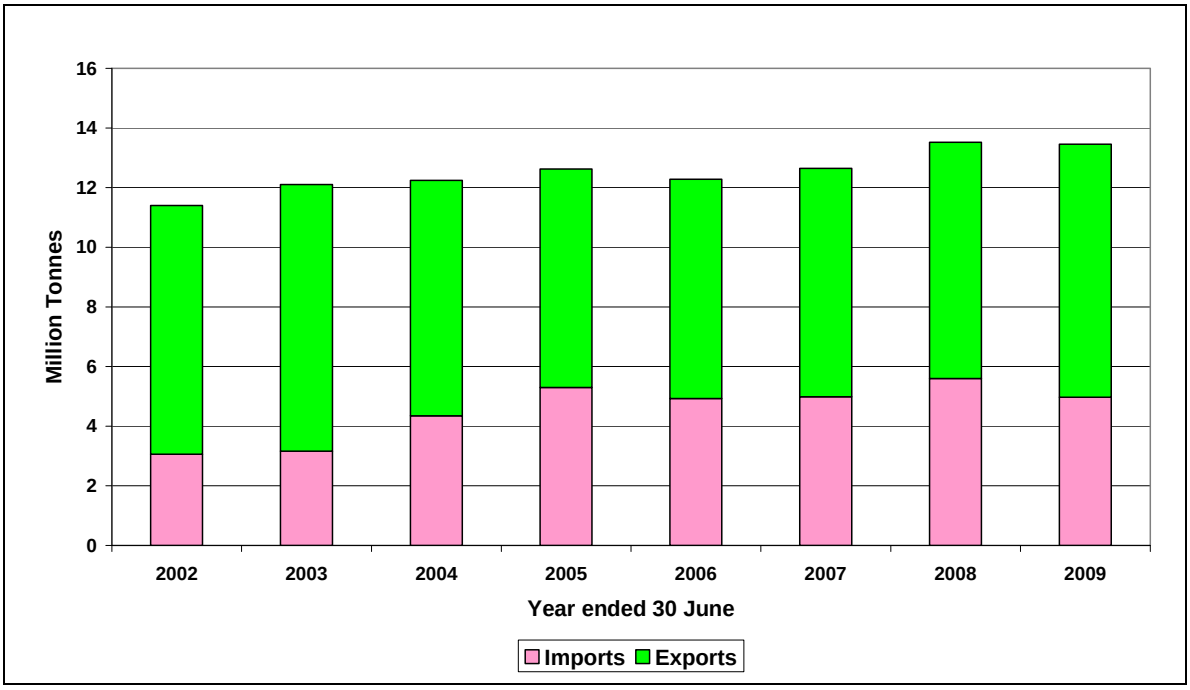


Figure 5.7 International traffic through the Port of Tauranga (million tonnes)

The breakdown of traffic by commodity is set out in Table 5.11.

Table 5.11 Exports and imports through the Port of Tauranga by commodity 2003-2009 (million tonnes)

Commodity	2003	2004	2005	2006	2007	2008	2009
Exports							
Logs	3.89	2.88	2.30	2.22	2.34	2.45	3.09
Other forest products	2.37	2.12	2.12	1.94	1.97	2.11	2.00
Dairy products	0.76	0.82	0.78	0.84	0.78	0.46	0.58
Meat	0.18	0.21	0.23	0.31	0.38	0.32	0.38
Kiwifruit	0.51	0.60	0.65	0.66	0.62	0.78	0.75
Other horticultural	0.09	0.09	0.08	0.12	0.09	0.11	0.09
All other	1.14	1.17	1.17	1.24	1.48	1.68	1.58
Total	**8.94**	**7.89**	**7.32**	**7.34**	**7.66**	**7.92**	**8.46**
Imports							
Oil products	0.85	0.97	1.12	1.08	1.15	1.17	1.10
Cement	0.12	0.12	0.15	0.17	0.16	0.16	0.14
Fertilisers	0.48	0.52	0.61	0.45	0.58	0.53	0.41
Chemicals salt and bulk liquids	0.29	0.36	0.31	0.29	0.30	0.36	0.34
Grain	0.22	0.21	0.23	0.26	0.24	0.28	0.24
Palm Kernel	0.00	0.00	0.00	0.00	0.15	0.46	0.43
Coal	0.04	0.66	0.88	1.13	0.93	0.39	0.66
Other goods	1.20	1.61	2.08	1.66	1.56	2.31	1.72
Total	**3.20**	**4.45**	**5.38**	**5.05**	**5.06**	**5.68**	**5.05**
Total Imports plus exports	12.13	12.34	12.70	12.39	12.73	13.60	13.51
Total TEUs (000s) (1)	349.8	394.4	438.2	423.1	466.2	582.1	546.5

Note (1) - TEU = twenty foot equivalent units a standard measure used to combine containers of different sizes

The volumes of both imports and exports have fluctuated over the period. This reflects:

- Changes in both the volumes of commodities harvested or produced, particularly for logs and timber which accounts for 60% of exports and which have been affected by the costs and availability of shipping services to the main markets and changes in the level of demand in these.
- Demand for imports of basic commodities such as coal.
- Growth of imports of palm kernels from nothing in 2006 to 0.4-0.5 m tonnes in 2008 and 2009.
- Changes in the patterns of shipping services, particularly affecting the balance between the ports of Auckland and Tauranga and which has affected the volumes of dairy products and other containerised cargo through the port.
- The effects of the economic downturn particularly for manufactured goods reflected in the reduction of TEU's in 2009 and also for fertiliser bases.

It should be noted that the numbers of TEU's handled includes transhipment containers, estimated at 129,000 in 2008, and empty containers, estimated at about 130,000 in 2008.[7] The breakdown of traffic by commodity in 2009 for exports and imports is set out in Figure 8 and Figure 5.9.

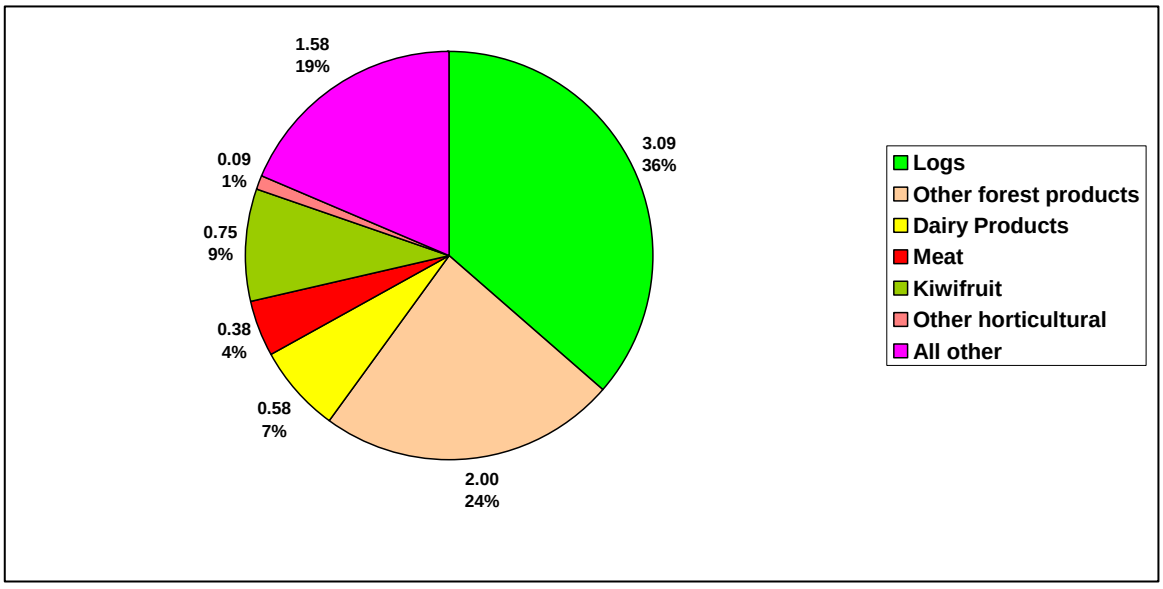


Figure 5.8 Breakdown of Port of Tauranga exports by commodity 2009 (million tonnes)

[7] Rockpoint Corporate Finance in association with Richard Paling Consulting and IPC & Associates, 2009, "Coastal Shipping and Mode Freight Choice".

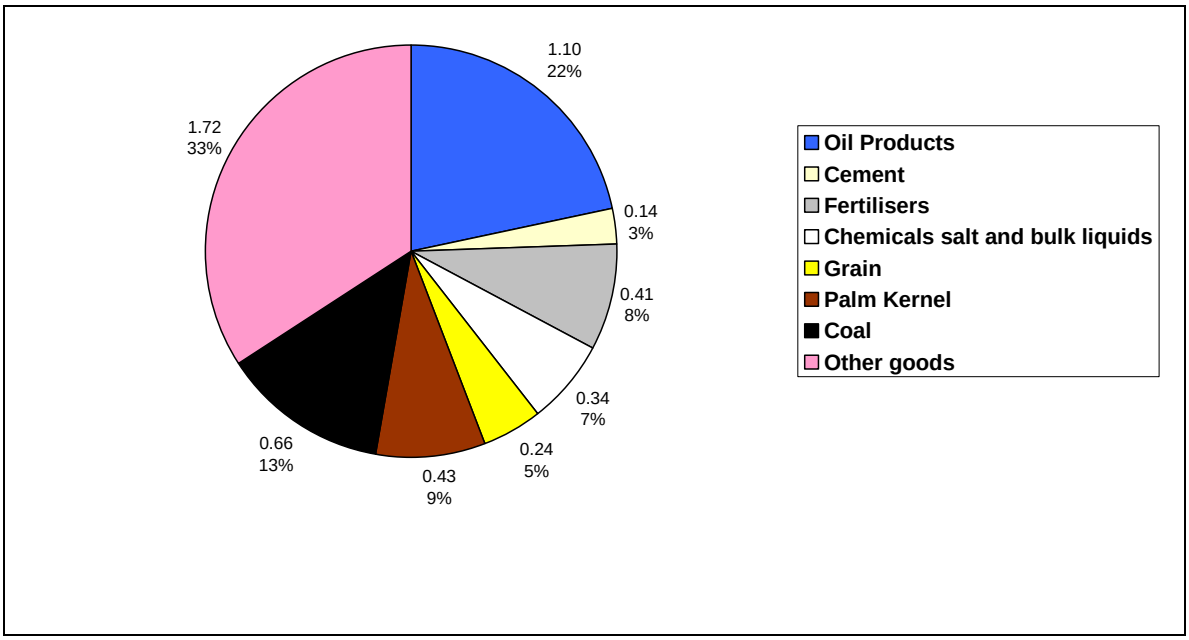


Figure 5.9 Breakdown of Port of Tauranga imports by commodity 2009 (million tonnes)

In both directions, the volume of trade is dominated by basic products although there are substantial movements of “other goods" which include imported and exported manufactured goods. For exports, the basic products include logs and timber products, dairy products meat and horticultural products. Imports are dominated by oil products, coal, agricultural inputs of fertilisers and palm kernel, although there are substantial volumes of “other goods” which make up about a third of the total.

A significant proportion of the container traffic is handled by the Metroport inland port in Auckland and transferred to and from Tauranga by rail. The volumes of containers handled in this way are set out in Table 12.

Table 5.12 Container volumes through Metroport 2003-2009 (TEU’s)

Year	Containers handled at Metroport
2003	82,500
2004	132,000
2005	134,000
2006	119,147
2007	138,200
2008	170,000
2009	140,000 (1)

Notes (1) Consultants estimates

As in the case of the overall shipping totals, the volumes handled through Metroport have generally been growing but have fluctuated from year to year. This reflects both changes in shipping patterns and also most recently the general economic downturn which has had a particular impact on the volumes of manufactured goods imported or exported to and from the Auckland region which represent a high proportion of Metroport traffic.

5.5.6 Road traffic flows

Information is available on the movement of heavy vehicles on the state highway network within the bay are set out in Table 5.13 and in Figure 5.10.

Table 5.13 Heavy vehicle flows on state highways in Bay of Plenty 2002-2009 AADT

SH	Count location	2002	2003	2004	2005	2006	2007	2008	2009
SH2	Te Puna	974	1180	1072	1089	1038	1189	1167	1131
SH2	Te Puke	1719	1601	1480	1458	1510	1521	1918	1792
SH2	Ohinepanea	660	684	659	717	605	631	704	726
SH5	Tarukenga	506	724	583	606	543	567	573	556
SH5	Waipa	703	1016	671	753	724	742	794	798
SH29	Kaimai	468	1039	1072	969	1022	1141	1284	1144
SH30	Te Ngae	1368	2111	1718	1857	1676	1799	1812	1992
SH30	Lake Rotoma	288	325	300	281	282	304	329	331
SH33	Paengaroa	609	741	605	464	470	507	560	577
Average flow all sites		**811**	**1047**	**907**	**910**	**875**	**933**	**1016**	**1005**

Source: Transit/NZTA Traffic Counts

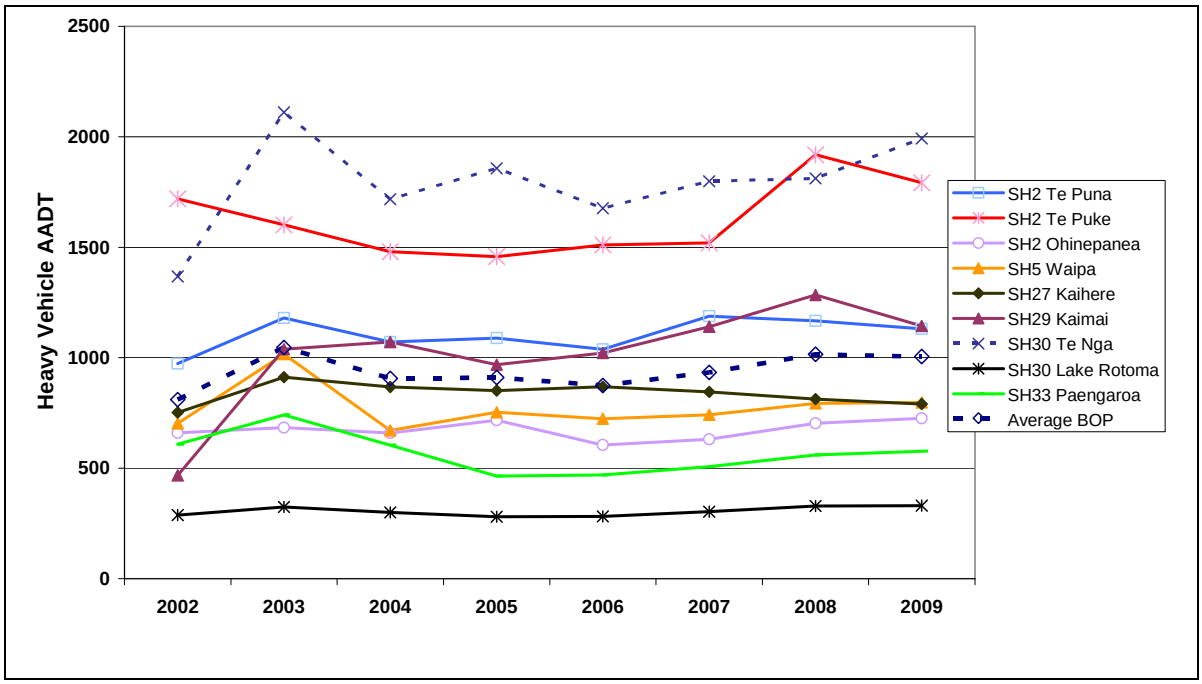


Figure 5.10 Heavy Vehicle flows on state highways in Bay of Plenty region 2002-2009 (AADT)

As the analysis earlier in this section has indicated, much of the freight within and to and from the Bay of Plenty region is composed of basic commodities, in particular logs and timber and milk and dairy products. Although the period from 2003-2008 was one of economic growth, movements of these bulk commodities were very much affected by other factors. These included the weather (where drought conditions can have a significant impact on the production and movement of liquid milk) and the availability of shipping capacity which has had an impact on the trade in logs and hence on the volumes harvested. As a result, with the possible exception of the flows through Te Puke possibly reflecting growth in the kiwifruit harvest, heavy vehicle movements on the individual components of the state highway network in the Bay of Plenty and on the network as a whole typically increased only very modestly.

5.5.7 Summary of transport movements

The commuting flows in 2006 display a range of patterns. At one extreme Rotorua, Whakatane, and Opotiki are relatively self-contained (with 93%, 89%, and 89% of the workforce living in the area) with relatively little interaction with surrounding areas. At the other extreme is Kawerau, where less than half the workforce lives in the district and where there is substantial in-commuting from Whakatane, the neighbouring district but also further afield from Rotorua and Tauranga.

Tauranga has about 85% of its workforce living in the city with much of the balance (12%) travelling in from western Bay of Plenty.

The movements of freight reflect a number of useful and important observations including:

- The importance of Bay of Plenty as a major producer of a range of basic commodities, often focussed on supplying export markets. These include logs and timber products, horticultural products mainly kiwifruit, and some dairy products.

- The role of Port of Tauranga as a major export and import port serving much of the upper North Island for a range of basic products. The links with the Waikato are important for a range of export and import products mainly fairly basic materials typically transported in bulk and these generate substantial freight flows within the Bay of Plenty region.

- The port is also an important gateway for a range of products to or from the Auckland region, either exported manufactured and agricultural products from Auckland producers or imported goods bound for the large market in the region or for warehouses and distribution centres for onward transport throughout the country. As such, it provides a complement to the services provided within the Auckland region by Ports of Auckland, with the movement of containers to and from the MetroPort inland port in Southdown forming an important component.

5.6 Region wide patterns of employment and the demand for transport

In addition to the analysis of the position for individual employment sectors, the position has also been considered on an area-wide basis, and this is set out in Table 5.14. Table 5.15 Growth in Employment by Sector 1996-2006, sets out the growth in these over the period from 1996-2006.

Table 5.14 Breakdown of employment by sector and area 2006

	Ag and Mining	Manu-facturing	Const and gas and Water	W'lesale and Trans-port	Retail	Accom.	Comms finance and property	Govt Health and Edc.	Other support svs	NES	Total
Total employment											
Western BOP	4686	1284	990	708	1149	435	1422	1656	549	411	13296
Tauranga	753	5292	4092	4611	7269	2046	7629	9135	2595	711	44127
Rotorua	1959	3024	1584	2025	3687	2322	3498	5691	2076	468	26331
Whakatane	1671	924	858	576	1677	480	1239	2922	627	288	11274
Kawerau	51	1476	240	126	252	60	240	414	126	57	3048
Opotiki	729	105	162	102	351	156	228	549	135	105	2625
Total BOP	9849	12105	7926	8148	14385	5499	14256	20367	6108	2040	100701
Total NZ	141954	226137	153636	182925	238107	94575	342183	367368	127758	111093	1985790
Proportion of total by area											
Western BOP	35.2%	9.7%	7.4%	5.3%	8.6%	3.3%	10.7%	12.5%	4.1%	3.1%	100.0%
Tauranga	1.7%	12.0%	9.3%	10.4%	16.5%	4.6%	17.3%	20.7%	5.9%	1.6%	100.0%
Rotorua	7.4%	11.5%	6.0%	7.7%	14.0%	8.8%	13.3%	21.6%	7.9%	1.8%	100.0%
Whakatane	14.8%	8.2%	7.6%	5.1%	14.9%	4.3%	11.0%	25.9%	5.6%	2.6%	100.0%
Kawerau	1.7%	48.4%	7.9%	4.1%	8.3%	2.0%	7.9%	13.6%	4.1%	1.9%	100.0%
Opotiki	27.8%	4.0%	6.2%	3.9%	13.4%	5.9%	8.7%	20.9%	5.1%	4.0%	100.0%
Total BOP	9.8%	12.0%	7.9%	8.1%	14.3%	5.5%	14.2%	20.2%	6.1%	2.0%	100.0%
Total NZ	7.1%	11.4%	7.7%	9.2%	12.0%	4.8%	17.2%	18.5%	6.4%	5.6%	100.0%

Table 5.15 Growth in employment by sector 1996-2006

	Ag and Mining	Manu-facturing	Const. and gas and Water	W'lesale and Transport	Retail	Accom.	Comms finance and property	Govt Health and Educ.	Other support services	NES	Total
Western BOP	1.040	1.126	1.542	1.129	1.088	1.933	1.711	1.456	1.317	0.725	1.192
Tauranga	0.866	1.201	1.624	1.406	1.370	1.561	1.835	1.680	1.393	1.339	1.487
Rotorua	0.791	1.078	1.195	0.953	1.050	1.017	1.124	1.173	1.218	0.891	1.065
Whakatane	0.803	0.817	1.521	1.231	1.020	1.280	1.337	1.412	1.237	0.932	1.119
Kawerau	0.739	0.908	1.455	1.235	0.866	0.870	0.860	1.150	1.167	1.583	0.980
Opotiki	1.025	1.029	1.588	1.172	0.873	1.733	1.382	1.102	1.324	0.921	1.105
Total BOP	0.919	1.080	1.490	1.218	1.178	1.263	1.505	1.419	1.299	0.980	1.241
Total NZ	0.921	0.972	1.493	1.168	1.191	1.363	1.435	1.312	1.336	1.099	1.218

In order to help analyse the relative importance of transport related factors in supporting economic development, we have developed a simple breakdown of economic activity in terms of employment, by its potential use of freight and other transport services.

For this purpose, employment has been defined in terms of three main groups:

- Employment in sectors which generate major flows of bulk commodities often carried in large freight vehicles or on dedicated trains (agriculture and mining)

- Employment in sectors which typically are less freight intensive but which still make substantial use of transport in supporting their activities, using a range of vehicle types ranging from courier vans to very large vehicles. For these sectors, access to a large and skilled labour force is in general moderately important (manufacturing, construction, gas, electricity and water, wholesaling and transport)

- Employment in other sectors typically in the service industries, where freight uses are more limited and are often accommodated in courier vans and small freight vehicles. For these activities the ability to attract staff and customers and the provision of good transport links for these is more important than the movement of freight (all other sectors).

The breakdown of employment into these three sectors is set out in Table 5.16.

Table 5.16 Employment and GDP by transport generating category in the Bay of Plenty 2006

Transport generating category	Employment in 2006		GDP in 2006	
	Workers	Percent	$bn	Percent
High	13236	13%	1,325	13%
Medium	38898	39%	3,896	37%
Low	48567	48%	5,224	50%
Total	100701	100%	10,445	100%

Source : Statistics NZ and Consultants Analysis. BERL (2007)

Using these categories, the position in 2006 would suggest that using employment as a base, a relatively small proportion 13% is associated with intensive freight 39%, with medium freight and almost half (48%) with relatively low freight using activities.

It is also possible to break down employment in each of these transport using categories by district and this is set out in Table 5.17.

Table 5.17 Employment by district and transport generating category 2006

	Transport generating category			
	High	**Medium**	**Low**	**Total**
Western Bay of Plenty	4900	3900	4500	13300
Tauranga	2800	19200	22200	44100
Rotorua	2700	9500	14200	26300
Whakatane	1900	3700	5700	11300
Kawerau	100	2000	900	3000
Opotiki	800	700	1200	2600
Total Bay of Plenty region	13200	38900	48600	100700

The main urban areas of Tauranga, Rotorua and Whakatane all have over half their employment in the "low" transport generating capacity. Western Bay of Plenty and Opotiki have substantial shares of employment in the "high" category reflecting their emphasis on agricultural production, particularly kiwifruit and dairying. Kawerau has a high "medium" share reflecting the high proportion of employment in manufacturing associated with the timber processing in the town.

Over the period from 1996-2006, the pattern of employment and hence of potential freight use has changed, and this is set out in Table 5.18.

Table 5.18 Changes in employment by transport generating category 1996-2006

Transport generating category	**Employment**		
	1996	**2006**	**Growth**
High	13446	13236	-210
Medium	32214	38898	6684
Low	35460	48567	13107
Total	81120	100701	19581

Growth in activity has been concentrated in "low" transport generating category comprising the service type activities with relatively low freight demands but high demands for good worker access. In addition, on a spatial basis much of the growth for both medium and low freight using sectors has been focussed in Tauranga, accounting for 80% and 65% respectively of the regional growth in these categories. This then sets the background against which future changes in the demand for the movement of freight and of passengers can be considered.

5.7 Tourism in the Bay of Plenty region

5.7.1 Employment in tourism

Tourism plays an important role in the Bay of Plenty and impacts on a number of sectors. Direct employment in "accommodation, cafes and restaurants", the main tourism related employment category, is particularly important in Rotorua where it amounts to about 10% of the workforce and across the region as a whole, where it accounts for about 6.5% of the workforce. This can be compared with a national average of 6%.

The growth of employment in tourism over the recent past is set out in Table 5.19.

Table 5.19 Employment in tourism (accommodation, cafes and restaurants) (1) in Bay of Plenty region 2001-2006

	2001		2006		
	Total	**Percent of total employment**	**Total**	**Percent of total employment**	**Growth 2001-2006**
western Bay of Plenty	456		600	3.8%	31.6%
Tauranga	1,674		2,157	5.6%	28.9%
Rotorua	2,334		2,445	9.9%	4.8%
Whakatane	456		507	5.3%	11.2%
Kawerau	66		81	2.8%	22.7%
Opotiki	123		159	6.9%	29.3%
Bay of Plenty region	5109		5949	6.4%	16.4%
New Zealand			89,055	6.0%	

Notes (1) As defined by ANZSIC96

This indicates relatively strong growth in the west and east of the region but with only relatively modest growth in the key centre of Rotorua. At a regional level employment in the sector has continued to grow, increasing by about 7% or 3.5% per year between 2006 and 2008, slightly faster than the average rate of 3.1% achieved between 2001 and 2006. This demonstrates the ongoing importance of the sector to the regional economy at an aggregate level.

5.7.2 Tourism activity

Information on the level of tourism activity is available for the three Regional Tourism Organisations (RTO's) for Rotorua, Kawerau-Whakatane and Bay of Plenty which cover the Bay of Plenty region. Summary statistics for the last available year 2009 are presented in Table 5.20.

Table 5.20 Tourism activity in the Bay of Plenty by RTO in 2009

	Overnight visits	Day visits	Total visits	Visitor nights	Expenditure ($NZ m)
Bay of Plenty RTO	1,455,130	2,369,666	3,824,796	4,318,236	435
Kawerau-Whakatane	347,155	637,800	984,955	966,985	86
Rotorua RTO	1,511,699	1,672,814	3,184,513	3,394,585	537
Bay of Plenty Total	3,323,984	4,680,280	8,004,264	8,679,806	1,058
New Zealand	35,029,570	53,589,256	88,618,826	104,760,979	15,103
BOP as % of New Zealand	9.5%	8.7%	9.0%	8.3%	7.0%

Source : Forecasts of regional Tourism Activity in New Zealand, Ministry of Tourism

In total in 2009 the three RTO's attracted about 8 m visitors with an expenditure of just over $1 b. This expenditure can be compared with the total GDP for the region of about $10 b. Tourist visits in the Bay of Plenty account for about 8-9% of New Zealand totals but their expenditure is somewhat smaller at about 7% of the national total.

Within the region, the Bay of Plenty RTO accounts for about half the total day visits and visitor nights. Although Rotorua attracts a higher number of overnight visitors, on average these stay for a shorter time (2.2 nights) compared to Bay of Plenty (3.0 nights) or to Kawerau-Whakatane (2.8 nights) or to New Zealand as a whole (3.0 nights). However, the availability of the range of formal tourist attractions in Rotorua means that the average expenditure per visit at $355 is higher than in Bay of Plenty $300 but is below the national average of $430 per night.

The origins of tourist visits to the region are set out in Table 5.21

Table 5.21 Origins of tourist visits to the Bay of Plenty 2009 (million tourist visits)

	Auckl'd and Northl'd	Waikato	BOP	Other North Island	South Island	Total NZ	Australia/ Oceania	Other Intl	Total Intl	Total	Per Cent NZ	Per cent BOP
Bay of Plenty	1.02	1.19	0.90	0.34	0.09	3.55	0.12	0.16	0.28	3.82	92.7%	23.6%
Kawerau-Whakatane	0.18	0.15	0.44	0.14	0.02	0.92	0.03	0.04	0.06	0.98	93.4%	44.3%
Rotorua	0.71	0.66	0.66	0.31	0.06	2.40	0.24	0.55	0.79	3.18	75.3%	20.6%
Total	1.91	2.00	2.00	0.79	0.17	6.87	0.38	0.75	1.13	7.99	85.9%	25.0%

Source : Forecasts of regional Tourism Activity in New Zealand, Ministry of Tourism

The majority of tourist visits are from either residents of Bay of Plenty itself or from Waikato or Auckland and these three areas supply about three quarters of the total. International visitors of whom about a third are from Australia, account for just less than 15% of the total. Rotorua attracts a relative high proportion of international visitors (70% of the total international visitors to the region), possibly reflecting the particular nature of the tourist attractions in the area and it also attracts these from a

wider area with Australia having a smaller share of the total. To a significant extent, overseas tourists may visit Rotorua in the course of organised tours rather than the rather more independent holiday more typical of Bay of Plenty and this may be particularly attractive to tourists from Asia.

The relatively high share of domestic tourists from Auckland and Waikato emphasises the need for good road communications with these areas and the construction of the Waikato Expressway would improve the links to all three RTOs from their major markets outside the region.

For international travellers, the development of direct air services to Rotorua would help to support the Australian market, but much of the rest of the international visitor market is likely to be focussed on Auckland and improved surface links again would help to support this traffic.

The recent growth in tourist visits from 2004 to 2009 is set out in Table 5.22.

Table 5.22 Growth in tourist visits to the Bay of Plenty by origin 2004-2009 (million tourist nights)

RTO	Auckl'd and Northl'd	Waikato	BOP	Other North Island	South Island	Total NZ	Australia/ Oceania	Other Intl.	Total Intl.	Total
Bay of Plenty	2.7%	3.7%	4.1%	-0.4%	1.4%	3.0%	36.2%	1.3%	13.4%	3.7%
Kawerau-Whakatane	2.7%	3.2%	3.6%	-0.9%	-1.0%	2.6%	31.6%	-0.7%	10.3%	3.0%
Rotorua	7.1%	4.9%	4.1%	1.7%	4.1%	4.9%	30.1%	-11.0%	-1.7%	3.2%
Total	4.3%	4.0%	4.0%	0.7%	2.1%	3.6%	32.0%	-8.1%	2.3%	3.4%

The numbers of tourist visits as a whole have grown in total by about 3 to 3.5% over the five years from 2004 to 2009, in part reflecting the effects of the economic downturn. While the domestic market as a whole has grown from between 2.5% to 5% with Rotorua experiencing particularly high growth, the position for international visitors is more mixed. Typically, visitors from Australia have grown strongly but this has been offset to varying degrees by a slow growth or in the case of Rotorua a significant decline in visitors from other destinations. This may reflect the particular impacts of the downturn which has influenced the demand from more distant destinations and also for the more formal type of holiday more typical for Rotorua.

5.7.3 **Tourist expenditure**

Patterns of tourist expenditure in the area over the period for domestic and international visitors are set out in Table 5.23.

Table 5.23 Annual expenditure by type of visitor ($ millions per year)

Area/RTO	2004	2006	2008	2009
	Total expenditure			
Bay of Plenty RTO	394	403	413	435
Kawerau-Whakatane	77	82	82	86
Rotorua RTO	520	512	509	537
Total BOP	991	997	1,004	1,058
New Zealand	13,525	14,146	14,321	15,103
BOP as % of NZ	7.3%	7.0%	7.0%	7.0%
Expenditure by domestic visitors				
Bay of Plenty RTO	311	314	321	340
Kawerau-Whakatane	64	68	67	71
Rotorua RTO	266	268	276	296
Total BOP	640	650	665	707
New Zealand	7,803	8,234	8,374	8,915
BOP as % of NZ	8.2%	7.9%	7.9%	7.9%
Expenditure by international visitors				
Bay of Plenty RTO	83	89	92	95
Kawerau-Whakatane	13	14	15	15
Rotorua RTO	254	243	233	242
Total BOP	350	346	339	351
New Zealand	5,723	5,911	5,947	6,187
BOP as % of NZ	6.1%	5.9%	5.7%	5.7%

Bay of Plenty region accounts for about 7% of all visitor expenditure in New Zealand, although the share for both domestic and international visitors has been declining. Rotorua accounts for about 69% of expenditure by international tourists ahead of Bay of Plenty RTO with 27%. However, for domestic tourist expenditure, the position is reversed with Bay of Plenty having the largest share with about 48% of the total compared to about 42% for Rotorua.

5.7.4 Trips by purpose

The breakdown of visitor trips by purpose is set out in Table 5.24.

Table 5.24 Total tourist visits to the Bay of Plenty region by purpose 2009 (million trips or percent of total for area)

	Total trips					
	Holiday	**VFR**	**Business**	**Education**	**Other**	**Total**
Auckland RTO	5.6	4.8	2.5	0.3	0.4	13.6
Waikato RTO	3.0	3.4	1.7	0.1	0.3	8.6
Bay of Plenty RTO	1.5	1.6	0.6	0.0	0.1	3.8
Kawerau-Whakatane	0.4	0.4	0.2	0.0	0.0	1.0
Rotorua RTO	1.7	0.8	0.5	0.1	0.1	3.2
Total Bay of Plenty region	3.6	2.8	1.3	0.1	0.2	8.0
New Zealand	41.6	28.8	14.0	1.4	2.8	88.6
	Percent of total					
Auckland RTO	41%	35%	18%	2%	3%	100%
Waikato RTO	35%	40%	20%	2%	4%	100%
Bay of Plenty RTO	40%	41%	15%	1%	3%	100%
Kawerau-Whakatane	37%	45%	16%	1%	2%	100%
Rotorua RTO	53%	26%	15%	2%	3%	100%
Total Bay of Plenty region	45%	35%	16%	1%	3%	100%
New Zealand	47%	33%	16%	2%	3%	100%

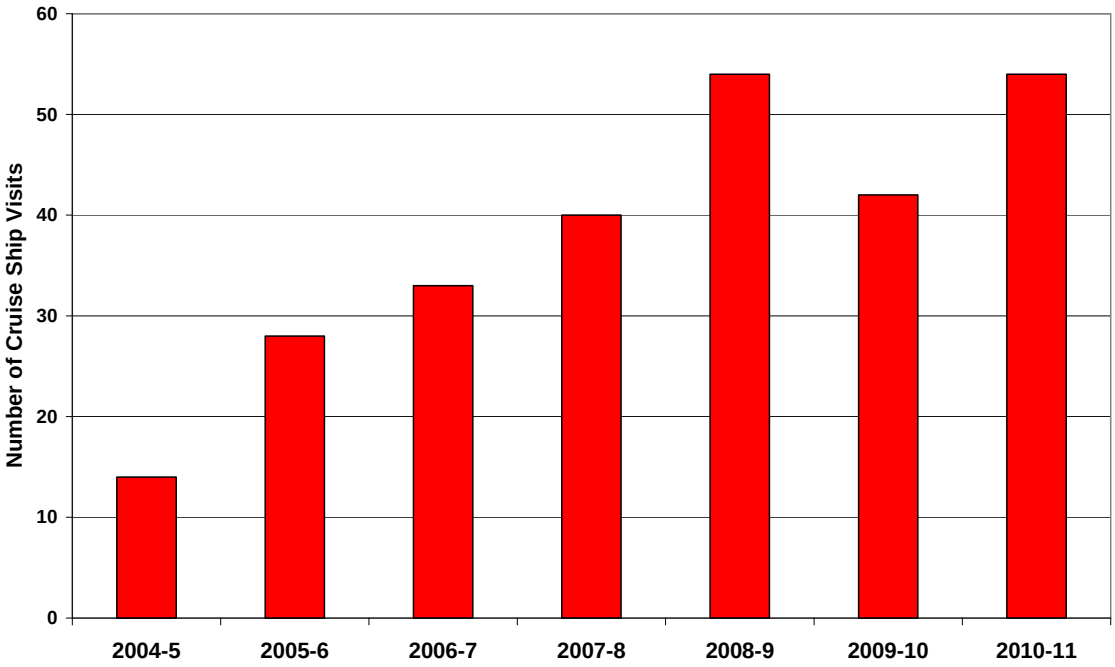


Figure 5.11 Cruise ship visits to Tauranga

The great majority of tourist visits are holidays or visiting friends and relations (VFR), although the balance between these two categories varies widely from Rotorua which has a high proportion of holiday visits and Bay of Plenty and Kawerau – Whakatane where VFR is more important. Again, this reflects the availability of recognised tourist activities in Rotorua, possibly the higher migration levels into Bay of Plenty. Business trips account for about 15-16% of the total with the share being similar for each of the RTO's.

5.7.5 Cruise ships

Cruise ships, although not normally contributing to the use of accommodation in the region, do provide a large number of visitors to the region and their numbers have been growing rapidly. This growth is set out in Figure 5.11.

It was estimated that each visit of a cruise passenger to a port would generate additional value added in the New Zealand economy of about $300[8] although not all of this would accrue to the region in which the port was located. For the planned visits to Tauranga in 2010/11, this would therefore generate an increase in value added in the economy as a whole of about $25-30 m and possibly supporting up to 300-400 jobs.

The extent of the exact figure and the distribution of the value added will depend in part, on the range of tourist activities available and on the structure of the local industry but it is likely that the contribution of passengers calling at Tauranga will be fairly substantial. Again, this is likely to benefit Rotorua but we understand that with

[8] New Zealand Cruise Industry Study

the growth of the potential numbers of passengers, other options for tourist activity with an increased focus on Tauranga are being considered. Increasing numbers of passengers seeking independent tours are likely to reinforce this trend.

5.7.6 Summary of tourism activities

Tourism plays an important role in the economy of the Bay of Plenty, providing direct employment for about 6.5% of the workforce overall and a rather higher share for the key tourist destination of Rotorua. Employment in most areas has grown steadily since 2001, although growth in Rotorua has been relatively slow. In part this reflects the different nature of tourism in Rotorua with an emphasis on international travellers and on more formal holiday activities, which may have been affected both by the recent economic downturn and by the earlier SARS outbreak. Tourism in other parts of the Bay of Plenty relies more on domestic tourism and less formal activities which appears to have been less affected by the downturn.

Domestic tourism is dominated by visitors both from within the Bay of Plenty and from Auckland and Waikato. Land based links to the bay of Plenty are therefore important to sustain these movements. International tourism is split between visitors from Australia for which the airport at Rotorua and possibly Hamilton may provide a regional gateway and those from further afield which are likely to route through Auckland and require land based modes for their onward journey. There has also been substantial growth in cruise passengers through Tauranga. These are typically dominated by Australians. The transport needs for these passengers depend on the tourist destinations they are likely to visit, but again would need to be supported either by good short distance links for travel within Tauranga or good longer distance connections for travel to Rotorua or further destinations such as Waitomo, Hamilton or Auckland.

Part 6: Identifying key linkages and drivers: investigating the importance of transport connections

6.1 Introduction

In investigating the potential linkages between transport and economic development, we have employed a variety of approaches to help our understanding of the connections and the ways in which changes in the level of transport accessibility and level of service might impact on economic development. The first part of this section sets out background findings from other studies and the second describes our examination of the linkages, building on the background research and on the analysis of the data for the region as described in the preceding sections.

6.2 Theoretical background – literature review

6.2.1 Introduction

The purpose of this review of the literature is to firstly, consider the relationship between transport and the economy and secondly to highlight the importance of economic geography as the theoretical basis of our study.

It is sometimes assumed that investment in transport infrastructure will automatically lead to the promotion of economic development. Nevertheless, the literature on this subject paints a more equivocal picture which suggests that although plausible, it should not be assumed that such outcomes will automatically occur. Two broad camps can be identified in the research literature (discussed in the following sub-sections):

- Some authors claim that national programmes of public investment, including road construction, lead to high rates of social return measured in terms of economic growth and productivity improvement.

- Others claim that effects do occur but any contribution to the sustainable rate of economic growth in a mature economy, with well-developed transport systems, is likely to be modest and will depend critically on the underlying conditions for growth.

The following sections discuss these perspectives in more detail and identify their relevance to our study.

6.2.2 The case for a positive relationship between transport investment and economic growth

Looking at the literature supporting high rates of economic growth related to transport investments, it has been observed that there is clear historical evidence of a connection between transport improvements and economic development. At the macro-economic level, historical data confirms this close correlation between transport growth, and in particular road transport growth, and economic growth

(SACTRA 1999). Critics have, however, pointed out that this data on its own does not help clarify the direction of cause and effect – whether increased movement is a sign of economic growth stimulated by other factors, whether traffic growth, facilitated by transport improvements, itself stimulates economic activity, or whether there is some iteration of the two (SACTRA 1999).

The main theoretical research supporting this view comprises a number of macro-economic studies, focused on the link between investment and productivity growth (e.g. Aschauer 1989). Aschauer argued that public investment in infrastructure leads to increases in firms' profitability or return on private capital such as the capital invested in a vehicle fleet. Firms respond by increasing the rate of capital investment leading to higher labour productivity and output, so perpetuating a further virtuous spiral of investment. The result, according to Aschauer, is a return on the public funds invested in public infrastructure that is significantly higher than the return on private capital.

These studies were initially very influential due to the strong links identified in early work. However, recently this approach has been heavily criticised for a number of reasons:

- Firstly, critics have again noted a lack of attention to causality – that the approach used does not demonstrate causality but presupposes it (Banister and Berechman 2000). It is pointed out that the empirical evidence used by Aschauer could imply a different relationship of cause and effect – higher transport investment not causing economic growth but being made more affordable by growth in income (SACTRA 1999).

- Secondly, critics argue that the suggested high rates of return on public capital defy experience. For example, and the empirical findings of Aschauer in relation to the United States of America experience do not appear to have been borne out by the United Kingdom (McKinnon 1996).

A further point is that the work of Aschauer is concerned with impacts on total factor productivity, i.e. the impact on overall productivity of all factors of production, rather than just the narrower measure of output per worker. It has been observed that much of the work undertaken in this context appears more suited to questions around the general level of transport investment which is economically warranted, than to the assessment of the relative merits of particular schemes.

6.2.3 The case for a weaker relationship between transport investment and economic growth

Although it is widely accepted that the contribution of transport improvements to economic development will be significant in a developing country, for a developed country with a well-developed transport network the question arises as to whether further transport network improvements can have anything more than marginal benefits to the national economy? The second broad camp within the literature includes a number of international studies that have concluded that there is not a clear and automatic link between transport investment and economic development.

In one influential publication, Banister and Berechman (2000) argued that: "In developed countries, where there is already a well-connected transportation network of high quality, further investment in that infrastructure will not on its own, result in economic growth. Transportation investment acts as a complement to other more important underlying conditions, which must also be met if further economic development is to take place." Breheny (1995) similarly argued that roading investment will not necessarily be a sufficient condition for economic growth and may not even be a necessary condition. He concluded that roading investment would only make a significant difference where it is the only missing feature of a strong regional economy. In a depressed regional economy where other conditions for growth were missing roading investment appears to have made only a limited difference to economic development.

BERL's (2004) investigation of the potential economic impact of Auckland's proposed Eastern Corridor supported the approach of Breheny and argued that transport infrastructure will make a positive contribution to economic development when it resolves isolation and bottleneck issues and a sound economic basis already exists for growth. Work undertaken for NZTA in connection with the development impact of the RoNS by Richard Paling Consulting suggested that based on experience from overseas there was evidence that new roads which provided significant accessibility benefits appeared to generate increased economic activity.[9] However this needed to be viewed in the context of the existing local development patterns and potential for economic development in the corridors served.

This raises the critical question: How might transport investment stimulate economic development? Rather than assuming the existence of an automatic link, the more recent studies emphasise the importance of supporting pre-conditions being present in order for economic development spin-offs to occur from transport investments. Banister and Berechman (2000) conclude that the necessary conditions relate to economic externalities, investment factors, and political factors:

- Economic conditions: The presence of underlying positive economic externalities, such as agglomeration[9] and labour market economies including the availability of a good quality (well trained and highly skilled) labour force, adequate supply of suitable land etc.

- Transport investment conditions, including the availability of funds for the investment, the scale of the investment and its location, the network effects (e.g. are there missing links in the network), and the actual timing of the investment.

- Political and institutional conditions related to the broader policy environment within which transport decisions must be taken, such as supportive land-use planning policies.

Individually, these conditions may have very little or no impact on economic development, and it is only when all three necessary sets of conditions are present and operating together that economic growth will ensue (Banister and Berechman 2000). Banister and Berechman also argue that transport infrastructure

[9] See next section.

improvements are location related. Thus, they concluded that the identification and measurement of the economic impact of transport improvements must take place at the local level. Aggregating the analysis will fail to capture these local impacts within the analysis.

Other recent papers support the conclusion that transport improvements, by themselves, are insufficient to ensure that economic development. SACTRA (1999) concluded that although transport improvements could positively affect economic growth, it is specific local conditions and circumstances that influence the effects of transport improvements, such that no particular outcome can be guaranteed.

The European Conference of Ministers of Transport (ECMT 2001) found that overall, transport systems improvements could not be said to systematically improve productivity in a region. Improvements to the transport network may increase the pool of available labour but alternatively may promote urban sprawl and have little impact where other constraints prevent an uptake of the improvements.

6.2.4 Relevance to our study

On balance, the evidence from the literature tends to support the view that in the case of a region with a developed economy and arguably a substantially complete transport network, such as the Bay of Plenty, investment in transport infrastructure cannot be assumed to automatically lead to economic growth. Rather, the economic growth potential of transport improvements will depend critically on the presence of other pre-conditions for growth at the national, and most importantly, regional and local level. Specifically this will be the case where transport improvements can resolve isolation and bottleneck issues and a sound economic basis already exists for growth at the local level.

Recent developments within the economic geography literature have done much to provide a framework within which these factors can be analysed.

6.2.5 Economics and geography

This economic framework that we will be using is grounded in the field of economic geography. Economic geography is a broad area of study, explaining economic development patterns from the broadest global trends to specific local economic features.

At the broader level a recent paper by McCann (2009, p280) argues that “a coherent understanding of New Zealand’s current economic predicament can be gained by examining the modern interrelationships between geographical location, economies of scale, and the diversity of production and trade.” By focusing debate on these key themes of economic geography, New Zealand’s productivity performance can be considered within the context of “a much fuller and systematic account of geographical factors” than has been the case to date (McCann, 2009).

It is useful to firstly summarise the key interrelationships of economic geography; scale, location and economic diversity.

- Scale is important at both the national and regional level. Large domestic markets can provide economies of scale far beyond those achievable within a small, isolated market (NZIER 2006).

- Location matters for countries, cities and regions. Analysis from the OECD and World Bank finds that New Zealand and Australia suffer the greatest adverse effects of geographical isolation on productivity of any advanced economy (World Bank 2009). The IMF has found that the effect of distance is to reduce labour productivity in Australia and New Zealand by just over 10% (IMF 2004).

- Finally, according to McCann, economic diversity in production and trade supports a more productive economy (OECD 2008).

Within this vein, previous research has demonstrated that New Zealand is becoming increasingly characterised as an economic region of Australasia, with Auckland the dominant economic centre of this region (Grimes 2005).[10] Maré (2008) demonstrated that the size distribution of New Zealand's cities reasonably reflects the results that would be expected if Australia and New Zealand were treated as one economic region. When looking at regional performance, only Tasmania exhibits lower regional productivity than New Zealand and interestingly, the age distribution patterns of labour migration to Australia from both New Zealand and Tasmania are very similar (McCann 2009).

Confirming the relevance of the key themes of economic geography is the observable trend towards an increasing concentration of economic activity taking place in relatively small geographical areas. In approximately half of OECD countries, more than 40% of the national GDP is produced in less than 10% of all regions (OECD, 2009). In the United States of America 40% of employment is currently located in areas constituting just 1.5% of its total land mass (Scott and Storper, 2007 p576). As Scott and Storper observed, "the most striking forms of agglomeration in evidence today are the super- agglomerations or city-regions that have come into being all over the world in the last few decades,"

McCann's paper is useful in demonstrating how reductions in spatial transactions costs benefit low knowledge-intensive and low value outputs but these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value higher knowledge intensive outputs.

Importantly for this study, the evidence clearly demonstrates that cities and city-regions have reaped the benefits of a structural transformation that has taken place in most modern economies. Cities now thrive through the concentration and provision of high value added service activities. A key factor underpinning the structural economic transformation and growth of modern cities is agglomeration, the clustering of people and economic activity in larger, denser urban agglomerations generating higher levels of productivity and higher returns to businesses and workers.

[10] See also MED 2007 and McCann 2009 (p296).

Agglomeration theory postulates that the congregation of businesses and workers is caused by the existence of positive externalities (or benefits which are external to firms) that are generated through close spatial proximity and that these serve to raise the efficiency of firms. The literature emphasises three sources of agglomeration economies, roughly following three examples given by Marshall (1920), which explain the effects on productivity of concentrating economic activities in urban areas. Marshall's classification of externalities are as follows (see Crawford, 2006).

- **Input-output linkages** promoting more efficient provision of intermediate inputs to firms in greater variety and at lower cost. Here a "concentration of producers using particular inputs allows increased specialisation and greater economies of scale in the production of inputs."

- **Larger labour markets.** With increased urban size, deeper labour markets are likely to arise. This "may allow greater specialisation in human capital, by reducing the risks to workers of firm specific employment shocks. Similarly it will be easier for firms to find new employees, should current employees quit."

- **Technological or knowledge spill-overs** between firms. In this regard, agglomeration facilitates faster communication and transfer of information across firms.

However, it is also important to understand the channels through which the process of agglomeration happens in practice. Duranton & Puga, (2004) suggest that the Marshallian externalities can be better understood through an awareness of sharing, matching and learning mechanisms as follows:

- Sharing which refers to "indivisible facilities" (e.g. machinery with high fixed costs that few firms would buy individually), the "gains from a wider variety of input suppliers that can be sustained by a larger final-goods industry", the "gains from the narrower specialisation that can be sustained with larger production, and risks"

- Matching which refers to an ability to improve quality (e.g. improving the match between the skills demanded by business and the skills available in the workforce) and alleviate "hold-up problems"

- Learning which refers to the "generation", "diffusion" and "accumulation of knowledge"

6.2.6 Observations relevant to this study

Economic geography is now recognised as providing a very powerful framework for undertaking the analysis of regional economic development and the role of transport within this process. The framework demonstrates the importance of concentrating knowledge intensive activities which typically occurs in urban areas but also indicates that where primary production takes place, a focus on spatial transactions costs will be important, although these savings will not prevent regions dependent on such outputs from falling behind regions producing higher value higher knowledge intensive outputs. So too will be opportunities to broaden and diversify the economic base of a region and also to seek opportunities to move production processes higher up the value chain.

Within this framework we will use this study as an opportunity to profile the composition and changes within the Bay of Plenty economy and relate these to the observable trends in the wider national and international economy and to assist in painting a picture of the future opportunities and constraints this may reveal.

6.3 Linkages between the movements of freight and economic development

The efficient movement of freight clearly plays a role in facilitating a wide range of economic activity in the region, especially the movement of basic agricultural materials and minerals where the cost of transport may be a large proportion of the total delivered cost to the customer. The movement of freight links the producers of basic materials with processing facilities and export markets. This is particularly the case for the movement of milk and dairy products, logs and timber products and kiwifruit which are sold extensively on world markets. Effective freight links are also particularly important for supporting activities in the more remote areas of the region to the east and may therefore support a geographical broadening of the region's economic base. This may have particular impact on the extension of kiwifruit growing, the development of aquaculture round Whakatane and Opotiki and the timber industry and its links with the port of Tauranga.

It should be noted however, that in many cases, improving freight levels of service mainly contribute to reducing the costs of transport as broadly defined for the movement of products but the volumes of these may be constrained by other factors. Examples of these within the Bay of Plenty region are a range of agricultural products such as meat and milk and dairy products where the output is largely constrained by the productive capacity of the land and climatic conditions and where the levels of production do not have the potential to increase substantially, even if the transport system is improved.

However, where output has the potential to increase sharply, the expansion of the capacity of the transport system will be required to ensure that the economic potential of these increases is achieved. Examples where this is likely to be important include the expansion of the logging and timber industry, with the potential for increased harvesting as trees currently growing are harvested, the expansion of the kiwifruit industry into new areas, particularly to the east and the expansion of aquaculture. However, the opportunities for expansion of this type are probably limited. Where these opportunities are not present, while good freight transport generally allows existing activities to be undertaken more efficiently and thus improves the returns from these, it may only have a limited impact on the gross value of the output produced.

The Port of Tauranga is a key freight node for the upper North Island. However, the extent of additional economic activity generated by the port is sensitive to the measurement approach being used. A number of studies undertaken in New Zealand and Australia over the past ten years have examined the economic impacts of ports. A key point of difference between these studies is in the treatment of 'trade facilitation' which is related to the value of trade being undertaken as a result of cargo flowing through the port. A study of the economic impact of the Ports of Auckland undertaken by Market Economics in 2005 is an example of an approach which included a value for trade facilitation within the overall estimate of the economic impact of the port. However, in our view, trade facilitation is clearly

important but not something that can be seen to directly increase the value of output in a given area. Therefore, while the Port of Tauranga is an important component of the local economy, the level of spin off into other locally based activities is seen to be relatively limited.

Our view is consistent with the approach used in Covec's re-estimation of the extent of economic impact attributable to the Ports of Auckland (Covec 2008). This study did not include the value of trade facilitation. Covec argued that although "the port is an important facilitator of trade, we consider it tenuous to assign the underlying value as a port impact." This was based on the view that although the port provides infrastructure through which goods are traded, the port itself is not responsible for their production (and hence any associated impacts). This position is also consistent with the port impact framework established by the Australian Bureau of Transport Economics.

There are some examples of the development of locally based distribution centres and manufacturing activities in close proximity to the Port of Tauranga, such as the production of fertiliser, but in general for value added activities, the port acts as an Auckland gateway rather than one generating high levels of increased activity outside the transport sector for the Bay of Plenty region itself. It does carry out an important role in providing routes for Auckland importers and exporters and in reducing the pressure on the limited space available on the quayside in Auckland.

Given the data that is available, it is not feasible to develop a formal model to link the movements of freight with levels of economic development and a more pragmatic two part approach will be developed. This derives the general background from the conclusions of the Bay of Plenty Freight Study and then supplements this with a consideration of key flows where these are likely to impact particularly on economic development.

6.4 Modelling key drivers of economic development: commuting flows and agglomeration benefits

6.4.1 Introduction

The movement of people forms an important component of economic development, especially for the development of skill-based value-added activities which benefit from the clustering of activity. Commuting flows match the resident workforces with the jobs available and the easy movement of people in the course of their work gives rise to range of activities which contribute further to the productivity of the workforce and the value of the output that might be produced.

The ability to access the outputs and skills available both in a particular area itself and in other areas is also important and lies at the heart of agglomeration modelling. This links levels of accessibility with the scale of economic output. The basis of this is understanding the range of opportunities which are available at a particular location which is typically and for this study measured in the form of the "effective density" a combination of employment level and the costs of accessing or interacting with these. Building on the approach developed by NZTA for the assessment of agglomeration benefits, we have estimated the effective densities for each of the districts within the Bay of Plenty region, and have also considered how the totals are built up with contributions from each area. This then provides a measure of the

extent to which areas may potentially interact and also gives a baseline against which any future changes can be assessed.

6.4.2 Commuting flows

While the pattern of observed commuting flows has been discussed earlier in Section 5.3, to explore future patterns we have developed a simple gravity model based on the levels of attraction and generation and the measure of separation between these. This allows us to look at differences in commuting patterns between the different areas on a structured basis and also to identify the importance of the travel costs of their connection. It additionally allows an assessment to be made of the effects of the changes in population over time on patterns of commuting to be assessed.

For the base position in 2006, Figure 1 to Figure 6.3 illustrate the observed position and results obtained from the gravity model for Tauranga, Rotorua and Whakatane.

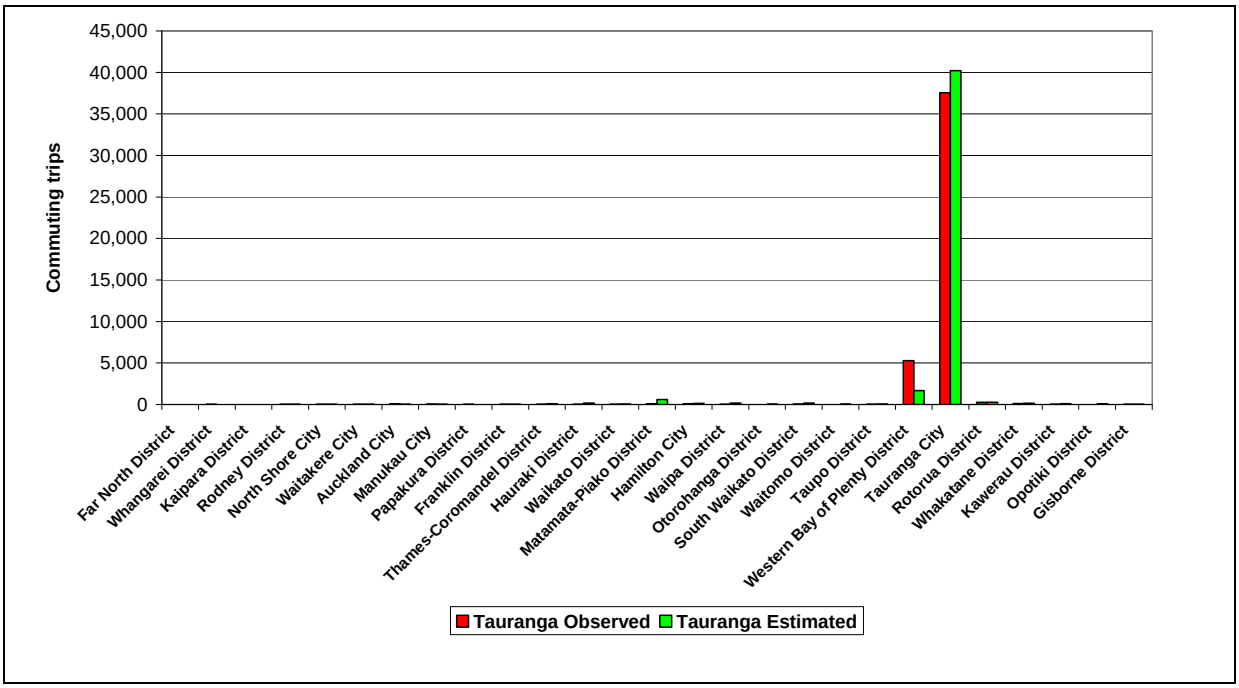


Figure 6.1 Observed and predicted commuting movements to Tauranga 2006

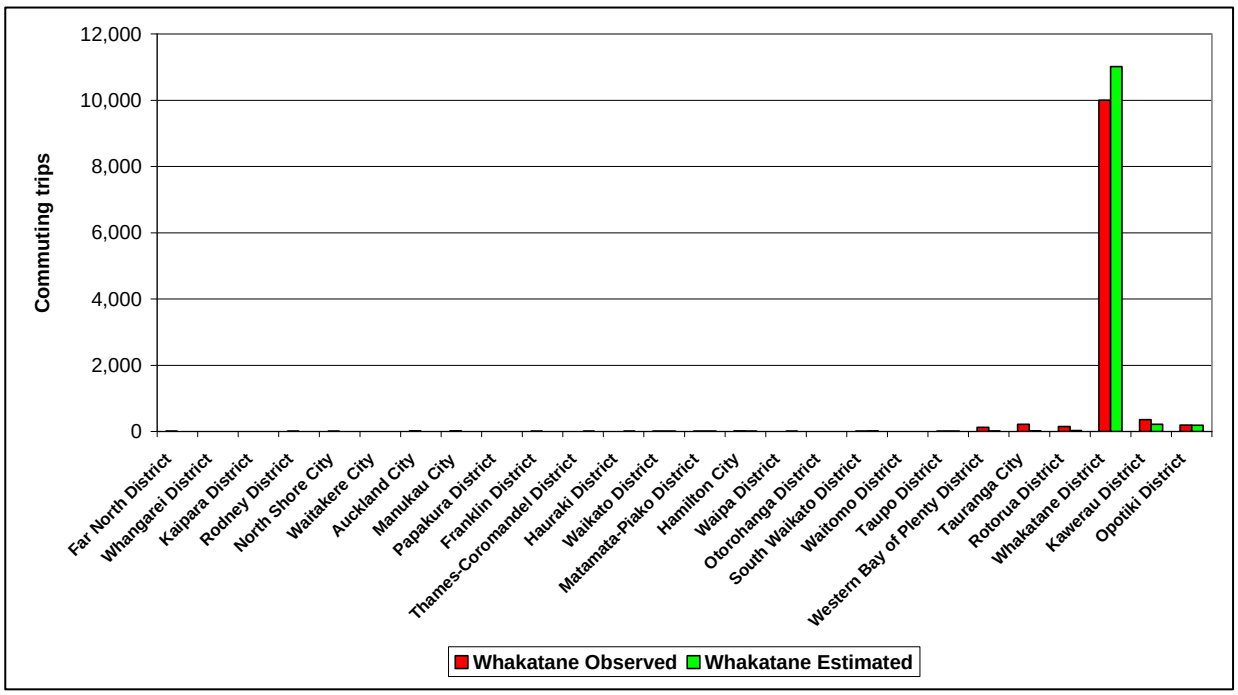


Figure 6.2 Observed and predicted commuting movements to Rotorua 2006

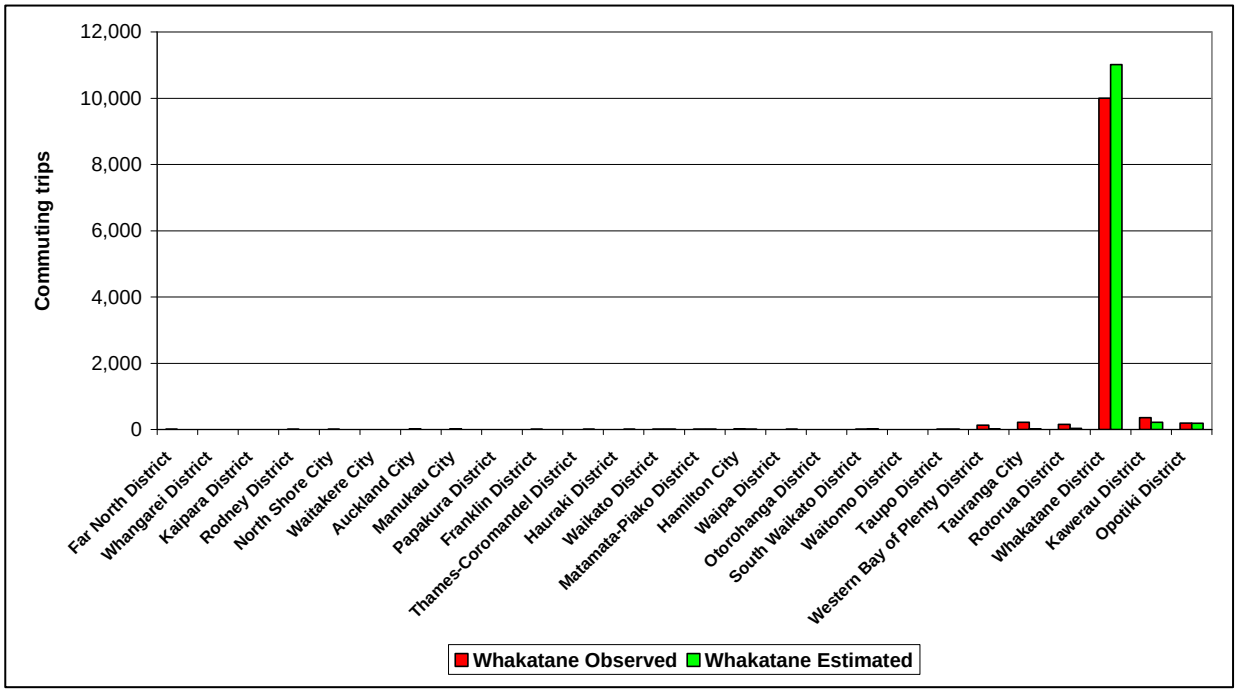


Figure 6.3 Observed and predicted commuting movements to Whakatāne 2006

All three examples demonstrate the high proportion of jobs that are filled from workers resident in the area itself or in the case of Tauranga from the immediately surrounding area. However, while the model provides good estimates of the key commuting flows, it provides less precise estimates of the more minor movements. As a result, there are some issues with the smaller flows from neighbouring areas, where while the total differences between observed and predicted flows tend to be small, the proportional differences may be substantial. For these, the gravity model typically but not always under-predicts the flows. While this does not affect the main conclusions about the high proportion of commuter trips being satisfied locally, it does mean that care needs to be taken when considering the predictions of longer distance movements. This is considered further in Section 7 which considers the results of the modelling for future years.

6.4.3 Agglomeration benefits

As noted earlier in this section, agglomeration benefits measure the impacts that arise when economic activities become more closely clustered and the level of interaction between these increases. The ease of interaction can be changed either by the physical relocation of activities or alternatively by other changes in the costs of the links between them and in particular, by altering the journeys times along these.

New Zealand Transport Agency has undertaken considerable work on the assessment of these potential benefits which come under the category of Strategic Benefits in the Economic Evaluation Manual. Research has been undertaken looking at the position nationally within New Zealand for a range of activities and from this parameters have developed which assess the effects of changes in employment and in the measures of separation between areas. While this approach is still evolving and may not fully take into account the strength of the factors affecting productivity within Auckland (as for example described in earlier work by the consultants) it does represent a base position for considering agglomeration impacts at a regional level.

The approach developed by NZTA and the agglomeration elasticities estimated have therefore been used in the appraisal for this work. It should also be noted that, in principle, agglomeration benefits only form part of the wider economic benefits resulting from major transport schemes, and the approaches developed only reflect changes in productivity of the labour force rather than changes in the locational pattern of employment. In addition, they relate only to interactions between workers at their place of work and do not take into account the benefits of improved matching of the skills of the workforce resident in an area with opportunities elsewhere. However, agglomeration benefits as defined here have proved amenable to investigation in some detail and sufficient confidence in their estimation has been derived to allow this process to be included in standard transport evaluation methodologies in New Zealand and the United Kingdom.

In New Zealand, agglomeration benefits have been determined for a number of schemes including the Waterview Connection, the central component of the Waikato Expressway around Hamilton, the Tauranga Eastern Link, the urban components of the Wellington Urban RoNS, Christchurch Motorways RoNS and the Rail Development Plan in Auckland.

Although in general agglomeration, benefits have been considered within the context of single urban areas, work undertaken for the Northern Way in the United Kingdom used a similar approach to look at agglomeration benefits as links between free-standing towns and cities were improved. The analysis developed to estimate agglomeration elasticities in New Zealand was also based on a nationwide assessment of impacts. While the development of a regional agglomeration model is therefore innovative, the approach underlying this is soundly based. This approach has been used in the recent Economic Linkages Study, looking at the connections between Auckland Hamilton and Tauranga.

The approach to the assessment of agglomeration benefits is based on the concept of the "effective density", a measure of the accessibility to employment (as a proxy for economic activity) of an area. This reflects the level of employment potentially accessible to the location in question, weighted by the measure of separation between them, typically the inverse of the distance or generalised cost of travel. Using this approach, employment further afield has a lower impact than employment closer which reflects the different levels of potential interaction between them. By looking at the way in which the effective density of an area is built up and the ways in which different areas contribute to this, it is possible to gain an indication of the relative influence of these and the importance of the interactions between the areas. The approach that has been developed in New Zealand uses generalised costs which combines the time and distance of a journey and this approach is therefore followed in this study.

This analysis has been undertaken for each of the local authority areas within the upper North Island and the results for the Bay of Plenty region for 2006 are set out in Table 6.1. It should be noted that while this model is relatively coarse and as a consequence the results should be regarded as broadly illustrative, it does provide useful insights into the interactions between different areas.

Table 6.1 Effective densities (1) for Bay of Plenty districts in 2006

Source of weighted employment	Bay of Plenty district					
	WBOP	**Tauranga**	**Rotorua**	**Whakatane**	**Opotiki**	**Kawerau**
	Weighted employment (effective density)					
Western BP	1,859	430	162	123	90	120
Tauranga	1,429	6,169	748	557	371	529
Rotorua	321	446	3,681	368	239	568
Whakatane	133	181	200	2,004	366	511
Opotiki	18	22	24	67	367	39
Kawerau	27	37	66	109	46	426
Auckland Metro	3,564	2,826	2,548	1,970	1,694	2,052
Other Auckland	441	345	310	238	204	249
Hamilton	592	669	651	399	304	444
Total inc. other	10313	13129	10507	7307	4984	6532
	Percent of total for area					
Western BP	18%	3%	2%	2%	2%	2%
Tauranga	14%	47%	7%	8%	7%	8%
Rotorua	3%	3%	35%	5%	5%	9%
Whakatane	1%	1%	2%	27%	7%	8%
Opotiki	0%	0%	0%	1%	7%	1%
Kawerau	0%	0%	1%	1%	1%	7%
Auckland Metro	35%	22%	24%	27%	34%	31%
Other Auckland	4%	3%	3%	3%	4%	4%
Hamilton	6%	5%	6%	5%	6%	7%

Source Consultants Analysis and Model
Notes (1) Defined as employment weighted by the inverse of the costs of travel

The table indicates that the accessibility (effective density) varies across the region. The highest levels of accessibility are achieved in Tauranga, in part reflecting its size, with much lower levels of accessibility being experienced in the smaller and more remote areas in the east of the region.

The table also indicates the strength of the potential interactions between the different areas within the region and with key external areas. In general, this indicates that while the Auckland area has a strong influence mainly reflecting the

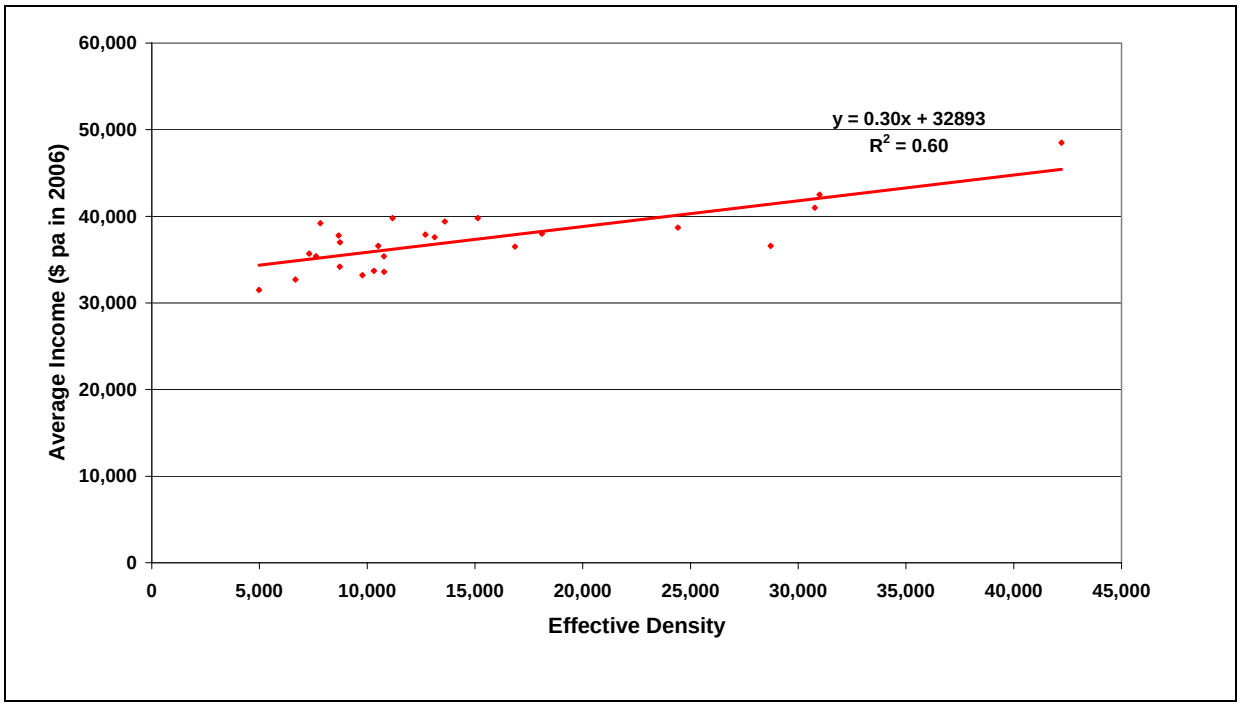
sheer size of employment in the area, the interactions between the different areas within the region are typically more muted except for the links between western Bay of Plenty and Tauranga. Thus, taking the example of Rotorua, the employment in Auckland Metro contributes about a quarter of the total effective density, with employment in Rotorua itself about 35%. The contribution of other areas within the Bay of Plenty amounts to about 12%. A similar position exists for Tauranga where other areas within Bay of Plenty contribute 7% to the total effective density. For the smaller districts to the east, where the total effective density is much lower because of their lower levels of employment, other areas within the Bay of Plenty make a larger contribution to the total (up to 28% for Kawerau) but the total is still dominated by the size of Auckland.

The conclusions from this are that in general, the potential business linkages generated by the different areas within the Bay of Plenty only make a relatively limited contribution to each other's effective density, reflecting the distances between the areas and the relatively low levels of employment. The presence of Auckland is important with the sheer size of its employment outweighing the distance between it and the Bay of Plenty.

The position defined for the effective density within the region supports the conclusions from the analysis of commuting flows, which indicated that in these terms linkages between the different areas within the Bay of Plenty were relatively modest, except for western Bay of Plenty and Tauranga. While Auckland is in general, too distant for significant volumes of day to day commuting to and from locations in the Bay of Plenty, its size means that it has a substantial influence on the individual areas, a finding that has been supported by a number of the stakeholder interviews.

Effective density is also fairly strongly correlated with income and for a broad study area comprising the upper North Island, the relationship between these is set out in Figure 6.4.

Figure 6.1 Relationship between effective density and average earnings by TLA in the upper North Island 2006



While effective density is clearly only one of the factors which affect average earnings, there is fairly strong relationship between the two. As areas get more accessible and their effective density increases, their productivity also tends to rise.

Part 7: Future growth in the Bay of Plenty

7.1 Introduction

The analysis set out above has built up a picture of the current position in the Bay of Plenty in terms of the movements of goods and people and the economic structure of the area. In this section, we develop forecasts for the future up to 2041 and then using the models developed earlier consider how these might affect patterns of economic activity in the region.

7.2 Population forecasts

Population growth is a key driver of economic activity in the region as it affects both the scale of the workforce and the size of the market for a wide range of goods and services. Estimates of population growth for the study area have been made based on projections published by Statistics NZ. For this study (as for the AHT Economic Linkages Study) we have used the high growth forecasts which are available from Statistics NZ for the period to 2031 and have then assumed that the growth predicted for the final five years within this period between 2026 and 2031 continues at the same linear rate to 2041. The use of the high forecasts is considered appropriate particularly for the study area in light of the substantial growth that has occurred over the past, which has typically been higher than the Statistics NZ medium forecasts. The increases in population that result for future years are set out in Table 7.1.

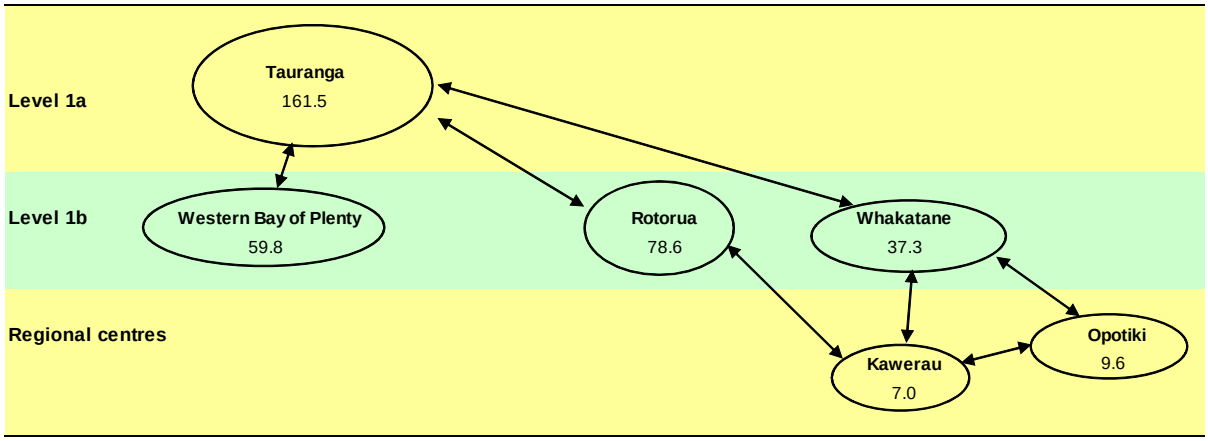
Table 7.1 Forecast population growth for the Bay of Plenty 2006-2041

Area	Population in					Average growth rate pa 2006-2041
	2006	2011	2021	2031	2041	
Western Bay of Plenty	43000	47300	51500	55700	59800	1.5%
Tauranga	106900	120100	133500	147300	161500	1.9%
Rotorua	68100	70800	73400	76000	78600	0.7%
Whakatane	34500	35300	36100	36800	37300	0.3%
Kawerau	7150	7180	7160	7110	7010	-0.3%
Opotiki	9200	9320	9440	9550	9640	0.2%
Total Bay of Plenty region	**268850**	**290000**	**311100**	**332460**	**353850**	**1.3%**
Auckland Metro	1187600	1311400	1441600	1577200	1715500	1.7%
Hamilton	134400	148600	162100	175900	189900	1.6%
Total NZ	**4184080**	**4522720**	**4848550**	**5176160**	**5503290**	**1.2%**
Bay of Plenty region as% of NZ	**6%**	**6%**	**6%**	**6%**	**6%**	

Continuing existing trends, the areas in the west of the region are forecast to grow strongly at a rate well above the national average but further east the rate of growth is typically more modest with a decline forecast for Kawerau. High growth rates are also projected for the two main centres of Hamilton and Auckland potentially influencing the region. Our forecast for 2041 is slightly lower than that of 370,000 for 2040 made in the Bay of Plenty Transport Futures Study, although as discussed above, it is consistent with that for the AHT Economic Linkages Study.

These 2041 population forecasts for the districts in the region are shown in Figure 7.1.

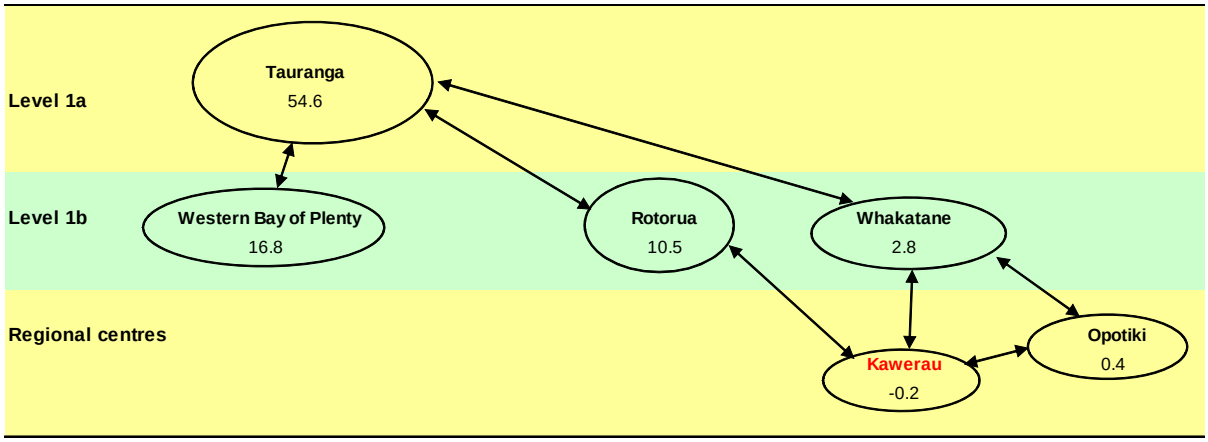
Figure 7.1 Bay of Plenty region. High level district hierarchy (for the projected usually resident population count 2041 (000's)



Source: Statistics NZ population forecasts, BERL

The total population in Tauranga and western Bay of Plenty in 2041 will be over 220,000, and the rest of the region about 132,000. This means Tauranga and western bay in 2041 will be two-thirds larger than the rest of the region. This is in contrast to the situation in 2006, where the population in Tauranga and the western bay was 150,000, one and a quarter times the population of 120,000 in the rest of the Bay of Plenty.

The pattern of that projected population increase in the districts across the region as between 2006 and 2041 is shown Figure 7.2.



Note: Settlements in red have a projected decline in population between 2006 Census and 2041 forecast. *Source: Statistics NZ population forecasts, BERL*

Figure 7.2 Bay of Plenty region: Change in population for the High Level district Hierarchy (for the projected usually resident population count 2041 (000's)

This graphic shows that there is projected to be strong population growth in both Tauranga and the western Bay of Plenty. From a transport viewpoint, this will be a key driver of the need for expansion of passenger transport in that part of the region. We note that the projections of the population growth in Opotiki district could well be exceeded by 2041 if the aquaculture industry in the eastern Bay of Plenty expands as presently expected. This could have some spin-off to increased population in Whakatane district also.

7.3 Employment forecasts

A similar approach has been used to the development of employment forecasts and for these we have assumed the same rates of growth as for population. This therefore assumes that overall participation rates would remain broadly the same as they are today.

While employment has grown faster than the population in general over the past, it is assumed that the scope for additional participation in the labour force is now more limited, particularly as the population ages and as a consequence population and employment would therefore grow at the same rates. On this basis the employment in the Bay of Plenty is forecast to increase as set out in Table 7.2, although it should be recognised that given the period over which forecasts are made, the results are subject to considerable margins of error.

Table 7.2 Forecast growth in employment 2006-2041

Area	Employment in		Forecast growth
	2006 (1)	2041	
Western BP	13300	22200	67%
Tauranga	44100	84400	91%
Rotorua	26300	33100	26%
Whakatane	14300	15900	11%
Opotoki	2600	2800	6%
Kawerau	3000	2800	-10%
Total Bay of Plenty region	103600	161200	56%
Auckland Metro	478,900	842,784	76.0%
Hamilton	60,800	105,212	73.0%
Total New Zealand			

Note: There are a number of definitions of the numbers employed. This table is based on the numbers employed as recorded in the 2006 Census and therefore includes full and part time workers. The numbers derived are therefore slightly different to those set out elsewhere in this report which reflect alternative measures.

By assuming a continuation of existing trends we have also made forecasts of the distribution of employment by type and this is set out in Table 7.3.

Table 7.3 Forecast changes in employment by industry in the Bay of Plenty 2006-2041

Employment sector (1)	2006	2041	Growth from 2006-2041
Agriculture and Mining	9800	9800	0%
Manufacturing	12100	14000	16%
Construction and gas and Water	7900	15500	96%
Wholesale	4800	6700	40%
Transport	3400	5000	47%
Retail	14400	19400	35%
Accommodation	5500	8300	51%
Communications finance and business and property services	14300	28400	99%
Government health and education	20400	37100	82%
Other support services	6100	9700	59%
NES	2000	2000	0%
Total	100700	155900	55%

Notes (1) Based on ANZSIC96

The division of this growth in employment into the different categories affecting transport demand is set out in Table 7.4.

Table 7.4 Breakdown of forecast employment growth by potential freight usage types

	2006	2041	Growth from 2006-2041
Heavy freight using industries	13200	14800	12%
Moderate freight using industries	39200	55600	42%
Minor freight using industries	48300	85500	77%
Total	100700	155900	55%

About two thirds of the projected growth will occur in those sectors which have a relatively low usage of freight but where the movement of people both as workers and as suppliers and customers is important. Growth in employment in the higher freight generating activities is expected to limited.

To the extent to which increased value added can be obtained from the primary commodities produced in the region, it is likely that much of this activity will be

located in the urban areas, either in the centres in the Bay of Plenty or further afield in New Zealand or even overseas. To some extent the work of Scion in the forestry industry provides an example of this where the agency is based in Rotorua but where it collaborates with a range of other research institutions mainly in other urban areas.

From the information available it is difficult to be certain of the scale of this activity and its importance to the urban economies in the region, although anecdotally it is probably typically quite small. However, increasing the scale and amenities of the urban areas will assist in attracting the workforces and support activities necessary to underpin the expansion of activities of this type albeit typically from a fairly low base.

7.4 Freight traffic

Forecasts of the growth in freight traffic up to 2041 have been made as part of the Bay of Plenty Freight Study.

There is forecast to be substantial growth in the freight movements impacting on the Bay of Plenty, driven in part by the growth in log and timber products and in part by growth in the demand for aggregates and building materials. At a more local level, the growth of the kiwifruit production will also have some impacts and could particularly affect flows from the east of the region. There is also forecast to be growth in the movement of retail goods, but the scale of this is expected to be attenuated by changes in distribution patterns with more direct delivery to destinations in the South Island and to some extent the lower North Island rather than routing through distribution centres in Auckland. Growth in freight in the Bay of Plenty is also expected to be affected by the decline in coal imports transported from Tauranga to Huntly.

A characteristic of the freight movements in the Bay of Plenty is that these are dominated by a relatively small number of bulk products for which the demands can fluctuate considerably. These fluctuations can reflect climatic conditions as is particularly the case for milk and dairy products, and also international market conditions and competition for shipping space, as is the case for logs and timber. The market for aggregates, another important contributor to regional traffic flows, can also fluctuate with the demands from the construction sector. In addition, the routing of export traffic can have an impact on the area, with the potential for large fluctuations in traffic from the east and also from Waikato. Waikato, which is an important source of traffic through Tauranga port is located approximately equidistantly from Auckland and Tauranga ports and the traffic from this area may therefore shift, in response to relatively small changes in the patterns or costs of international shipping services.

The forecasts made in the NFDS assumed a ‘business as usual’ approach for the future and also did not take into account short-term fluctuations. It is however, recognised that providing precise forecasts for the future can be a particularly difficult process, given the particular nature of the commodities transported and the potential for change over and above what has been forecast. This is particularly the case for the movement of overseas cargoes which dominates much of the traffic in the Bay of Plenty and also for movements of some commodities like logs and timber. However, by considering forecasts on a commodity basis and developing separate approaches for each of these can help to limit any possible issues that might arise.

The NFDS made forecasts for 2031, reflecting a 25 year forecasting horizon. However, given the economic downturn, it is considered that these forecasts are now probably more applicable to 2035, although to maintain consistency with the NFDS and the UNIFS work currently being undertaken concurrently, these are still labelled as "2031". A set of forecasts have also been made for 2040, a forecasting year used for the RLTS, and in developing these it has been assumed that growth over the five year period from 2035 to 2040 would represent 20% of the growth forecast for 2006-07 to 2031 made in the NFDS.

The growth by geographical type of traffic is set out in Table 7.5.

Table 7.5 Forecast growth of Bay of Plenty traffic movements 2006-07 to 2031 and 2040 all commodities (million tonnes)

Type of movement	2006-07	2031	Growth to 2031	2040	Growth to 2040
Internal	17.4	29.1	67%	31.4	80%
To and from other upper North Island (UNI) regions	11.2	15.2	36%	16.0	43%
To and from other regions	3.2	4.3	35%	4.5	41%
Total	31.8	48.6	53%	51.9	64%

Growth of the shorter distance movements within the Bay of Plenty is expected to be particularly large, with increases in the longer distance inter-regional movements being more modest. As indicated above, the growth of freight movements to and from the other UNI regions is affected by the decline in coal traffic and the change in patterns of retail distribution.

The growth by commodity over the period to 2031 (2035) and 2040 is set out in Table 7.6.

Table 7.6 Forecast growth of freight movements to 2031 and 2040 for identified commodities (million tonnes)

Commodity group	2006-07	NFDS growth to 2031		Growth to 2040	
	Tonnes (m)	Tonnes (m)	Percent	Tonnes (m)	Percent
Dairy products	1.9	0.0	0%	0.0	0%
Logs and timber products	8.6	4.3	50%	5.2	60%
Meat and livestock	0.3	0.0	0%	0.0	0%
Horticulture	0.8	2.0	260%	2.4	311%
Petroleum	1.3	0.5	38%	0.6	46%
Coal	0.9	-0.9	-100%	-0.9	-100%
Aggregate	3.1	3.0	99%	3.7	119%
Limestone, fertiliser, cement and concrete	2.1	1.6	76%	1.9	90%
Other minerals and metals	0.9	0.0	0%	0.0	0%
Retailing and couriers	1.5	0.8	53%	0.9	61%
Total	**21.4**	**11.3**	**53%**	**13.6**	**64%**

Forecast growth is expected to be dominated by the movements of the key basic commodities produced in the region, particularly those related to logs and timber products, horticulture with a strong focus on kiwifruit and aggregates and other building materials and chemicals. The forecast shares of freight traffic by mode for the Bay of Plenty region are set out in Table 7.7 and Figure 7.3.

Table 7.7 Forecasts of growth to 2040 - total flows by mode (million tonnes)

Year	Total	Rail		Coastal shipping		Road	
	M tonnes	M tonnes	Modal share	M tonnes	Modal share	M tonnes	Modal share
2006-07	31.8	4.8	15%	0.6	2%	26.4	83%
NFDS to 2031	48.6	6.9	14%	1.3	3%	40.4	83%
2040	52.0	7.3	14%	1.5	3%	43.2	83%

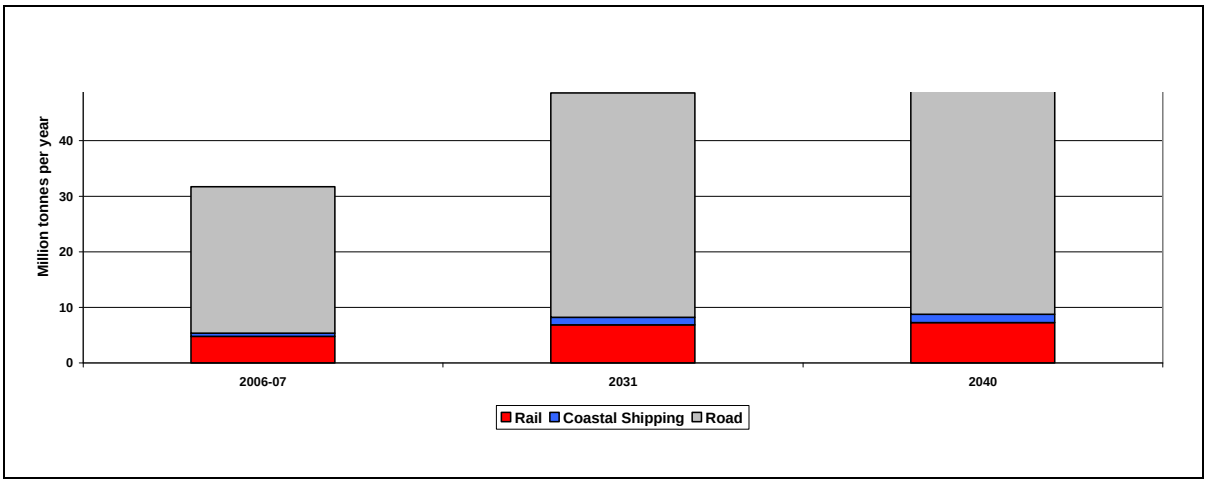


Figure 7.3 Forecasts of freight traffic impacting on Bay of Plenty to 2040 – total flows (million tonnes)

Over the forecast periods, the shares of the three modes in total freight movements are expected to remain broadly constant with the rail share decreasing slightly and that of coastal shipping increasing also slightly. Although the rail share is forecast to decline, the underlying growth in the level of demand means that the volumes transported by rail are forecast to increase substantially by over 50%, despite the reduction in coal traffic and limited growth in the movements of imports of retail and manufactured goods between Tauranga and Auckland.

There is therefore a need for the transport network, including both road and rail to provide sufficient capacity support to the potential growth in the output of a number of key industries in the region. We have in particularly highlighted the importance of the links with the areas to the east of the region, to cater for the flows associated with increased outputs of logs and timber, of kiwifruit and possibly of aquaculture products. The role of the port in serving more distant markets, particularly in Waikato and Auckland also emphasises the importance of the provision of sufficient capacity, for these longer distance flows, again with both road and rail playing a part.

7.5 Changes in commuting patterns

The substantial growth forecast in population and employment will impact on the possible patterns of commuting and the gravity model developed as discussed in Section 6 has been used to assess these impacts. On the initial assumption that the level of accessibility offered by the transport network stays at current levels, except for the major urban areas where some increase in travel time has been assumed, the forecast changes in commuting flows are set out in Table 7.8.

Table 7.8 Initial gravity model forecasts of commuting in the Bay of Plenty 2006-2041

Residence of workers	Workplace									
	WBOP	**Tauranga**	**Rotorua**	**Whakatane**	**Kawerau**	**Opotiki**	**Total BOP**	Hamilton	Other Waikato	Auckland region
WBOP	**6,900**	**5,000**	**50**	**0**	**0**	**0**	**11,950**	**50**	**100**	**100**
Tauranga	**1,350**	**34,400**	**50**	**0**	**0**	**0**	**35,750**	**100**	**50**	**350**
Rotorua	**100**	**300**	**6,100**	**0**	**0**	**0**	**6,500**	**50**	**100**	**150**
Whakatane	**50**	**150**	**50**	**950**	**-50**	**0**	**1,150**	**0**	**0**	**100**
Kawerau	**0**	**0**	**0**	**0**	**-250**	**0**	**-200**	**0**	**0**	**0**
Opotiki	**0**	**0**	**0**	**0**	**0**	**50**	**50**	**0**	**0**	**0**
Total BOP	**8,450**	**39,800**	**6,300**	**900**	**-300**	**50**	**55,200**	**250**	**250**	**750**
Hamilton	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**34,650**	**2,250**	**550**
Other Waikato	**100**	**250**	**100**	**0**	**0**	**0**	**450**	**8,900**	**18,100**	**750**
Auckland region	**50**	**200**	**50**	**0**	**0**	**0**	**300**	**400**	**300**	**419,200**

The pattern forecast for the future very much reflects that currently observed with a high proportion of employment satisfied from within each of the districts and only limited growth in the commuting from other areas. Although as noted earlier in the discussion that the gravity modelling did tend to under-predict the longer distance flows, the effects of this on the overall patterns of commuting are small and do not affect the broader conclusions on the high level of employment, which is satisfied by workers living in the same area. While there will be considerable proportional growth in longer distance commuting, the flows will remain small.

The forecast growth in employment in the Bay of Plenty will increase the dominance of Tauranga and the western Bay of Plenty in general. The increased movements of workers will however bring greater pressure onto the local transport systems and in turn bring increasing congestion with the increased level of activity. Ways to manage this potential congestion will therefore be important in ensuring that the areas are able to function most effectively and this is considered below in later sections of this report.

Part 8: Relative importance of transport related factors in the future

8.1 Introduction

Section 7 has set the background to the likely increases in population and employment in the Bay of Plenty over the period to 2041 and the increases in key transport demands that are likely to arise. This section considers the importance of transport related factors in supporting this economic growth and identifies some of the implications of improvements to different components of the region's transport system.

8.2 Freight

8.2.1 Introduction

Although as Section 7 indicates, employment growth in the activities generating high levels of freight is likely to be relatively muted, the volume of freight traffic in the region will continue to grow. In part, this will be in response to particular tasks and opportunities generated by the increased production of a range of basic agricultural and aquaculture products and in part, to support activities servicing the growing population. Forecasts from the Bay of Plenty Freight Study indicate that the scale of the freight task in the region, including both flows within, and to and from the region will increase by about 60-65% including substantial growth for both road and rail. This growth combined with the growth of commuting and other private travel will result in growing pressure on the transport network especially in and around the major urban centres.

8.2.2 Specific freight issues

A number of specific areas have been identified which will require enhanced levels of service and capacity from the freight sector if the full economic potential is to be met. These include:

The movement of logs and timber products

The logs available for harvesting within the Bay of Plenty or adjacent in the central North Island and Eastland are likely to increase substantially and additional capacity will be required to move these for processing or export via Tauranga. This will put particular pressure on the transport links from Murupara and Kawerau to the port, both for road and rail and possibly also from Opotiki if the logs from Gisborne and the Te Kaha areas are routed in this direction. Other logs are likely to be processed at locations within the Bay of Plenty, primarily around Rotorua before being exported and this will also require the establishment of reliable transport links to support this expansion. This could also result in some demand for the movement of containerised products from Kawerau to support these activities, for which rail may be able to play a part.

In addition, there are proposals to develop an industrial hub at Kawerau to make use of the timber resources available there and possibly including the production of biofuels. This would need to be supported by high quality and reliable transport links, both for the movement of products to markets and also to allow the site to draw on a large workforce with the skills needed.

The movement of kiwifruit

Although the majority of kiwifruit is currently produced in the western and central parts of the Bay of Plenty, there are proposals to expand substantially, the volumes harvested in the east of the region, particularly in and around Opotiki. This traffic is fairly peaked with a concentration of activity between March and October. The road network in this area is vulnerable to natural disasters, particularly in the winter months and there is only very limited network resilience in the case of any disruptions.

Aquaculture

There are well advanced proposals for the very substantial development of aquaculture in the sea off Opotiki. This would result in large movements of shellfish and possibly other products between Opotiki and processing plants likely to be located in Tauranga. There are proposals to develop a small port at Opotiki to land the product which could also possibly be used for the movement of aquaculture products and possibly other products, particularly logs by coastal barge.

The aquaculture operation could readily produce 20,000 to 25,000 tonnes per annum at an early stage, and employ 900 people. This aquaculture development is likely to have a demand for workers greater than available in Opotiki at present. It will therefore increase the demand for local transport, either for commuters to travel in to Opotiki from nearby areas, or the increased transport needed to support an enlarged population in Opotiki.

While the volumes that might transfer are potentially large, especially if this route is used to timber from Gisborne and Te Kaha is exported via Tauranga, the economics of such an operation are uncertain, and it is likely that the majority of this traffic will be moved by road.

Supporting the needs of the local population

As the population grows, the demand for a wide range of commodities both for personal and commercial use will also grow and have to be supported by the freight transport system. However, in general, while these demands are important, they are probably less sensitive to the level of service provided. While the level of performance of the transport system affects the ways in which these demands would be met, it is unlikely to act as a serious constraint on their expansion. Much of this increased demand is likely to arise in the main urban areas and it is this and its combination with growing flows of commuters and other travellers which raises significant issues.

The role of the port

While there is likely to be an increasing focus on value added activities in the main urban areas, the production of basic materials and commodities for export will remain important and as discussed above, is likely to grow, both for the region and for the other areas in the hinterland of the port of Tauranga. The role of the port in supporting economic activity in Auckland and mitigating the pressure on operational land utilised by the Port of Auckland may also grow.

The planning undertaken by the port indicates that it appears to be well placed to meet the overall growth in traffic likely to arise. However, the efficient servicing of the needs of exporters and importers means that the provision of high quality access links between it and the producers or consumers of the goods moving through the port, will remain important and that potential conflicts between freight to the port and the general traffic supporting accessibility in the city need to be managed.

The port also supports other activities such as the manufacturing of fertiliser and some distribution type activities. However, for much of the traffic there will be little or no value added or transformation in the port of its environs, reflecting the nature of much of the cargo transported and the distance of Tauranga from the main markets in New Zealand.

8.3 Movements of passengers

As Table 7.4 indicates, much of the forecast growth in economic activity is in the services sectors which will increasingly be focussed in the main urban areas, particularly Tauranga, where population and employment are forecast to grow strongly. Satisfying the needs of these industries to attract workers and allow them to operate most effectively and in particular, to gain from the agglomeration benefits gained when firms operate in close proximity to one another, will be important to allow the best use to be made of the potential generated. This will require the provision of a high level of accessibility to the main urban centres, and will need to be achieved in a way which supports the high level of urban amenity that such workers expect. This would be especially the case in a centre like Tauranga where lifestyle and quality of life may be particularly important. This would indicate a major role for quality public transport in supporting these movements and providing a high level of accessibility in the urban cores as well as a well managed system for the movement of private car traffic.

8.4 Impacts of transport changes on levels of economic output

Using the regional Agglomeration Model, an assessment has been undertaken of the impacts of transport changes and also population changes in the levels of economic output in the region. The RAM has been used to forecast the base position for 2041, which takes into account the growth in employment forecast for the region and also the extent to which the increasing employment densities would themselves generate additional agglomeration benefits.

The examination of possible future commuting patterns has indicated that much of the growth will be concentrated within the main urban areas in the region and a nominal allowance for the additional congestion that might result has been included in the base case forecasts for the future. Three additional transport scenarios have then been developed to assess the relative impacts on economic output of different transport options. These are as follows:

- Scenario 1 - Reduction of typical travel times within the three urban areas of about 30%

- Scenario 2 - Reduction of travel times of all other movements within the Bay of Plenty region of 30%

- Scenario 3 - Improvement of inter-regional links, based on the assumed journey time savings, resulting from the construction of the Waikato Expressway and a notional improvement in travel times across the Kaimai Ranges

In addition, a further test **(Scenario 4)** was also undertaken of the effects of reducing in employment in Tauranga in 2041 by 10,000, matched by increases in Rotorua of 7,500 and in Whakatane of 2,500. This allowed the effects of alternative levels of employment concentration to be assessed.

The forecasts that result are set out in Table 8.1. It should be noted that because of the nature of the modelling, these should be regarded as indicative of the position that might result rather than providing precise forecasts. Nevertheless, the approach gives an indication of the scale of the impacts that might be expected and allows the different options to be considered.

Table 8.1 Applying the regional Agglomeration Model, impacts of changes in the transport network and changed distribution of employment in the region 2041 ($bn in 2009 prices)

Scenario	**Impact on base case regional GDP**	
	$bn	**Percent**
Base Case regional GDP in 2041 ($bn)	22.2	
Scenario 1 - Impact of reducing travel times by 30% within the three main cities	0.15	0.7%
Scenario 2 - Impact of reducing all other travel times within region by 30%	0.08	0.4%
Scenario 3 - Improving inter-regional connections - Impact of Waikato Expressway and Kaimai improvement	0.05	0.2%
Scenario 4 - Changes in balance of employment	-0.02	-0.1%

Although the impacts on regional GDP of the scenarios identified are fairly small in proportional terms, in absolute terms, the impacts could be substantial. The greatest impact is achieved with improving accessibility within the three towns. There would be benefits from improving the other links within the Bay of Plenty and between the Bay of Plenty and the rest of the country but given the more limited interactions between the main areas, the effects of this are much smaller.

The results are also sensitive to the distribution of population within the region. Rebalancing population growth away from Tauranga to Rotorua and Whakatane would reduce the scale of the major urban area within the region. As a result, this scenario is predicted to lead to an overall loss of economic output, because of the lower agglomeration benefits achieved.

Although the largest benefits are predicted to be achieved with improvements to accessibility within the three major towns, the modelling and more general analysis undertaken has demonstrated that improving interregional accessibility and particularly accessibility to Auckland is important, despite the substantial distance between the two. Improved links to Auckland would allow employers in the Bay of Plenty to interact more effectively with firms and workers in Auckland, although because of the distances the effects of the improved transport links may be fairly limited. Improving the connections to Auckland Airport as an international gateway would also give better connections to the rest of the world, although in part, this market is addressed with the air services from Tauranga and Rotorua to Auckland.

Tourism plays an important role in the Bay of Plenty, although much of this is focussed in trips from Auckland and Waikato, either from residents or international travellers routing through these. Improving the links from Auckland and Waikato would therefore act to boost tourism in the Bay of Plenty. There are issues with mixing tourist traffic with other types of road traffic and measures which improved the capacity of the transport network would help to alleviate these.

Another growing source of tourists is from cruise vessels of which 54 are expected to berth in Tauranga over the 2010-2011 season. Each of these typically carries about 1500-1600 passengers of whom about 85% are likely to go ashore. These tourists undertake a mixture of types of activities including trips to Rotorua, more local tours within Tauranga or just spend time independently in Mount Maunganui and Tauranga. Again, this last group would probably particularly benefit from bus services and walking and cycling facilities within the urban area allowing them to experience and spend money on a wider range of activities.

Part 9: Deficiencies in the region's transport infrastructure

The main current and potentially emerging future deficiencies in the region's transport network which are likely to impact on economic growth include:

Network resilience

Network resilience is particularly an issue to the east of the region, where there is a very constrained transport network which is also particularly vulnerable to disruption from natural disasters.

Capacity of transport network for freight within the region

There are possible constraints by the vulnerability of the transport network in the east of the region, where this could impact on proposals to expand the production of kiwifruit and also the scale of the proposals for aquaculture. In addition, there are also likely to be issues associated with the increased movement of logs and also processed timber, especially by rail from Murupara and especially Kawerau, where traffic flows are likely to grow strongly as the existing forests are harvested. There may also be a requirement to support a more diverse industrial base in Kawerau if proposals for the production of bio-fuels and other wood-based products eventuate. For all of these, the lack of transport capacity may act to constrain development and thus detract from the levels of economic growth that might be achieved, although quantifying these effects is challenging.

Congestion and interactions in urban areas

There are also issues with the increased volumes of freight through the port and in particular, the way in which this interacts with the movement of travellers within Tauranga. The problem of increased traffic is likely to be compounded with the likely increase in big ships which would increase the peakiness of freight flows into and out of the port and also service rationalisation by the international shipping companies, which may result in international traffic being diverted to Tauranga from other ports. All of these are likely to put pressure on the connections to the port where they will be competing with increased flows of commuter and other traffic, wanting to share the same networks. Congestion on these links will reduce the effectiveness of Tauranga as a compact urban centre, able to again the benefits of clustering of a range of economic activities and measures to protect the accessibility of the town centre are likely to be needed.

Inter-regional links

While some increases in inter-regional capacity will be necessary to support higher flows of some basic commodities, such as logs from the central North Island and from Eastland, the main function is probably to increase the scope for interactions between firms and agencies, provide better connections with customers and suppliers and expand the work force available. For this, a key link is probably the connection between Tauranga and Hamilton where the Kaimai Ranges impose a substantial barrier to movement between Hamilton and Tauranga.

Rural isolation

Many parts of the Bay of Plenty region, particularly in the east are relatively lightly populated and remote from the main urban centres. For these areas, accessibility to a range of facilities is difficult, especially for those who have no or only limited options for travel by car. The difficulty of securing post school education for those who wish to remain in these communities, many of which have high proportions of Maoris, may restrict their choices and economic potential, and may limit opportunities to establish or expand employment, especially in industries using local raw materials. While the overall impact on economic output may be limited, the local social benefits from measures to provide better connections with education facilities may be substantial. The ways in which these might be achieved would include the development of remote learning facilities or probably more satisfactorily, the development of some form of shared public transport. These are illustrated schematically in Figure 9.1.

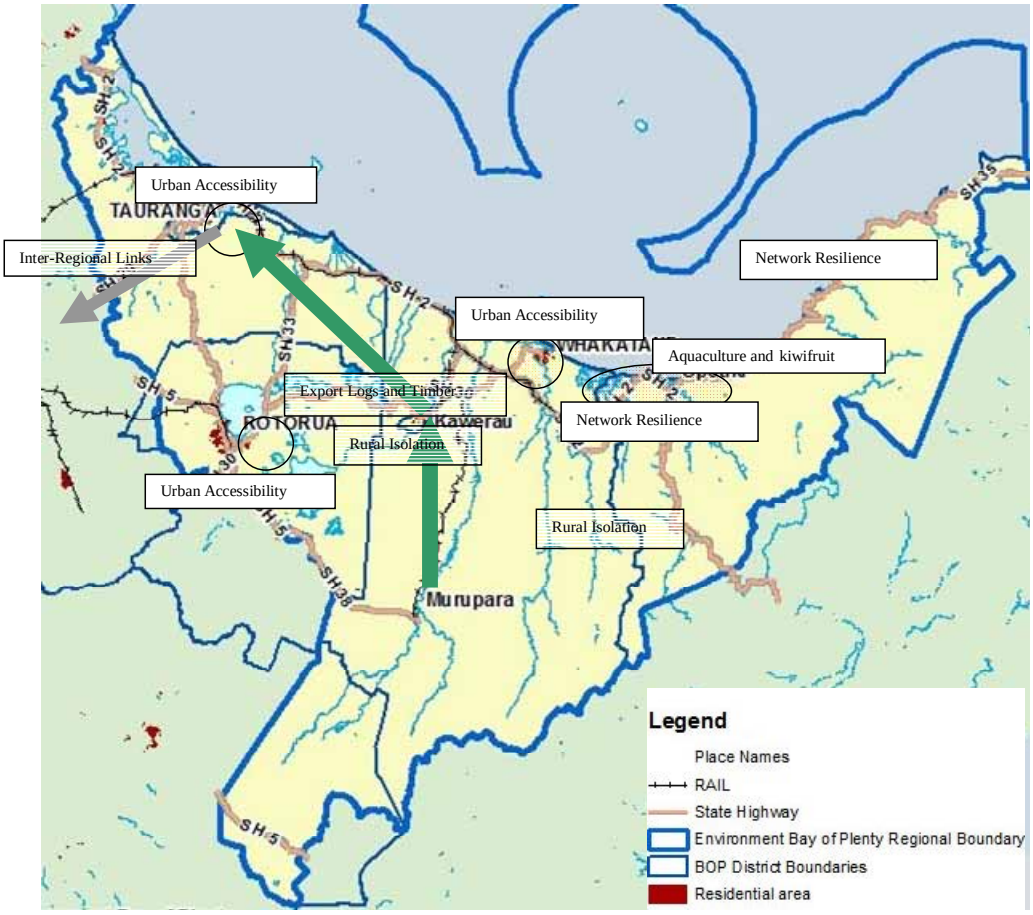


Figure 9.1 Transport issues in the Bay of Plenty

Part 10: The relationship between transport modes and the benefits of improved modal integration

10.1 Introduction

Within the Bay of Plenty, the key drivers of future economic development are likely to comprise increases in the production of a range of basic materials, coupled with the expansion of value added knowledge based activities which generally flourish in concentrated urban centres. For both of these, transport links are important. In the first case, there is the need to move the commodities from where they are produced through the supply chains to where they are consumed or exported. In the case of value added activities, the key factors are to provide employers with access to the skills of the workforce and the potential for interaction between workers, and also to provide the range of commodities required to support these workers at work and at home.

10.2 Freight intermodal terminals and issues

Increases in the volumes on freight on the transport network will arise both because of increased production of primary and manufactured products and because of the increased demands associated with the growing population in the region. The Bay of Plenty Freight Study forecast an increase in freight volumes of about 60-65% by 2041, although in part this reflects the cessation of coal traffic from Tauranga to the Waikato and excluding this, the rate of increase would be larger.

Both road and rail play a significant role in the movement of freight in the Bay of Plenty region. Rail has a significant share of the log and paper traffic between Murupara, Kawerau and the port of Tauranga. It is in principle, well positioned to take advantage of the increased flows of logs expected from the central North Island, although to some extent this would be offset by the reduction in the coal traffic to Huntly. However, accommodating the additional log traffic will require increases in both the capacity of the lines and also additional rolling stock. KiwiRail are currently progressing both of these, although the timing of any improvements will depend on the development of an attractive business case for the investment and on competition from proposals for investment elsewhere in the rail network. Some expansion of the facilities at Kawerau and at Murupara would also be required to support this traffic.

Much of the other traffic currently carried by rail and likely to form the basis of future freight flows is port -related to or from locations outside of the region. This comprises a mixture of bulk traffic and the movement of containerised or other manufactured goods between Auckland and Tauranga. Increasing the volumes carried by rail will therefore require the development or expansion of intermodal facilities in other locations, particularly Auckland, to receive or despatch traffic from or to the port of Tauranga. These would be outside the Bay of Plenty.

There are proposals to develop Kawerau as an industrial hub, primarily related to the processing of logs in some form. This may generate the need for the movement of containers from here to the port supported by a handling facility at Kawerau. Suitable trains would be required for this. At present there appear to be no firm plans to develop rail services for this type of traffic on this route, but if the demand grew to the point where it appeared to be commercially viable, KiwiRail would review the position.

As well as developing some form of timber processing facilities, there are also proposals to develop a form of inland port where logs would be marshalled at Kawerau before despatch to Tauranga. This would help relieve the pressure on space on or near the wharf in Tauranga. The development of such a facility would require that the rail connection between the inland port with Tauranga would provide a reliable link.

Other opportunities for the development of freight intermodal terminals in the Bay of Plenty appear to be limited and the key issues within the region are more likely to be about track capacity and rolling stock availability as the volume of rail traffic grows.

These issues are likely to be compounded by the impacts of changes in international ship calling patterns and also of the introduction of bigger container vessels. The forecasts in the Bay of Plenty Freight Study were based on a 'business as usual' assumption about shipping patterns in part, because of the considerable uncertainty as to the ways in which these may evolve over both the short and longer term. While there have been some moves to rationalise services, the volatility of the industry means that it is difficult to predict longer term trends and the balance of services between the ports. Reducing vessel calls at other North Island ports could be to the advantage of Tauranga in terms of increasing the volumes of traffic through the port and rail, if it had sufficient capacity should be well placed to handle these cargoes. There are however, issues with the speed in which the land transport network both road and rail can respond to major changes in the patterns of flows. This issue also arises with respect to the introduction of larger international container vessels. While not necessarily increasing the volumes of traffic through the port they will increase the peakiness of the traffic and put pressure on Quay space and on the land-side transport links to cater for the very large cargo exchanges. However, discussions with the port have indicated that they consider that the port itself should have sufficient capacity to cope with the exchanges. Steps are being undertaken to improve the capacity of the rail link between Tauranga and Auckland using JOG money but greater investment in rail rolling stock may be required. Additional investment in terminal capacity in Auckland may also be required to accommodate these increased flows.

The development of aquaculture in the eastern Bay of Plenty may generate significant volumes of traffic and the option of transferring the catch to Tauranga for processing by barge is being considered, using the proposed harbour facilities at Opotiki. This could provide an opportunity for transferring some traffic away from road, particularly over a particularly vulnerable part of the road network, although the need to transfer the product to Tauranga fairly quickly may militate against the use of a relatively infrequent barging service.

Overall therefore, apart from some possible development in and around Kawerau associated with the movements of logs and logging products, the potential for developing intermodal terminals for the movement of freight in the Bay of Plenty appears limited. Where there are opportunities, these lie in other regions.

10.3 Movements of passengers

The movement of passengers is likely to become of increasing importance to support the switch of the economy towards higher value added activities especially in the larger cities. The forecasts we have developed in Sections Part 1: and Part 1: highlight these growing trends and the increasing importance of the major urban areas, particularly Tauranga. This will require the development of an attractive, high capacity transport system to cater for passenger flows which are increasing and becoming more concentrated.

To meet these objectives and in particular the delivery of substantial numbers of workers to the main urban centres in a way that as far as possible avoids congestion it is likely that public transport of some form will play an increasingly important role. This will reduce the pressure for new road building in urban areas, which in practice may be difficult or even impossible to achieve within a liveable urban structure and will also allow better use to be made of the highway capacity that is available. By providing a reasonable level of accessibility in a way which is consistent with good urban amenity, public transport can therefore play an important role in supporting economic development.

Within the context of the main centres in the Bay of Plenty, particularly Tauranga and Rotorua it is likely that in general public transport services will provided by bus and increasingly the regional Council is supporting the development of these services. There are possibly some limited opportunities for the use of rail in Tauranga but the potential for this is probably over the longer term and would need to be supported by an appropriate planning regime encouraging the development of the higher density nodes both of employment and residential development which are more supportive of high capacity public transport.

Bus and possible future rail services will also need to be supported by the development of quality terminals and stations and may also be supported by the development of priority measures allowing improved access to the central areas possibly supported by the development of suitable park and ride or interchange facilities at suitable locations. For these it will be necessary for the various agencies concerned with the management of the road network, the provision of public transport infrastructure and the provision of public transport services to work together to produce integrated outcomes.

Improved public transport may also help to retain older workers within the workforce, allowing their experience and expertise to continue contributing to the economy. Analysis of the education levels of the older residents of the areas in the Bay of Plenty indicates that these tend to be higher in the urban areas where there is greater potential for the development of public transport services which may enhance the accessibility of this age group.

Part 11: Conclusions and an appropriate 'mix' of future transport investment across activity classes to 2040

Overall, we have reached the following conclusions in regard to the overarching connections between transport and economic development:

- In a developed economy with a substantially complete transport system, the impact of transport investments cannot be automatically assumed to lead to economic growth.

- In practice, the economic growth potential of transport improvements will depend critically on the presence of other pre-conditions for growth at the national, and most importantly, regional and local level. Specifically, this will be the case where transport improvements can resolve isolation and bottleneck issues and a sound economic basis already exists for growth at the local level.

- It is our view that the current transport network provided by the links within and to the region can be regarded as acceptable. However, future economic and population growth will be likely to impose pressures at certain points across the network.

- Agglomeration benefits are a consequence of urban scale and density and are not universal across the transport network. Therefore, transport investments which facilitate increased employment density in urban centres, can be expected to significantly contribute towards the potential for productivity growth. In a modern economy it is these types of accessibility improvements that can be expected to have the greatest impact on economic development, through the improved access for people. Currently, most areas of the region are self-contained in terms of commuting flows with very little movement between main centres. This is unlikely to change in the future.

- There are limits to the potential for higher densities to be achieved through reliance on private vehicle access alone. An integrated approach to land use and transport planning, with increasing emphasis on passenger transport and alternative modes will become more of a necessity to support further intensification in areas of higher density.

The report has identified a set of potential or actual network deficiencies, currently impacting on the transport system or likely to arise with future population and economic growth. Addressing these deficiencies will require a balance of investment across transport modes and locations, specific to the deficiencies identified. Our analysis suggests that in terms of the potential impact on economic activity, the priorities for investment should sit in the categories defined below.

- Improving urban accessibility to accommodate population growth and achieve higher residential and employment densities, in order to seek productivity gains from further agglomeration and providing opportunities for travel while maintaining the amenity of the urban areas. This includes:

  - Public transport services and infrastructure which will be increasingly important in facilitating increased employment density in main urban areas, in conjunction with land use planning intended to deliver higher residential and employment densities.

- Improving the effective capacity of the highway network through demand management and limited provision of new capacity, to the extent that this can be incorporated without impacting on the amenity of the areas affected.
- Provision of walking and cycling facilities in urban areas in conjunction with supportive land use planning and development.

- Providing for inter-urban freight movements to support the continued growth and viability of the primary sector within the region through:
  - Improvements of capacity to meet increased flows of logging and timber traffic. This is likely to be focussed on rail and on the connections from Kawerau to cope with the movement of logs and possibly more sophisticated products but would also include improvements to the highway network, particularly in the east where there are issues of both network capacity and network resilience.
  - Improvements of capacity to meet the likely doubling in production of kiwifruit again, especially in the east, in order to facilitate the transport of primary produce via packhouses to the port for export.
  - Provision of infrastructure for the movement of aquaculture products, especially from the Opotiki area. In principle, there may be options for transporting material by sea but the feasibility of this would need to be demonstrated.
  - Improvement of the rail network supporting the inter-regional movement of products to and from the Port of Tauranga, to ensure that there is sufficient capacity to meet the increased demands resulting from the overall growth of this traffic and from the changes in the patterns of demand, resulting from the introduction of larger ships. Work is already being progressed on upgrading the capacity of the East Coast Main Trunk railway but this process will probably have to be continued further as it is likely that traffic flows will continue to increase. This will be driven in part by the increasing importance of the Port of Tauranga as a port serving Auckland as well as other parts of the upper North Island.
- Providing improved inter-regional movements of passenger traffic, particularly connections to Auckland. This could take advantage of the proposed construction of the Waikato Expressway, and include an improved route across the Kaimai Ranges, which would also have the advantage of improving the connection to Hamilton.
- Providing improved connections for inter-urban passenger movements within the Bay of Plenty. To some extent, the construction of the Tauranga Eastern Link provides a major improvement to the east which will benefit passenger movements both within and to and from Tauranga, as well as a number of the freight movements identified above. In part, these should aim to address issues of rural isolation, and allow the training and entry to the workforce of potential workers living in remote communities.

The key requirements for future investment are set out in Figure 11.1.

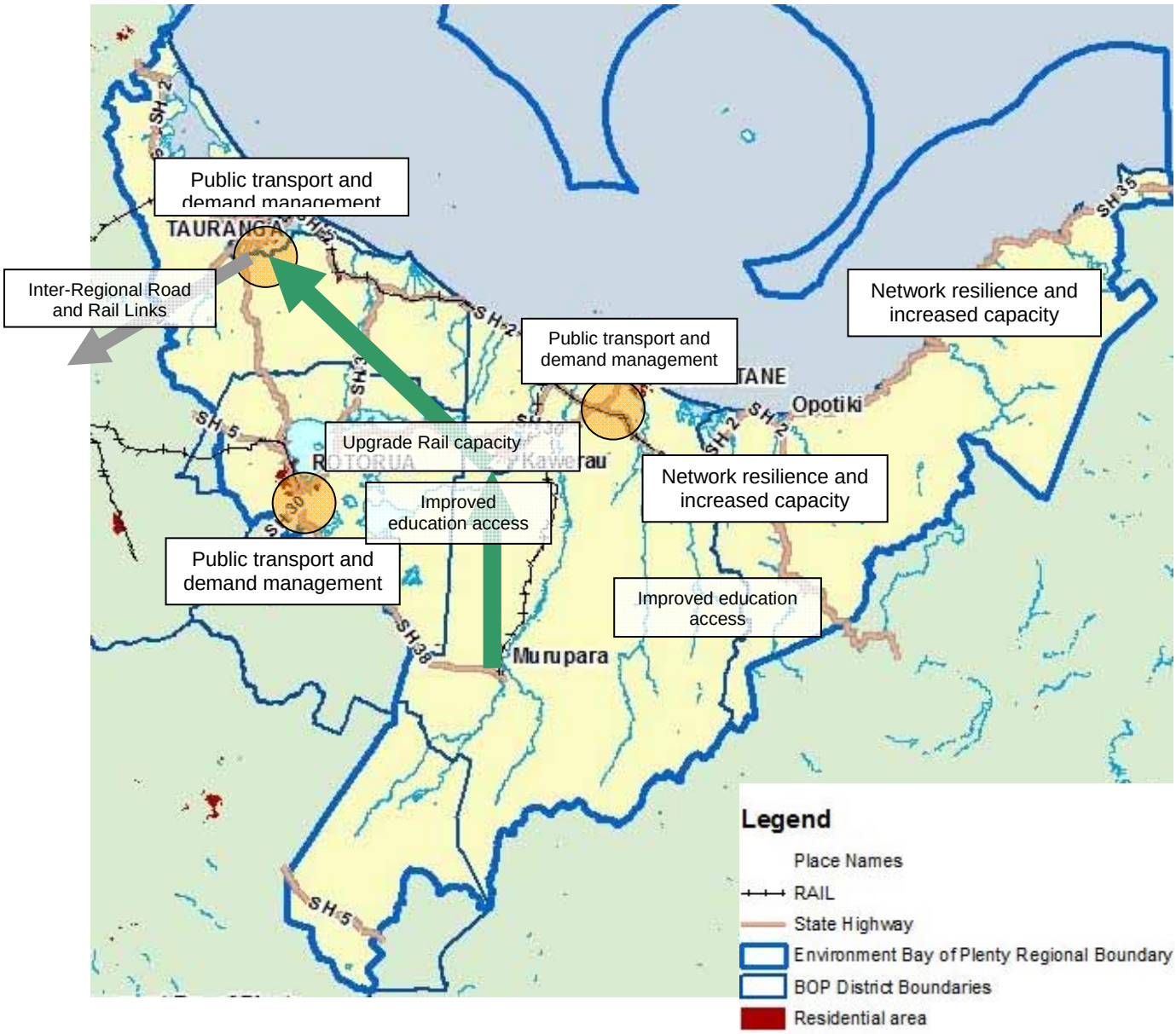


Figure 11.1 Focus for future transport investment

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Appendices

Appendix A - Stakeholder workshop notes

Workshop notes: Transport and the economy in the Bay of Plenty

October 2011

- Workshops were held in Tauranga (a.m., pa 12 October 2011), Whakatane (a.m. 13 October 2011) and Rotorua (p.m. 13 October 2011).
- Discussion was structured around a briefing paper and key questions circulated prior to the workshops.
- Workshops were facilitated by Rawinia Kamau, Richard Paling, Kel Sanderson and John Williamson.

The tables below record key comments and observations from participants.

	Transport and economy in the Bay of Plenty Workshop – Tauranga, 12 October 2011 - a.m.
Theme	**Key comments**
Industry	• **Steel and coal** as a key item to transport. Distance from quarries a restraint. Affects price and cost of road building and maintenance. Shortage of material? – more about where the material is, rather than the shortage. No constraints on getting aggregate where we want it • **Tourism opportunities** - More season type tourism activities around the summer when population grows from holiday makers • Western Bay of Plenty – Key sectors - **forestry, kiwifruit, dairy** • Foster existing and emerging (**aquaculture, titanium**) industries • **Geothermal energy** is an emerging industry • **Iwi development** key part of future - Iwi/trust coming together to get better leverage off that land • **Wood processing** - what is needed to get further value add. Need technology to add value. Big players tend to source their product and sell to Chinese market versus smaller players? • **Added value** issue - cost of processing here costly, so taken overseas, e.g. China more economically sound, e.g. Timaru – leather manufacturer. Wellington – architect designing and exporting houses. Co that are further processing are usually. Sawmill in Katikati – export to USA • **Weather** – key factor, driven avocado and kiwifruit industries. Good weather and rainfall. Good soil • **Forestry** – Key industry for the region, transport constraints, particularly distance. East Coast forests due for harvest, problem with roads and distance • **Kiwifruit -** Economy 20% of GDP kiwi fruit, treble in 10 years – improve on orchards…make it more mechanical versus labour intensive. Opportunities in varieties versus added value • Primary production is limited, dairying limited. Not much growth, but will need

	to do much more efficiently • **Aquaculture** – Will they transport to process? • **Marine servicing industry** might relocate to Opotiki as a result of the harbour development
Demographics	• Population a driver for western Bay of Plenty • Population growth key economic driver • Lifestyle is a key driver, Waikato farmers come to Tauranga to retire • Changing demographic. Locate first and then look for the job. Set up a base here, versus have employment – commute out, but live here • Resistance to intensification by general public. Older residents are bit more open to it as long as it's been done

Theme	Transport and economy in the Bay of Plenty Workshop – Tauranga, 12 October 2011 - p.m. Key comments
Industry	• Aquaculture key industry for Bay of Plenty, specifically for Bay of Plenty Regional Council. Need funding for harbour entrance • Key industries for eastern bay include kiwifruit, eco-tourism, river aggregate and forestry • Maori economy significant – JV for aquaculture venture, offshore opportunities being investigated • Geothermal new industry – key driver for future growth • Biofuel opportunities – wastage from forest floor • Recycling and Zero Waste opportunities • Titanium - poses threat to stainless steel • Tourism key industry
Transport/ infrastructure	• Roading isn't economic development, an enabler. Harbour entrance like road bridge – economic enabler. Transport responding to. Transport needs in the Bay – 4000 fertiliser from wharf to Opotiki for kiwifruit. Potential of barges; if oil price get to point where some of it is more economic. Five thousand on barge versus 40 tonne on a truck. River aggregate. Sixty truck/trailers/month of Opotiki aggregate. Eco tourism, charter boat fishing and other stuff from harbour. Other benefits, but cost effective • Whakatane not option for harbour entrance, unworkable 140 to 150 days per year • Rail link from Kawerau a big constraint for wood processing • Skill workers commute, therefore need route to be secure • Under investment in infrastructure, in catch-up mode versus (particularly Te Puke), also examples in Katikati • Karangahake Gorge a bottleneck. Tauranga urban area – still bottleneck, still need funding • Most SME – lost time due to congestion – stuck in traffic, lots have relocated out of CBD • Proximity to residential areas might be an issue later as port movement increases. Kawerau – putting on more trains, makes it more difficult at Tauranga end • Dual conflict – more people living in CBD as well as more trains. Protect rail and road corridors. Keep them open and have multiple uses • **Air transport** – inland airport (customs broker in Tauranga airfreight/air service) – similar to Christchurch. Transport logistic support industries
Route security	• Routine Security for Opotiki. All routes closed. Issue with emergency services. Six hundred thousand dollars for all weather access.
Educations/skills development	• **Education** key driver for Bay of Plenty's economy. More specific to industry needs - retain students and attract others. Stimulates community. **Su** – commuting a problem. Opportunities for public transport. Same for Opotiki. Bay of Plenty Polytechnic – Waikato Strategic Partnership. (includes Awanuiarangi) – possible rationalisation. (e.g. Tairawhiti and EIT, Hawkes Bay). Aligning/predicting to grow and diversification • **Skilled workforce** – Having the right skill set to meet demand. Public transport doesn't enable people to come in to get some skills. Accessibility issues. PT and technology. Deprived communities don't have access and/or public

	transport
Public transport	• Access to PT. Buses to sites; possible seasonal work. Bottleneck – Bayfair • Parking big issue, cost of parking. Pressure on economic viability on CBD Dispersion to malls and Cameron Road. • Changes people's attitude and culture – going from A to B, door to door

	Transport and economy in the Bay of Plenty Workshop – Whakatāne, 12 October 2011 - p.m.
Theme	**Key comments**
Public transport	• Students need transport to main centre (Whakatane). Have to put on transport to bring in students. Lack of transport Kawerau, Whakatane and Opotiki. More trade training have to 'attend' in person versus remote login. Socio-economic situation prohibits transport • Primary/secondary; large network of schools. Large number of kids coming to town ($10/day) – intermediate and high school • Focus on PT is more Tauranga and Rotorua – need more in eastern bay. Social and economic drivers for PT in the eastern bay • Have ageing populations that have difficulty accessing health care services due to limited PT available
Industry	• **Maori** key factor to economic growth – huge potential in Maori land development • **Primary industry + tourism important**. How can primary industries add value • **Land values** here in the eastern Bay of Plenty more affordable than other parts of the Bay of Plenty • Need all **linkages to work** in order for the eastern Bay of Plenty to remain sustainable • Need to think about **fuel and gas**; possible big driver for economy in the future • **Geothermal**, Hydrodams, power demands in the big picture • **Commodity prices** main driver for logs. Need to be high enough. Only harvest when high. Can be harvested on demand and prices versus kiwifruit and milk that need to be harvested • **Chemical extraction out of wood** – new range of product from wood source. Need to get it OUT of the eastern Bay of Plenty. Opotiki as a possible port for logs • Individuals create businesses in the places that they want to retire. • **Fifteen charter boats** in Whakatane (were 23) – possible relocation to Opotiki
Demographics	• **Eastern Bay of Plenty unique within the Bay of Plenty** – Maori living in Maori communities and wanting to remain there rather than all live in CBD and other urban areas • **Low income** – transport needs to support social and economic needs in small communities
Transport infrastructure	• Logs reliant on Tauranga port. Opotiki could be alternative • State Highway 2 and 29 not suitable infrastructure route • Link of rail and road for eastern Bay of Plenty – economic port/road link along Matata straits. Economic development in the eastern Bay of Plenty not limited by needed to 'get it out'. Eastern Bay of Plenty not compounded issue of migration of populations. Keep our economy alive. Have to have the link there • Route is a 'jewel' that needs to be protected • Airport has potential. Unrestrained protected airspace. Enable it to be used for larger aircraft without restrictions of Tauranga. Airport as a possible route for freight transport. Capacity for 737,1200 m sealed.

	Projected extension to 737 • Second most popular place for motorhomes – good for tourism. How this can benefit economic 200,000 days of motor home hire per annum in New Zealand. How do we manage that? What transport needed? Money spent on activities versus accommodation • Issues with local road and state highways; the relationship mixture of local and state highway roads. Is there a way to protect heavy traffic from coastal route, improve efficiency around the back
Internet/connectivity	• Impact of the internet, **faster broadband** – GoNET (iwi owned) attracts individuals to live here and not in the city • Face to face contact still important though – may be the next generation is a bit more open to not having face to face. Technology a life line but people still wanting to drive, so still need the link
Attracting new business	• How do we determine how many large companies will relocate by 2041. Big or small?
Planning/regulation	• TLA's need to be better at recognising the value of those organisations – partnering • Land use planning, proper management of land – RMA enabled improved land use
Route security	• One bridge serving eastern bay • Major problems with State Highway 35 and Waioeka Gorge • $40 m cost; only 1200 using that route, 15% heavies. Port cost $30-$35 m. Possible to transport aggregate and/or forestry

Theme	Transport and economy in the Bay of Plenty Workshop – Rotorua, 13 October 2011 a.m. Key comments
Industry	• **Forestry.** Critical to have current investment in forestry, sawmilling/processing. Long standing forestry industry in the district, up to third and fourth rotation • **Tourism.** Change in tourism industry with impact rest of the Bay of Plenty, not just Rotorua. Same transport routes. Rotorua as a spoke – creation of considerable number of tourism services. Currently a point on the journey, could be a hub in the future • **Iwi** – Iwi as key play for future economic growth • **Adding value**. Need to identify industries where value add is going to take place. (Bay of Plenty forestry and wood processing strategy a key economic driver) • **Look after the existing industries.** Agriculture, forestry and tourism key industries for the district. Need to recognise other industries and their contribution, e.g. manufacturing and emerging geothermal • **Diversification** Must diversify from three core sectors) and attract new as well as grow existing industries. Need infrastructure for business to have confidence. What kind of diversification?? – aquaculture (eastern), geothermal, tourism (high value). Grow in boutique business (brewery, cheesemakers). Geothermal is a possible future industry – issues around district plan (e.g. solid energy re: pellets). KT highly mechanized, maximised technology in forestry already. Areas for better value add. Services within region. Manufacturing to support is good • **Land Use.** Consider land use change of existing dairy properties into other areas. Conversion from forestry to diary. Carbon farming opportunities
Internet/connectivity	• **Fibre networks** will change in the structure of the economy. High speed broadband in the regions will encourage people to stay and or attract others to the region
Labour force and education	• Labour skills need to match existing and future industries. Workers for diversification, (chicken and egg work or workers?). (EG MRP – bring workforce), forestry workers (100 km long). They will stay in the urban areas if they can good access to stuff like broadband • One of the biggest knowledge generators at (SCION – 300 scientists) • Waiariki, Wananga key players in **education** and industry/economic development
Transport infrastructure	• **Three ports**: airport, seaport, IT port • **Roading** - discussion re: freight movements within the region • Key routes identified to avoid having to go through Rotomas for example. Main freight routes into and out of the regions. High productivity routes • Conflictive usage for tourism and forestry – needs to be managed • **Rotorua airport** – two months ahead of target