ENVIRONMENT B·O·P

Bay of Plenty Regional Council

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BAY OF PLENTY REGIONAL LAND TRANSPORT STRATEGY

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1.1 Modes

The car is primarily used for social and recreational reasons, closely followed by work related trips and shopping trips. However, it is the dominant individual travel mode and its dominance is very unlikely to change into the foreseeable future.

Cycling and walking have a role as predominantly urban travel modes for short trips for social and recreational reasons, work related trips and shopping trips.

Public passenger transport has a role to meet the needs of the transport disadvantaged. Over time it is hoped a secondary role will develop in Tauranga and to a lesser extent Rotorua, as an alternative mode to car use for peak hour commuting trips.

1.2 Port of Tauranga

For the year ended June 2002, the Port of Tauranga (POT) was New Zealand's most important export port by volume and value. It was New Zealand's third most important import port by volume and second most important import port by value. In total, more cargo is loaded and unloaded at Tauranga than for any other port in New Zealand.

The freight industry as a whole is already experiencing congestion and significant delays at key points as it tries to access the Port. Given that traffic volumes on Tauranga's major arterials are projected to increase significantly over the next 15 or so years, this will only make access to the Port more difficult (even without an increase in cargo through the Port).

1.3 Population

In 2001 the region had a usually resident population of 239,412 people - a 7% increase on 1996 levels and a 17% increase on 1991 levels. The most significant population increases at a district level, occurred in the Tauranga District (a 36% increase between 1991 and 2001) and the Western Bay of Plenty District (a 28% increase).

By 2021 it is forecast that the region's population will grow from 229,100 in 1996 to 315,100 (primarily in the western Bay of Plenty sub-region). There is some thought that the population growth will spill over into other parts of the region and have a significant impact on the region's land transport network (whether or not it does spill over into other parts of the region)

The number of households in the Bay of Plenty will increase by about 39,000 (again primarily in the western Bay of Plenty sub-region) and it is likely the number of households without a car will grow.

The projected increase by 2021 in the number of children, elderly, people with disabilities, and households without a car will mean that there will be a greater demand for access to transport from these transport disadvantaged groups (some of who have demands now that are not being particularly well met; e.g. people with disabilities).

The significant increase in the elderly population may also see an increase in off peak travel demand to access health, shopping and recreation services.

1.4 Car Ownership

Compared to Hamilton, Wanganui, Palmerston North, Napier/Hastings, Christchurch, Dunedin and Invercargill, Tauranga had the highest proportion of households with one or more cars (about 91% in 1996). The proportion of households with cars in Rotorua was similar to Hamilton, Palmerston North, Napier/Hastings and Christchurch and higher than Wanganui, Dunedin and Invercargill (about 88%).

1.5 Index of Deprivation (1996 Census)

The Bay of Plenty is the third most deprived region in New Zealand. Opotiki, Kawerau and Whakatane are among the most deprived 10% of districts in New Zealand. Opotiki is the most deprived district in New Zealand, Kawerau is the second and Whakatane the sixth most deprived.

1.6 Growth in Traffic Volumes in the western Bay of Plenty sub-region

There have been significant increases in both industrial and residential developments in and around the sub-region, and many of the major arterial routes have recorded annual increases in traffic volumes between 4% and 6%. This has caused congestion of the routes between Mount Maunganui and Papamoa to and from the Tauranga CBD, Welcome Bay to and from the Tauranga CBD and Cameron Road.

In 1997, Transit and the Tauranga and Western Bay of Plenty District Councils entered into a Heads of Agreement to work together for the development of a strategic roading network within the western Bay of Plenty Sub-region. Part of this agreement involved the adoption of a strategic roading network for the sub-region.

This partnership has subsequently been branded **'ACCESS'** and whilst **'ACCESS'** has no legal entity, it is able to provide a unified and coordinated "front" to the development of the network.

Partnerships like the **'ACCESS'** one, will be important in effectively delivering the Regional Land Transport Strategy, not only in the western Bay of Plenty sub-region, but across the region as a whole.

1.7 Forestry

The Bay of Plenty region forms part of the Central North Island Wood Supply Region (CNI). As at 1 April 2000, there were 575,607 hectares of planted exotic forest in the CNI (about 144 million m^3 of wood - 40% of the national total).

Over half the wood harvested in New Zealand in 2000 came from the CNI – about 10.4 million cubic metres.

Wood is drawn into the Bay of Plenty region from the Coromandel, Waikato, East Cape and Taupo areas.

By 2020, it is forecast that the amount of harvestable wood in the Central North Island wood supply region will grow by 15% (about 1.5 million cubic metres), while for the Northland and East Coast wood supply regions it will grow by 2.9 million cubic metres and 2.8 million cubic metres per annum, respectively.

Harvesting in the East Cape will peak over the years 2007 to 2015, with volumes near to Opotiki reaching 600,000 cubic metres per annum. It will be carted on State Highway 35 (SH35) through Opotiki by truck to Mount Maunganui, Te Puke, Rotorua, Kawerau and Kinleith. The Opotiki District Council is greatly concerned at the volumes that it expects will be moved by truck on State Highways 35 and 2.

However, the increase in truck movements along State Highway 35 in response to increased harvesting of the East Cape resource is not considered to be beyond the capacity of the existing road infrastructure. However:

- Seal widening will be required on some curves to prevent forestry trucks crossing the centreline in tight terrain.
- The projected increase in heavy vehicles will impact significantly upon the opportunity for the general motorist to travel through the heavy traffic stream. Currently, passing opportunity was limited.
- There were several significant single lane sections, which would potentially become bottlenecks under increased logging traffic.
- There was the potential for a major slip to take the road out of service for an extended period. Some sections of the road were prone to flooding.
- An increase in logging traffic will increase the frequency of heavy vehicles being delayed by wandering stock on the road and also the number of accidents involving stock.
- A substantial increase in logging traffic will result in loss of amenity to people living in the vicinity of the highway.
- A major increase in logging traffic will adversely affect the attractiveness of SH35 to “self-drive” overseas tourists and cyclists

An increase in harvesting of, or a switch to smaller stand-alone forests instead of large continuous or linked forests, will result in greater use of the public roading network and an increase in the number of logging trucks using those roads.

There is no certainty about future wood flows. Domestic processing and/or export opportunities are generally determined regionally because of the cost of transporting logs. The economically viable distance to cart logs depends on a number of factors, including the value of the end product, availability of back loading, plant location relative to market/export port and whether the logs represent marginal supply or base load supply.

1.8 Tourism

For the year ended June 2001, 1.9 million overseas tourists visited New Zealand. Of this number, 604,058 visited the Bay of Plenty (32%) with the majority visiting Rotorua (543,322).

In 1999, the Bay of Plenty was the third most popular domestic travel destination in New Zealand, accounting for 10.9% of all overnight trips taken (1,813,000 trips). About 42% of all overnight trips taken to the Bay of Plenty had Rotorua as their main destination (760,000 trips).

By 2010 it is projected that there will be 1,093,345 international visitors to the Bay of Plenty, of which 983,413 will visit Rotorua (currently 604,058 and 543,322, respectively) and 4,473,000 domestic overnight trips compared to 3,022,000 in 1999.

1.9 Road Safety

In 2001 there were 43 deaths, 135 serious casualties and 487 minor casualties arising from reported crashes in the region. There were also 1,364 non-injury crashes. The annual social cost (the measure of all costs which the crash inflicts on the community) of crashes in the region in 2001 was about $209 million. It is estimated that the crash-reporting rate is 51%.

1.10 Environment

The usage of transportation fuels in the region, especially diesel, is much higher than the per capita average. The high use of diesel fuel results in relatively higher emissions of particulate matter and sulphur dioxide from the transport sector.

Road transport accounts for 51% of carbon monoxide emissions, 87% of nitric oxides emissions, 57% of sulphur dioxide emissions and 17% of particulate matter emissions in the region.

Levels of emissions from motor vehicles are exacerbated when travelling in congested traffic conditions.

Under the Kyoto Protocol New Zealand will have to limit its levels of greenhouse gas emissions to 1990 levels during the period 2008 to 2012. Central government has announced its intentions to ratify the Protocol. The transport sector currently generates 42.2% of total CO_2 emitted in New Zealand, with road transport alone generating 39% of total CO_2 emitted in New Zealand. New Zealand's transport CO_2 emissions, particularly from road use, are rising at a rate of 3.2% per year

It has been estimated that in 1996, motor vehicles in the region generated 740,367 tonnes of carbon dioxide.

Another environmental issue is that of heavy commercial through-traffic (trucks) travelling through urban areas such as Opotiki. This results in loss of amenity to people living in the vicinity of the route (noise, vibration, and a perception of a busier road that is inherently less safe).

There is also some concern relating to the spilling of effluent from stock trucks onto roads and dumping of effluent at roadsides.

1.11 Regional Roading Hierarchy

There is currently no regional roading hierarchy for the Bay of Plenty. There is therefore, no certainty that there is consistency in standards on comparable roads between different road controlling authorities.

1.12 Route Security

The Opotiki District Council is concerned at the risk of having the transport of all produce from its district being reliant on just one transport route to the rest of the region and the Port of Tauranga and believes upgrading the Waioeka Bridge will assist in solving that issue. The District Council is also concerned at the effect global warming (seas level rise) may have on low-lying sections of SH2 and SH35.

The Regional Land Transport Committee at a workshop on 29 April 2002 identified a similar issue about the need for alternative routes.

Chapter 2: Bay of Plenty Region

2.1 Location[1]

The Bay of Plenty Region is located on the east coast of the North Island of New Zealand (refer to Figure 1). The region's coastline extends from Potikirua in the east, to the southern end of Homunga Bay, north of Waihi Beach, in the west. On the landward side, the region is mostly bounded by the watersheds of the catchments that flow into the Bay of Plenty, and includes the Rotorua lakes. On the ocean side, it takes in some 18 offshore islands and extends to the limit of the territorial sea. The area of the region is 21,740 km^2, comprising 12,247 km^2 of land and 9,509 km^2 of coastal marine area.

The region extends inland generally to the top of the catchments of the surface waters that flow to the Bay of Plenty. The furthest point from the coast to the top of the Rangitaiki River catchment is some 130 km from the sea.

Geologically recent, the surface of the region is immature and often unconsolidated. Consequently, the soil is vulnerable to damage from surface disturbance.

2.2 Bay of Plenty Districts[1]

The Bay of Plenty Region encompasses seven district councils (in whole or in part). District council boundaries are also shown on Figure 1.

2.2.1 Rotorua District

The Rotorua District lies partly within both the Bay of Plenty and Waikato regions. The whole district covers approximately 2,615 km^2 with 1,609 km^2 in the Bay of Plenty Region.

Land use is fairly evenly divided between native and exotic forestry, and grazing. Tourism forms a major industry and saw milling an important primary industry in Rotorua.

[1] Sourced from Environment B·O·P, (1999), Bay of Plenty Regional Policy Statement, Resource Planning Publication 99/04, Environment B·O·P, Whakatane.

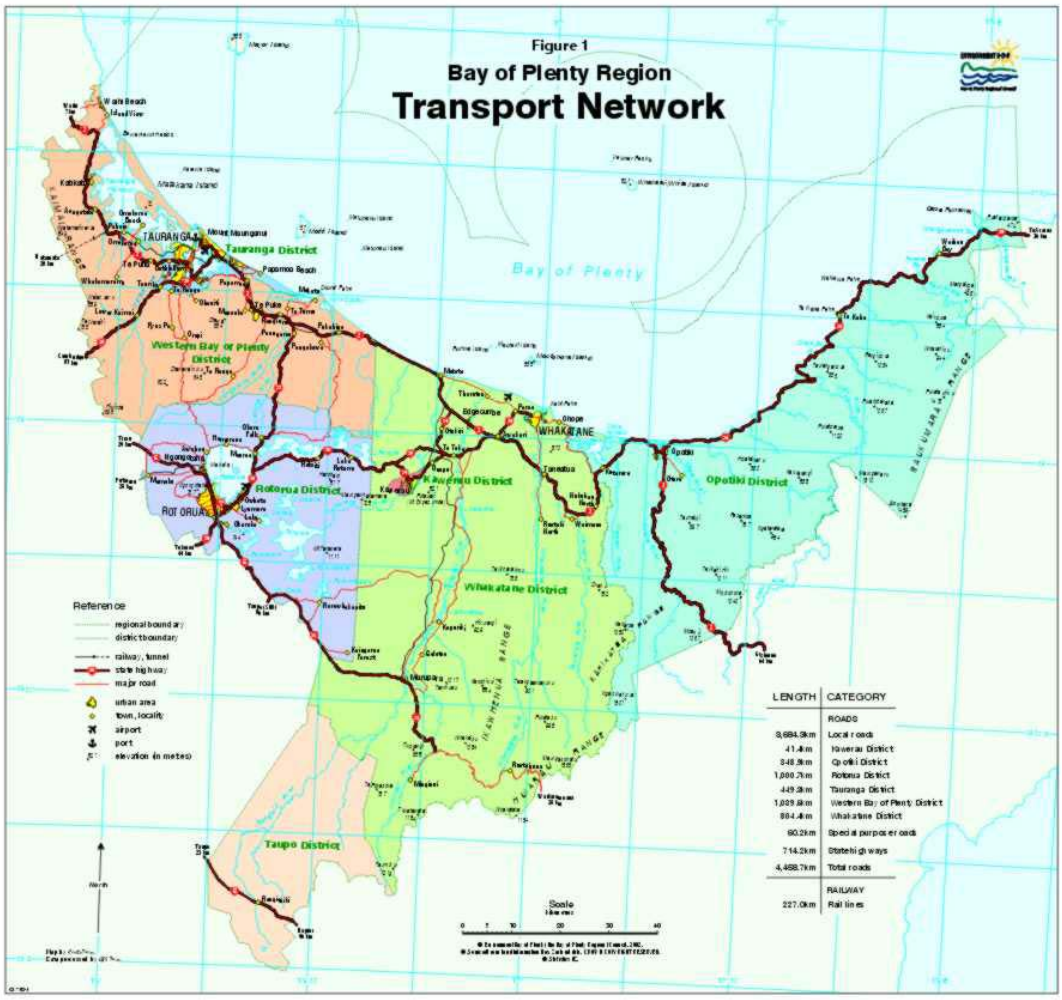


Figure 1: Bay of Plenty Region Transport Network

2.2.2 Tauranga District

The Tauranga District occupies 168 km^2. The predominant land uses in Tauranga are urban, horticultural, dairying and grazing. The district provides a junction point for a variety of transport links, including road, rail, air and sea, most notably the Port of Tauranga. Tourism, in particular the domestic market, is an important industry to the district.

2.2.3 Western Bay of Plenty District

The Western Bay of Plenty District is the region's northern-most district. It encompasses an area of 2,121 km^2 from Ohinemuri to the Whakatane District boundary, surrounds Tauranga District and is bounded by the Kaimai Ranges to the west and the Pacific Ocean to the east.

Land use within the district is varied and includes horticulture, grazing, dairying and exotic and plantation forestry. Horticulture, especially kiwifruit, and meat processing are important primary industries in the district.

2.2.4 Opotiki District

The Opotiki District extends approximately 160 km along the eastern coastline of the Bay of Plenty Region, from Ohiwa Harbour to Potikirua, and covers 3,104 km^2. Most of the district remains in native forest, this largely being an expression of the rugged nature of the land. Predominant land uses include sheep and cattle grazing, dairying and some plantation forestry. Its main centre is Opotiki.

2.2.5 Whakatane District

The Whakatane District has a central location in the Bay of Plenty Region, covering the coast from Otamarakau in the west to Ohiwa Harbour in the east. It also extends inland over part of the volcanic plateau and covers 4,442 km2.

The predominant land uses are plantation forestry, sheep and cattle grazing and dairying.

2.2.6 Kawerau District

The Kawerau District is situated within the Whakatane District, at the foot of Putauaki (Mount Edgecumbe) in the south west of the Rangitaiki Plains. The district provides a base for the region's pulp and paper and timber industry and their supporting activities. The predominant land use is sheep and cattle grazing. Its area is approximately 22 km2.

2.2.7 Taupo District

The Taupo District covers 6,956 km2 of which 995 km2 falls within the Bay of Plenty Region and comprises the southern-most part of the region. Much of the land is currently in plantation forestry, although sheep and beef grazing is also a common land use in this area.

2.3 Land Transport Administrative Structure

Land transport is administered by a number of organisations in the region. A summary of the role of these organisations follows:

2.3.1 Transit New Zealand (Transit)

Road controlling authority responsible for managing the state highway network.

2.3.2 Transfund New Zealand (Transfund)

Funding authority that distributes central government funds for roading and passenger transport and undertakes audits of road controlling and tendering authorities.

2.3.3 Land Transport Safety Authority (LTSA)

Regulatory authority responsible for the safe operation of the roading and rail systems and development of land transport rules and issues passenger transport licenses and ensures compliance with land transport legislation.

2.3.4 District Councils

Road controlling authorities responsible for all public roads other than state highways, providing bus stops, shelters and other passenger transport infrastructure and providing cycle lanes and cycle ways.

2.3.5 Regional Councils

Authority responsible for preparing the Regional Land Transport Strategy, planning and contracting of passenger transport services within the region and registering passenger transport services.

2.3.6 Police

Responsible for enforcement of land transport legislation.

Chapter 3: Transport Network

3.1 Air

Commercial airports in the region are situated in Rotorua, Tauranga and Whakatane.

Based on the total number of passengers in a year, Table 1 shows that Rotorua is the region's most important airport, followed by Tauranga and Whakatane.

Table 1: Total Annual Passengers

Airport	**Total Annual Passengers**
Rotorua	250,000
Tauranga	70,000
Whakatane	25,000

Source: Airport Companies (1995)

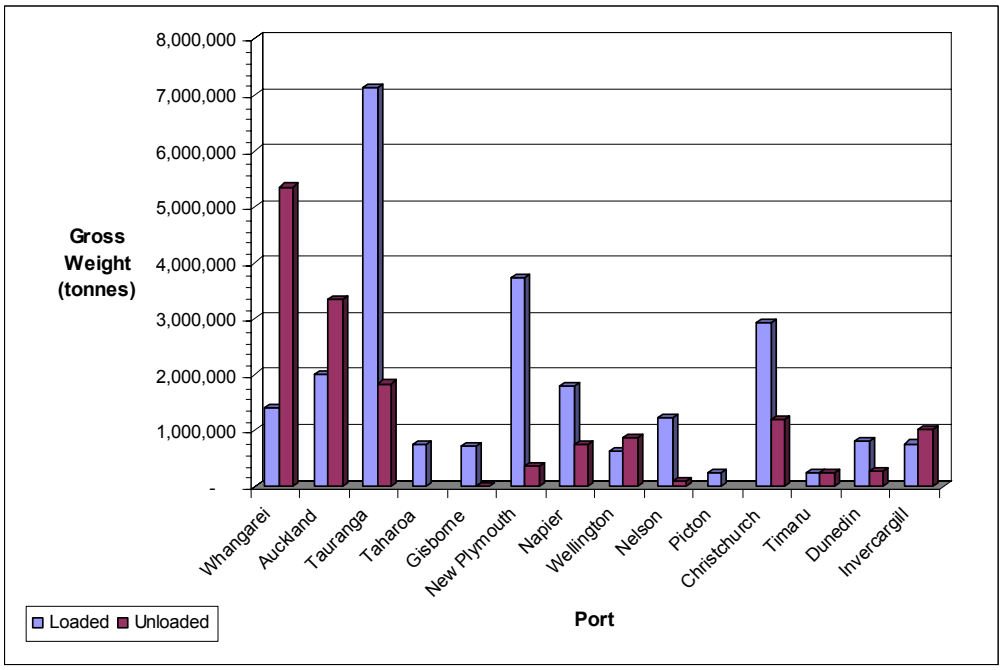
Direct access to Rotorua Airport is via SH 5, while for the other two airports it is onto the local roading network.

Environment B·O·P is currently in the process of conducting a Bay of Plenty Regional Airports Study. The study may be in two parts. The first part of the study aims to analyse to what extent the existing three airports within the region are meeting the requirements of the people and visitors of the region. The study will also take into account any current pressures on the existing airports. In the event that the initial analysis indicates that there are shortcomings in the present air and transport facilities, the study will be extended to look at possible alternatives such as a single regional airport.

Depending upon the outcome of the study, Environment B·O·P may have to revisit the Regional Land Transport Strategy at a later date.

3.2 Sea

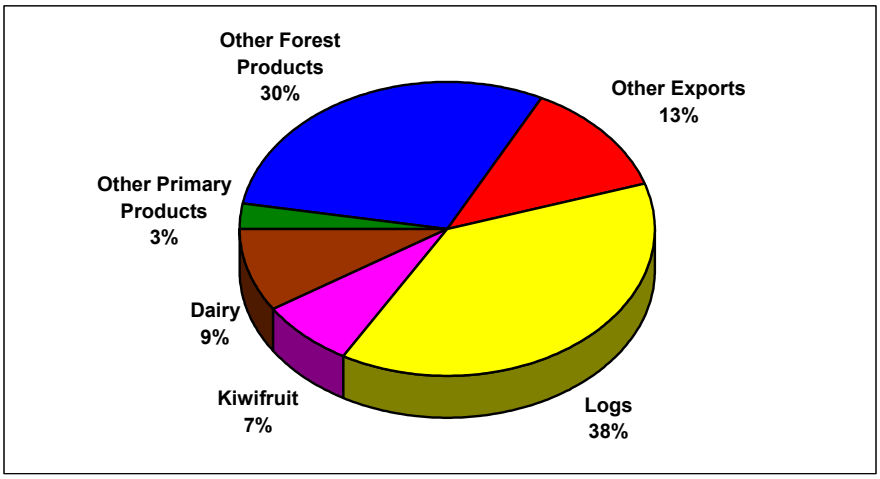
New Zealand's largest export port is to be found in the Bay of Plenty, based at Tauranga. For the year ended June 2002, the Port of Tauranga (POT) was New Zealand's most important export port by volume and value. It was New Zealand's third most important import port by volume and second most important import port by value. In total, more cargo is loaded and unloaded at Tauranga than for any other port in New Zealand (see Figure 2).



(Source: Overseas Cargo Statistics: 12 Months Ended June 2001, Statistics New Zealand)

Figure 2: Overseas Cargo Loaded and Unloaded by Port (year ended June 2002)

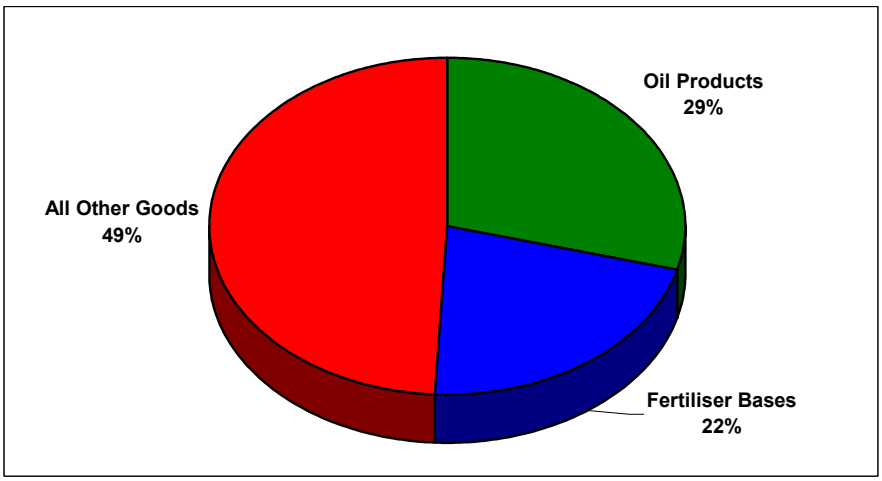
As can be seen from Figure 3, the major commodities exported through POT during the 2000/01 financial year were logs and other forest products. POT also became New Zealand's largest dairy export port in 2000 and strengthened that position in 2001 when it increased the tonnages of dairy products exported through the Port by 26% on the previous year.



(Source: Port of Tauranga Limited website)

Figure 3: Products Exported (year ended June 2001)

Major import commodities are shown in Figure 4. Imports of containerised cargo have grown rapidly over the past 15 years, and will be developed further through POT's integrated inland port, Metroport Auckland.



(Source: Port of Tauranga Limited website)

Figure 4: Products Imported (year ended June 2001)

The POT has two separate wharves divided by Tauranga Harbour – one on the Mount Maunganui side of the Harbour and the other on the Sulphur Point side.

On the Mount Maunganui side of the harbour, POT has 2,055 metres of continuous berth face. Immediately adjacent to the wharf are cargo sheds and a 20,000 tonne capacity cold store. Spread along the wharf are 22 bunker points to allow ships to re-fuel while loading or unloading. A total of more than 90 hectares of back-up land is available for cargo handling and storage.

To the south of the Mount Maunganui Wharf is a dolphin berth, with facilities for discharging and/or loading tankers carrying bulk fluids such as oil products, chemicals and cement. A conveyor system is also used for loading wood-chips.

The Mount Maunganui side of the Port is predominantly used for loading/unloading bulk products. These products arrive/leave the Mount by rail and road.

Road access to the Mount wharf is via Wharf Road, Hull Road and Rata Street. Annual average daily traffic counts on Hull Road east of Totara Street is 7,822 vehicles.[2]

The Sulphur Point side of the Port was opened in 1992 and the development features 600 metres of wharf, three container cranes and 27 hectares of paved container yard. More than 25,000 square metres of covered storage is available for cargo handling, and a further 9,000 tonne cool store caters for temperature controlled cargo. Over 700 power points are available for refrigerated containers.

The Sulphur Point side of the Port is predominantly used for loading/unloading containerised cargo. In 2001, container traffic increased by 22% on the previous year, to 286,806 twenty-foot equivalent units (TEU).

Containers arrive/leave the Sulphur Point wharf by rail and road.

Road access to the Sulphur Point wharf is via Mirrielees Road. Annual average daily traffic counts on Mirrielees Road between Cross Road and Dive Crescent is 9,526 vehicles.[3]

The Port of Tauranga is now also offering its customers, by prior arrangement, a 24-hour receipt and delivery service for trucks bringing cargo to the Tauranga Container Terminal. The new service is a pre-cursor to a full-time 24-hour service at the Terminal.

In the past trucks were limited to delivering containers between 7:00 am and 11:00 pm. In addition, often trucks departing the Terminal were unable to obtain a back load of an empty container if required.

The main advantage for businesses using the port is that with the potential to take a load each way they can cut transport costs and can now work to hours that suit their business.

The POT has also established Metroport Auckland in the heart of Auckland's industrial belt. It was opened in May 1999 and commenced operations in June 1999. Metroport Auckland is the first part of POT's multi-port strategy, which is aimed at extending its operations beyond the Bay of Plenty.

The dry port is operated through an integrated transport system using rail to and from the POT. Shipping lines contracted to use Metroport Auckland call at the POT where import cargo destined for Auckland is offloaded at the Tauranga Container Terminal (Sulphur Point). Cargo is then railed to Metroport Auckland before distribution to its final destination.

[2] Source: Geoff Morgan, Transportation Development Engineer, Tauranga District Council, pers comms, 29 April 2002.
[3] Source: Geoff Morgan, Transportation Development Engineer, Tauranga District Council, pers comms, 29 April 2002.

The same process happens in reverse for Auckland sourced export cargo. It is amassed at Metroport Auckland and then railed to Tauranga for loading onto a vessel.

Early in 2001, POT reached an agreement with Tranz Rail to extend transport to and from Metroport Auckland from a weekend-only service to one that also operated during the week.

3.2.1 The Future?[4]

Internationally, there is an increasing trend to hub containers on Singapore for on-delivery to any continent. The Port has been increasing the number of services that call with direct services to Singapore and this would allow the exchange of containers to the "round the world" services.

Over the long-term this should increase trade through the Port of Tauranga and significantly change the balance of transport between Auckland, Hamilton and Tauranga.

The growth in container traffic is likely to be substantially based on the Sulphur Point facility at Tauranga although some will go on the container services operated across the Mt Maunganui wharves. The containers should be substantially transported by rail, although a small percentage will still be transported by road due to their need for urgent delivery.

Other forestry cargoes are likely to be substantially handled at the Mount Maunganui wharf, but as the percentage or processed/added value cargo increases then it may well be containerised and shipped through Sulphur Point.

[4] Sourced from Tauranga District Council, September 1997, Tauranga Region: Transportation, Current Situation, Future Trends and Issues, section 3.2 Sea, page 3-3.

3.3 Land

3.3.1 Rail

The Bay of Plenty rail network extends from Hamilton in the West to Taneatua and Murupara in the East and comprises the following lines

- East Coast Main Trunk (ECMT) 114 km
- Mt Maunganui Branch 6 kms
- Rotorua Branch 20 km
- Murupara Branch 57 km
- Taneatua and Whakatane Branch 30 km
- Total Route Kms 227 km

Principal traffic commodities carried are as follows:

- ECMT (Ham to Tauranga) import / export & forestry
- ECMT (Tauranga to Kawerau) forestry
- Rotorua Branch not currently used
- Murupara Branch logs
- Taneatua and Whakatane Mills forestry products

A total of 5m net tonnes per annum is currently handled within the region. Of this approximately 2m net tonnes per annum originates and remains within the region. The remainder originates outside the region and travels to a destination within the region or vice versa. Typical examples of this are:

- Metro port traffic which travels between Auckland and Tauranga.
- Agriculture export traffic which is moved to Tauranga for consolidation prior to shipping.
- Forestry traffic which is moved into the region for processing prior to export.

Key Issues facing rail in the Bay of Plenty Region are:

- Maintenance and upgrading of existing branch lines to meet current and forecast traffic volumes.
- Construction of new routes and facilities to meet new traffic flows such as those emanating from East Cape and specifically a new line from Taneatua to Opotiki.
- Possible extension of the Murupara line southwards to Taupo.

Current strategies are to:

- Upgrade existing main routes and principal branch lines.
- Upgrade and invest in new intermodal exchange facilities.
- Provide new rolling stock where this is economically justified.
- Expand the network where this can be shown to be economically superior to road.

Most of these issues cannot be economically justified in their own right and will require ATR funding either for existing maintenance or for new work. Application has already been made for ATR funding of maintenance on the ECMT and key branches such as the Kinleith and Murupara lines.

3.3.2 Road

There are 4,460 kilometres of road in the Bay of Plenty comprising state highways, local roads and Special Purpose Roads.

3.3.2.1 State Highways

As can be seen in Table 2 and Table 3, there are 714 kilometres of state highway in the Bay of Plenty region, about five kilometres of which are not sealed (for the location of the roads, see Figure 1). On that 714 kilometres of state highway are 201 bridges.

Table 2: State Highways - Physical Statistics as at 30 June 2001 (roads)

	Length (km)	Length Sealed (kms)	% Sealed
Bay of Plenty	714.2	709.4	99.3
New Zealand Total	10,774.4	10,715.5	99.5
% of NZ Total	6.6%	6.6%	

(Source: Transfund Roading Statistics 2000 – 2001)

Table 3: State Highways - Physical Statistics as at 30 June 2001 (bridges)

	Total Bridges		Single Lane Bridges		Restricted Bridges -Speed Only		Timber Bridges	
	No.	Length (m)	No.	Length (m)	No.	Length (m)	No.	Length (m)
Bay of Plenty	201.0	6,390.0	2.0	490.0	2.0	220.0	1.0	20.0
New Zealand Total	3,713.0	125,962.0	197.0	16,640.0	14.0	2,464.0	30.0	1,372.0
% of NZ Total	5.4%	5.1%	1.0%	2.9%	14.3%	8.9%	3.3%	1.5%

(Source: Transfund Roading Statistics 2000 – 2001)

In the Rotorua District, Transit has delegated the management of the state highways in that District to the Rotorua District Council.

3.3.2.2 Deficiencies in the State Highway Network

Transit has currently prepared (or is preparing) State Highway Strategy studies for the following sections of state highway within the Bay of Plenty region:

- SH 29 – Port of Tauranga to Piarere;
- SH 29, SH 2, SH 34 – Mt Maunganui to Kawerau;
- SH 33, SH 30, SH 5 – Paengaroa to Wairakei;
- SH 2, SH 34 – Junction to Makaraka;
- SH 30 – Te Ngae to Whakatane River Bridge.
- SH 30 Te Kuiti to Rotorua; and
- SH 5, SH 30A – Tirau to Rotorua.

The strategies describe Transit's policies and plans for sections of state highway, in accordance with the National State Highway Strategy, in terms of:

- efficiency and safety improvements;
- traffic and road management;
- access and highway protection;
- road user services;
- community services; and
- environmental protection.

The strategies are reviewed every five years.

Major improvement projects (those estimated to cost greater than $3 million) identified in the strategies are listed in Table 4, below.

Table 4: Major State Highway Improvement Projects

Project	Cost ($ 000)	Priority
SH 30 Rotokawa Weight Bridge	3,697	High[5]
SH 30 Te Ngae/Sala Intersection Improvements	3,250	High[5]
SH 30 Rotorua Eastern Arterial	20,500	Medium[5]
SH 5 Tumunui South Realignment	3,180	High[5]
Hewletts Rd/Maunganui Rd Traffic Management Study	12,600	High[6]
Investigate median barrier between Te Maunga and Maungatapu	3,300	High[6]

[5] High = benefit/cost ratio of > 4
Medium = benefit/cost ratio of > 3 - 4
[6] High = benefit/cost ratio of > 3
Medium = benefit/cost ratio of 2 – 3
Low = benefit/cost ratio of < 2

Project	Cost ($ 000)	Priority
Hairini to Route K four laning and grade separation of major intersections	21,500	High[6]
Realign curves at Hastings Rd	4,050	Low[6]
Investigate Tauriko Bypass	17,000	Low[6]
Redwood to Omanawa Rd realignment	3,800	Medium[6]
Wairata Rd curve realignment	3,830	Low[5]
Pekatahi Bridge replacement	5,180	Long-term project

(Source: Transit State Highway Strategies)

Current traffic volumes on state highways in the region are shown in Table 5, below.

Table 5: Growth Rates for State Highway Traffic

State Highway	Station Reference	Count Site	Growth Rate	Average Annual Daily Traffic (2000)	% Heavy Commercial Vehicle (2000)
2	00200106	Athenree	2.83	5,600	16.1
2	00200117	Katikati	2.84	9,550	11.7
2	00200137	Omokoroa[7]	4.43	10,900	10.4
2	00200141	Te Puna[8]	4.74	12,690	6.0
2	00200143	Te Puna	3.76	10,400	13.3
2	00200148	Tauranga	2.77	20,000	7.6
2	00200168	Mangatawa	2.84	16,500	14.7
2	00200171	East of Domain Rd	4.25	4,494	17.2
2	00200204	Te Puke	1.98	4,494	6.0
2	00200187	Maketu	2.50	15,800	16.0
2	00200204	Ohinepanea	2.76	4,494	22.0
29	02900020	Tauriko	3.09	10,500	13.9
29	02900034	Kaimai	3.32	6,709	11.0
30	03000218	Awakeri[9]	2.35	5,100	6.7
33	03300003	Te Ngae	2.51	5,700	10.6
33	03300031	Paengaroa	3.21	4,209	11.0
38	03800000	Waiotapu	2.18	2,900	9.7

(Source: Transit, State Highway Traffic Volumes 1970 – 2000)

[7] Count discontinued in 2000. 1999 count shown.
[8] Data lost due to telemetry fault in 2000. 1999 count shown.
[9] Count not completed in 2000. 1999 count data shown.

3.3.2.3 Local Roads

As can be seen in Table 6 there are 950 kilometres of urban roads, 2,734 kilometres of rural roads and 60 kilometres of Special Purpose Roads in the Bay of Plenty region. As can also be seen from the Table the Western Bay of Plenty District Council is the largest local rural road controlling authority and the Tauranga District Council the largest urban local road controlling authority in the region?

Table 6: Local Roads - Physical Statistics as at 30 June 2001 (roads)

		Length (km)	Length Sealed (kms)	% Sealed
Kawerau	Urban (U)	39.4	39.4	100%
	Rural (R)	2.0	0.7	35.0%
Opotiki	U	26.2	26.2	100.0%
	R	322.7	105.0	32.5%
Rotorua	U	236.2	235.7	99.8%
	R	764.5	527.4	69.0%
Tauranga	U	401.8	400.9	99.8%
	R	47.5	44.7	94.1%
Western Bay of Plenty	U	125.5	123.3	98.2%
	R	914.1	588.6	64.4%
Whakatane	U	120.9	120.1	99.3%
	R	683.5	493.6	72.2%
Special Purpose (SPR)		60.2	7.7	12.8%
Bay of Plenty Region	U	950.0	945.6	99.5%
	R	2,734.3	1,760.0	64.4%
	SPR	60.2	7.7	12.8%

(Source: Transfund Roading Statistics 2000 – 2001)

Table 7: Local Roads - Physical Statistics as at 30 June 2001 (bridges)

	Total Bridges		Single Lane Bridges		Restricted Bridges -Speed Only		Restricted Bridges -Weight		Timber Bridges	
	No.	Length (m)	No.	Length (m)	No.	Length (m)	No.	Length (m)	No.	Length (m)
Kawerau	5	50.0	1	38.0						
Opotiki	53	1,094.0	52	1,085.0			6	111.0	12	18.1
Rotorua	87	1,480.0	61	985.0			1	12.0	7	98.0
Tauranga	11	861.0	2	36.0			1	13.0		
Western Bay of Plenty	100	1,270.0	63	890.0	2	18.3	1	7.4	2	40.4
Whakatane	136	2,340.0	64	1,210.0	1	56.0	6	135.0	6	36.0
Special Purpose (SPR)	9	157.0	6	93.0						
Bay of Plenty Region	401	7,252.0	249	4,337.0	3	74.3	15	278.4	27	192.5

(Source: Transfund Roading Statistics 2000 – 2001)

While the Western Bay of Plenty District Council is the largest local road controlling authority in the region, the Whakatane District has the greatest number of local road bridges – about a third of the region's total (see Table 12). The table also shows that of the 53 local road bridges in the Opotiki District, 52 are single lane bridges. Opotiki also has the equal highest number of weight-restricted bridges (with Whakatane) and the highest number of timber bridges, of any local road controlling authority in the Bay of Plenty.

3.3.2.4 **Deficiencies in the Local Road Network**

(a) Rotorua

The Rotorua District Council commissioned Opus International Consultants Ltd to prepare the 'Rotorua Urban Transportation Study 2001'. The Study identifies the need to investigate the following road capacity projects:

- Old Taupo Road – four lanes – Pukuatua Street to Malfroy Road.
- Malfroy Road upgrade with widening, an extension to Te Ngae Road parallel to Ti Street, a roundabout at the Fenton Street/Malfroy Road intersection and additional approach lanes at the Malfroy Road/Ranolf Street roundabout.
- Lake Road – four lanes – Koutu intersection to Ranolf Street.
- Eastern Arterial – construct new two lane link.
- SH 5 northern entrance to the City – four lanes.
- Ranolf Street – four lanes – Lake Road to Arawa Street.
- Tarewa Road.
- Ranolf Street – Arawa Street to Pukuata Street.

The Study also identifies the need to investigate the following intersection capacity projects to reduce delays to side road traffic:

- Old Taupo Road and Fairy Springs Road – reduce delays to side roads.
- Pukuatua Street/Tarawera Road and Pukuatua Street/Amohau Street – reduce delays.
- Amohau Street/Fenton Street and Koutu intersections – increase capacity.
- Lake Road/Tarawera Road intersection.

Other projects may be required for safety reasons. Projects proposed for investigation are:

- Old Taupo Road/Devon Street intersection.
- Ranolf Street/Amohau Street intersection in CBD (signals).

Projected traffic growth at some sites in Rotorua are given in the Table below.

Table 8: Rotorua Traffic Growth at Selected Locations

Road	Location	Traffic Volume (vpd)		
		1996	2006	2021
Fairy Springs Rd	North of Koutu I/S	22,000	24,750	29,630
Old Taupo Rd	North of Pukuatua Rd	25,150	27,100	30,900
Lake Rd	At Railway Overbridge	19,700	23,600	27,000
Amohau St Ext	East of Fenton St	17,950	25,000	28,800
Te Ngae Rd	At Puarenga Stream	31,100	39,750	49,300
Ngongotaha Rd	SH 5 Roundabout	15,300	19,000	23,600

(Source: Opus International Consultants Ltd, Rotorua Urban Transportation Study 2001)

(b) Opotiki

A submission to Environment B·O·P's Draft 2002/03 Annual Plan from the Opotiki District Council, states:

"The Opotiki District Council also has a regional strategic issue which justifies attention and which affects regional development. The issue ... is the risk of having the transport of all produce from this district being reliant on just one transport route to the rest of the region and the Port of Tauranga, and that in case of the Waioeka River Bridge, this route is partly at risk of flooding and hence closure. Unlike most other parts of the region, there are no alternative transport routes available. This is indeed a regional strategic development issue".

3.3.2.5 Strategic Plans and Land Transport

The region's road controlling authorities have adopted the following strategic approaches to transport in their areas:

(a) Transit

In June 1996, Transit prepared a Draft Regional State Highway Strategy for the Bay of Plenty. The purpose of the Strategy was to:

- "establish a regional roading hierarchy
- develop and establish:
  - specific strategies,
  - regional performance indicators,
  - desirable standards
- identify regional deficiencies,

for the cost effective management of the state highway network".

The Strategy has never progressed beyond being a draft document (i.e. it has not been adopted by Transit).

(b) **Opotiki**

The Opotiki District Council's 'Five Year Strategic Plan 1999 – 2004' contains the following strategies for transport and public access in the Opotiki district:

- "To provide an effective and efficient infrastructural network for local roads in the district planned and managed by Council.
- To work with Transit NZ to explore the integration of state highway management with local roads" (page 60).

(c) **Whakatane**

The Whakatane District Council has a vision for roading that is:

- "A network of roads providing safe and efficient movement of traffic throughout the district through to 2011."[10]

Some of the land transport issues highlighted in the Whakatane Strategic Plan are:

- "The impact of the haulage of timber between East Cape forests and the Port of Tauranga."
- "The effect on local roads of loads generated by log and dairy transportation."
- "The need to provide for foot and cycle traffic to encourage energy conservation and appreciation of the natural landscape."
- "To provide a safer roading network" (page 42).

(d) **Rotorua**

The Strategic Plan for the Rotorua District identifies a number of existing ongoing programmes relating to transport roading network and facilities. These include:

- a ten-year programme to seal roads in rural areas;
- annual programmes of rural and urban street improvements;
- economically viable safety improvements including roading arterial improvements, rural seal extensions, rural and urban street improvements, minor safety projects and Maori road lines;
- investigation of the eastern arterial; and
- four laning of the Old Taupo Road between Pererika and Malfroy.

(e) **Western Bay of Plenty**

The growth strategy for the Western Bay of Plenty District includes transport corridors linking the region internally and externally. It also contains a strategy to *"develop with strategic partners, the joint Tauranga Sub-region Transportation*

[10] Whakatane District Council, 2001, Strategic Plan 2001 - 2011, Whakatane, page 33.

Strategy to provide an efficient and co-ordinated transportation network" (see the section on the **Growth in the Western Bay** of Plenty Sub-region on page 55).

(f) Tauranga

The Tauranga District Strategic Plan also contains a strategy for an integrated transportation network. The strategy is to:

- provide a roading network to ensure the ease of movement of goods;
- progressively upgrade Tauranga airport to ensure air services meet business and domestic growth; and
- establish close working relationships with the port of Tauranga and transportation sector.

As part of the process of preparing its Strategic Plan, the Tauranga District Council prepared a number of background papers. One of these, was a paper on Transportation (December 1997). It suggested some principles on which future transportation strategies for the Tauranga region, might be based. These are:

Strategic Principles

- "Transportation planning to encourage the development and increased use of alternative modes, in an integrated manner, having regard to economic, social and environmental issues.
- That future transportation corridors, including connections to the network, should be protected from development. This should apply to all transport modes including road, rail, light rail, and bus routes. In particular, corridors that provide access to the port, harbour bridge duplication, arterials and urban bypasses should be protected by designation and/or land purchase at an early stage prior to development. This action
  - will protect existing and future corridors to preserve transportation options, minimise future land use conflicts and provide clear direction for the long term.
  - recognise that the existing rail corridor is located through existing urban areas, which in the long term may provide an opportunity for public passengers transport. This includes preserving the Strand rail corridor, notwithstanding any possible relocation of the existing railway line.
- Development of strategic agreement(s) with Tranz Rail on the provision and development of rail corridors for other transport modes, the use of rail corridors for passenger transport and defining future corridor development options.
- Develop a Tauranga region urban growth strategy which as a preliminary phase, brings together the existing urban development, and transportation policies and networks for the Tauranga region. This would provide the framework for the ongoing development of integrated land use and transportation strategies and polices."

Policy Principles

- "Provide for an increase in inner city residential ad commercial densities with encouragement for walking and cycling through provisions of appropriate infrastructure. This includes the provision for apartment development and unit development in the residential areas adjoining the CBD and suburbs in commercial areas and relaxing height restrictions adjacent to the CBD to accommodate such development.

- Public transport should be considered to provide services to all urban areas. Facilities for public transport should be incorporated in to subdivision standards and requirements, once a public transport strategy is agreed upon.

- That the purpose and nature of bus services in an integrated transportation strategy be clearly defined, so the reasons for the provision and requirement for such services is clear.

- Develop integrated cycling and pedestrian walkway networks in stages, for geographic areas of the Tauranga region. The development stages of such networks include:

    - investigation and design
    - implementation
    - publicity

- In addition any such network(s) to involve as appropriate:

    - cycle lanes
    - cycle tracks (dedicated for cyclists)
    - shared cycle and pedestrian paths
    - linkages with primary and secondary schools, major industrial, commercial and residential areas.

- That the planning and design of future transportation corridors to provide for the development of cycle and pedestrian infrastructure.

- That the concept of cyclists and pedestrians using the same footpaths be encouraged and that consideration be given to new footpaths being constructed to a greater width to allow joint use.

- Review the 1995 parking strategy to provide for a more market led approach and encourage private sector provision of parking that would allow the council to withdraw from the actual provision and operation of off-street parking facilities.

- Encourage the development of a fully integrated transportation centre based on the existing Dive Crescent bus and information centre that will provide a centralised passenger transfer facility involving:

    - buses (local and inter regional services)
    - rail

- cabs

- That the role of the territorial authorities is one of facilitation, planning and promotion of public passenger transport and not as a purchaser of services.

- Recognition that the provision of public transport is driven by:

  - Socio/economic nature of the community
  - needs of the transport disadvantaged (mainly young and the aged)
  - environmental issues
  - provision of an alternative to assist in moving people other than by private car."

Planning Principles

- "Promote and encourage the aggregation of parking in the CBD to allow maximum utilisation of sites by moving away from individual site parking provision and encourage the provision of appropriately located parking buildings and sites by the private sector, where parking spaces could then be purchased/leased.

- That in respect of the development of the strategic roading network, the following criteria apply:

  - Efficient and least restrictive access to the Port of Tauranga facilities (both Mt. Maunganui and Sulphur Point)
  - Separation, as far as practicable, of local traffic especially in residential areas, from industrial and commercial traffic.
  - Most convenient and safe route for through traffic having regard to social and environmental factors.
  - "Corridor" approach to transportation where various modes could be accommodated.
  - Routes that meet long term needs.
  - Grade separation of strategic roads from local roads over time.
  - Development of network roads on a "limited access" basis.

- Assist in the creation of an environment for public passenger transport to develop without the need for local subsides, through the provision of:

  - support infrastructure such as bus shelters and bus stops.
  - provision and circulation of timetables and route maps.
  - promoting the use of public transport and associated development of a public transport culture.
  - being supportive in the creation of a land transport funding and charging regime that encouraged proper allocation of costs, which will assist in increasing the viability of public passenger transport.

- Encourage the development of district plan strategies, policies and rules that permit and support those who wish to work from home."

3.3.2.6 Roading Hierarchy

Roading hierarchies have a number of purposes, including:

- defining priorities or levels of service for maintenance contracts;
- town planning, land use/road interface management;
- setting road design, safety or construction standards;
- developing transportation/land use strategies; and
- prioritising improvement works.

The LTSA(LTSA) has recently conducted a survey of roading hierarchies in use around New Zealand.[11] The LTSA concludes:

> *"To develop a safety management system approach to managing roads, New Zealand needs an agreed functional road hierarchy for the entire road network. Safety standards and levels of service can then be set for each class of road, taking into account the needs of all road users. Furthermore greater consistency in standards is needed on comparable roads between different road controlling authorities."*

There is currently no regional roading hierarchy for the Bay of Plenty, although each road controlling authority within the region has its own hierarchy. These are:

Table 9: Bay of Plenty Roading Hierarchies

State Highway Hierarchy
National State Highway
Regional State Highway
District State Highway

Opotiki Roading Hierarchy
National Routes
Primary/Regional Arterials
Secondary/District Arterials
Collector Routes
Local Roads

Rotorua Roading Hierarchy
High Density (urban area only)
Rural Arterial Routes
Major Arterial Routes (urban)
Collector

Tauranga Roading Hierarchy
Strategic Route
Arterial Route (Regional)
Arterial Route (District)
Collector
Sub-collector
Local Road

Whakatane Roading Hierarchy
National Routes
Primary (Regional) Arterials
District Arterials
Collector Routes
Local Roads

Western Bay of Plenty Roading Hierarchy
National Roads/Regional Arterials
District Arterials
Other Roads

(Sources: Transit Draft Regional State Highway Strategy; territorial authority District Plans)

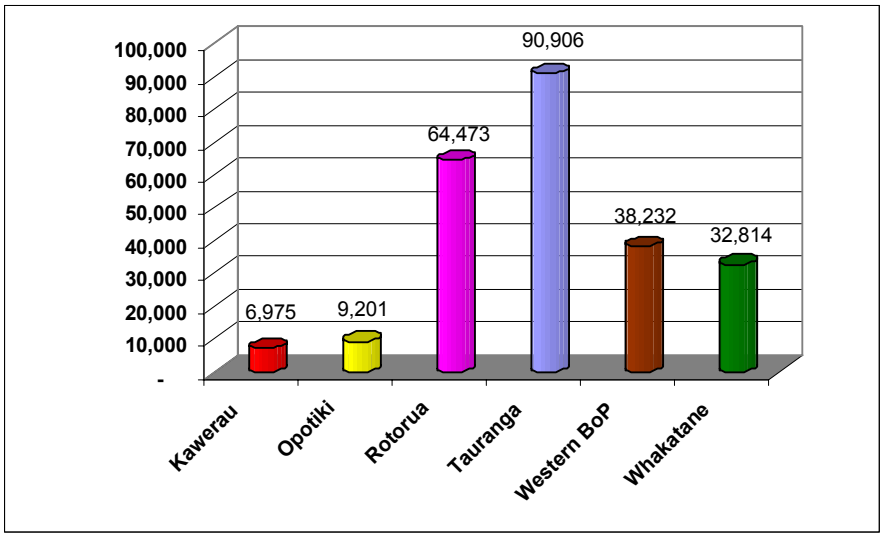
[11] Land Transport Safety Authority, 2001, Traffic Standards and Guidelines 2000/2001 Survey, RSS 16, Road Hierarchies.

It is uncertain if there is consistency in standards on comparable roads between different road controlling authorities in the region. Developing a regional roading hierarchy may go some way to resolving this issue.

Chapter 4: Population

4.1 Total Population

In 2001 the region had a usually resident population of 239,412 people (Figure 5). This represents a 7% increase in the population in 1996 and a 17% increase on 1991. The most significant population increases between 1996 and 2001 occurred in the Tauranga District (a 17% increase) and the Western Bay of Plenty District (a 9% increase).



(Source: Statistics New Zealand)

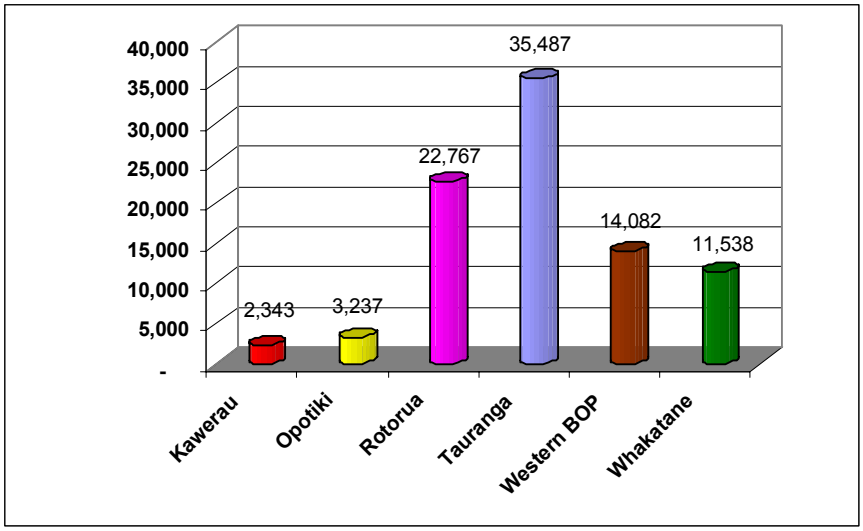
Figure 5: Usually Resident Population by Territorial Authority (2001)[12]

In 2001 just under 70% of the population lived in the region's three main urban areas of Tauranga (95,700), Rotorua (52,600) and Whakatane (17,800).

[12] Throughout this section, the figures quoted for the Rotorua District are for the whole district (i.e. including that part outside the Bay of Plenty). While the Rotorua District lies within both the Waikato and Bay of Plenty regions, about 95% of the population resides in the Bay of Plenty region. On this basis and given the difficulty involved in splitting out the non-Bay of Plenty Rotorua District residents from the Bay of Plenty Rotorua District residents, it was much easier to simply refer to the figures for the whole district. Similarly, while part of the Taupo District lies within the Bay of Plenty region, very few people reside there and therefore, Taupo has been excluded from the figures.

4.2 Total Households

At the time of the 2001 Census there were about 88,400 households in the Bay of Plenty region (Figure 6). This represents a 10% increase in the number of households in 1996 and a 24% increase on 1991.



(Source: Statistics New Zealand)

Figure 6: Number of Households by Territorial Authority (2001)

The most significant increases in household numbers between 1996 and 2001 occurred in the Tauranga District (a 19% increase) and the Western Bay of Plenty District (a 12% increase). *"In addition to the traditional urban population growth there was a significant increase in the number of lifestyle rural/residential developments taking place, particularly between Katikati and Tauranga, but also extending southeast towards Paengaroa."*[13]

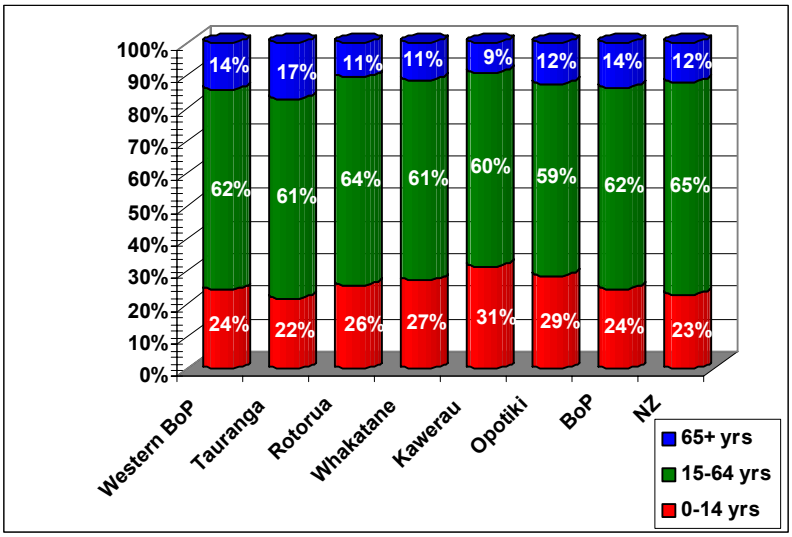
4.3 Age Distribution

Compared to New Zealand as a whole (see Figure 7) the region has a higher percentage of children[14] and elderly (24% and 14% respectively, compared to 23% and 12% for the New Zealand population) and a corresponding lower percentage of adults (62% compared to 65%).

As can be seen from Figure 7, in 2001:

- 31% of all the people in Kawerau were children;
- Tauranga had the lowest proportion of children (22%);
- Rotorua had the greatest proportion of adults (64%),;
- 17% of the people in Tauranga were elderly while only 9% in Kawerau were.

[13] J Hannah, pers comms.
[14] Children are aged 0 to 14 years; adults 15 to 64 years; and the elderly 65 years and over.



(Source: Statistics New Zealand)

Figure 7: Age Distribution for Usually Resident Population (1996)

Population numbers by age group is shown in Table 10.

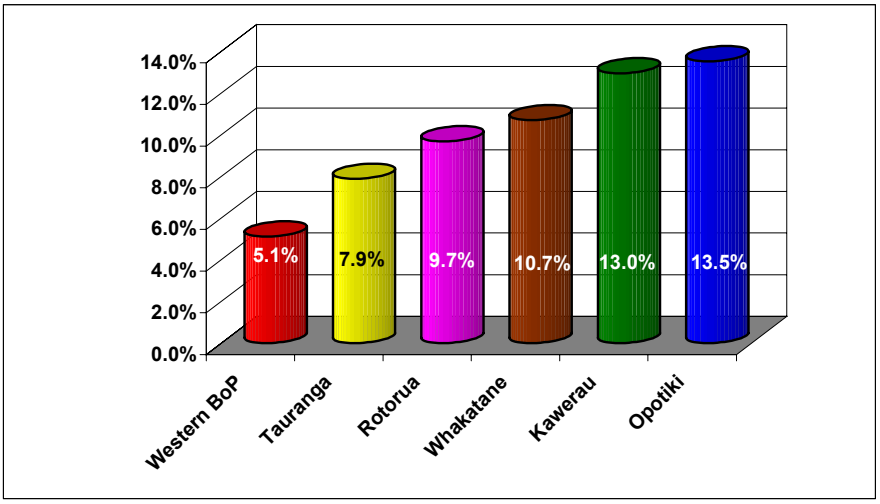
Table 10: Age Distribution for Usually Resident Population (2001)

Territorial Authority	0-14 yrs	15-64 yrs	65+ yrs	Total
Western BoP	9,252	23,513	5,467	38,232
Tauranga	19,727	55,544	15,636	90,906
Rotorua	16,634	41,005	6,834	64,473
Whakatane	8,925	20,148	3,741	32,814
Kawerau	2,183	4,150	642	6,975
Opotiki	2,622	5,438	1,141	9,201
BoP	59,344	149,797	33,461	242,601
NZ	848,362	2,436,705	452,211	3,737,277

(Source: Statistics New Zealand)

4.4 Car Availability/Ownership

In 1996 and 2001 the Western Bay of Plenty District had the lowest proportion of households with no car of all the territorial authorities in the Bay of Plenty region (Figure 8). Conversely, in 2001 Opotiki had the highest proportion of households with no car, closely followed by Kawerau (in 1996 it was the reverse).



(Source: Statistics New Zealand)

Figure 8: Proportion of Households Without a Car (2001)

Between the 1996 Census and 2001 Census, all territorial authorities except for Tauranga recorded a decrease in the number of households without a car.

In both 1996 and 2001, the Western Bay of Plenty District had the highest proportion of households with two or more cars (51% and 55%, respectively).

The actual number of households in 2001 with no car, one, two, or three or more cars, is shown below:

Table 11: Households by Number of Cars (2001)

2001	Households with no car	Households with 1 car	Households with 2 cars	Households with 3 or more cars	Not Specified
Western Bay of Plenty	708	4,998	5,592	1,983	573
Tauranga	2,751	14,898	12,321	3,618	1,320
Rotorua	2,154	8,748	7,410	2,676	1,266
Whakatane	1,212	4,623	3,792	1,194	507
Kawerau	300	996	693	162	165
Opotiki	426	1,401	888	249	186
BOP Region	7,551	35,664	30,696	9,882	4,017

(Source: Statistics New Zealand)

The total number of motor vehicles registered in each local authority is given in Table 12.

Table 12: Number of Motor Vehicles by Local Authority (2001)

2001	Kawerau	Opotiki	Rotorua	Tauranga	Western BoP	Whakatane	BOP Region
Buses	24	34	294	274	66	161	853
Cars	3,349	4,321	36,494	64,445	17,011	17,136	142,756
Heavy trucks	109	356	1,584	2,489	975	758	6,271
Light trucks	747	1,326	6,991	9,232	3,384	3,834	25,514
Mopeds	47	14	172	528	83	137	981
Motorcycles	131	117	1,004	2,225	527	606	4,610
Rental cars	1	1	63	125	17	176	383
Taxis	3	1	101	123	12	20	260
Total	4,411	6,170	46,703	79,441	22,075	22,828	181,628

(Source: Transport Registry Centre, LTSA)

Compared to other urban areas in New Zealand in 1996 (Hamilton, Wanganui, Palmerston North, Napier/Hastings, Christchurch, Dunedin and Invercargill), Tauranga had the highest proportion of households with one or more cars. The proportion of households with cars in Rotorua was similar to Hamilton, Palmerston North, Napier/Hastings and Christchurch and higher than Wanganui, Dunedin and Invercargill.

A report by Booz·Allen & Hamilton (NZ) suggests *"the most likely explanation for Tauranga's car ownership pattern is that many people have been forced to buy a car for their travel because of the relatively low level of public transport services in Tauranga since the mid-1980s.*

The other possible explanation is that the people of Tauranga are more car oriented than other cities, i.e. a 'car culture' exists. However, comparing Tauranga to Napier/Hastings, for example, shows this is not in fact the case."[15]

4.5 Index of Deprivation[16]

The index of deprivation, NZDep96, is "an academically rigorous integration of nine variables (for example, income – people aged 18 to 59 receiving a means tested benefit; employment – people aged 18 – 59 unemployed; transport – people without access to a car; etc) from the 1996 census, reflecting eight dimensions of deprivation."

"Bay of Plenty is the third most deprived region in New Zealand. Three of the Bay of Plenty's districts, Opotiki, Kawerau and Whakatane, are among the most deprived 10% of districts in New Zealand, with Index of Deprivation scores of 10" (a score "of 1 represents the least deprived area and a score of 10 the most deprived). Opotiki is the most deprived district in New Zealand, Kawerau is the second" and Whakatane the sixth most deprived.

"Rotorua[17] (with an Index score of 9), Taupo (8) and Tauranga (6) are less deprived. Western Bay of Plenty is the least deprived district in the region, scoring 5.

[15] Booz·Allen & Hamilton (NZ) Ltd, 2000, Tauranga Public Transport Study, Environment B·O·P & Tauranga District Council, page 14.
[16] Sourced from Environment B·O·P, 1999, Index of Deprivation, Supplement to People of the Bay of Plenty Region, A Socio-economic Profile, Environment B·O·P, Whakatane.

The Bay of Plenty Region has fewer people in less deprived areas and more people in more deprived areas than the New Zealand average.

Within each district of the region the levels of deprivation range widely." Areas in each district of greater deprivation are Maketu, Te Puke and Katikati (Western Bay of Plenty), Yatton Park, Greerton and Matapihi (Tauranga), around Lakes Rotoehu and Rotoma and most of Rotorua's urban areas, Kawerau generally, the rural southern two-thirds of Whakatane District and Awatapu (Whakatane) and rural Opotiki and Opotiki Township.

4.6 Disability

In 1996, Statistics New Zealand conducted a national 'Household Disability Survey' and in 1997 a 'Disability Survey of Residential Facilities'. Statistics New Zealand found:

- 19% of the total New Zealand population (excluding people with disabilities in residential facilities) had a disability;
- 68% of all adults and the elderly with a disability had a physical disability, followed by sensory disabilities (43%);
- 11% of children, 16% of adults and 52% of the elderly reported having a disability;
- 72% of the elderly reported having more than one disability, compared with 55% for adults;
- 17% of the adult and elderly New Zealand Maori population reported having a disability compared with about a quarter of the New Zealand European adult and elderly population;
- 21% of the adult and elderly male population reported having a disability compared with 22% of the female adult and elderly population.

The 1996 Census also asked people to indicate whether or not they had a disability. The results for the region are shown in Table 17.

[17] Most of Taupo District and some of Rotorua District are outside the Bay of Plenty Region. The data included in this analysis is only for those parts of the Taupo and Rotorua Districts that are located within the region.

Table 13: Usually Resident Population Indicating they had a Disability (1996 Census)

Local Authority	0-14 yrs		15-64 yrs		65+ yrs		Total	
	No. indicating a disability	% of Total Population Age Group	No. indicating a disability	% of Total Population Age Group	No. indicating a disability	% of Total Population Age Group	Total No. indicating a disability	% of Total Population Age Group
Kawerau	189	7.4%	651	13.7%	153	31.9%	993	12.7%
Opotiki	183	6.5%	930	16.7%	387	37.8%	1,500	16.0%
Rotorua (whole district)	1,128	6.6%	5,844	14.2%	2,325	36.6%	9,297	14.4%
Tauranga	1,068	6.4%	7,215	15.1%	4,758	35.5%	13,041	16.8%
Western Bay of Plenty	465	5.5%	3,381	15.5%	1,650	35.3%	5,496	15.7%
Whakatane	597	6.5%	3,012	14.7%	1,230	35.8%	4,839	14.6%
Bay of Plenty	3,630	6.4%	21,033	14.9%	10,503	35.8%	35,166	15.5%

(Source: Statistics New Zealand)

As can be seen from the table, in the Bay of Plenty region:

- 16% of the total population indicated that they had a disability; and
- 6% of children, 15% of adults and 36% of the elderly indicated that they had a disability.

Tauranga had the greatest percentage and number of people with a disability.

4.7 Forecasts:

4.7.1 Total Population[18]

By 2021 the region's population is projected to increase by 86,000 people (or 38%). Most of the region's population increase is forecast to be in the western Bay of Plenty (see Table 14).

Table 14: Projected Resident Population for the Local Authorities of the Bay of Plenty (1996 base)

Local Authority	Year Ended 30 June					
	1996	2001	2006	2011	2016	2021
Kawerau	8,100	7,400	7,100	6,700	6,200	5,800
Opotiki	9,600	10,100	10,500	10,800	11,200	11,600
Rotorua (part in BOP)	62,600	63,700	65,600	66,900	68,100	69,200
Tauranga	79,200	93,400	104,300	114,900	125,500	136,500
Western Bay of Plenty	35,700	40,600	45,300	49,800	54,300	58,800
Whakatane	33,900	33,600	33,900	33,800	33,600	33,200
Bay of Plenty	229,100	248,800	266,700	282,900	298,900	315,100

(Source: Statistics New Zealand)

If the projections for the western Bay of Plenty sub-region are correct, an additional 80,400 people will need to be accommodated by 2021.

Table 14 shows that by 2021, Rotorua is forecast to have a 10% increase in population (about 6,600), Opotiki a 21% increase (2,000 people) and Kawerau a 28% decrease (2,300 people).

[18] Western Bay of Plenty sub-region figures not updated for the work of Smart Growth.

4.7.2 Total Households[18]

Statistics New Zealand is projecting that by 2021 the number of households in the region could rise by 38,000, with over half of those in Tauranga and over three-quarters in the western Bay of Plenty area (see Table 15).

Table 15: Projected Households for the Local Authorities of the Bay of Plenty

	1996 Occupied Dwellings (Census)	2001 Occupied Dwellings (Projected)	2006 Occupied Dwellings (Projected)	2011 Occupied Dwellings (Projected)	2016 Occupied Dwellings (Projected)	2021 Occupied Dwellings (Projected)	Change in Occupied Dwellings 1996 - 2021
Kawerau	2,500	2,400	2,400	2,300	2,200	2,100	-400
Opotiki	3,100	3,300	3,600	3,900	4,200	4,500	1,400
Rotorua	21,900	23,100	24,200	25,300	26,400	27,400	5,500
Tauranga	29,400	34,500	38,300	42,100	46,100	50,100	20,700
Western BoP	12,400	14,600	16,400	18,300	20,000	21,700	9,300
Whakatane	11,000	11,500	11,900	12,300	12,600	12,900	1,900
Bay of Plenty	80,300	89,400	96,800	104,200	111,500	118,700	38,400

(Source: Statistics New Zealand)

"Converting this growth into a demand for land and … assuming a predominance of suburban houses with limited intensification and 12 households per hectare … an additional"[19] 2,500 hectares of land may be required for housing in the western Bay of Plenty. This does not include additional land that will be required for uses such as roading, business, industry and recreation.

An area of 2,500 hectares is about the size of Matua, Bellevue, Otumoetai, Waikareao Estuary, Central Tauranga, Brookfield, Judea, Belvedere, Te Reti, and Tauranga South, combined.

Rotorua may require an additional 460 hectares of land for housing, Whakatane an additional 160 hectares and Opotiki 120 hectares.

4.7.3 Age Distribution[18]

The period to 2021 will see a slight increase in the region's child population (8%), an increase in the region's adult population by one-third (35%) and a doubling in the region's elderly population (116% - see Table 20).

[19] Environment B·O·P, Tauranga District Council, Western Bay of Plenty District Council, 2001, Joint Sub-regional Growth Management Study Inception Report, pages 5 and 6.

Table 16: Projected Population in 2021 by Age Group

Local Authority	0-14 yrs		Change	
	1996	2021	Number	%
Kawerau	2,571	1,670	(901)	-35.0%
Opotiki	2,796	2,575	(221)	-7.9%
Rotorua (whole district)	17,127	14,048	(3,079)	-18.0%
Tauranga	16,692	25,935	9,243	55.4%
Western Bay of Plenty	8,484	10,996	2,512	29.6%
Whakatane	9,228	6,408	(2,820)	-30.6%
Bay of Plenty	56,898	61,631	4,733	8.3%

Local Authority	15-64 yrs		Change	
	1996	2021	Number	%
Kawerau	4,767	3,335	(1,432)	-30.0%
Opotiki	5,556	6,972	1,416	25.5%
Rotorua (whole district)	41,028	43,665	2,637	6.4%
Tauranga	47,673	81,491	33,818	70.9%
Western Bay of Plenty	21,822	34,574	12,752	58.4%
Whakatane	20,472	20,252	(220)	-1.1%
Bay of Plenty	141,318	190,289	48,971	34.7%

Local Authority	65+ yrs		Change	
	1996	2021	Number	%
Kawerau	480	795	315	65.5%
Opotiki	1,023	2,053	1,030	100.7%
Rotorua (whole district)	6,357	11,487	5,130	80.7%
Tauranga	13,401	29,211	15,810	118.0%
Western Bay of Plenty	4,671	13,230	8,559	183.2%
Whakatane	3,432	6,540	3,108	90.6%
Bay of Plenty	29,364	63,316	33,952	115.6%

(Source: Statistics New Zealand)

At a local level, Table 20 shows that by 2021 it is projected Kawerau will have experienced the greatest percentage decrease and Rotorua the greatest decrease in the number of children. Conversely, Tauranga will experience both the greatest percentage increase and the greatest increase in the number of children.

The trend for children is also similar for adults. Kawerau will experience both the greatest percentage decrease and the greatest decrease in the number of adults. Tauranga will experience both the greatest percentage increase and the greatest increase in the number of adults.

The number of elderly people in the Western Bay of Plenty District is projected by Statistics New Zealand to almost treble by 2021. In each of the Opotiki and Tauranga Districts, the number of elderly will double (and almost double in the case of Whakatane). In terms of actual numbers, Tauranga will experience the greatest increase in the number of elderly.

4.7.4 Car Availability/Ownership

It is projected that the Western Bay of Plenty District will show the greatest percentage growth in the number of households without a car, followed by Tauranga (Table 17). In terms of numbers, highest growth in households without a car will take place in Tauranga.

Table 17: Change in Number of Households without a Car

	Households with no car			
	2001	2006	2021	% Growth 1996 - 2021
Kawerau	300	311	272	-9.3%
Opotiki	426	487	609	42.9%
Rotorua	2,154	2,342	2,652	23.1%
Tauranga	2,751	3,018	3,948	43.5%
Western Bay of Plenty	708	838	1,109	56.6%
Whakatane	1,212	1,273	1,380	13.9%
BOP Region	7,551	8,270	9,970	32.0%

(Based on 2001 Census statistics from Statistics New Zealand)

Similarly, it is also projected that the highest growth in the number of motor vehicles (excluding trucks) will also take place in Tauranga (Table 18).

Table 18: Number of Motor Vehicles by Local Authority

		Buses	Cars	Mopeds	Motorcycles	Rental cars	Taxis	Total	% Change (2001 - 2021)
Kawerau	2001	24	3,349	47	131	1	3	3,555	-12.5%
	2021	19	2,930	41	115	3	3	3,111	
Opotiki	2001	34	4,321	14	117	1	1	4,488	36.2%
	2021	39	5,892	19	160	3	1	6,114	
Rotorua	2001	294	36,494	172	1,004	63	101	38,128	18.7%
	2021	319	43,287	204	1,191	164	110	45,275	
Tauranga	2001	274	64,445	528	2,225	125	123	67,720	45.4%
	2021	400	93,585	767	3,231	325	180	98,489	
Western BoP	2001	66	17,011	83	527	17	12	17,716	48.7%
	2021	96	25,283	123	783	44	18	26,347	
Whakatane	2001	161	17,136	137	606	176	20	18,236	13.5%
	2021	159	19,222	154	680	458	20	20,692	
BOP Region	2001	853	142,756	981	4,610	383	260	149,843	33.2%
	2021	1,032	190,201	1,308	6,159	583	331	199,614	

(Based on 2001 data from the Transport Registry Centre, LTSA)

4.7.5 Disability

It can be expected that the projected population increases to 2021 will also be reflected in an increase in the number of people with disabilities. It is projected that by 2021 there will be an additional 19,900 people (a 56% increase) with disabilities in the region (see Table 23).

Table 19: Projected Population Indicating a Disability in 2021

Local Authority	No. 0 - 14 yrs with a Disability		Difference
	1996	2021	No.
Kawerau	189	123	(66)
Opotiki	183	169	(14)
Rotorua (whole district)	1,128	925	(203)
Tauranga	1,068	1,659	591
Western Bay of Plenty	465	603	138
Whakatane	597	415	(182)
Bay of Plenty	3,630	3,893	263

Local Authority	No. 15 - 64 yrs with a Disability		Difference
	1996	2021	No.
Kawerau	651	455	(196)
Opotiki	930	1,167	237
Rotorua (whole district)	5,844	6,220	376
Tauranga	7,215	12,333	5,118
Western Bay of Plenty	3,381	5,357	1,976
Whakatane	3,012	2,980	(32)
Bay of Plenty	21,033	28,512	7,479

Local Authority	No. 65+ yrs with a Disability		Difference
	1996	2021	No.
Kawerau	153	253	100
Opotiki	387	777	390
Rotorua (whole district)	2,325	4,201	1,876
Tauranga	4,758	10,371	5,613
Western Bay of Plenty	1,650	4,673	3,023
Whakatane	1,230	2,344	1,114
Bay of Plenty	10,503	22,620	12,117

Local Authority	Total No. People with a Disability		Difference
	1996	2021	No.
Kawerau	993	832	(161)
Opotiki	1,500	2,112	612
Rotorua (whole district)	9,297	11,346	2,049
Tauranga	13,041	24,364	11,323
Western Bay of Plenty	5,496	10,633	5,137
Whakatane	4,839	5,738	899
Bay of Plenty	35,166	55,025	19,859

(Source: Statistics New Zealand)

As can be seen from Table 23, the largest increase in the disabled population will take place in the elderly population. It is projected that the number of disabled elderly will more than double by 2021 and they will comprise more than 40% of the region's total population with a disability (compared to 20% of the population as a whole).

In the Western Bay of Plenty District the number of disabled elderly is projected to almost treble (an increase of 183%). Tauranga District is close behind with a doubling of its disabled elderly population (an increase of 118%).

Overall, by 2021 it is projected that the greatest number of disabled people will reside in Tauranga.

Chapter 5: Urban Growth and Transport

The previous section suggests that by 2021 the region's population will have increased by 86,000 people and the number of households by 38,000. To accommodate this growth will require about additional 2,500 hectares of land in the western Bay of Plenty, 460 hectares of land in Rotorua, 160 hectares of land in Whakatane and 120 hectares of land in Opotiki solely for housing (i.e. it does not include additional land for roading, business, industry and recreation).

The affected territorial authorities plan to deal with this urban growth in the following ways.

5.1 Eastern Bay of Plenty

5.1.1 Opotiki District

The Strategic Plan for Opotiki recognises that its population will increase through to 2004 and that new dwellings will be needed to accommodate that growth. It believes many of these people will live in the Opotiki township and mainly along the coast and the Woodlands area.

In the view of the District Council, projected growth to 2004 does not present any great challenges for its infrastructure.

5.1.2 Whakatane District

The Whakatane District Council recognised in its Strategic Plan that there will be an increase in the number of dwellings in its district by 2011 (a 10% increase between 2001 and 2011), although the rate of growth will not be spread evenly throughout its district. Whakatane township and Ohope are likely to experience a higher rate of growth than other parts of the district.

The Plan signals that the lead time required to provide residential subdivisions and the supply of land for residential activities in Ohope are constraints and the latter, will affect land term development. For Whakatane township, it notes that there is an adequate supply of residential sections available to meet current demands and infill development will allow further residential development in the central area. Areas for future residential expansion are seen as an issue.

It therefore seems likely that urban growth in the Whakatane district through to 2011, will not present any great challenges for its infrastructure.

5.2 Rotorua

The Strategic Plan for Rotorua recognises that population change through to 2011 will probably be modest. This means "development choices in favour of infill, higher density, or development of vacant residentially zoned land can be met without major difficulties for infrastructure or network services".

"Within this general pattern however, population growth anomalies are occurring in the District in particular areas".

"The population growth in Hamurana and Kaharoa as a specific area has had impacts on roading with increased traffic flows into Ngongotaha and Fairy Springs. As a result Council is now planning improvements to the arterial roads in that area.

In terms of *timing of projects identified in the Strategic Plan, the main differences relating to population growth are considered to be when, rather than whether particular projects should proceed".* [20]

As can be seen, Rotorua is planning for modest population growth through to 2011 and has determined that such growth can be met without major difficulties for infrastructure or network services.

5.3 Western Bay of Plenty

5.3.1 Western Bay of Plenty District

The Western Bay of Plenty District's *"growth strategy provides for complementary growth and development between Tauranga District and the Western Bay of Plenty District. It comprises six parts ... being:*

- Residential Growth Centres to accommodate most additional population growth and provide for a range or urban living opportunities (at Waihi Beach, Katikati, Omokoroa and Te Puke).
- Employment Growth Centres to provide for employment opportunities of local and regional significance (at Te Puke North, Rangiuru, Parton Road and Katikati).
- Supporting strategies to maintain the viability and attractiveness of our town's commercial centres and smaller settlements.
- Rural development opportunities that protect the productive land resource while also allowing for rural lifestyles.
- Cost of the development to be met by the developer and not subsidised by the community."[21]

[20] Rotorua District Council, 2000, Strategic Plan for Rotorua's Future 2000 - 2010, Rotorua, pages 12 –14, 25 - 26.
[21] Western Bay of Plenty District Council, 1998, A Strategic Plan for the Western Bay of Plenty District 1998 - 2020, Tauranga, pages 31 –35.

5.3.2 Tauranga District

The Strategic Plan for Tauranga (Vision 2020), contains the following statements:

"To achieve *sustainable urban development in the Tauranga region the following general guidelines have been adopted by both the Western Bay of Plenty and Tauranga District Councils: ...*

2. Creation of a Pleasant Urban Environment and Efficient Urban Form

- Urban land use patterns should aim to provide opportunities to reduce car dependence.
- Accommodating future household demand should:
  - avoid extensive, low-density sprawl.
  - enable greater provision for local services in and near residential areas.
  - intensify household densities and housing types along selected main transport corridors and around business centres.
  - promote consolidation of existing urban centres and smaller rural settlements.
  - avoid excessive rural-residential lifestyle subdivision opportunities.
  - increase suburban employment opportunities in or near residential areas.
- Urban centres and smaller rural settlements should maintain a local identity.
- Maintain and enhance resident accessibility to public open spaces and facilities to offset the loss of private space as housing densities increase.
- Urban development needs to recognise the environmental effects of increasing noise and ensure:
  - traffic noise screening along main transportation corridors where they adjoin urban areas.
  - non-residential activities mitigate their noise effects.
  - local traffic-calming measures are designed and constructed in intensive residential streets.
- Any development needs to be of a scale to ensure efficient support for any necessary facilities, whether they be infrastructural or social, recreation or other services.
- The development itself, or the provision of services, must be economically sustainable, i.e. affordable for both the public and private sectors. The full costs of development should be met by that development."[22]

[22] Tauranga District Council, 1997, Part A of Vision 2020, Your Vision – Your Future, Draft Tauranga District Strategic Plan, Tauranga, pages 51 –52.

Tauranga's Strategic Plan identifies Mount Maunganui, Bellevue, Otumoetai, central Tauranga, Judea, Brookfield, Tauranga South, Greerton, Parkvale and Gate Pa as areas suitable for intensified residential development and Papamoa as suitable for new residential development.

It identifies new employment nodes at Bethlehem Centre, Parton Road and Papamoa East.

5.3.3 Smart Growth

Environment B·O·P, Tauranga District Council and the Western Bay of Plenty District Council have combined resources to develop an agreed growth management strategy for sustainable development of the Western Bay of Plenty/Tauranga sub-region, over the next 20 years and generally for the next 50 years.

The Western Bay of Plenty/Tauranga growth management strategy (called Smart Growth) will include:

- a detailed plan of the quantity, location and timing of land required for urban development to 2020;
- plans for the provision of transportation services; and
- identification of mechanisms for implementation, including funding other statutory and non-statutory methods.

The scope of the project includes:

- understanding and integrating the different growth management strategies of Tauranga and the Western Bay of Plenty District Councils;
- developing, costing and evaluating options which show the quantity, timing and location of land and supporting infrastructure required for urban development;
- recognising the potential of implementation tools such as the Regional Land Transport Strategy.

It is quite possible therefore, that the direction for growth set down in the current Strategic Plans for the western Bay of Plenty, may be different to the direction for growth that comes out of Smart Growth and therefore the Regional Land Transport Strategy will need to be revisited.

Chapter 6: Key Factors Affecting Urban Transport Systems[23]

There are some key transport and land use policy matters that affect transport use in cities. If cities want to reduce car dependence, they need to focus on the following:

- Increasing urban density (the number of people in an urban area) results in lower car use and increased use of alternative forms of transport such as public transport, cycling and walking; increasing urban density in residential and commercial areas designed to maximize access by public passenger and non-motorised transport (such as nodes and along transport corridors) will support more viable transport alternatives.

  A recent literature review sponsored by the American Federal Transit Administration[24] about urban sprawl and its effects supports this. It has found that there is general agreement in the literature that sprawl generates more total miles of vehicle travel than more compact forms of development.

- Increasing the number of jobs and people in nodes and transport corridors will be made possible by providing better public passenger transport services, which will result in higher public passenger transport use, as well as an increase in the number of walking and cycling trips and generally a decrease in the length of a car trip.

- The total size of an urban area is directly related to the level of car use and the associated amount of transport energy used; developing or maintaining an urban growth management boundary (i.e. a boundary for an urban area outside of which no urban growth will occur) results in reduced travel per person, transport energy use and transport emissions.

  Again the assertion above is supported by 'The Costs of Sprawl – Revisited'. The literature review has found that there is general agreement that a greater share of trips are made by cars and a lesser share by public transport, walking and cycling in sprawled developments compared to more compact developments.

[23] Unless otherwise referenced, the majority of the information in this section has been sourced from Bachels, M, Newman, P, and Kenworthy, J, 1999, Indicators of Urban Transport Efficiency in New Zealand's Main Cities, An International City Comparison of Transport, Land User and Economic Indicators, Murdoch University).

[24] Transportation Research Board, 1998, The Costs of Sprawl – Revisited, Report 39, National Research Council, Washington.

- The speed of transport partly determines how attractive it is; improving the speed of public passenger transport to be competitive with the car is important.

  There is general agreement in the literature that public transport is less cost-efficient and effective in sprawled urban areas and some agreement that it is sprawl that reduces that efficiency and effectiveness.

  Similarly, there is some agreement in the literature that cars are the most efficient mode of transportation in sprawl and general agreement that it is sprawl that makes them so.

- Transport infrastructure investment directly relates to transport use. Building more roads results in greater car use; conversely, providing more public passenger transport services results in greater public transport use.

- Increasing density, decreasing urban growth in the urban area, improving alternative transport – all are measures that directly relate to reducing transport energy use and reducing both local and global emissions.

- The proportion of a city's wealth spent on operating its transport system increases with increases in the provision of roads and use of cars, or conversely decreases when public transport plays a larger role. Cities with high car dependence spend a greater share of their city's wealth on transport than cities with excellent public transport systems.

  The literature also notes that there is some agreement that travel in sprawl development generates higher social costs than in more compact development.

By themselves, none of the factors above will reduce dependence on the car or the environmental effects of excessive car use. In general, three approaches need to be considered for reducing car dependence:

- strategies for integrated transport and land use;
- strategies for improving alternatives; and
- strategies for reducing travel demand.

6.1 Strategies for Integrated Transport and Land Use

Transport and land use policies are integrated. Changes in land use policies affect transport choices and changes in transport policies affect land use.

A reduction in car dependence requires the combination of transport and land use policies that will:

- reduce the length of car trips; and
- make possible more viable alternatives to the car such as public passenger transport, cycling and walking.

To achieve this requires policies that provide for an urban form of nodal sub-centres along well-defined corridors.

6.1.1 Nodes and Corridors

If a city's daily activities are brought closer together, into a series of nodes along defined corridors of activities (i.e. like "beads on a necklace"), then there will be less travel in general as well as greater use of alternative forms of transport.

To achieve an integrated transport and land use approach, cities need to:

- increase density at nodes and along corridors associated with an improved public passenger transport (rail) network;
- increase density in existing urban areas in a way that maintains many of the qualities of the urban area (the effects of poor intensification will receive significant backlash from existing residents);
- mix commercial and residential developments to make possible the local linking of activities to reduce trip distances and better support public passenger transport;
- adopt a growth management strategy that limits or slows the absolute spread of the total urban area to achieve less car travel, lower transport fuel use and less care dependence; and
- adopt a growth management strategy that supports the nodes and corridor approach to discourage or limit urban sprawl which itself is not easily supported by public passenger transport.

6.2 Strategies for Improving Public Transport, Cycling and Walking

The development of urban transport strategies that supports alternatives should be considered a critical second step in reducing car dependence.

6.2.1 Public Transport Strategies

Integrated transport and land use requires excellent public passenger transport services. Public passenger transport services need to become part of, not apart from, all transport and land use development plans – developments should be designed to support excellent public transport access, ease of use and recognition.

Improvements to public transport should be pursued including:

- Service provision (and image) of public transport – increasing frequency and coverage results in increased use. Upgrading the service will also improve the image of public transport.
- Improving the speed of public transport to make it more competitive with car travel is critical (e.g. fast efficient express bus services and improved ticketing systems for fast efficient passenger loading).
- Electric rail systems should be evaluated.

6.2.2 Cycling and Walking Strategies

Improving the access and safety for cyclists and pedestrians can contribute to reducing car trips, especially for short trips.

Efforts should be made to find out what design elements and infrastructure best meet cyclist and pedestrian needs (e.g. areas with continuous footpaths and short blocks are better than areas with long blocks and discontinuous footpaths).

6.3 Strategies for Reducing Travel Demand[25]

A number of transport planning policies can also reduce the demand for travel. The aim of travel (or transportation) demand management (TDM) is to get the best use of existing transport resources at least cost (that is to increase the efficiency of the transportation system). TDM also has other benefits of reducing congestion and air pollution at peak times.

Specific TDM strategies, divided into major categories according to how they impact travel are:

6.3.1 Improved Transport Options

Alternative Work Schedules	Flexitime, Compressed Work Week (CWW), and staggered shifts used to reduce peak-period vehicle traffic.
Bicycle Improvements	Ways to improve bicycle transportation.
Bike/Transit Integration	Ways to integrate bicycle and public transit to improve mobility.
Car sharing	Vehicle rental services intended to substitute for private vehicle ownership.
Flexitime	Allowing employees flexibility in their daily work schedules to avoid peak-period traffic.
Guaranteed Ride Home	Programs that provide an occasional subsidized ride home to commuters who use alternative modes.
Individual Actions for Efficient Transport	Actions that individuals can take to travel more efficiently and support TDM in their community.
Non-motorized Planning	Planning for walking, cycling, and small-wheeled transport.
Park & Ride	Programs to provide convenient parking at transit and rideshare stations.
Pedestrian Improvements	Ways to improve walking conditions.
Ridesharing	Ways to support and encourage carpooling and vanpooling.
Shuttle Services	Shuttle buses, jitneys and free transit zones.
Small Wheeled Transport	Accommodating roller skates, push scooters, handcarts and utility wagons for transportation.
Taxi Service Improvements	Ways to improve taxi services.

[25] The majority of the information on TDM has been sourced from the Online TDM Encyclopaedia (http://www.vtpi.org/tdm/). Being an overseas source, some of the initiatives included in the paper may not be relevant to New Zealand.

Telework (Telecommuting, Distance-Learning, Tele-shopping, etc.)	Ways to encourage use of telecommunications as a substitute for physical travel.
Traffic Calming	Roadway design features that reduce vehicle traffic speeds and volumes.
Transit Improvements	Ways to improve and promote public transit.
Universal Design (Barrier Free Transport Planning)	Designing transportation systems to accommodate people with disabilities and other special needs.

6.3.2 Incentives to Use Alternative Modes and Reduce Driving

Bicycle and Pedestrian Encouragement	Programs and activities that encourage walking and cycling.
Commuter Financial Incentives	Parking cash out, travel allowance, transit and rideshare benefits.
Congestion Pricing	Road pricing used to reduce peak-period vehicle trips.
Distance-Based Pricing	Charging insurance, road use fees, emission charges and taxes based on a vehicle's mileage.
Fuel Tax Increases	Increasing fuel taxes to fund roads, encourage energy conservation, and reduce travel demand.
HOV (High Occupant Vehicle) Priority	Strategies that give transit and rideshare vehicles priority over other traffic.
Parking Pricing	Charging motorists directly for parking.
Road Pricing	Congestion pricing, value pricing, road tolls and HOT lanes
Street Reclaiming	Encouraging community interaction on neighbourhood streets.
Vehicle Use Restrictions	Regulatory strategies to limit automobile travel at a particular time and place.

6.3.3 Parking and Land Use Management

Bicycle Parking	Selection and location of bicycle racks, bicycle lockers and changing facilities.
Car-Free Districts and Pedestrianised Streets	Designing special areas and times for minimal automobile use.
Clustered Land Use	Locating common destinations close together.
Location Efficient Development	Development that maximizes multi-modal accessibility.
New Urbanism	Accessible, liveable community design.
Parking Management	Strategies for more efficient use of parking.
Parking Solutions	A comprehensive menu of solutions to parking problems.
Parking Policy Evaluation	Factors to consider when evaluating parking policies.
Shared Parking	Sharing parking facilities among multiple users.
Smart Growth	Land use practices to create more resource efficient and liveable communities
Smart Growth Planning and Policy Reforms	Planning, regulatory and fiscal reforms that encourage Smart Growth.

Transit Oriented Development (TOD)	Multi-modal and liveable communities based around transit stations.

6.3.4 Policy and Institutional Reforms

Car-Free Planning	Reduced driving at particular times and places.
Comprehensive Market Reforms	Policy changes that result in more efficient and fair transportation pricing.
Institutional Reforms	Creating organizations that support efficient transport.
Least Cost Planning	Creating an unbiased framework for transport planning.
Regulatory Reform	Policy changes to encourage competition, innovation, diversity and efficiency in transport services.

6.3.5 TDM Programs and Program Support

Access Management	Coordination between roadway design and land use.
Campus Transportation Management	Transportation management at colleges, universities and other large facilities.
Commute Trip Reduction	Programs that encourage more efficient commuting.
Freight Transportation Management	Methods of increasing the efficiency of freight and commercial transport.
School Trip Management	Programs that encourage parents, students and staff to use alternative modes for travel to and from schools.
Special Event Management	Transportation management for major events, construction projects and emergencies.
Tourist Transport Management	Transportation management for tourist and leisure travel.
Transportation Management Associations (TMA)	Private, non-profit, member-controlled organizations that provide transportation services in a particular area.

Some TDM strategies manage, accommodate or encourage travel demand. For example, street channelisation, signalisation and removal of street parking are all aimed at accommodating traffic rather than reducing volumes. Similarly, vanpools, rideshare (carpools), passenger transport and cycling encouragements are all aimed at encouraging demand for these modes of travel.

Other strategies reduce travel demand especially solo driving (for example, increased parking prices for long term parkers). The primary focus of these strategies is to discourage solo driving rather than managing how they travel, or encouraging them to use other modes.

In between are strategies that combine the two approaches (for example flexible work hours manages travel demand peaks, but may reduce solo driving to the extent that it encourages more use of passenger transport).

6.4 The National Energy Efficiency and Conservation Strategy

New Zealand has now produced its first National Energy Efficiency and Conservation Strategy (NEECS). The purpose of the NEECS is to promote energy efficiency, energy conservation and renewable energy.

Although there is no requirement in the Land Transport Act for the RLTS to be consistent with the NEECS, the NEECS is a statement of central government policy and it therefore is sensible for the RLTS to have some regard to provisions it contains.

The NEECS contains an overall direction and goals and five action plans have been prepared to outline how those goals will be met. Two of the action plans are relevant to the preceding discussion on integrated transport and land use and reducing travel demand. They are:

6.4.1 Central and Local Government Programme

The Central and Local Government Programme contains the following two objectives relating to sustainable urban form:

- "Investigate the role of settlement form (including design) in achieving intended sustainability outcomes.
- Promote the consideration of settlement form for the sustainable development of existing and new communities."

6.4.2 Transport Programme

The Transport Programme contains the following key facts:

- "Domestic transport accounts for 42 percent of consumer energy use.
- From 1990-99 transport energy use grew at an average of 3.5 percent p.a. (highest of any sector).
- Transport energy use produces 45 percent of New Zealand's energy CO_2 emissions.
- 90 percent of transport energy use is used in land transport vehicles.
- New Zealanders have the second highest car ownership rate in the world."

It contains the following objectives:

- "Reduce the need to travel by individuals, business and government.
- Improve the effectiveness of funding for alternatives to roading.
- Energy savings can be achieved if people and businesses choose less energy intensive transport.

- Improve management of traffic flows and improve roading characteristics, e.g. reducing road rolling resistance, grades and alignment.

- Reduce open road speeds to conserve energy."

Chapter 7: Growth in the Western Bay of Plenty Sub-region[26]

7.1 Population, the Port and the Cost of Roading

As indicated in the section of the report on population, the western Bay of Plenty sub-region has experienced extremely high population growth for the past 10 to 15 years. Over the same period the Port of Tauranga has also undergone significant growth (also see the section in the report on the Port).

These two factors are having a significant impact on all of the infrastructural requirements provided by the Tauranga and Western Bay of Plenty District Councils. In particular the roading network has become the most congested of any provincial city in New Zealand and it is considered that it is rapidly becoming an impediment to the industrial/commercial growth of the sub-region.

"Due to the region's topography, the roading networks are extremely difficult to achieve in a" simple and "rational manner. The topography involves a series of peninsulas and harbour estuaries that results in long feeder roads with limited cross connections between the peninsulas.

The cost of providing roading infrastructure within the western Bay of Plenty sub-region is also very high. Within the peninsulas soil conditions tend to comprise very weak ashes which are extremely sensitive to moisture. Flatter areas between these peninsulas often comprise very deep layers of swampy sediments, which are also very difficult and expensive for road construction. In addition to these geotechnical difficulties land costs, particularly on the peninsulas, are extremely high in comparison with other New Zealand provincial cities."

It is for these reasons that the sub-region has had great difficulty in attracting central government funding to build new roads based on benefit-cost criteria within the timeframes that the infrastructure is required.

[26] Unless otherwise stated, all quotes in this section are from: Hannah, J, 2002, Bay of Plenty Regional Council Land Transport Strategy Tauranga Subregional Strategy (draft), unpublished.

7.2 Traffic Volumes

"As noted above, there have been significant increases in both industrial and residential developments in and around the sub-region, and many of the major arterial routes have recorded annual increases in traffic volumes between 4% and 6%."

Table 20: Western Bay of Plenty Sub-region Traffic Counts

Site Description	1997	1998		1999		2000		2001		Avg
	Volume	Volume	% Increase	Volume	% Increase	Volume	% Increase	Volume	% Increase	Traffic Increase
SH 2: Te Maunga/Domain (00200168: Nth of Kairua Rd)	13,743	14,586	6%	15,290	5%	16500	7%	16,754	2%	4%
SH 29: Hewlwtts Rd (02900001: 370m past Maru St)	18,905	19,343	2%	19,452	1%	-	-	23,963	-	4%
SH 2/29: Maungatapu (00200160: 205m before Maungatapu	15,538	16,619	7%	18,248	9%	20600	11%	21,244	3%	5%
SH 2: Bethlehem (00200148: 885m West of Bethlehem Rd)	15,662	16,700	6%	17,290	3%	-	-	17,834	-	2%
SH 29: Tauriko (02900020: East of Cambridge Rd)	10,252	11,633	12%	12,371	6%	-	-	13,267	-	5%

Source: Beca Carter Hollings & Ferner Ltd

It should be noted that the gaps in the Table above are because the traffic counts either did not happen in that year, or there were questions about the accuracy of the counts. The Table also does not include any traffic counts taken since the removal of the tolls on the Harbour Bridge.

7.3 'Access'

"In 1997, three road controlling authorities (Transit NZ, Tauranga District Council and Western Bay of Plenty District Council) entered into a Heads of Agreement to work together for the development of a strategic roading network within the Tauranga/Western Bay of Plenty Districts. Part of this agreement involved the adoption of a strategic roading network for the sub-region.

*This partnership has subsequently been branded **'access'**, and whilst **'access'** has no legal entity, through its part-time Co-ordinator, it is able to provide a unified and co-ordinated "front" to the development of the network.*

This partnership has now been ... co-operating on the integration and development of major capital projects for the strategic network", in excess of five years.

Prior to the formation of the 'access' there was little or no co-ordination between Transit NZ and the Tauranga and Western Bay of Plenty District Councils. This uncoordinated approach resulted in projects being constructed by individual authorities without there being the necessary and appropriate improvements to the adjacent roading infrastructure managed by one of the other road controlling authorities. This approach resulted in relatively low benefits to road users and in turn impacted upon the congestion on other sections of the roading network."

7.4 The Strategic Roading Network

7.4.1 Objective

The objective "*was to provide a roading network that enables the efficient movement of inter-regional and sub-*regional *traffic and allows local collector and some arterial roads to be safe and convenient for use by residents for local trips."*

7.4.2 Strategy

The strategic roading network has been developed based on the following criteria:

- efficient and least restrictive access to the Port of Tauranga;
- separation, as far as practicable, of local traffic, especially in residential areas, from industrial and commercial traffic;
- most convenient and safe route for through traffic having regard to social and environmental factors;
- 'corridor' approach to transportation where various modes could be accommodated;
- routes that meet long-term needs;
- grade separation of strategic roads from local roads over time;
- development of some 'limited access roads' for strategic purposes.

7.5 The Network

"The strategic *roading network which was agreed upon by the 'access' partnership in 1997 involves a major ring road around the central Tauranga residential peninsula, with connections on to that ring road from SH2 from the northwest, SH2 to the southeast, SH29 to the southwest, and Pyes Pa to the south"* (see Figure 9).

"The following is a detailed description of the elements of this strategic roading network."

7.5.1 The Ring Road

"The southern portion of this ring road commences at the junction of Route K on SH29 near Tauriko, and proceeds via SH29 to the junction of SH2 at Maungatapu; then the combined SH2 and SH29 continues through Maungatapu to the junction at Te Maunga. The ring road then continues on SH29 on Maunganui Road and Hewletts Road to Totara Street and the entrance to the Mt Maunganui portion of the Port of Tauranga. The ring road then proceeds across the Tauranga Harbour Bridge via Marsh Street to Takitimu Drive (previously Waikareao Expressway) and then to the connection with Route J.

The Tauranga District Council is currently constructing Route K and when finished it will complete the ring road by forming a link between SH29 and Route J, which is a recently completed Transit NZ state highway project".

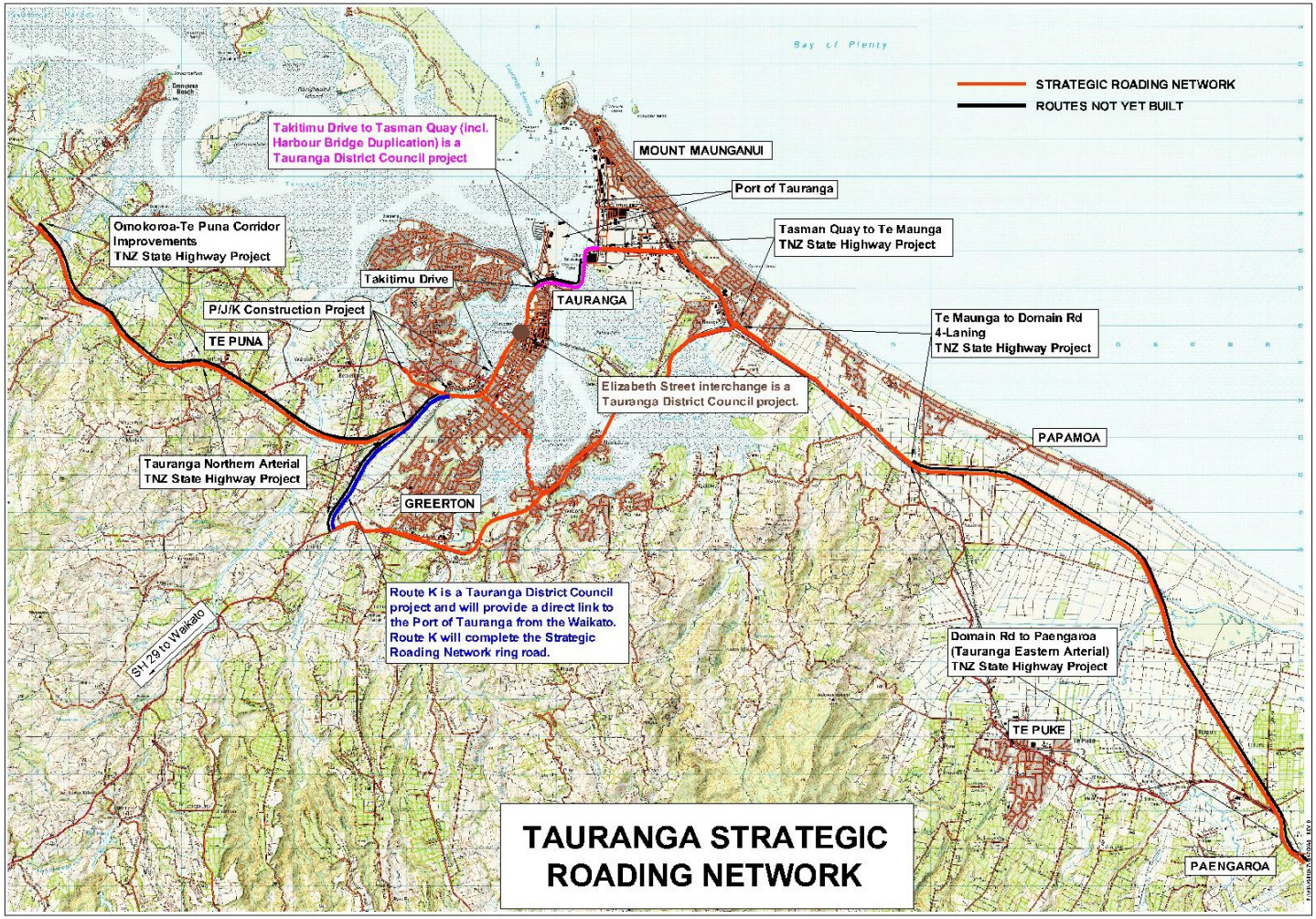
7.5.2 The Connections to the Strategic Network

"SH2 to the northwest is a major connection to the strategic roading network. Transit NZ has designations in place for, or is seeking designations for, significant improvements to this road corridor. These improvements include the Tauranga Northern Arterial and corridor improvements to the existing highway between Omokoroa and Te Puna.

SH29 to the southwest provides the link from the strategic roading network ring road to the Waikato and services a significant amount of transport carting export freight to the Port of Tauranga. No major improvements to this corridor are anticipated within the next 10 years, except for a possible bypass of Tauriko.

To the southeast *Transit NZ has designated SH2 to be upgraded to a four-lane facility between Te Maunga and Domain Road and Transit is currently seeking designation for a 17 km bypass of Te Puke via the Tauranga Eastern Arterial.*

Western Bay of Plenty District Council are continuing with the seal extension of Pyes Pa Road to improve the connection to the south from the strategic roading network ring road to Rotorua. Western Bay of Plenty District Council propose to have this seal extension completed and thus provide a complete sealed road via this alternative route to Rotorua by 2004. The Council is also seeking its designation as a state highway."



(Source: Beca Carter Hollings & Ferner Ltd)

Figure 9: Tauranga Strategic Roading Network

7.6 Implementation Strategy

"The strategic roading partnership 'access' has recently adopted the attached priority list for the construction of the various projects."

The following "*priority list sets out the major projects within the 'Western Bay' sub region. The table identifies the project benefits in accordance with the February 2002 government announcements. The 'Alternative Funding' column identifies projects that have the potential to be Public Private partnership (PPP) funded with tolls. It is important to note that this possible funding source required both new legislation and an analysis at the projects before proceeding with a PPP project delivery method."*

Table 21: Western Bay of Plenty Sub-region Priorities

Priority	***Project***	***Preliminary Capital Cost $M***	***Project Benefits***			***Alternative Funding***
			Congestion	***Safety***	***Level of Service***	
1.	Hewletts Rd/Maunganui Rd Intersection	30	✓✓		✓✓✓	No
2.	Takitimu Drive to Tasman Quay	110	✓✓✓		✓✓✓	Possible ($110M)
3.	Te Maunga to Mangatapu Median Barrier	3		✓✓✓		No
4.	Hairini to Maungatapu (incl Junction)	20	✓	✓	✓✓	No
5.	SH2 Domain Road Intersection	3	✓	✓✓✓	✓	No
6.	Omokoroa/Te Puna 4 Lane Sections	30		✓✓✓	✓	No
7.	Te Maunga/Domain Rd 4 Laning	17		✓	✓✓	No
8.	Katikati/Omokoroa 4 Laning Sections	22		✓✓✓	✓✓✓	No
9.	Tauranga Northern Arterial (part only)	50	✓	✓	✓✓	Possible ($50M)
10.	Hewletts Rd 4 Laning (Aerodrome Rd - Totara St), Maunganui/Girven and Te Maunga Intersections	15	✓	✓	✓✓	No
11.	Tauranga Eastern Arterial	100		✓✓	✓✓	Possible ($100M)
		$400M				**$260M**

Source: Beca Carter Hollings & Ferner Ltd

"Current preliminary estimated cost for completing all of the projects within the strategic roading network is in the vicinity of $500 million. Routes J and K are part of this total project, and the $91 million required for their funding has been secured by Transit NZ from Transfund for Route J, and by the Tauranga District Council for the construction of Route K by obtaining a specific act of Parliament to enable them to" implement a toll on the route.

"The partnership intends to pursue funding for the construction of the remaining $400 million worth of projects by one of two means:"

- The National Roads Fund.
- Public/Private Partnerships.

Greater detail about funding options is provided in the 'Funding' section of the report.

7.7 Implications of not Building the Strategic Roading Network

If the strategic roading network is not built then it is projected that by 2016 traffic volumes on SH 29 will increase to 55,000 to 60,000 vehicles per day. Access to the city from the east will require Turret/Fifteenth Avenue to be at least six lanes requiring significant purchase of developed residential land.[27]

[27] Source: Geoff Morgan, Transportation Development Engineer, Tauranga District Council, pers comms, 29 April 2002.

Chapter 8: Land Use

8.1 Agriculture

As at 30 June 1999 there were 4,020 farms in the Bay of Plenty covering an area of 312,000 hectares (2% of the total land used for agricultural production in New Zealand).[28]

The dominant form of livestock farming in the Bay of Plenty in 1999 was dairy cattle followed by beef cattle. Just over 25% of Bay of Plenty farms farmed dairy cattle and another 16% farmed beef cattle. Livestock numbers at the time were (see Table 22):

Table 22: Number of Livestock in the Bay of Plenty (1999)

	Bay of Plenty	% of NZ Total
Total Dairy Cattle	346,255	8.0%
Total Beef Cattle	119,084	2.6%
Total Sheep	496,237	1.1%
Total Deer	71,618	4.3%
Total Pigs	5,294	1.4%
Total Goats	14,148	7.6%
Total	1,052,636	1.9%

(Source: Statistics New Zealand, 'Agricultural Production Survey for the year ended 30 June 1999')

Of the 346,000 dairy cattle in the region at the time, half were in herds of 300 or more and the mean size of those herds was 510 (the highest mean size for herds over 300 of any region in New Zealand). These large herd sizes meant that 33% of the dairy farms in the Bay of Plenty farmed 50% of the dairy cattle.

"*The majority of the dairy industry in the Bay of Plenty is processed by Bay Milk Products, which is based in* Edgecumbe.

They have a fleet of 24 tanker trucks which annually cover 2.5 million kilometres and carry 600,000 tonnes *of milk. There is potential for considerable growth in the plant and the tanker fleet is likely to increase by a third and production by nearly a half."*

"There is concern *at the standard of road service and finish and Bay Milk Products believe this to be inferior to many roads in other areas".* It also has *"safety issues with access and crossings on state highways and the density of traffic in some areas."*[29]

[28] Source: Statistics New Zealand, 'Agricultural Production Survey for the year ended 30 June 1999'

[29] Tauranga District Council, September 1997, Tauranga Region: Transportation, Current Situation, Future Trends and Issues, Tauranga District Council, Tauranga, page 4-5.

8.2 Horticulture

As at 30 June 2000 there were 8,900 hectares of land planted in Kiwifruit in the Bay of Plenty and nearly 1,500 hectares planted in Avocados.[30] Of the of the total area planted in Kiwifruit and Avocados in New Zealand, over 70% and 55% respectively, were planted in the Bay of Plenty.

Between 1990 and 2000, the total area planted in Kiwifruit in New Zealand decreased by 30%. In the Bay of Plenty the figure was just under 15%. In 1990, more land was planted in Kiwifruit in New Zealand than any other single outdoor fruit. By 2000, Kiwifruit had dropped to third place behind apples and wine grapes.

"The horticultural *industry is centred around the Te Puke and Tauranga Harbour areas* (see Figure 10).

The Kiwifruit industry is the most significant with nearly 80% of the national crop moving through the Port of Tauranga. The industry returns over $200 million to the region and contributes around 18% of all agricultural and horticultural output."

The key transport *"issue for the industry is to maintain the integrity of the cool chain for the product.* Most *of the transport is done in taut liners and it becomes imperative that those vehicles do not suffer delays from cool store to ship's side. The concern of the industry is the increasing congestion occurring at key points, especially as the trucks get closer to the Port. There are significant movements from the Te Puke area and from Katikati and delays are occurring from both directions. The industry would therefore like to see much clearer access to the port area."*[31]

[30] Source: Statistics New Zealand, 'Agricultural Production Survey – Horticulture for the year ended 30 June 2000'

[31] Sourced from Tauranga District Council, September 1997, Tauranga Region: Transportation, Current Situation, Future Trends and Issues, section 4.3 Horticulture, page 4-6.

Figure 10: Bay of Plenty Region Agriculture and Forestry

8.3 Forestry

8.3.1 The Resource

Along with most of the Waikato region, the Bay of Plenty region forms part of the Central North Island Wood Supply Region[32, 33] (CNI). As at 1 April 2001, there were 577,000 hectares of planted exotic forest in the CNI which equated to about 148 million cubic metres of wood - just under 40% of the national total (see Table 23).

Table 23: Exotic Forest Area Planted and Standing Volume as at 1 April 2001

Wood Supply Region	Area (Ha)	Area (% of NZ Total)	Standing Volume (000 m3)	Standing Volume (% of NZ Total)
Northland	205,105	11.4%	56,784	14.9%
Auckland	54,940	3.1%	12,423	3.3%
Central North Island	577,385	32.1%	147,689	38.7%
East Coast	153,311	8.5%	26,757	7.0%
Hawkes Bay	123,367	6.9%	25,065	6.6%
Southern North Island	156,934	8.7%	28,706	7.5%
Nelson/Marlborough	174,132	9.7%	33,443	8.8%
West Coast	33,482	1.9%	5,233	1.4%
Canterbury	118,147	6.6%	17,158	4.5%
Otago/Southland	201,954	11.2%	28,317	7.4%
NZ Total	1,798,757		381,575	

(Source: MAF, 2002, A National Exotic Forest Description as at 1 April 2001, Edition 18, Wellington)

The area of exotic forest planted and volume of wood for each territorial authority in the Bay of Plenty region is shown in Table 2[34].

Table 24: Exotic Forest Area (hectares) by Territorial Authority as at 1 April 2001

	Total Area (ha)	Standing Volume ('000 m3)	Standing Volume as % of NZ Total
Kawerau	28	200	0.05%
Opotiki	18,911	5,262	1.38%
Rotorua	58,210	14,048	3.68%
Tauranga	185	33	0.01%
Western BoP	27,046	6,127	1.61%
Whakatane	118,358	27,348	7.17%

(Source: MAF, 2002, A National Exotic Forest Description as at 1 April 2001, Edition 18, Wellington)

Table 24 and Figure 10 show that the Whakatane District has almost as much area planted in exotic forestry as the rest of the region's territorial authorities put together.

[32] The Central North Island wood supply region includes all the territorial authorities in the Bay of Plenty and Waikato regions, except: Thames-Coromandel; Hauraki; Waikato and Matamata-Piako Districts.

[33] Wood supply regions are zones where forest stands of the same species and tending regime are represented by the same generalised yield table. They reflect wood supply processing catchments and reconcile with aggregates of territorial authority units. The National Exotic Forest Description Steering Committee identified them in 1989.

[34] Rotorua includes the whole Rotorua District not just that part in the Bay of Plenty region. As most of the Taupo District is in the Waikato region it has not been included in the table.

In volume terms, it has the greatest quantity of wood than the rest of the region's territorial authorities put together.

Table 25: Forest Area by Forest Owner Size Class

Wood Supply Regions	Size Class (ha)					Total
	0-39	40-99	100-499	500-999	1000+	
Northland	33,915	4,421	11,993	5,161	149,615	205,105
Auckland	12,545	1,997	4,777	2,051	33,570	54,940
Central North Island	46,124	3,735	7,857	3,458	516,211	577,385
East Coast	19,809	2,367	11,208	5,817	114,110	153,311
Hawkes Bay	22,133	1,626	9,129	3,801	86,678	123,367
Southern North Island	50,599	7,667	27,040	7,179	64,449	156,934
Nelson/Marlborough	28,677	7,213	18,190	8,588	111,464	174,132
West Coast	2,897	449	720	-	29,416	33,482
Canterbury	44,810	3,302	9,470	1,903	58,662	118,147
Otago/Southland	48,504	5,561	14,870	4,582	128,437	201,954
NZ Total	310,013	38,338	115,254	42,540	1,292,612	1,798,757

(Source: MAF, 2002, A National Exotic Forest Description as at 1 April 2001, Edition 18, Wellington)

In terms of forest size, Table 25 shows that of the 575,607 hectares of forest in the CNI, 89% is in forests of 1,000 or more hectares (i.e. a small number of very large forests). Conversely, there are also a large number of small forests less than 40 hectares in size in the CNI (if you conservatively assume that each small forest is 39 hectares in size this equates to about 1,200 separate forests).

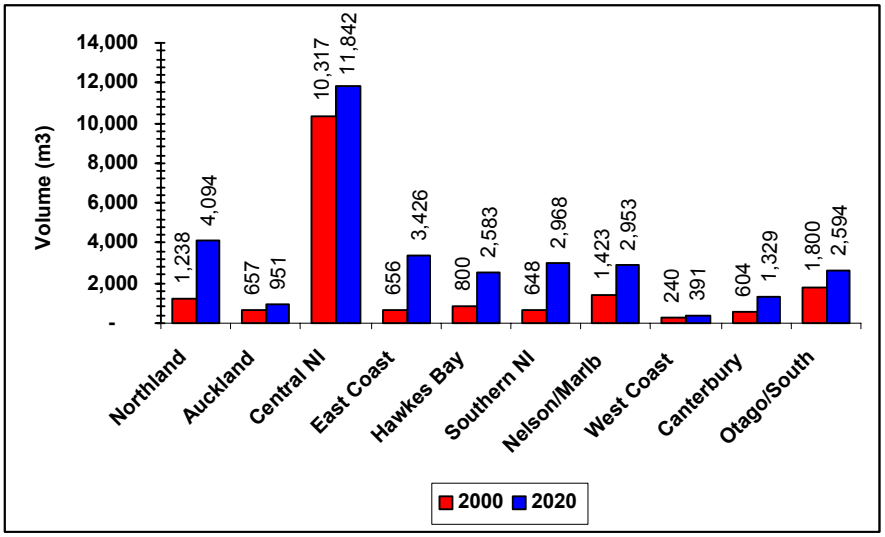
The Port of Tauranga is the preferred export port for logs from the central North Island because of competitive freight and port charges to/at Tauranga. The fact that the Port of Tauranga receives sufficient volumes to cater on a regular basis for full ship loading also assists in the Port attracting logs. In 2001, about 2.9 million tonnes of logs and 2.2 million tonnes of other forest products were exported through the Port.[35]

However, congestion of the routes leading to the Port is causing serious time delays to operators trying to access/leave the Port as well as other industries adjacent to Hewlett's Road. In peak travel times, some operators are experiencing delays of 1.5 hours.

8.3.2 Harvesting, Forecasts and Trends

Any discussion of the implications of wood harvest for the Bay of Plenty must consider the forestry resource not only in this region, but also in adjoining regions. This is because wood is drawn into the region from the Coromandel, Waikato, East Cape and Taupo areas. It should also be noted that *"domestic processing and/or export opportunities are generally determined regionally because of the cost of transporting logs. The economically viable distance to cart logs depends on a number of factors, including the value of the end product, availability of back loading, plant location relative to market/export port and whether the logs represent marginal supply or base load supply."*[36]

[35] Figures sourced from Port of Tauranga website (www.port-tauranga.co.nz/02.600.asp)
[36] Forestry Roading Taskforce, (1993), Report from Forestry Road Funding Task Force, Ministry of Forestry, Wellington, page 20.



(Source: MAF, Regional Wood Supply Forecasts, New Zealand Forestry Statistics 2000)

Figure 11: Regional Wood Supply Forecasts

As can be seen from Figure 11, over half the wood harvested in New Zealand in 2000 came from the CNI – about 10.4 million cubic metres. By 2020, it is forecast that the amount of harvestable wood in the CNI will grow by 15% (about 1.5 million cubic metres). However, nationally for the same period, it is estimated the amount of harvestable wood will increase by 80% (about 12.5 million cubic metres).

If the additional 1.5 million cubic metres of recoverable wood in the CNI by 2020 is all transported by truck from forest to its processing or export destination, it is estimated this will equate to an additional 170 daily truck movements of logs (laden trucks only).[37]

However, it should be noted that off-highway roads "favour continuous or linked forest estates and easier forest topography (rather) than the ridge-valley character of some estates in more difficult country" (CNIPS, page 35). Where there is an increase in harvesting of, or a switch to smaller stand-alone forests instead of large continuous or linked forests, this will result in greater use of the public roading network and possibly an increase in the number of logging trucks using those roads.

Such a scenario is a real possibility, especially as there are currently a large number of small forests less than 40 hectares in size in the CNI (> 1,200), Northland (> 800) and the East Coast (> 600). It is unclear what the impact will be on the land transport network from harvesting these small forests.

Figure 11 also illustrated that by 2020 both the Northland and East Coast wood supply regions are forecast to experience a huge increase in the amount of recoverable wood available (an increase of 2.9 million cubic metres and 2.8 million cubic metres per annum, respectively).

[37] Assuming a 44 tonne truck transports about 28.5 m^3 of wood per load, six days a week.

In regards to the East Cape, Environment B·O·P commissioned a study in May 2000[38], into forestry transport from this area. The study assumed that:

- all wood originating west of Hicks Bay; and
- between 10% to 40% of all wood from Hicks Bay to Ruatoria;
- would travel via SH 35 (SH35) through Opotiki by truck to Mount Maunganui, Te Puke, Rotorua, Kawerau and Kinleith (assumptions tested with and validated by the major forest owners in the East Cape).

The study concluded that cumulative wood flows on SH35 show a peak over the years 2007 to 2015, with volumes near to Opotiki reaching 600,000 cubic metres per annum. These volumes equate to 74 trucks per day near Opotiki.

The Forestry Roading Task Force report[39] suggests that a good indicator of those local authorities likely to experience a large increase in log production (and therefore logging traffic) in the future, is where at least 70% of the forest area is less than 16 years of age and the total stocked area exceeds 5,000 hectares.

Table 26: Proportion of Total Stocked Area Less than 16 Years of Age

Territorial Authority	Hectares of Planted Plantation < 16 Years Old	Total Hectares of Planted Plantation	% of Total
Kawerau	28	28	100.0%
Opotiki	8,119	18,911	42.9%
Rotorua	34,238	58,210	58.8%
Tauranga	120	185	64.9%
Western BoP	17,511	27,046	64.7%
Whakatane	68,495	118,358	57.9%
Gisborne	109,021	153,311	71.1%

(Data sourced from MAF, 2002, A National Exotic Forest Description as at 1 April 2001, Edition 18, Wellington)

As can be seen from Table 26, the only territorial authority in the region that is close to the 70% mark and 5,000 hectares is the Western Bay of Plenty District.

The industry looks at this differently however. It suggests that where less than 70% of the forest area is less than 16 years of age (that is, where the forest is older and closer to felling) the timing for new transport infrastructure is much more immediate and this should be of greater concern to road controlling authorities.

Another change taking place in the industry was highlighted in a 1998 study by Woodward-Clyde (NZ) Ltd into Taupo forestry transport options. The study concluded that in order to maximise value from the forest harvest stream, tree log processing would increasingly be undertaken at purpose built processing sites, rather than at the traditional landing load out locations in the forest.[40]

[38] Moynihan, S & Askey, P, (2000), East Cape Forestry Transport Study, Opus International Consultants Ltd, Whakatane.
[39] Forestry Roading Taskforce, (1993), Report from Forestry Road Funding Task Force, Ministry of Forestry, Wellington.
[40] Woodward-Clyde (NZ) Ltd, 1998, Taupo Forestry Transport Options Study, Woodward-Clyde (NZ) Ltd, Auckland, page 4-1.

The haulage of full-stem logs cannot be undertaken on public roads because of over-dimensioned loads. Consequently, such tree log processing sites will be located on off-highway routes with convenient dispatch routes and transport modes to processing plants and ports.

For continuous or linked forest estates, such a system will concentrate log haulage within forests and onto off-highway routes.

8.3.3 Public Roads

In 1994, Environment Waikato and Environment B·O·P commissioned a study to identify issues relating to the transport requirements of the forest industry in the CNI.[41] The study identified that the forestry industry saw the flexibility of road transport compared with rail as a big advantage – not only did roads cover a wider area than rail, but road transport operators could provide additional capacity at short notice to meet sudden changes in demand.

While the projected increase in heavy vehicles from the East Cape is significant, the authors of the East Cape study did not consider the increase to be beyond the capacity of the existing road infrastructure (log truck operators disagree and suggest there is a problem now). The peak movements extend over seven to eight years and are not a short-term phenomenon. West of Opotiki, the extra heavy vehicle movements are a much smaller proportional increase on the current traffic.

However, the authors of the East Cape study concluded that the increase in traffic would be sufficient to detrimentally affect other road users and the amenity of communities beside the road. It noted:

- The existing road geometry was not considered to significantly limit the passage of legal dimension logging loads.
- Existing seal widths were narrow in parts. While parts of the road were below national standards, the seal width generally increased towards Opotiki. Similarly, forestry traffic flows will be heaviest closer to this point.
- Seal widening will be required on some curves to prevent forestry trucks crossing the centreline in tight terrain.
- Speed environments change significantly over very short lengths of the route. Speed environments were typically in the range of 80 to 100 kilometres per hour. Passing distances were generally less than 450 metres as a consequence of the terrain and curve visibility and therefore passing opportunity was limited.
- The projected increase in heavy vehicles will impact significantly upon the opportunity for the general motorist to travel through the heavy traffic stream. There will be a need to create more passing opportunities with pullover areas for trucks and slow vehicle bays on steep grades.

[41] McInnes Group in Association with PF Olsen and Co Ltd and Bruce Henderson Consultants Ltd, 1994, A Scoping Study – Central North Island Forestry Transportation, Environment Waikato and Environment B·O·P.

- There were several significant single lane sections, which would potentially become bottlenecks under increased logging traffic. The projected increase in heavy vehicles could rapidly compound delays to several vehicles causing the outward logging trucks to lose their separation on the road. There may be a need for some form of traffic control to be installed on these sections (the preference of log truck operators is for the road to be widened).

- There was the potential for a major slip to take the road out of service for an extended period. Some sections of the road were prone to flooding. Sustained loading from logging traffic will also test minor culvert structures.

- The projected increase in heavy vehicles will be noticeable by general road users. Detritus from logging trucks will be a nuisance to road users.

- An increase in logging traffic will increase the frequency of heavy vehicles being delayed by wandering stock on the road (a particular feature/problem of SH35) and also the number of accidents involving stock. Log truck operators suggest this is a significant problem that needs to be addressed urgently.

- A substantial increase in logging traffic will result in loss of amenity to people living in the vicinity of the highway (noise, vibration, and a perception of a busier road that was inherently less safe).

- A major increase in logging traffic will adversely affect the attractiveness of SH35 to "self-drive" overseas tourists and cyclists (Pacific Coast Highway).

The forestry industry also has some concerns about the way that road networks are managed, particularly that money is not spent in a proactive manner to improve roads rather than in the reactive manner that now happens.

8.3.4 Private Roads

In the CNI forest companies have constructed and maintain very extensive off-highway roading systems within their forests for their use and use by their contractors (for example, Carter Holt Harvey has in the Kinleith region, 3,500 kilometres of off-highway roads).

The incentives for forest owners to use private roads include:

- road user charges are not payable on private roads;

- freedom on private roads to operate heavier vehicles than the 44 tonne gross vehicle weight maximum permitted on public roads, resulting in productivity and energy use benefits;

- stem length cartage for central processing;

- greater freedom with design of the vehicle configuration; and

- avoiding criticism from the community and other road users.

For the forest owner, the advantages of private off-highway roads are control over:

- who uses the road;
- how it is used;
- the standard of maintenance;
- the standard and cost of the road; and
- savings from being able to use over-dimension and mass vehicles.

The disadvantages to forest owners of private off-highway roads are:

- capital roading costs;
- the costs of road maintenance;
- the cost of monitoring unlawful use of the roads;
- occupational safety and health issues associated with others using their roads.

These disadvantages make forest owners wary about opening the roads to other users.

The authors of the 1994 study suggested that forest companies currently use a mix of public and private roads to minimise their costs and maximise their profits. From their perspective, they are presently making optimal use of private roads. However, one issue that has been raised before is whether greater use of off-highway roads (and therefore less use of public roads) should be encouraged by the road transport industry, if by doing so, there was a net social benefit to New Zealand.

The types of benefits arising from the reduced presence of heavy commercial vehicles on public roads fall into three groups:

- road-user benefits;
- road-provider benefits; and
- rest of New Zealand benefits.

As noted above, forestry companies are presently making optimal use of private roads. If they departed from their present pattern of road usage they would be faced with additional costs.

One way to address this cost issue would be to offer an inducement to forestry companies to transfer heavy vehicles off public roads. The inducement should be up to, but no more than, the benefit received.

However, the option would only be worth pursuing if the benefits to the rest of New Zealand would be greater than the additional cost to the forestry industry. The option also assumes there is adequate capacity available on off-highway roads.

It should also be noted that some other industries have reached agreement with the forestry companies that own off-highway roads and are currently using those roads instead of the public network.

8.3.5 Rail

Although Tranz Rail is the only rail operator in New Zealand it faces stern competition for all the traffic it carry's, from the other modes and over the years this has led to significant improvements in efficiency and substantially lower rates. It is now problematical as to whether either road or rail are now making adequate returns on the investment in them.

There is also considerable disquiet in the region regarding the number of heavy trucks on the roads and a consequent wish to see some of this traffic shifted to rail. However this will only occur when the rates for rail traffic are lower than the equivalent road rates but are still economically sustainable for rail. Ensuring that the competitive playing field is level is an obvious first step in this direction. Application of ATR's is another option available to achieve this end.

In comparing rail and road rates it must be recognized that most traffic carried by rail involves an inter-modal change component and provision of these facilities should be included in future planning for both road and rail

Specific rail projects that are being considered by Tranz Rail for the future are as follows:

- Murupara to Taupo Link
- Taneatua to Opotiki Link"

Forest owners consulted in the preparation of this report have some real concerns about the current monopoly ownership of rail in New Zealand. In their view, the current ownership of the rail system prevents competition, innovation and use Murupara/Taupo Rail Link

A 1998 study by Woodward-Clyde (NZ) Ltd[42] suggested that a rail extension from the Murupara railhead would be the most likely route for rail access to Taupo to service the forest industry. The study discussed two options:

- Extension of rail from Murupara to a centralised tree log-processing site at Taupo Off-Highway Road/High Level Road.
- Extension of rail to Taupo Industrial Park – this extension involves the rail line continuing on from Off-Highway Road/High Level Road to the Taupo Industrial Park. Forest industry people spoken to as part of the study did not express an interest in this option as it did not facilitate any new opportunities. The Taupo Off-Highway road already provides a useful private road link between the Taupo forest processing plants, the forests on the Kaingaroa Plains and forest processing plants in the Bay of Plenty.

The study concluded that the rail option was not commercially viable, although this was dependent on the revenue that could be generated.

[42] Woodward-Clyde (NZ) Ltd, 1998, Taupo Forestry Transport Options Study, Woodward-Clyde (NZ) Ltd, Auckland.

Where a land transport project is not commercially viable, it may be eligible for funding from Transfund as an 'Alternative to Roading' proposal (ATR). In order to evaluate an ATR proposal alongside other roading proposal, an efficiency ratio for the ATR proposal must be calculated. The efficiency ratio is expressed as the benefits per dollar of public expenditure. In order to be considered efficient, the ratio must be higher than 1.0 (that is, a proposal needs to return more than a dollar's benefits for every dollar of public expenditure made).

The 1998 study concluded:

- A rail extension from Murupara to the intersection of Taupo Off-Highway/High Level Roads, servicing a centralised tree log-processing yard had an efficiency ratio less than 1.0.

- A rail extension from a centralised tree log-processing yard, near the intersection of Taupo Off-Highway/High Level Roads, into the Taupo Industrial Park, significantly increases costs with little additional benefits. Consequently the efficiency ratio of this option was expected to be significantly less than 1.0.

Thus, neither option would return benefits in excess of their costs and are therefore not worth pursuing.

8.3.5.1 Taneatua/Opotiki Rail Link

The 2000 East Cape study noted that a 1996 Opotiki Harbour Development study considered a proposal to extend the Taneatua railhead to Opotiki. The 1996 study concluded that it would be costly and operationally difficult to do so. This means a rail service for East Cape logs would be limited to receiving logs at Taneatua for the relatively short haul to Mt Maunganui. Development would be required at Taneatua and extra handling costs would be incurred.

However, the authors of the East Cape study believed there was a real possibility that a portion of the East Cape harvest volume bound for the Port of Tauranga would be offloaded at Taneatua for the final leg because:

- ports are perpetually short of storage space for logs. Railhead storage is seen as an alternative.

- loading costs for rail can be about 50% cheaper than for trucks. This means that the extra handling is not such a big issue (forest industry representatives consulted over the production of this paper did not agree).

- off-loading at Taneatua will effectively shorten the cart by truck. This may allow an extra trip.

When volumes from the East Cape increase, it would be possible for a portion to be offloaded at the Taneatua railhead for the final leg to the Port of Tauranga. This option may be more viable than trucking logs to the Port.

8.3.6 Barging

The feasibility of barging as an alternative to road transport for East Cape logs has been investigated for both Hicks Bay and Opotiki.

8.3.6.1 Hicks Bay

Hicks Bay is reasonably sheltered for a large amount of time, but is exposed to occasional stormy weather from the east. The feasibility of the Bay as a barge terminal depends on the ability of barge operators to weather out such storms.

The East Cape study concluded that it would cost $15.00 per tonne to barge logs from Hicks Bay to Gisborne, compared to a trucking cost of $24.00 per tonne (forest industry representatives consulted over the production of this paper were of the view that these figures may no longer be accurate).

At a rate of $15.00 per tonne, a barge terminal would be viable for logs north of Te Kaha and north of Tikitiki (80 kilometres from Hicks Bay towards Opotiki and 27 kilometres from Hicks Bay towards Gisborne). This zone would be further extended almost to Ruatoria, if the project qualified as an 'Alternative to Roading' proposal.

At the time of peak East Cape wood flow, it is projected that barging logs from Hicks Bay will reduce the number of laden truck movements through Opotiki per day, from 74 to between 28 to 50 (from one truck every eight minutes to one truck every 12 to 21 minutes).

Barging logs from Hicks Bay to Gisborne also raises an issue over whether it is economically beneficial to the Bay of Plenty region for logs harvested in the Bay of Plenty to be barged to and exported from a port located in an adjacent region.

8.3.6.2 Opotiki

At Opotiki the berth would be sheltered, but the major concern would be operation over the bar at the river mouth.

The East Cape study concluded that it would cost $16.50 per tonne to barge logs from Opotiki to Mount Maunganui, compared to a trucking cost of $20.00 per tonne.

At a rate of $16.50 per tonne, a barge terminal would be viable for all logs south of Raukokore. An 'Alternative to Roading' proposal would only extend this catchment area by another eight kilometres.

At the time of peak East Cape wood flow, it is projected that barging logs from Opotiki will reduce the number of laden truck movements through Opotiki per day, from 74 to between 57 to 67 (from one truck every eight minutes to one truck every nine to 11 minutes).

A barge terminal further up the Cape from Opotiki would show greater economic viability than the proposal at Opotiki. An ideal location would be near Omaio Bay – Te Kaha.

8.3.7 Generic Land Transport Issues

The Forestry Roading Task Force identified a number of generic social issues specific to roading[43]. They were:

- Volume of heavy traffic – at the time of harvesting, the number of heavy commercial vehicles travelling to a forest increases. This brings with it a number of associated concerns.

- Noise – logging trucks and the movement of other heavy equipment will result in greater road noise than during the growing period.

- Road safety – the size and frequency of vehicles involved in forestry traffic can cause concern regarding road safety. There is a public perception that this traffic constitutes a threat to other road users. There are a number of sub-issues:

    - the perceived threat to normal vehicle traffic represented by the larger forestry vehicles;
    - difficulties can exist where normal vehicles may need to pass large logging rigs;
    - in some rural areas, school children may need to walk (or wait) on roads frequently traversed by forestry traffic (forest industry representatives consulted over the production of this paper were concerned for the safety of children forced to walk considerable distances along roads used by log trucks due to the policies being adopted by the Ministry of Education);
    - on unsealed roads, the dust to adjacent crops, or stone throw from heavy commercial vehicles may constitute a driving hazard as well as being aesthetically unpleasant.

- Road damage – local ratepayers may be concerned about the cost of damage to the roads caused by forestry related traffic, particularly in locations where there has not been a history of forestry harvesting. It is also fair to say that forest owners have some real concerns about the rates they pay, especially when they their product is moved on off-highway roads.

[43] Forestry Roading Taskforce, (1993), Report from Forestry Road Funding Task Force, Ministry of Forestry, Wellington.

Chapter 9: Tourism

Rotorua is the Bay of Plenty region's significant destination for overseas visitors. "Tauranga and Mount Maunganui are significant domestic rather than overseas destinations. The eastern Bay of Plenty does not attract significant numbers of overseas tourists, however the tourists who visit this area tend to be independent backpackers or holidaymakers who travel by cycle, rental car or campervan. Large numbers of domestic tourists visit the East Cape over summer."[44]

9.1 International Visitors

For the year ended June 2001, 1.9 million overseas tourists visited New Zealand. Of this number, 604,058 visited the Bay of Plenty (32%) with the majority visiting Rotorua (543,322). Compared to the previous year, the figures for the Bay of Plenty for 2000/01 show a 4.7% increase and for Rotorua, a 5.2% increase.

During 2000/01, international visitors to the region were accommodated in the region for a total of 1,624,930 nights, averaging out at almost three nights per visitor. The figures for Rotorua were 1,091,256 nights and just under two nights per visitor.

[44] Crampton, C and Petre R, 1996, Draft Region 4: Bay of Plenty Regional State Highway Strategy, Transit New Zealand, Hamilton, page 10.

Table 27: Number of Overseas Visitors Using Each Transport Mode (Nationally)[45]

Mode	No. of Visitors Using Each Mode (Year Ended June '01)
Domestic Air	489,831
Rental car	451,837
Coach Tour	440,866
Private car	279,170
Ferry	243,761
Scheduled bus	112,949
Train	96,523
Campervan	58,982
Backpacker bus	40,312
Cruise Ship	16,058
Hitchhiking	10,448
Taxi/Limousine/Car Tour	8,922
Yacht/Private Boat	8,564
Walking/Tramping	5,682
Helicopter	4,787
Other	4,282
Cycling	4,222
Motorbike	2,754
Don't Know	1,239

(Source: International Visitors Survey, Tourism New Zealand website (www.tourisminfo.govt.nz)

As can be seen from Table 29 above, nationally, the most common mode of land transport used by international visitors was rental car, followed by coach tour, private car, scheduled bus, train, campervan, and backpacker bus.[46]

Based on the assumption that the international visitor travel patterns are the same for the Bay of Plenty as they are nationally, this would equate to:

[45] Note – visitors can and often do, use more than one type of transport during their stay in New Zealand. Therefore a visitor may be included more than once in the data.
[46] Figures from Tourism New Zealand's website (www.tourisminfo.govt.nz).

Table 28: Number of Overseas Visitors Using Each Transport Mode (Bay of Plenty)

Mode	No. of Visitors Using Each Mode (Year Ended June '01)
Domestic Air	157,013
Rental car	144,834
Coach Tour	141,317
Private car	89,486
Ferry	78,136
Scheduled bus	36,205
Train	30,940
Campervan	18,906
Backpacker bus	12,922
Cruise Ship	5,147
Hitchhiking	3,349
Taxi/Limousine/Car Tour	2,860
Yacht/Private Boat	2,745
Walking/Tramping	1,821
Helicopter	1,534
Other	1,373
Cycling	1,353
Motorbike	883
Don't Know	397

(Based on International Visitors Survey, Tourism New Zealand)

9.2 Domestic Visitors

9.2.1 Overnight Trips[47]

In 1999, the Bay of Plenty was the third most popular domestic travel destination in New Zealand, accounting for 10.9% of all overnight trips taken (1,813,000 trips) and 10.8% of all nights spent (5,705,000 nights). About 42% of all overnight trips taken to the Bay of Plenty had Rotorua as their main destination (760,000 trips) and 37% of all nights spent in the Bay of Plenty, were in Rotorua (2,110,000 nights).

Of all the regions in New Zealand, the Bay of Plenty generated the fifth greatest number of overnight trips (7.3% or 1,209,000 trips) and the sixth greatest number of person nights (6.6% or 3,478,000 nights). In terms of trips per person, Bay of Plenty residents were the fifth most frequent travellers of all New Zealand regions (6.8 trips per person). The New Zealand average was 5.8 trips per person.

In 1999, the Bay of Plenty experienced the second largest gain of any region in net overnight trips to and net nights spent in the region. That is, there were 604,000 more trips into the region than Bay of Plenty residents took from the region and 2,226,000 more nights spent in the region than Bay of Plenty residents spent out of the region.

[47] Forsyte Research, 2000, New Zealand Domestic Travel Study 1999, Office of Tourism and Sport, Wellington.

As expressed as a ratio of trips into the region versus trips out of the region, the Bay of Plenty experienced the second highest ratio of any region in New Zealand (trips in/trips out ratio of 1.5). As a ratio of nights spent in the region versus nights spent out of the region, the Bay of Plenty experienced the fourth equal highest ratio of any region in New Zealand (nights spent in/nights spent out ratio of 1.64).

The main reason for travel to the Bay of Plenty for overnight trips was for holiday/leisure (44.2% of trips), visiting friends and relatives (39.4%), business (12.4%), and other reasons (4.0%).

Table 29: Percentage of Domestic Over-night Travellers Using Each Transport Mode (Nationally)

Mode	% of Total Domestic Travellers Using Each Mode
Private/Company Car/Van	80.9%
Air Travel	9.7%
Bus/Coach	2.3%
Rental Car/Van	2.2%
Commercial Bus/Ferry	1.9%
Inter-Island Ferry	1.5%
Train	0.9%
Other	2.9%

(Source: Forsyte Research, 2000, New Zealand Domestic Travel Study 1999, Office of Tourism and Sport, Wellington, page 21)

As can be seen from Table 29 above, nationally, the most common mode of land transport used by domestic travellers for overnight trips is their private motor vehicles/company cars/vans, followed by bus/coach, rental car/van, commercial bus/ferry and train.

Based on the assumption that domestic travel patterns are the same for the Bay of Plenty as they are nationally, this would equate to:

Table 30: Number of Domestic Over-night Travellers Using Each Transport Mode (Bay of Plenty)

Mode	Total Trips per Mode
Private/Company Car/Van	5,257,630
Air Travel	630,396
Bus/Coach	149,475
Rental Car/Van	142,976
Commercial Bus/Ferry	123,480
Inter-Island Ferry	97,484
Train	58,490
Other	188,469

(Based on: Forsyte Research, 2000, New Zealand Domestic Travel Study 1999)

A trip is defined as the journey between the origin and an overnight stop or the journey between two overnight stops. For example, a one-night return journey from Whakatane to Auckland will comprise two trips (i.e. the trip from Whakatane to Auckland and the trip home the next day from Auckland to Whakatane). If however, a night is spent in Tauranga on the way back from Auckland (but not on the way there), the journey will comprise three trips.

It was estimated that in 1999, New Zealanders travelled an average of 2.2 trips per journey. For the Bay of Plenty this would mean that residents of and visitors to the region, made about 6,648,400 trips.

9.2.2 Day Trips[48]

The 1999 Domestic Travel Survey defines day trips as travel of at least 40 km one way from home, outside the area in which people usually live or work in day to day. Long commutes to work are not included in this definition.

In 1999, the Bay of Plenty was the fourth most popular destination for day trips (4,109,000 day trips or 9.3% of all day trips) and 46.7% of all day trips took place within the region.

Of all the regions in New Zealand, the Bay of Plenty generated the fifth greatest number of day trips (8.6% or 3,828,000 trips). In terms of trips per person, Bay of Plenty residents were the fourth most frequent travellers of all New Zealand regions (21.6 trips per person). The New Zealand average was 15.4 trips per person.

In 1999, the Bay of Plenty experienced the fourth largest gain of any region in net day trips to the region. That is, there were 281,000 more trips into the region than Bay of Plenty residents took from the region. As expressed as a ratio of trips into the region versus trips out of the region, the Bay of Plenty experienced the seventh highest ratio of any region in New Zealand (trips in/trips out ratio of 1.07).

Nationally, the main reason for day trip travel was for holiday/leisure (44.1% of trips), followed by visiting friends and relatives (25.8%), business (18.1%), and other reasons (12.0%).

As can be seen from Table 31 above, nationally, the most common mode of land transport used by domestic travellers for day trips was their private motor vehicles/company cars/vans, followed by commercial bus/ferry, bus/coach, train and rental car/van.

[48] Forsyte Research, 2000, New Zealand Domestic Travel Study 1999, Office of Tourism and Sport, Wellington.

Table 31: Percentage of Domestic Day Travellers Using Each Transport Mode (Nationally)

Mode	% of Total Domestic Travellers Using Each Mode
Private/Company Car/Van	91.8%
Air Travel	1.3%
Bus/Coach	1.9%
Rental Car/Van	0.5%
Commercial Bus/Ferry	2.3%
Train	0.8%
Other	2.4%

(Source: Forsyte Research, 2000, New Zealand Domestic Travel Study 1999, Office of Tourism and Sport, Wellington, page 36)

Based on the assumption that domestic travel patterns are the same for the Bay of Plenty as they are nationally, this would equate to:

Table 32: Number of Domestic Day Travellers Using Each Transport Mode (Bay of Plenty)

Mode	Total Trips per Mode
Private/Company Car/Van	14,428,051
Air Travel	204,319
Bus/Coach	298,620
Rental Car/Van	78,584
Commercial Bus/Ferry	361,487
Train	125,735
Other	377,204

(Based on: Forsyte Research, 2000, New Zealand Domestic Travel Study 1999)

A trip is defined as the journey between the origin and the day trip destination. A day trip is a return trip from home to a destination and back again (therefore 2 trips). For the Bay of Plenty this would mean that residents of and visitors to the region, made about 15,874,000 trips.

9.3 Tourist Routes

For the Bay of Plenty region, the current National State Highway Strategy[49] recognises:

- SH 2 between Opotiki to where it crosses the regional boundary on its way to Gisborne, as a scenic route[50];
- SH 2 from the intersection with SH 33 to where it crosses the regional boundary on its way to Waihi, as a tourist route[51];
- SH 5 as a tourist route;
- SH 33 as a tourist route;

[49] Transit New Zealand, undated, National State Highway Strategy, Transit New Zealand, Wellington, page 14.
[50] The National State Highway Strategy defines a scenic route as ones through areas of outstanding beauty (page 5).
[51] The National State Highway Strategy defines a tourist route as ones defined by the tourism industry (page 5).

- SH 35 between Opotiki to where it crosses the regional boundary on its way to Gisborne, as a scenic route; and

- SH 38 from Murupara to the intersection with SH 5 as a scenic route.

In addition tourism agencies in the Auckland, Waikato, Bay of Plenty, and Hawkes Bay regions and the Gisborne district, promote the Pacific Coast Highway and the Thermal Explorer Highway as tourist routes (see map ?).

9.4 Generic Roading Issues

In 1993 the Long Term Roading Task Force was established to investigate future tourism demands on road transport. The main issues highlighted in the Task Force report were:[52]

- if New Zealand was to benefit as much as possible from the projected levels of tourism, roads must facilitate access to the main scenic attractions and be of a standard which is acceptable to international tourists;

- the standard of some roads has been a concern to the tourism industry for a number of years and road controlling authority priorities are not always the same as perceived by the tourism industry (e.g. some local roads should have a greater priority for upgrading than some state highways);

- some lengths of state highways currently carrying high volumes of tourist traffic and which are important to tourists, will require additional passing lanes;

- similarly, where possible, road-controlling authorities should encourage the use of alternative routes for tourism and forestry traffic. Where alternative routes do not exist, then consideration should be given to the provision of additional passing lanes;

- the provision for additional internationally recognised 'Keep Left', warning and directional signage; and

- the greater need for new amenity stopping places and improvement of existing facilities.

[52] Task Force on Long Term Tourism Roading, 1994, Long Term Tourism Roading Requirements, Task Force Report, Transit New Zealand and Ministry of Commerce, Wellington.

"The other key tourism issue affecting the region is the development of a quicker link between Rotorua and Tauranga. The Rotorua, Tauranga and Western Bay of Plenty District Councils are advocating the continued development of the Pyes Pa Road … as the alternative route to SH 33.

Preliminary estimates indicate that the average one-way trip between Rotorua and Tauranga will be reduced by between ten and 15 minutes. Such a saving is thought to have positive repercussions for the tourism industry within the region as it will assist the development of Tauranga as a tourist destination.

However it is noted that:

- the existing route (SH 33) is quicker in terms of access to Rotorua Airport;
- the present road is programmed for sealing within the foreseeable future and will draw an estimated 700 light vehicles per day from SH 33; and
- a major realignment would be required for the route to be used by buses." [53]

9.5 Forecasts

The National Tourism Strategy released by Tourism New Zealand forecasts that by 2010, international visitor numbers to New Zealand will have grown by 81% to 3.2 million people.

Based on the assumption that the increase will be the same for the Bay of Plenty as it will be nationally, this would mean by 2010 there will be 1,093,345 visitors to the Bay of Plenty, of which 983,413 will visit Rotorua (currently 604,058 and 543,322, respectively).

The National Tourism Strategy also forecasts that by 2010, domestic visitor numbers will have grown by 48% to 25.5 million people.

Based on the assumption that the increase will be the same for the Bay of Plenty as it will be nationally, this will mean that by 2010, the Bay of Plenty will record 4,473,000 domestic overnight trips compared to 3,022,000 in 1999.

[53] Crampton, C and Petre R, 1996, Draft Region 4: Bay of Plenty Regional State Highway Strategy, Transit New Zealand, Hamilton, page 11.

Chapter 10: Road Safety

10.1 Road Safety Strategy 2010

In October 2000, the National Road Safety Committee released 'Road Safety Strategy 2010 – A consultation document' for public input. Once central government has worked through and made some decisions on the submissions received on the consultation document, it will be able to release the final Road Safety Strategy 2010 (hopefully in the next few months). When approved, the Strategy will replace the National Road Safety Plan 1995.

The Strategy aims to achieve a level of safety in New Zealand by 2010 equal to that enjoyed by the safest countries in the world today. This would mean halving the country's current fatality rate over the next ten years.

10.1.1 Themes

The proposed Strategy had a number of themes running through it. They were:

- **The right intervention for the right road** (an intervention is an activity that improves road safety outcomes) - the proposed strategy is constructed around a roading classification based on traffic volume and posted speed limit (motorways, state highways, minor open roads, and major and minor urban roads). Because road classes differ in the demands placed on them, they tend to differ in design. This affects their safety performance and the appropriateness of individual safety interventions.

- **Lessons for a safer network** – roads must be used properly if they are to be safe. It is therefore up to the people who design the roads to tell us how they can be safely used (e.g. posting advisory speed limits on curves) and for the Police to enforce safe behaviour.

- **It's not about blame** – sometimes the best way to address crash spots is to change the road and /or vehicle instead of attempting to change people's driving.

- **Optimising and targeting** – to be most cost-effective, interventions must be imposed with optimum intensity and targeted to where they have most impact.

10.1.2 Targets

The National Road Safety Committee is proposing that the Strategy will set targets to address the following safety problems that have been highlighted in the traffic and crash data:

- protecting pedestrians and cyclists;
- accommodating the special needs of older road users;
- making school trips even safer;
- dealing with a dispersed pattern of trips;
- encouraging passenger restraint-wearing by maori and pacific peoples;
- improving on the decrease in road crash risk over the past decade;
- making open roads safer;

The target areas that it is proposing are:

- **Social cost – the aggregate measure of all costs that crashes inflict on the community.**
- **Final outcomes – the number of fatalities and serious injuries.**
- **Intermediate outcomes – factors contributing to the final outcomes such as average traffic speeds, proportion of drunk drivers, seatbelt wearing rate, etc.**
- **Outputs – represent physical deliverables**, for instance the number of police patrols and the amount of advertising delivered.

It is also proposing that the Strategy will set separate targets for regions (social cost and final outcome targets) and road user groups (pedestrians and cyclists, older road users, Maori and Pacific peoples).

10.1.3 Interventions

The proposed Strategy suggested that there were three ways to achieve the targets. They were:

- **enforcement**;
- **engineering**; and
- a **mix** of **enforcement** and **engineering**.

In terms of safety, enforcement and engineering have similar outcomes. However, they differ in cost, timing, and other benefits.

The approach of mixing enforcement and engineering interventions to achieve a safety outcome has been used in the Bay of Plenty to address the significant open

road crash and casualty rates in the region. The campaign also included and education campaign.

Twenty types of interventions were evaluated in the proposed Strategy. Three in particular stood out:

- speed management on open roads;
- an expanded road construction programme; and
- improved vehicle standards.

The interventions were classified according to whether they affected the road environment, vehicle, or road user and whether they set standards and rules or ensure compliance with them.

Standards and Rules

Standards and rules stipulate how road safety assets are to be built and used and how road safety activities are to be conducted.

Compliance

Compliance interventions aim to make road users, builders and operators and the motor vehicle industry adhere to safety standards and rules. Compliance can be improved by a combination of:

- enforcement – promoting compliance by imposing penalties for non-compliance;
- education - promoting compliance by imparting knowledge so that people know how to comply; and
- performance assessment - promoting compliance by offering a way of reducing compliance costs.

10.1.4 Performance Assessment – Safety Management System

The proposed Strategy considers the introduction of a Safety Management System (SMS) for all road-controlling authorities. *"The SMS is in the first instance preventive:*

- *to ensure good road engineering and traffic management practice are followed;*
- *that poor design does not add to road trauma; and*
- *that changes to road infrastructure do not contain dangerous elements that may be hard to undo.*

In the second instance the SMS reveals locations where remedial action is cost-effective." [54]

A SMS "sets out:

- *standards of practice for traffic management and road engineering;*
- *appropriate staff expertise and procedures;*
- *a management structure;*
- *a system of regular audits;*
- *rules for disclosure of information on road conditions and performance;*
- *a procedure for developing a safety strategy, identifying problems and proposing solutions."* [55]

Transfund is currently funding 15 road-controlling authorities in New Zealand to prepare their own SMS. The Rotorua District Council is one of the 15 authorities participating in the trial.

10.2 General Crash and Casualty Trends[56]

Over the last five years average road crash and casualty rates of 2.0 per 100 million vehicle kilometres travelled (VKT) and 1.6 per 100 million VKT respectively, have been recorded in the Bay of Plenty.

Table 33: 2001 Road Toll for Bay of Plenty Region

	Deaths	Serious casualties	Minor casualties
Kawerau	1	2	4
Opotiki	3	6	14
Rotorua	9	40	159
Tauranga	5	31	140
Western BOP	18	31	107
Whakatane	7	25	63
BOP Region	43	135	487

(Source: LTSA Road Safety Issues reports (July 2002))

As can be seen from Table 33, in 2001 this translated into 43 deaths[57], 135 serious casualties[58] and 487 minor casualties[59] arising from 35 fatal crashes, 97 serious-

[54] National Road safety Committee, 2000, Road Safety Strategy 2010, A Consultation Document, page 77.
[55] National Road safety Committee, 2000, Road Safety Strategy 2010, A Consultation Document, page 76.
[56] Most of the information contained in this section is either directly quoted from or based on the LTSA's 'Road Safety Issues' reports for 2001, for local council areas in the Bay of Plenty region.
[57] Fatal injuries are ones that result in death within 30 days of the crash.
[58] Serious injuries are such things as fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock necessitating medical treatment and any other injury involving removal to and retention in a medical facility/hospital.
[59] Minor injuries are such things as sprains and bruises that may or may not require first aid treatment, but do not require retention in a medical facility/hospital but may require a visits to such a facility.

injury crashes and 274 minor-injury crashes. There were also 1,364 non-injury crashes.

Put another way, the annual social cost of crashes[60] in the region in 2000 was about $223 million.

The Bay of Plenty region has the second highest cost density[61] and the fourth highest crash risk in the country.[62] This measure suggests that road safety interventions in the region are likely to be cost-effective.

As can also be seen from Table 33, over 40% of the region's fatalities and over 20% of the region's serious casualties arose from crashes in the Western Bay of Plenty District.

Between 1997 and 2001 in the Bay of Plenty region:

- Saturday **and** early afternoon (12:00 to 4:00 pm) were the worst periods for crashes resulting in injury;
- approximately 69% of fatal crashes and 51% of injury crashes occurred on rural roads[63] in the Bay of Plenty Region.
- 3,557 people were injured on Bay of Plenty Region roads. Drivers accounted for 47% of people injured, and passengers 32%. Motorcyclist, cyclist and pedestrians comprise a smaller proportion of injuries (18%).

At a district level, the regional trends are reflected except in Kawerau, where 'passengers' are the highest group of road users to be injured and in Tauranga where 'motorcyclist, cyclist and pedestrians' are the second highest group of road users to be injured (see Table 34).

[60] The estimated social cost includes loss of life or life quality (estimated by the amount New Zealanders are prepared to pay to reduce their risk of fatal or non-fatal injury), loss of output due to injuries, medical and rehabilitation costs, legal and court costs, and property damage. These costs are expressed at June 2000 prices.
[61] The annual social cost of crashes per kilometre of road.
[62] National Road Safety Committee, (2000), Road Safety Strategy 2010, LTSA, Wellington, Figs 23 & 24, page 39.
[63] A rural road is one where the speed limit is 70 km / hr or greater.

Table 34: Proportion of Total Road Users Injured

	Drivers	Passengers
Kawerau	34%	44%
Opotiki	43%	35%
Rotorua	45%	35%
Tauranga	44%	26%
Western BOP	54%	33%
Whakatane	46%	34%
BOP Region	47%	32%

(Based on: LTSA Road Safety Issues reports (July 2002))

10.3 Major Road Safety Issues

Table 35: Major Road Safety Issues

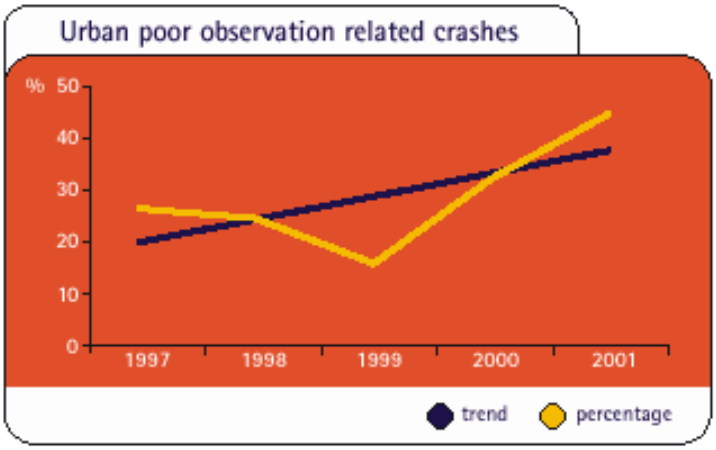
Bay of Plenty	New Zealand
Poor Observation	Speeding
Drink Driving	Drink Driving
Failure to Give Way	Failure to Give Way
Restraints & helmets	Restraints

(Source: Bay of Plenty Region Road Safety Issues report, LTSA, July 2002)

10.3.1 Poor Observation

Poor observation relates to how the driver performs the task of driving, and includes factors such as inattention, attention being diverted, and not seeing or looking for another party until too late.

In the Bay of Plenty, poor observation was a factor in 36% of injury crashes in 2001, an increase from 2000, and increasing in line with the national trend. There were 535 poor observation related injury crashes reported in the last five years.



(Source: Bay of Plenty Region Road Safety Issues report, LTSA, July 2002)

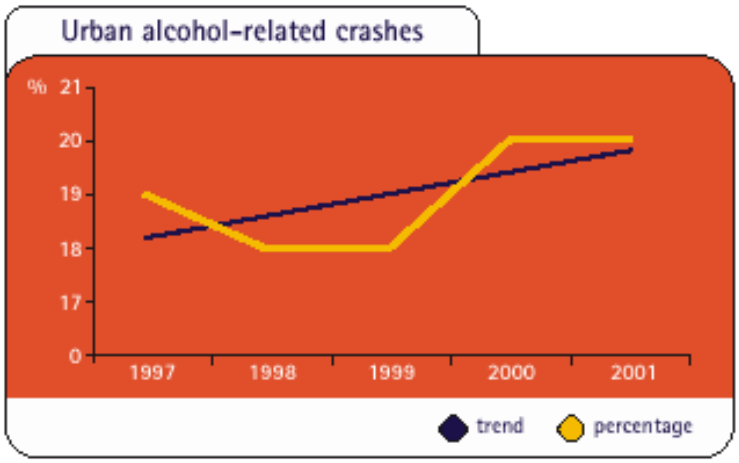
Figure 12: Poor Observation

Poor observation was the most important road safety issue in Tauranga, Opotiki, and the Western Bay of Plenty and the second most important issue in Rotorua and Whakatane.

Poor observation was predominately an urban issue in the Bay of Plenty in 2000 and was a factor in 46% of the injury crashes occurring on roads with a speed limit lower than 70 km/hr. Poor observation has increased as a factor on urban roads over the last three years, with the number of injury crashes rising from 63 in 1999 to 99 in 2001.

10.3.2 Drink driving

In the Bay of Plenty alcohol was a factor in 21% of injury crashes in 2001, an increase from 2000 and increasing against the national trend. There were 443 alcohol related injury crashes reported in the last five years.



(Source: Bay of Plenty Region Road Safety Issues report, LTSA, July 2002)

Figure 13: Alcohol Crashes

Alcohol was the most important road safety issue in Kawerau and Whakatane Districts, the second most important issue in the Opotiki District and the third most important issue in the Tauranga and Western Bay of Plenty Districts.

Alcohol was predominately an urban issue in the Bay of Plenty in 2001 and was a factor in 20% of the injury crashes occurring on roads with a speed limit lower than 70 km/hr.

Alcohol has decreased as a factor on urban roads over the last ten years, with the number of injury crashes rising from 39 in 2000 to 43 in 2001.

The 2001 Public Attitudes Survey responses from the Bay of Plenty Region indicated:

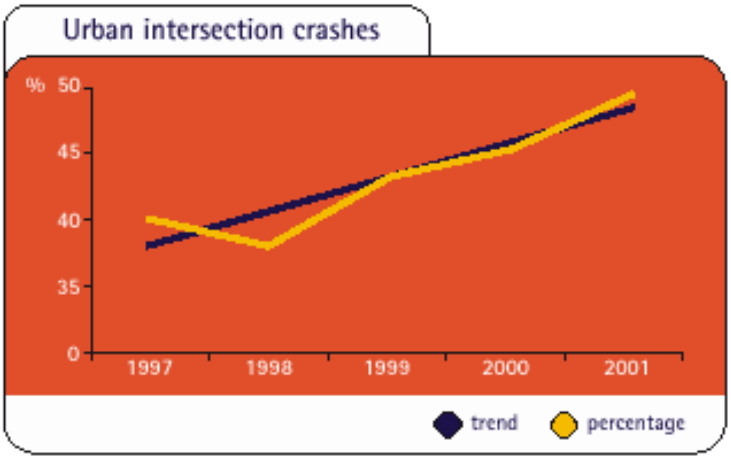
- 4% of drivers agree that there was not much chance of an accident when driving after drinking if you were careful;
- 40% of drivers believed that the overall risk of being caught drinking and driving was small;
- 84% believed compulsory breath testing helped to lower the road toll.

10.3.3 Failure to give way

Failed to give-way was the second most important issue in Tauranga and the third most important issue in Rotorua.

Drivers who fail to give way generally fall into one of four categories:

- those who don't understand the road rules and assume they have the right of way;
- those who assume the other car is going to let them through or stop (and may be travelling too fast to stop themselves);
- those who lack courtesy in relation to lane changing and merging; and
- those who are complacent about (or deliberately ignore) the road rules.



(Source: Bay of Plenty Region Road Safety Issues report, LTSA, July 2002)

Figure 14: Intersection Crashes

In the Bay of Plenty intersection crashes have fluctuated over the last five years, comprising up to 34% of all crashes in 2001. Intersection crashes accounted for 49% of all urban crashes in 2001, mainly caused by a failure to give way or stop and poor observation.

10.3.4 Restraints and Helmets

10.3.4.1 Front seat safety belt use – adults

In the Bay of Plenty, safety belt use in the front seat rose to 94% and is above the national average (92%).

10.3.4.2 Seatbelts – Rear seat – adults

In the Bay of Plenty, seatbelt use in the rear seat dropped to 53% and is significantly below the national average (70%).

10.3.4.3 Cycle helmets

In the Bay of Plenty, 93% of cyclists use helmets when cycling, slightly lower than the national average (94%).

10.3.4.4 Child restraint use

In the Bay of Plenty, the number of children that are restrained when they are travelling has fallen slightly to 78% and is below the national average (82%).

10.4 New Zealand Road Safety Programme

One way of giving effect to the National Road Safety Plan (and the Road Safety Strategy 2010 when it's released) and the road safety issues annually identified by LTSA for each local authority in New Zealand, is through the New Zealand Road Safety Programme (NZRSP).

The NZRSP is the principal means central government uses to co-ordinate the purchase of road safety outputs from the LTSA and the New Zealand Police. It is the mechanism through which road safety measures (other than road improvements), are planned, funded, implemented and evaluated.

The NZRSP brings together all the programmes prepared by territorial authorities and regional councils throughout the country. Each territorial authority programme is prepared in a number of parts that include the:

- number of Police hours that will be spent in the district on strategic outputs such as speed control, drinking or drugged driver;
- number of Police hours that will be spent in the district on traffic management outputs such as attendance at crashes and investigation;
- number of Police hours that will be spent in the district on community and education outputs such as school road safety education;
- need for a crash investigation study;
- road controlling authority's road safety audit programme; and
- community road safety projects that will be delivered in the district or region.

For the 2001/02 year, the New Zealand Road Safety Programme provides for the following level of activity in the Bay of Plenty:

Table 36: 2001/02 National Road Safety Programme

Local Authority	Police (hrs)				Community Projects		Total Police Funding
	Strategic	Traffic Management	Education	Community	Police Hrs	$	
Kawerau	2,350	500	250	70	60	$17,000	$232,700
Opotiki	2,310	670	150	70	100	$18,000	$237,700
Rotorua	21,220	4,130	1,720	390	500	$59,200	$2,014,000
Tauranga / Western Bay of Plenty	31,130	6,880	1,295	210	650	$85,000	$2,893,100
Whakatane	7,900	1,650	640	150	250	$28,000	$762,800
Environment B·O·P						$77,000	
Bay of Plenty Region Total	64,910	13,830	4,055	890	1,560	$284,200	$6,140,300

(Source: NZ Road Safety Programme 2001 – 2002, LTSA)

It should be noted that the dollar figures given for Police funding includes the cost of enforcement delivered by the Highway Patrol Group although the hours delivered by the Highway Patrol Group are not shown in the table.

New Zealand "Police hours allocated through the NZ Road Safety Programme are consolidated at the Police District level (the Bay of Plenty Police District encompasses the Opotiki, Whakatane, Kawerau, Rotorua, Western Bay of Plenty, Tauranga, Taupo and South Waikato districts). The NZ Police, through the national resource allocation process, ensure that for every 1,500 hours *of required road safety enforcement delivery, a sworn officer is assigned to a District. Each Police District Manager then has the responsibility for the distribution and work allocation of staff within the District."* [64]

10.5 Community Road Safety Programme

Community projects funded by the New Zealand Road Safety Programme form part of the LTSA's Community Road Safety Programme. The LTSA has developed the Community Road Safety Programme on the basis that community involvement and ownership of road safety issues are essential to successfully deliver road safety initiatives.

For the 2002/03 year, the Community Road Safety Programme provides for the following community projects:

[64] LTSA, 2001, Booklet A, General Information and Reference Material 2002 – 2003 to assist with the preparation of the 2002/2003 NZ Road Safety Programme, page 3.

Table 37: 2002/03 Community Road Safety Programme

Local Authority	Community Projects		
	Project Name	Police Hrs	$
Kawerau	Small Activities Programme		$8,500
	Committee-run Projects		$5,000
Opotiki	He Rangihou New Day Maori TV Advertisement Project		$15,000
Rotorua	Road Safety Co-ordinator		$27,000
	Driver Licensing Programmes	25	$8,100
	Committee-run Community Projects	100	$7,750
	Community-run Projects	375	$10,000
Tauranga / Western Bay of Plenty	Road Safety Co-ordinator		$38,000
	Community-run Projects	170	$10,000
	Alcohol & Speed	460	$20,000
	Road User Behaviour	470	$25,000
Whakatane	EBOP Marae Based Driver Licensing	50	$10,780
Environment Bay of Plenty	Road Safety Co-ordinator (Joint Eastern Bay of Plenty)		$27,000
	Regional Restraints Campaign		$30,000
	Open Road Project		$50,000
Bay of Plenty Region Total		1,650	$292,130

(Source: LTSA)

As can be seen from Table 37 above, the Community Road Safety Programme currently assists in funding the three road safety co-ordinators in the Bay of Plenty – a joint co-ordinator for each of the eastern Bay of Plenty (Opotiki, Whakatane and Kawerau) and the western Bay of Plenty (Western Bay of Plenty and Tauranga) and a co-ordinator for Rotorua.

The function of the co-ordinators is "to co-ordinate, facilitate and manage local efforts to address identified road safety problems in their areas. Their role is to assist and stimulate their communities as they develop a road safety awareness. This is to be done with community groups and other organisations*, in accordance with the goals and targets of the National Road Safety Plan and Regional Land Transport Strategies."*[65] In each instance the co-ordinator's report to a road safety Committee.

The region also has a Regional Road Safety Strategy Group as a sub-committee of the Regional Land Transport Committee. The Regional Manager of LTSA chairs the Group and its membership reflects that of the National Road Safety Committee (i.e. it has members from Transit, Transfund, Police, local government, ACC, etc).

The purpose of the Group is to increase the effectiveness of key strategic road safety partners.

10.6 Forecasts

If we maintain our current road safety efforts, it is estimated that the number of fatalities in the Bay of Plenty from road crashes will remain about the same in 2021 as in 2001 (that is about 43).

[65] LTSA, 2001, Booklet A, General Information and Reference Material 2002 – 2003 to assist with the preparation of the 2002/2003 NZ Road Safety Programme, page 28.

Chapter 11: Environment

11.1 Effects on the Environment of Infrastructure and its Usage

Land transport infrastructure includes roads, rail lines, bridges, culverts, footpaths, etc. Building, maintaining and using that infrastructure can have the following effects on the environment:

11.1.1 Water Resources

Roads provide important access across waterways. *"Good design and construction practices for bridges and culverts in waterways also provides an opportunity to channel water and may reduce the potential risk of flooding in some areas."*[66]

Building, maintaining and improving roads and rail lines can affect the hydrology and quality of water. Rail and road alignments often cross waterways and may affect such things as flows, drainage, flood channels and fish passage. Infrastructure along the coast may need protection or land to be reclaimed to provide for the infrastructure and this may affect coastal processes, tidal estuaries, mudflats and aquatic habitats.

"The amount of paving on" roads may reduce the amount of water entering into *"natural* groundwater *systems, or cause channelling of runoff resulting in erosion. Road surface runoff can affect surface waterways and groundwater by causing silting and damage to vegetation and fish breeding grounds."*[67]

Traffic using the land transport network can also adversely affect water resources, coastal waters, aquatic wildlife and their habitats. One example is manure being deposited on roads, from both, direct spillage off stock trucks and discrete emptying of tanks in transit.

"If disposed of in large quantities to a stream there would be potential for environmental damage. Similarly the runoff of road water carrying manure to stormwater is a contributor to the reduced quality of road stormwater. However, the majority of spilt effluent gets no further than the grass verge of a rural highway where sun acts quickly to kill any micro-organisms and nutrients are absorbed by vegetation and roadside soils.

[66] Transit New Zealand, (1999), Planning Policy Manual, Manual Number SP/M001, Transit New Zealand, Wellington page 19.
[67] Transit New Zealand, (1999), page 52.

Of the complaints logged in the Environment B·O·P database relating specifically to stock truck effluent none could be described as having a major adverse environmental effect. Similarly of the numerous roadside dumping locations observed in the course of this study … all are of minor consequence *as a source of pollution of the wider environment."* [68]

11.1.2 Stock Truck Effluent

In 1998 Environment B·O·P commissioned Opus International Consultants to report on the extent of the stock truck effluent spillage problem in the Bay of Plenty, and investigate the establishment of an initial network of collection points.

Opus concluded that, in conjunction with collection facilities at meat works and sale yards, a small number of strategically located collection sites would contribute significantly to reducing spillage and dumping of effluent. The two priority areas identified were SH 29 near Tauranga (for westbound trucks travelling over the Kaimai Ranges) and the Waioeka Gorge near Opotiki. Subsequent consultation with industry players also identified another possible location to service both through traffic and loads originating on the Rangitaiki Plains.

In September 1999 the Regional Land Transport Committee agreed to investigate the establishment of two stock truck effluent collection facilities in the region. The Committee recommended that Environment B·O·P accept responsibility for determining the location, design, cost and assessment of environmental effects of the two facilities and the Regional Council subsequently endorsed this.

Opus was then commissioned to identify (and did so) several feasible sites at each of the preferred locations. However this assessment was only a preliminary one; any final selection will require further consultation with landowners and other affected parties.

Work on this project is now on hold until after Transit finalises its 'North Island Stock Effluent Disposal Strategy Study' in September 2002.

11.1.3 Air Resources[69,70,71]

The Environment B·O·P Air Emissions Inventory states:

[68] Askey, P., Crawford, J., (1998), Management of Stock Truck Effluent in the Bay of Plenty, Opus International Consultants Ltd, Whakatane, page 11.
[69] Stringfellow, M., (1998), Vehicle Emissions Scoping Report, Environmental Report 98/23, Environment B·O·P, Whakatane.
[70] Read, C. (Dr) (Editor), (1994), How Vehicle Pollution Affects our Health, The Ashden Trust, London.
[71] Ministry of Transport with Technical Assistance from Fuels and Energy Management Group, (1997), Vehicle Fleet Emissions Control Strategy for local Air Quality Management, Stage 1, Carbon Monoxide Emissions from Petrol Vehicles, Ministry of Transport, Wellington.

"The usage of transportation fuels in the region, especially diesel, is much higher than the per capita average*. Presumably this reflects the large volumes of heavy vehicles needed to support activities in the area such as the Port of Tauranga, the forest industries, and possibly horticulture and farming. The high use of diesel fuel results in relatively higher emissions of particulate matter and sulphur dioxide from the transport sector."*[72]

Table 38: Total Annual Emissions for the Bay of Plenty by Source Category (tonnes/year)

	Particulate Matter	Carbon Monoxide	Nitrogen Dioxide	Sulphur Dioxide
Transport	455	16,848	10,193	1,167
Industrial	849	5,687	1,210	646
Residential/Commercial	1,110	7,991	244	243
Agriculture	323	2,661	76	-
Total	2,737	33,187	11,723	2,056

(Source: Weymss and Graham (1997))

Table 39: Estimated Emissions from Road Usage (tonnes/year)

District	Particulate Matter	Carbon Monoxide	Carbon Dioxide	Nitrogen Dioxide	Sulphur Dioxide
Western BOP	88.7	3,027.4	155,825	2,066.1	95.5
Tauranga	112.3	4,554.5	204,879	2,446.8	111.4
Whakatane	68.8	2,381.1	115,551	1,586.8	73.2
Opotiki	18.9	633.6	33,009	442.2	20.5
Kawerau	3.5	120.0	6,147	81.4	3.8
Rotorua	139.5	5,204.2	224,956	3,137.1	143.9
Total	431.7	15,920.8	740,367	9,760.4	448.3
Urban Areas					
Tauranga	113.4	4,388.3		2,329.3	106.0
Rotorua	91.5	3,616.6		2,014.6	92.0
Whakatane	5.2	242.2		106.5	4.8
Total	210.1	8,247.1		4,450.4	202.8

(Source: Weymss, P., Graham, B., (1997) except CO_2)

[72] Weymss, P., Graham, B., (1997), Environment B·O·P Air Emissions Inventory (Revised), Opus International Consultants.

Table 40: Estimated Emissions from Trains (kilograms/year)

District	Particulate Matter	Carbon Monoxide	Nitrogen Dioxide	Sulphur Dioxide
Western BOP	0.31	0.12	1.67	3.92
Tauranga	0.37	0.15	1.98	4.63
Whakatane	0.20	0.08	1.06	2.49
Kawerau	0.01	0.00	0.04	0.10
Rotorua	0.04	0.01	0.19	0.45
Total	0.93	0.36	4.94	11.59
Urban Areas				
Tauranga	0.31	0.12	1.67	3.92
Rotorua	0.00	0.00	0.02	0.05
Whakatane	0.01	0.00	0.05	0.12
Total	0.32	0.12	1.74	4.09

(Source: Weymss, P., Graham, B., (1997))

11.1.3.1 Carbon Monoxide

Carbon monoxide robs the body of oxygen. At low doses carbon monoxide can weaken concentration and neuro-behavioural function. It causes drowsiness and headaches, can worsen cardiovascular problems and is fatal at high concentrations.

Road transport accounts for 51% of carbon monoxide emissions in the Bay of Plenty.

11.1.3.2 Carbon Dioxide

Emissions of carbon dioxide are a concern because it is the second most important greenhouse gas contributing to global warming, after water vapour. The transport sector is a major contributor to carbon dioxide emissions.

In 1996, Wright and Kuschel (1996) estimated that motor vehicles in the region generated 740,367 tonnes of carbon dioxide.

11.1.3.3 Volatile Organic Compounds

Hydrocarbons are more correctly termed volatile organic compounds and include polycyclic aromatic hydrocarbons (PAHs).

One volatile organic compound that has given the most cause for concern is Benzene. It is a cancer-causing agent that can cause leukaemia at higher doses than are present in the normal environment.

PAHs also include other chemicals that are carcinogenic and it is likely that exposure to PAHs in traffic exhaust poses a low cancer risk to the general population.

Volatile organic compounds also contribute to the formation of tropospheric ozone by reacting with nitrogen oxides in the presence of sunlight. Ozone is a secondary pollutant that is made from the reactions of other discharged compounds.

Ozone irritates the eyes and air passages. It increases the sensitivity of the airways to allergic triggers in people with asthma and may increase susceptibility to infection.

Other examples of secondary pollutants are nitrogen dioxide and sulphate. The primary pollutants are nitric oxides and sulphur dioxide. The nitric oxides and

sulphur dioxide combine with oxygen to produce nitrogen dioxide and sulphate - both haze producing particulates.

Nitric oxides increase human susceptibility to viral infections and irritate lung tissue. They can cause bronchitis and pneumonia and contribute to acid rain and smog formation. Road transport accounts for 87% of emissions of nitric oxides in the Bay of Plenty.

Sulphur dioxide may provoke wheezing and worsen asthma. It is also associated with chronic bronchitis. Road transport accounts for 57% of sulphur dioxide emissions in the Bay of Plenty.

11.1.3.4 Airborne Fine Particulates (PM10)

The term "particulate matter" includes more commonly used terms such as dust, smoke aerosols, haze and fallout. Airborne particulate matter can arise from a wide variety of sources, both man-made (e.g. motor vehicle emissions) and natural (e.g. pollens).

Particles sized below 10 microns (0.01 mm) are of special importance, because they are small enough to be inhaled and therefore have an effect on the respiratory system. These are referred to as inhalable particulate, or PM10. Primary particulates are released directly into the air from sources such as diesel combustion. Secondary particles are formed from physical and chemical reactions involving gases such as nitric oxides, sulphur oxides and volatile organic compounds, released into the air.

Particulate matter can be a significant cause of nuisance effects when dust settles on clean surfaces. Airborne particles can also affect visual air quality.

Fine particulates are associated with respiratory symptoms, increased hospitalisations, impaired lung function, increased absence from work and increased death from cardiopulmonary disease and lung cancer. Children, the elderly, smokers, asthmatics and others suffering from respiratory disorders are especially vulnerable to this type of air pollution. Particulates can also carry carcinogenic materials in to the lungs.

A recently released New Zealand report states that "*the most likely estimate of the number of people* above *30 years of age who experience premature mortality in New Zealand due to exposure of PM_{10} particulates from vehicles is 399 per year (with a 95% confidence range of 241 – 566 people).*"[73] The authors of the report stress that the study is a preliminary, but the results are the best estimate based on the available information.

Transport accounts for 17% of particulate matter emissions in the Bay of Plenty.

11.1.3.5 Ambient Air Quality Guidelines74

The Ambient Air Quality Guidelines adopted in 1994 are the minimum requirements that outdoor air quality should meet in order to protect human health and the

[73] Fisher, G.W., Rolfe, K.A., Kjellstrom, Prof T., Woodward, Prof A., Hales, Dr S., Sturman, Prof A.P., Kingham, Dr S., Petersen, J., Shrestha, R., and King, D., 2002, Health Effects Due to Motor Vehicle Air Pollution in New Zealand, Ministry of Transport, Wellington, page i.

[74] Ministry for the Environment, (2000), Proposals for Revised and New Ambient Air Quality Guidelines, Ministry for the Environment, Wellington.

environment. The exposure levels and durations for the pollutants of immediate interest are:

Table 41: Ambient Air Quality Guidelines

Contaminant	Averaging Time	Value
Carbon Monoxide	1 hour 8 hour	30 mg/m^3 10 mg/m^3
Particulate Matter$_{10}$	24 hour Annual	120 μg/m^3 40 μg/m^3
Nitrogen Dioxide	1 hour 24 hour	300 μg/m^3 100 μg/m^3
Sulphur Dioxide	10 min 1 hour 24 hour Annual	500 μg/m^3 350 μg/m^3 125 μg/m^3 50 μg/m^3
Ozone	1 hour 8 hour	150 μg/m^3 100 μg/m^3

The Ministry for the Environment is currently reviewing the 1994 Ambient Air Quality Guidelines. It is likely that there will be changes to many of the guideline values (e.g. the PM_{10} 24 hour value has been reduced from 120 μg/m^3 to 50 μg/m^3) and perhaps the introduction of some others (e.g. $PM_{2.5}$).

11.1.3.6 Air Monitoring

"Environment B·O·P has implemented an air monitoring module of the Natural Environment Regional Monitoring Network (NERMN)".

"The major emphasis of the monitoring programme is to determine levels of the pollutants, carbon monoxide and particulate matter of less than 10 microns in size (PM_{10}). Hydrogen sulphide monitoring is also carried out in Rotorua and it is intended to also monitor benzene and the oxides of nitrogen and sulphur in the future."[75]

11.1.3.7 Particulate Matter

"As expected, the background site at Pongakawa has recorded the lowest overall results, with an annual average of 11.9 μg/m^3. Natural dust sources predominate at this site and the highest results have been recorded during the summer months, when there is less rain to suppress any natural dust.

The results recorded for the residential site at Otumoetai Road, Tauranga, are not much higher than "background", with an annual average of 13.3μg/m3. There is no wintertime increase, which suggests that impacts from domestic heating are minimal.

The results of traffic on calm morning can be seen from the diurnal plots. Other probable sources of peak values are sea spray on days with strong winds from the northerly quarter.

The other residential site in Pererika Street, Rotorua, shows several trends, the most noticeable being the increase in levels during winter. This increase is predominantly

[75] Iremonger, SD and McIntosh, JJ, (1999), NERMN Air Monitoring, Environmental Report 99/17, Environment B·O·P, Whakatane, page iii.

the result of emissions from domestic fires. The site is also influenced by traffic on nearby Amohau Street, especially under stable/light northerly wind conditions.

The highest average of 26.4 μg/m3 recorded so far was at the Fenton Street, Rotorua site. This is expected due to its close proximity to a major intersection.

A mixture of natural and anthropogenic sources is evident at the residential/commercial site in Quay *Street, Whakatane, with the most dominant being sea spray. The high result recorded in June 1998 is believed to be the result of dust generated by road works in the vicinity.*

Reduction *of the MfE PM_{10} guideline from 120 $\mu g/m^3$ to 50 $\mu g/m^3$ has resulted in exceedances at several of the monitoring sites. Fenton Street in Rotorua recorded 4 exceedances and 1 exceedance was recorded at both Quay Street and Pererika Street.*

EPI comparisons ... show that residential sites as expected are predominantly in the 'Excellent' to 'Acceptable' categories. The peak sites (Fenton Street and Marsh Street) have higher PM_{10} levels and *consequently fall in the 'Acceptable' and 'Alert' categories. Fenton Street also had some values that fell into the 'Action' category. Continued and future monitoring will be required at each of the sites in order to access long-term trends.*

11.1.3.8 Carbon Monoxide

Motor vehicles are the primary source of carbon monoxide in the region, and this is reflected in the monitoring *results. The highest values have been recorded at the Fenton Street site, Rotorua, which is regarded as being a peak site due to the heavy traffic flow in the sampling area. The time series data shows a weekday/weekend pattern, which is consistent with changes in traffic flows. Marsh Street being the other peak site also recorded elevated (but below guideline) CO levels as a result traffic flow in the sampling area.*

Carbon monoxide *levels at Pererika Street, Rotorua and Otumoetai Road, Tauranga are both well below the MfE guidelines. Increases during the winter months are mainly due to the increased frequency of stable atmospheric conditions.*

The results recorded *in the programme to date are generally lower than those measured in previous studies in the region. This is mainly due to differences in the location of the monitoring sites, the previous studies having focused on potential worst-case situations. These differences should become less pronounced as the current programme is extended to cover a wider range of monitoring sites.*

EPI comparisons … for the CO monitoring shows 'Good' to 'Excellent' air quality at all monitoring sites." [76]

11.1.4 Natural Features and Landscapes

Infrastructure and the use of that infrastructure can have both a positive and negative effect on natural features and the landscape. The physical presence of the

[76] Iremonger, SD (2002), NERMN Air Monitoring Report, Environmental Report 2002/037, Environment B·O·P, Whakatane, pp 43 - 44.

infrastructure may open up areas that people would not normally have access to, but also reduce the amenity value of the area and result in increased litter and fire risk.

11.1.5 Wildlife Habitats and Indigenous Ecosystems

Infrastructure and the use of that infrastructure may result in the loss or damage of plant and animal habitats, ecosystems and processes (through such things as the introduction of pest plants and animals, or the creation of a physical barrier to the movement of wildlife).

11.1.6 Historical, Heritage and Cultural Sites

Building, maintaining and improving infrastructure may result in damage or disturbance to archaeological sites, heritage buildings and places of significance to Tangata Whenua. Once the infrastructure can be used, there may also be adverse effects from the use of that infrastructure (such as vibration and noise).

11.1.7 Construction and Maintenance Material

Materials extracted to build infrastructure are non-renewable and the extraction process may create adverse effects on the environment.

'Bay Trends' notes that:

"Most of the gravel bearing rivers are stable."

"Over the longer term (30 years), gravel extraction in the Whakatane, Waimana and Waioeka Rivers has generally been similar to the rate of natural replenishment, while in the Otara River, gravel deposition has far exceeded extraction."

"Unless properly controlled, excessive gravel extraction can occur either throughout a river system or in localized reaches. Contractors prefer to extract gravel close to a processing site because it is cheaper and easier. There is also pressure to extract higher quality gravel, in some cases from rivers where controls are in place to reduce extraction (e.g. Whakatane River), whereas it is difficult to encourage contractors to extract from rivers with lesser quality gravel (e.g. Otara River)."

"Gravel extraction is now carefully managed to maximise benefits to the environment. Rules are set out in the Proposed Regional Gravel Plan which will set the framework for future applications."[77]

11.1.8 Social and Economic Effects

Land transport networks provide access to economic, social and educational opportunities and contribute to the well being of the community at large. Roads and rail lines also provide the corridor for a number of infrastructural facilities such as electricity and telecommunication lines.

Increased traffic volumes on existing state highways may disrupt the functioning of existing communities and adjoining land uses. Construction or realignments of infrastructure *"can affect existing* communities *in a number of ways including:*

[77] Environment B·O·P, 2001, Bay Trends, Report on the State of the Bay of Plenty Environment 2001, Environment B·O·P, Whakatane, pages 16, 18, 19.

- acting as a barrier by dividing parts of a community from services (such as schools), facilities (shopping centres), or disrupting ease of communication with other parts of the community;

- acting as a barrier between different communities;

- causing property severance (the division of property into separate parts) in rural areas;

- causing economic decline or business relocation when road users choose an alternative route; and

- affecting the amenity values of an area."[78]

Using the infrastructure can also result in social costs (from accidents). For example the deposition of manure from stock trucks in the roadside environment raises road safety concerns.

The spillage of effluent on to roads has the potential to reduce traction creating risk for the motorist and even more so for the motorcyclist. In wet weather there is a potential hazard through loss of visibility from the spray. *"Nonetheless there appear to be only one or two instances in which manure on the road from a stock truck has been directly linked to a fatal accident through loss of control."*[79]

Steep gradients (probably associated with slick road surfaces anyway) and high traffic volumes are locations where effluent on the roads has an increased potential for accidents. *"Cases in point would be SH 29 over the Kaimais and to a lesser extent the Ohope Hill. Nonetheless the overall risk is assessed to be low."*[79]

[78] Transit New Zealand, (1999), pages 27 - 28.
[79] Askey, P., Crawford, J., (1998), page 11.

11.1.9 Noise Effects

Noise may be generated from building and maintaining and using the infrastructure. Noise from using the infrastructure may, in some circumstances, disrupt sleep, interfere with hearing, interfere with social and business activities and have a detrimental effect on health. Infrequent or excessively loud noise from the use of the infrastructure during the night, can sometimes be disruptive.

Noise arising from the use of the infrastructure, increases with increased volumes, speed, the gradient of the infrastructure, changes in flow and on roads, increasing numbers and sizes of commercial vehicles.

While section 16 of the Resource Management Act 1991 imposes a duty to avoid unreasonable noise on every occupier of land, the application of section 16 to road noise was rejected in Walker v Manukau CC EnvC C213/99, noted [2000] BRM Gazette 1. The Court found that the duty under section 16(1) is imposed on the occupier of land, which, in the case of roads, would be the roading authority, not the users of the roads. Further, regulation 29 of the 1976 Traffic Regulations controls noisy vehicles and is a more relevant statutory constraint on road users.[80]

Territorial authorities are able to control some types of noise emissions, for example engine brakes, through their by-law making powers.

11.1.10 Vibration Effects

Vibration is a low frequency wave below the level of human hearing. It can be transmitted through the ground and air and is caused by a one-off event rather than being continuous (e.g. a truck passing by). Vibration may be generated through building, maintaining, improving and using the infrastructure.

In some circumstances vibration may cause disturbance or anxiety to occupants of neighbouring buildings and to pedestrians. The degree of vibration depends on many factors including the structural response of the building, amount of separation of the building from the road or rail line, ground conditions, sub-soil type, if there is any road surface irregularity, vehicle type, weight, speed and suspension.

11.1.11 Visual Effects

Some aspects of the infrastructure can enhance the visual amenity of the environment (for example, the planting of trees and shrubs on road reserves). However, infrastructure and the use of that infrastructure can also adversely affect the visual amenity of an area.

One example is manure being deposited in the roadside environment, both from direct spillage off stock trucks and from discrete emptying of tanks in transit.

[80] Brookers Resource Management, June 2001 Update.

"Spilt manure definitely causes nuisance to other road users. An example would be spray in wet weather flicking up onto following traffic. This is particularly unpleasant for motorcyclists. Occasionally members of the public will stop at a metal pit area and find conditions not to their liking.

Spillage in urban areas is a particular cause of complaint. The survey of local authorities identifies Hamurana*, Ohope Hill, Matata and Te Puke as records of complaints in the past."*[81]

11.2 Effects of Adjacent Activities on Infrastructure

Infrastructure is recognised as part of the environment and can itself be affected by activities that take place adjacent to it, in the following ways:

11.2.1 Access

Roads make a significant contribution to a community's social and economic well being by providing access to a wide range of activities. However, for state highways, "access has the greatest actual and potential effect on (their) safe and efficient operation". "Research indicates that there is a strong correlation between the frequency and use of accesses and accident rates. As the density and use of accesses along a state highway increases, the ability of the road to operate efficiently … diminishes."

"While providing for access, the principal role of the state highway system is to provide a 'through road' function so *that there is connectivity between regions for transportation of people and goods."*[82]

11.2.2 Signs

Signs are important for passing on information. However, in some circumstances signs will distract drivers. *"The potential for driver distraction to result in accidents is greatest when signs are inappropriately* located *near intersections, are obscuring traffic signs or signals, are not legible or contain too much information to be readily absorbed by drivers."*[83]

11.2.3 Glare/Light Sources

"Lighting can result in adverse effects on road safety if it shines directly at drivers, or if illumination distracts the driver's *attention." "The effects of lighting are influenced by the topography of the area, the orientation of the lighting and the type of lighting used"*.[84]

[81] Askey, P., Crawford, J., (1998), page 12.
[82] Transit New Zealand, (1999), page 40
[83] Transit New Zealand, (1999), page 46.
[84] Transit New Zealand, (1999), page 52.

11.2.4 Vegetation

Vegetation adds to the amenity value of the land transport network and assists with alignment definition. It also assists in controlling erosion by stabilising slopes and preventing sediment runoff.

However, as well as having benefits, vegetation can also restrict driver sight lines, obscure official signs, reduce the effect of road lighting and shade some areas preventing the thaw of ice or snow. Vegetation that is not easily broken down can also increase the risk of injury in a crash (for example a tree). These adverse effects are more pronounced in rural areas where speeds are greater.

11.2.5 Social Effects

The forecast social cost from crashes on the roading network is discussed in the Road Safety section of the report.

11.2.6 Noise and Vibration

If the same conditions prevail in 2021 as prevail today, then it can be assumed that in some places there will be an increase in traffic noise and vibration as a result of projected increased traffic volumes.

Chapter 12: Modes

12.1 Freight Traffic

12.1.1 Rail

Rail plays an important role in the region's transport system, principally in the movement of freight to and from the Port of Tauranga and major industrial processing centres.

The main commodities carried by rail in the Bay of Plenty include logs, wood pulp, paper and paperboard, dairy products, fertiliser and steel. A significant proportion of this traffic services the port; 37% of the export trade through the port in 1992 - comprising pulp and paper, logs, steel and dairy products - was carried by rail.

12.1.2 Road

The only readily available information that Environment Bay of Plenty has access to is drawn from a presentation by the Road Transport Forum (RTF) to a joint meeting of Transit and Transfund New Zealand on 5 April 2002 called "How Large is the Tauranga Road Transport Task". The RTF estimates:

- State Highway 2 north of Tauranga carries about 1.2 million tonnes of freight per annum, or just over 43,500 trucks per annum (about 150 per day);
- State Highway 2 south of Tauranga carries about 3.3 million tonnes of freight per annum, or just over 119,000 trucks per annum (about 420 per day);
- State Highway through Tauranga carries about 1.1 million tonnes of freight per annum, or about 41,000 trucks per annum (about 140 per day); and
- State Highway 29 over the Kaimais carries about 3 million tonnes of freight per annum, or about 108,000 trucks per annum (about 380 per day).

The RTF estimates that this means that there are close to 2,200 truck movements per day through Tauranga , or one truck movement every 40 seconds. Furthermore, the amount of freight being carried by road is increasing by about 10% per year, or an extra 220 truck movements per day.

12.2 Car

12.2.1 Cars as a Mode of Transport

The 1997/98 New Zealand Travel Survey estimated that 47.6 billion kilometres were annually travelled by New Zealanders and of that, 53% were travelled by drivers of cars, vans and utilities. Car, van and utility passengers travelled another 33% of the total annual kilometres travelled. The two statistics together shows that 86% of the total kilometres travelled were either as a driver of, or a passenger in a car, van or utility.

Clearly, for personal travel the car is the dominant mode.

Nationally, between 1989/90 and 1997/98:

- the number of trips made by drivers of cars, vans or utilities increased from 2,400 million in 1989/90 to 2,900 million (a 23% increase);
- the number of kilometres travelled by drivers of cars, vans or utilities increased from 18 billion in 1989/90 to 25 billion in 1997/98 (a 16% increase);
- the average kilometres per trip for drivers of cars increased from 7.6 in 1989/90 to 8.4 in 1997/98 (a 11% increase);
- the average kilometres per trip for drivers of vans or utilities increased from 8.6 in 1989/90 to 10 in 1997/98 (a 16% increase);
- the number of trips made by passengers aged five years and over in cars, vans or utilities increased from 1,100 million in 1989/90 to 1,300 million (a 12% increase);
- the number of kilometres travelled by passengers aged five years and over in cars, vans or utilities increased from 11.7 billion in 1989/90 to 13.5 billion in 1997/98 (a 16% increase);
- the average kilometres per trip for passengers aged five years and over in cars decreased from 10.7 in 1989/90 to 10.3 in 1997/98 (a 4% decrease);
- the average kilometres per trip for passengers aged five years and over in vans or utilities decreased from 12.3 in 1989/90 to 12 in 1997/98 (a 2% decrease).

In terms of age (for the population aged 15 years or older), the 35 to 39 year age group made the most trips and travelled the most kilometres as drivers of cars, vans and utilities. The longest average trip was made by the 25 to 29 year age group and was closely followed by the 20 to 24 year age group.

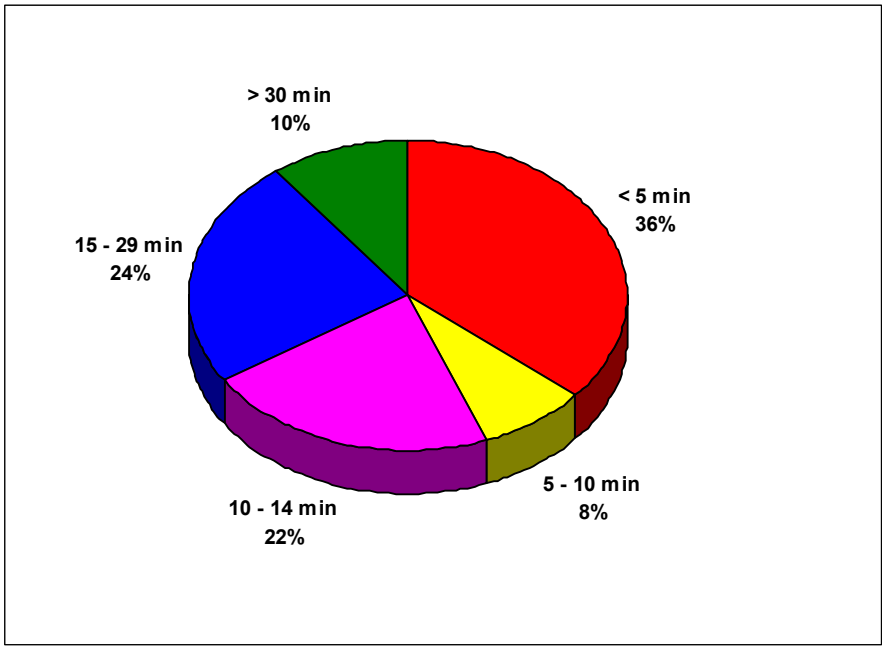
For passengers in cars, vans and utilities (for all age groups), the 0 to 4 year age group made the most trips and travelled the most kilometres. The 40 to 44 year age group made the longest average trip.

In terms of gender and age (for the population aged 15 years or older) males made more trips than females (except for the 20 – 24, 35 – 39 and 40- 44 year age groups), travelled further (all age groups) and had a longer average trip length (all age groups) as drivers of cars, vans and utilities.

For all age groups, female passengers in cars, vans and utilities made more trips than males (except for the 0 – 9 year age groups) and travelled further (except for the 0 – 14 year age groups). Male passengers in cars, vans and utilities and had a longer average trip length for all age groups except 20 – 24, 50 – 60 and 75 – 79 years.

In terms of gender and age (for the population aged 15 years or older) males made more trips than females (except for the 20 – 24, 35 – 39 and 40- 44 year age groups), travelled further (all age groups) and had a longer average trip length (all age groups) as drivers of cars, vans and utilities.

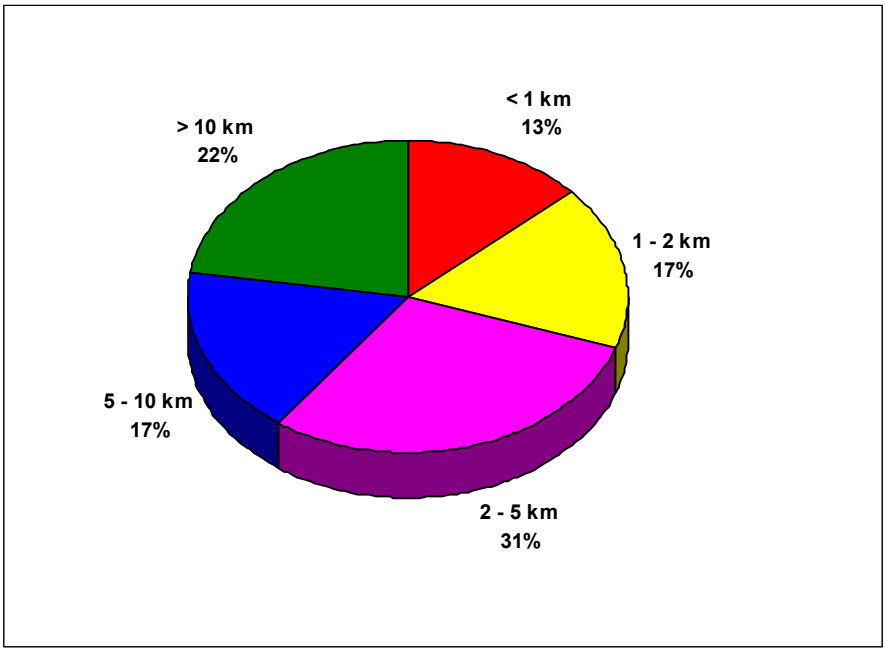
Of all the trips made by drivers of cars, vans and utilities, Figure 15 shows that over a third were for trips of less than five minutes. The trend for passengers was only marginally different, with 35% of passenger trips lasting less than five minutes.



(Source: New Zealand Travel Survey 1997/98)

Figure 15: Trip Duration – Car, Van and Utility Drivers

Short trip durations reflected short trip distances. As can be seen from Figure 16, just under a third of trips by drivers of cars, vans and utilities were for distances of up to two kilometres; just under another third were for distances of up to five kilometres; and the remainder were for distances over five kilometres. The trend for passengers almost exactly matched that for drivers.



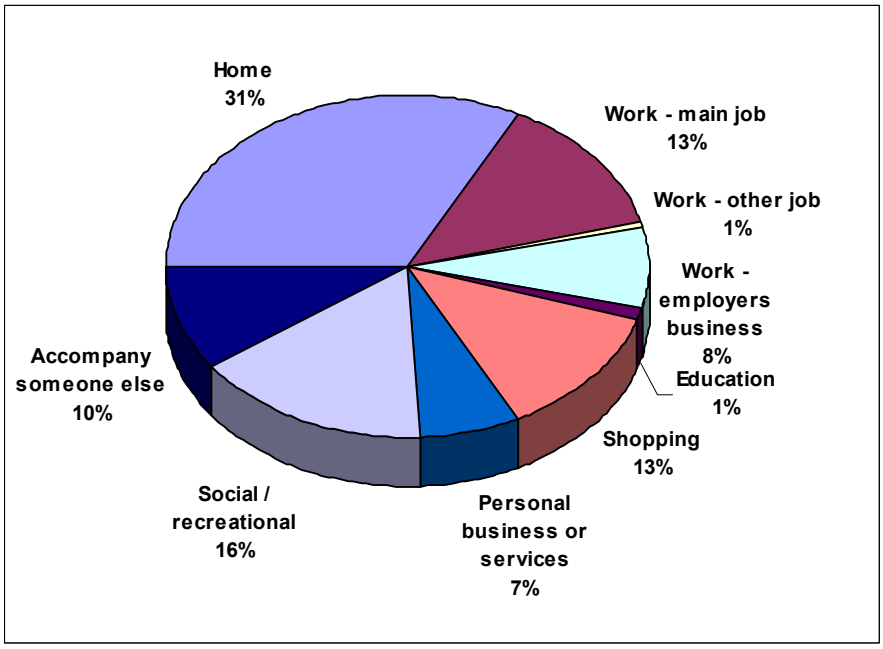
(Source: New Zealand Travel Survey 1997/98)

Figure 16: Trip Distance – Car, Van and Utility Drivers

Distance driven by all vehicles (not only cars, vans and utilities), peaks between 8:00 and 9:00 am and then peaks again between 4:00 and 5:00 pm and greatest distance is driven on a Friday.

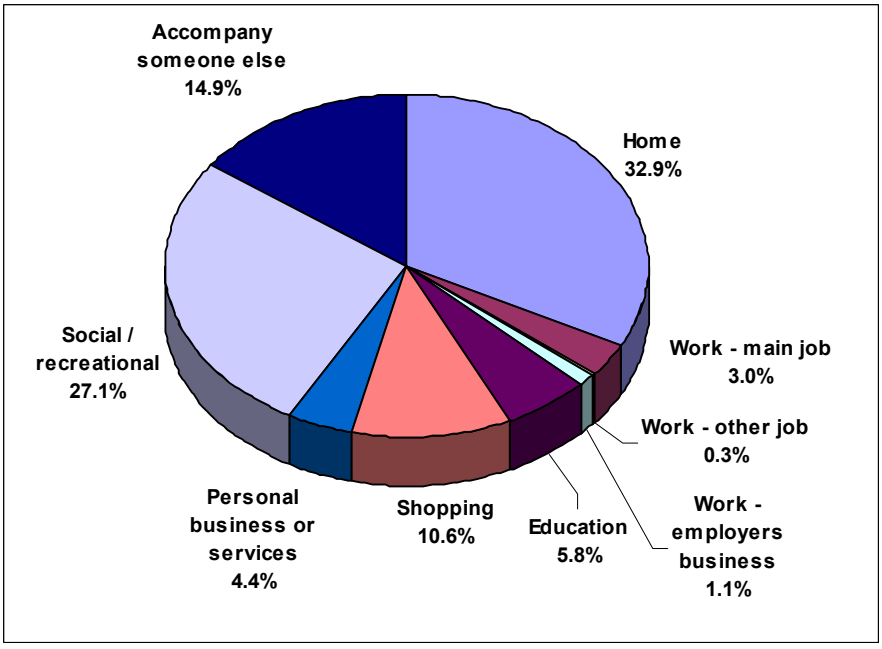
People most commonly drove a vehicle (not only cars, vans and utilities) to undertake a social or recreational activity (Figure 17). The next most important purpose was to go to work.[85]

[85] It should be noted that while Figure 17 and Figure 18 show that 31% and 33% respectively, of trips were 'Home' this includes trips from work to home, school to home, etc. Trips for this purpose are simply trips returning from doing something else and are therefore ignored.



(Source: New Zealand Travel Survey 1997/98, page 40)

Figure 17: Trip Purpose – Vehicle Driver



(Source: New Zealand Travel Survey 1997/98, page 40)

Figure 18: Trip Purpose – Vehicle Passenger

Figure 18 also shows that undertaking a social or recreational activity was the most common trip purpose for being a passenger in a vehicle. Unlike vehicle drivers however, the next most common trip purpose was not to travel to work, but was to accompany someone else.

The 1997/98 New Zealand Travel Survey estimated that Bay of Plenty drivers of cars, vans and utilities annually travelled 1.7 billion kilometres. Bay of Plenty car, van and utility passengers over five years travelled another billion kilometres.

The average trip length for drivers of cars, vans or utilities in Rotorua was about 14 kilometres; seven kilometres in Tauranga; 11 kilometres for the other parts of the region and an average of ten kilometres for the region.

As can be seen by comparing the figures in Table 42 with the figures in Figure 15, trip durations for drivers of cars, vans or utilities in the Bay of Plenty were very similar to national trends (nationally 36% of trips were of less than five minutes duration compared to 38% in the Bay of Plenty). At a local level however, some differences were apparent.

In Rotorua, median trip durations were longer than those made in Tauranga and nationally (62% of trips in Rotorua were for durations longer than ten minutes compared to 50% in Tauranga and 56% nationally). Similarly, median trip durations in Tauranga were shorter than those made nationally (50% of trips in Tauranga were for durations of less than ten minutes, compared to 44% nationally).

Table 42: Trip Duration – Car, Van and Utility Drivers (Bay of Plenty)

Trip Duration	Rotorua	Tauranga	Other Parts of the region	Bay of Plenty Region
< 5 min	32%	39%	39%	38%
5 - 10 min	5%	11%	6%	8%
10 - 14 min	21%	27%	18%	23%
15 - 29 min	27%	18%	25%	22%
> 30 min	14%	5%	13%	9%
Unknown	0%	0%	0%	0%
Total	100%	100%	100%	100%

(Source: New Zealand Travel Survey 1997/98)

Table 43: Trip Distance – Car, Van and Utility Drivers (Bay of Plenty)

Trip Distance	Rotorua	Tauranga	Other Parts of the region	Bay of Plenty Region
< 1 km	10%	14%	13%	13%
1 - 2 km	17%	20%	19%	19%
2 - 5 km	36%	36%	23%	31%
5 - 10 km	21%	19%	15%	18%
> 10 km	16%	11%	31%	19%
Total	100%	100%	100%	100%

(Source: New Zealand Travel Survey 1997/98)

Comparing the figures in Table 43 with the figures in Figure 16, shows that trip distances for drivers of cars, vans or utilities in the Bay of Plenty were very similar to national trends. However, a third of the trips in Tauranga were for distances less than two kilometres while in Rotorua just over a quarter of trips were for this distance. Places in the region other than Tauranga and Rotorua made longer trips (46% of trips were for distances of five kilometres or greater compared to 37% for Rotorua, 30% for Tauranga and 39% nationally).

With one exception, trip duration and distance trends for Bay of Plenty passengers in cars, vans and utilities were similar to the trends for drivers. In Rotorua, almost half of passenger trips were for durations of less than five minutes compared to a third of driver trips. Similarly, over a third of passenger trips were for distances of less than two kilometres compared to just over a quarter of driver trips.

12.2.2 Journey to Work

At the time of the 2001 Census, the dominant mode of travel to work in the Bay of Plenty was as a driver of a private or company car, truck or van (see Table 44). No other mode came close to challenging the dominance of this form of transport.

At that time about 60% of employed people drove to work in a private or company car, truck or van (a 2% increase on the 1996 Census). If we exclude those people who did not go to work, worked at home or did not specify a means of travel to work from the total figures, then 82% of people actually travelling to work did so by car, truck or van.

Table 44: Journey to Work on Census Day 2001

Main Means of Travel to Work	Western BOP	Tauranga	Rotorua	Whakatane	Kawerau	Opotiki	Bay of Plenty
Worked at home	3,969	2,895	2,475	1,677	81	561	11,658
Did not go to work today	1,998	4,941	3,195	1,662	318	336	12,450
Drove a private car, truck, or van	7,449	20,355	13,989	6,003	1,125	1,272	50,193
Drove a company car, truck, or van	1,572	4,560	3,342	1,218	123	237	11,052
Passenger in a car, truck, or company bus	531	1,428	1,536	564	126	156	4,341
Public bus	42	147	174	21	6	6	396
Train	9	21	21	12	6	3	72
Motor cycle or power cycle	198	372	324	213	42	57	1,206
Bicycle	144	1,032	687	414	108	48	2,433
Walked or jogged	588	1,356	1,272	789	156	213	4,374
Other (such as taxi, ferry, aeroplane)	54	177	147	42	6	12	438
Not specified	624	1,209	1,167	573	126	189	3,888
Total	17,178	38,493	28,329	13,188	2,223	3,090	102,501

(Source: Statistics New Zealand, 2001 Census)

The third most common way of travelling to work was as a passenger in a car, truck or company bus (just over 4% of the usually resident employed population).

If the two statistics are combined, then the number of vehicles making the joruney to work with only one occupant was very high (single occupancy vehicles - SOV).

Table 45: Single Occupancy Vehicle Trips to Work in 1996 and 2001

1996	Total drove a private or company car, truck, or van	Passenger in a car, truck, or company bus	Estimated SOV* Trips	% of the total travelling to work in a car, truck, van, company bus that travelled in a SOV*
Western Bay of Plenty	7,803	528	7,275	93.2%
Tauranga	20,418	1,407	19,011	93.1%
Rotorua	16,773	1,800	14,973	89.3%
Whakatane	6,573	660	5,913	90.0%
Kawerau	1,296	177	1,119	86.3%
Opotiki	1,356	120	1,236	91.2%
BOP Region	54,219	4,692	49,527	91.3%

2001	Total drove a private or company car, truck, or van	Passenger in a car, truck, or company bus	Estimated SOV* Trips	% of the total travelling to work in a car, truck, van, company bus that travelled in a SOV*
Western Bay of Plenty	9,021	531	8,490	94.1%
Tauranga	24,915	1,428	23,487	94.3%
Rotorua	17,331	1,536	15,795	91.1%
Whakatane	7,221	564	6,657	92.2%
Kawerau	1,248	126	1,122	89.9%
Opotiki	1,509	156	1,353	89.7%
BOP Region	61,245	4,341	56,904	92.9%

(Source: Statistics New Zealand, 2001 Census)

(* Assumes that each high occupancy vehicle (HOV) only carried two people (driver and passenger). The effect of this assumption is to overstate single occupancy vehicle rates (although probably not by a great amount)).

As we can see from Table 45, between 1996 and 2001:

- the number of people driving to work in a car, truck or van increased in all districts (especially Tauranga), except Kawerau; and
- the number of people being driven to work in a car, truck or van generally stayed the same or decreased (especially in Rotorua) in all districts.

Consequently, the estimated percentage of vehicles that made the journey to work on Census day only carrying one person increased in all districts, except in Opotiki.

12.2.3 Forecasts:

Based purely on projected increases in the population 15 years or older, the forecasted increases in driver and passenger car, van or utility travel that will take place in 2006 and 2021 are (see Table 46 and

Table 47):

Table 46: Forecasted Car, Van or Utility Driver Travel

	1997/98		2006		2021	
	Million km per year	Million trips per year	Million km per year	Million trips per year	Million km per year	Million trips per year
Rotorua	344.1	24.4	349.1	24.8	361.0	25.6
Tauranga	607.7	85.1	637.7	89.3	733.2	102.6
Other parts of the region	763.3	68.9	809.2	73.1	869.1	78.5
Bay of Plenty Region	1,715.0	178.4	1,796.1	187.1	1,963.3	206.7

(Based on: New Zealand Travel Survey 1997/98 and Statistics New Zealand Population Projections)

Table 47: Forecasted Passenger (five years or older) Travel in Cars, Vans or Utilities

	1997/98		2006		2021	
	Million km per year	Million trips per year	Million km per year	Million trips per year	Million km per year	Million trips per year
Rotorua	123.2	8.8	125.1	9.0	129.3	9.3
Tauranga	413.3	39.8	433.7	41.7	498.6	48.0
Other parts of the region	529.9	37.1	562.9	39.4	599.2	42.0
Bay of Plenty Region	1,066.4	85.7	1,121.7	90.1	1,227.1	99.2

(Based on: New Zealand Travel Survey 1997/98 and Statistics New Zealand Population Projections)

The figures above make no allowance for any growth or reduction in car travel (i.e. an increase or decrease in the number of trips made or the distance travelled) or change in modal share.

As can be seen from the Table 46 above, by 2006 it is forecast that car, van or utility drivers in Tauranga will drive an additional 30 million kilometres a year equating to an additional four million trips. By 2021, the 1997/98 figure for car, van or utility drivers will have grown by an additional 126 million kilometres and an additional 18 million trips.

Significant growth is also forecast to take place in other parts of the region, although most of this growth will probably take place in the Western Bay of Plenty District which is forecast to have a 70% increase in population by 2021.

Consistent with the projected growth in car, van or utility driver travel in Tauranga, is the growth in passenger travel in this area (

Table 47). By 2006 it is forecast that car, van or utility passengers will travel an additional 20 million kilometres a year equating to an additional two million trips. By 2021, the 1997/98 figure for car, van or utility passenger travel will have grown by an additional 85 million kilometres and an additional 8 million trips.

12.3 Public Passenger Transport

The public passenger transport needs of the Bay of Plenty region, and the policies and proposals to address those needs are set out in the Bay of Plenty's Regional Passenger Transport Plan. The Plan forms part of the Regional Land Transport Strategy.

12.3.1 Public Passenger Transport as a Mode of Transport

The 1997/98 New Zealand Travel Survey estimated that 2% of all travel trips nationally, were made by bus and less than 0.5% by taxi.

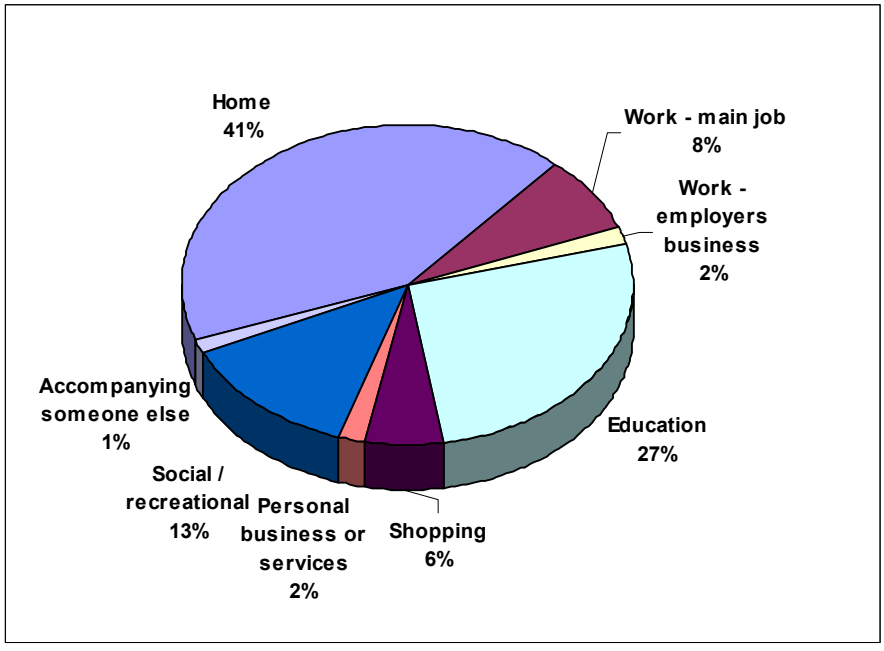
Nationally, between 1989/90 and 1997/98 the number of bus trips increased by 13% and the number of taxi trips by 6%.

Children aged less than 15 years old made over 40% of total bus trips. The 10 - 14 and 15 - 19 age groups made a substantially higher proportion of their trips by public transport than other age groups and females made more bus trips than males.

The average bus and taxi trip lengths were 13.7 km and 5.4 km, respectively. Compared to trips as a 'driver', 'passenger', 'cyclist' and in a 'taxi', bus passengers made the greatest proportion of trips in excess of ten kilometres (about 40% of all bus trips).

The most common trip duration by bus was 15 to 30 minutes. By taxi, the proportion of trips of five to ten minutes and 15 to 30 minutes was about the same. Both bus and taxi had very low proportions of trips less than five minutes.

As can be seen from Figure 19, people most commonly used a bus to enable them to undertake education. The next most important purpose was to undertake social/recreational activities.[86]



(Source: New Zealand Travel Survey 1997/98, page 40)

Figure 19: Trip Purpose – Bus

[86] It should be noted that while Figure 17 show that 41% of trips were 'Home' this includes trips from work to home, school to home, etc. Trips for this purpose are simply trips returning from doing something else and are therefore ignored.

On Census day in 1996, less than 1% of the workforce in the Bay of Plenty used public passenger transport to travel to work. At a local level, the proportion of the workforce using public passenger transport to travel to work ranged from 0.2% in Whakatane District to 0.8% in Rotorua District (see Table 48).

Table 48: Main Means of Travel to Work – Public Passenger Transport

	Number of Employed Usually Resident Population Aged 15 Years and Over that Used a Bus (2001)	% of Employed Usually Resident Population Aged 15 Years and Over that Used a Bus (2001)
Western BOP	42	0.4%
Tauranga	147	0.5%
Rotorua	174	0.8%
Whakatane	21	0.2%
Kawerau	6	0.3%
Opotiki	6	0.3%
Bay of Plenty	396	0.5%

(Source: Statistics New Zealand)

Table 49: Number of Registered Total Mobility Users as at October 2002

District Council		No. Total Mobility Users	% of Total Total Mobility Users
Kawerau District		6	0.2%
Opotiki District		1	0.0%
Rotorua District		822	30.2%
Tauranga District		1,643	60.4%
Western Bay of Plenty District	Katikati	13	
	Omokoroa	3	
	Te Puke	63	2.9%
Whakatane District	Edgecumbe	3	
	Te Teko	1	
	Whakatane & Ohope	166	6.2%
Total		2,721	

(Source: Environment B·O·P database)

As can be seen from Table 49 above, there are currently 2,721 people registered with Environment Bay of Plenty to use Total Mobility. Of this number:

- 60% resided in Tauranga
- 66% were female;
- 78% were aged 65 years or greater; and
- 85% claimed European ethnic origins.

Over the last year, Environment B·O·P has received new Total Mobility registrations at an average of about 36 per month.

12.3.2 Factors Affecting Demand for Public Passenger Transport

12.3.2.1 'Choice' vs 'Captive'

Broadly speaking there are two types of passengers who use public passenger transport. They are:

- Choice passengers – people who have another form of transport available to them other than public passenger transport. Generally they will tend to only use public passenger transport services when external factors 'force' them to (such as lack of parking at reasonable cost or very congested roads). However, this group will only switch to public passenger transport if the service provided is perceived as better than the motor vehicle.

- Captive passengers – people who do not have another form of transport available to them for the majority of their travel, other than public passenger transport. They will tend to use public passenger transport where it is affordable and provides a good network of services.

12.3.2.2 Land Use & Accessibility

The land-use pattern of a city has a significant impact on the amount of travel undertaken, and the transport modes used. A recent review by Booz·Allen & Hamilton of the international evidence on the impact of land-use on travel behaviour found that:

- The ease of access to employment, shopping and recreational opportunities is the most important factor in determining the amount of travel undertaken.

- Higher residential density areas have higher public passenger transport use and lower car use than lower density areas.

- Cities where jobs are concentrated in the CBD and several other employment nodes have higher public passenger transport usage than cities where jobs are more dispersed.

- Improving the mix of different land uses (e.g. residential, commercial, industrial, retail etc) increases the tendency to use non-car travel modes.

- Improving the jobs-housing balance within an area can favour public passenger transport where car ownership is low and public passenger transport is good.

- Neighbourhood design has an impact on travel behaviour.

- The availability and cost of car parking at destinations has a significant effect on mode of travel. Where car parking is constrained, or perceived as very expensive, public passenger transport usage is higher.

12.3.2.3 Demographics

As part of a project for Transit investigating public transport dependence, Booz·Allen & Hamilton analysed transport survey data from Wellington, Auckland and

Christchurch to assess the characteristics of regular public transport users[87]. The main findings were that:

- Car availability/ownership was the most significant single variable influencing public transport usage. In Wellington, people in households with no car available made over three times the proportion of trips by public transport as people for whom a car may be available, and six times the proportion of those for whom a car was definitely available.

- Income was much less important, apart from its relationship to car ownership.

- The 5-14 and 15-19 age groups made a substantially higher proportion of their trips by public transport than other age groups. The over 65-age group was next highest in Auckland (but not in Wellington which has a higher proportion of commuters using public transport), but made less trips in total than other age groups. The 15 to 19 age group were the highest users of public transport, with Wellington people in this group making twice the proportion of trips by public transport as all other groups.

- There was little difference between males and females in the proportion of trips made by public transport.

The key demographic measures of interest in regard to public transport usage are therefore car ownership and age.

12.3.2.4 Benefits of Public Passenger Transport

The community benefits of public passenger transport are:

- congestion relief (urban public passenger transport only);

- environmental benefits such as improved transport safety (reduced road accidents), decreased pollution (noise, emissions, global warming, water) and decreased energy consumption;

- the requirement for car parking (urban public passenger transport only)[88];

- improved mobility for the transport disadvantaged (people who, for reasons of age, disability or economic circumstance, do not have access to private transport and therefore, may have relatively poor access to employment, shopping, social and recreational opportunities); and

- to provide another travel option (many people within a community are willing to pay to have a public passenger transport service available as a potential back-up for when their car is out of action, for example).

12.3.2.5 Role of Public Passenger Transport

Public passenger transport has two main roles:

[87] Booz·Allen & Hamilton (NZ) Ltd, 'Survey of Public Transport Dependent People', 1995

[88] It should be noted that the level of any environmental or parking benefits in urban areas depends on how well public passenger transport reduces car usage.

- to provide an attractive alternative to using private motor vehicles for travel to major activity centres; and

- to provide adequate access to employment, shopping, amenities, services, and recreation, for the transport disadvantaged.

Currently, the role of public passenger transport in the Bay of Plenty is to meet the needs of the transport disadvantaged. It is on this basis that Environment Bay of Plenty currently funds urban bus services in Rotorua and Tauranga, Total Mobility across the region and inter-urban services in the eastern Bay of Plenty in the future.

12.3.3 Passenger Rail

Up until late 2001, week-day passenger rail services were operated between Auckland and Rotorua (the Geyserland Express) and Auckland and Tauranga (the Kaimai Express), by Tranz Rail.

In 2001 Tranz Rail's passenger rail business was sold and the new owners made a decision not to continue with these two services (along with other services around the country)

Since this time the Geyserland Trust has been established in Rotorua with the purpose to re-implement a service between Rotorua and Auckland.

Over the same period the issue of urban passenger rail in Tauranga has also been raised. The 'Tauranga Public Transport Study' prepared by Booz·Allen & Hamilton (New Zealand) Ltd for Environment Bay of Plenty and the Tauranga District Council concluded:

"The rail and ferry modes are substantially more expensive than the bus options. This is due to the substantial infrastructure required for the rail options, and the much higher vehicle costs (even taking into account the greater passenger capacities of rail vehicles eg a railcar could carry around 150 people at a cost of $3 million, whereas the same number of people could be carried by 4 buses at a cost of $1 million). Ferry vessels are also substantially more expensive than buses.

The rail modes have the advantage over conventional bus services in that they are separated from road traffic, and are therefore able to match, and sometimes exceed, the average speed of motor vehicles for comparative journeys (a Busway can also achieve this benefit, with greater flexibility).

Given the higher cost of rail services they also require much higher population and employment densities than bus services to be cost-effective (due to the much higher passenger capacities).

Rail type services are not likely to succeed in cities below 200,000 population.

The minimum demand requirement for rail services is around 30,000 passenger trips per weekday per rail corridor. The estimated demand for public transport services in Tauranga is around 200 passenger trips per route per day.

The most appropriate service strategy to meet the roles envisaged for public transport in Tauranga is therefore to implement a conventional bus service network."[89]

12.3.4 Total Mobility

Although the Total Mobility scheme is a regional scheme in the Bay of Plenty, Table 49 clearly demonstrates that it best serves urban areas (over 90% of current users live in Rotorua and Tauranga) and is not particularly good at meeting the needs of rural communities. There are a couple of reasons for this.

The first is that participation in Total Mobility is limited by the location of the existing taxi fleets – fleets are currently only based in Tauranga, Rotorua and Whakatane. Secondly, the further away from the centre of Tauranga, Rotorua and Whakatane, the greater the cost of taxi travel (cost is therefore the limiting factor on whether or not and how often, you can travel). For example, while Table 49 shows that there are six people in Kawerau currently registered to use Total Mobility, the cost of a taxi trip between Kawerau and Whakatane is between $50 and $60.

Other issues are:

- The high proportion of female users compared to male users. As noted above, 70% of the people currently registered to use Total Mobility are female and 79% of all registrants are aged 65 years or more. Based on an assumption that the rates of disability for males and females in this age group are the same, it would be expected that the proportion of males and females registered for Total Mobility would be the same as for the general population. They're not. For the region as a whole 55% of the population aged 65 years or more were female.

- The low proportion of Maori registered for Total Mobility. About 9% of those currently registered for Total Mobility, indicated they were Maori. In 1996, Maori comprised 28% of the region's population. Based on an assumption that the rates of disability for all ethnic groups are the same, it would be expected that the proportion of Maori registered for Total Mobility would be the same as for the general population.

12.3.5 Forecasts:

12.4 Slow Modes

12.4.1 Walking and Cycling[90] as Modes of Transport

The 1997/98 New Zealand Travel Survey estimated that almost 20% of all travel trips nationally, were made on foot and less than 2% were cycle trips. Walking was most commonly used for short trips, with 71% of journeys of less than one kilometre

[89] Booz·Allen & Hamilton (New Zealand) Ltd, 2000, Tauranga Public Transport Study, Environment Bay of Plenty and the Tauranga District Council, page 28.

[90] For the purposes of the RLTS, the term 'Pedestrian' means utility pedestrians who walk for practical purposes (i.e. to get from one place to another) and not recreation pedestrians and the term 'Cycling' means commuter and utility cyclists, not recreational and sporting cyclists.

(note - 13% of all the trips taken by drivers of private cars were for distances under one kilometre[91]).

Nationally, between 1989/90 and 1997/98 the number of walking trips increased by 2%. While the number of walking trips for children five to 14 years decreased by 12% between the two surveys, children still accounted for 20% of the total walking trips made. The age group showing the largest decrease in the number of annual walking trips was the 60 to 64 years group, while the 45 to 50 years age group had the greatest increase in trips.

Except for the 60 to 64 years age group, from the age of ten years onwards, females make more walking trips than males. The 30 to 34 years age group shows the greatest disparity between males and females.

For the same period, on-road cycling "decreased by 19%, with the largest decrease among school-age children and teenagers … Once an almost universal mode of transport for school children, concern about safety has seen cycling to school become less popular. However, there has been an increase in cycling, particularly longer trips, among the 20 - 24 age group. Trips to and from work make up 40% of this age group's cycling trips.

Despite the reduction in cycling among school children, this age group still makes up the greater part of New Zealand's cycling population. Just under half of all cycling distance (and 60% of cycling time) is by children and teenagers. Among adults, cycling is most popular with males. They account for over 80% of adult cycle trips and distance travelled."[92]

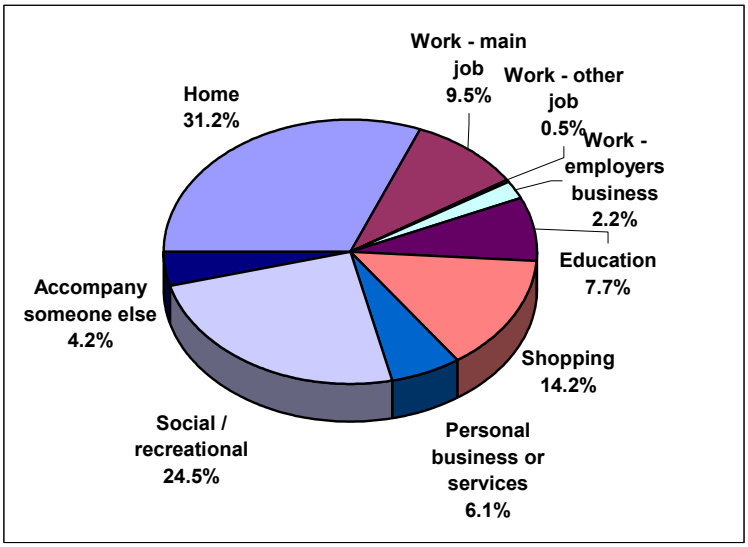
Peak times for walking are 11:00 to 12:00 pm and 3:00 to 4:00 pm and for cycling, 8:00 to 9:00 am and 3:00 to 4:00 pm, with a secondary peak at 4:00 to 6:00 pm. The afternoon peak reflects the influence of school trips on the hourly pattern. However, over the last decade the ways by which children travel to school have changed.

"Concern for children's safety … has had an influence on children's travel patterns. Overall there has been an increase in the number of children being driven to school by car, at the expense of walking or cycling."[93]

Between 1989/90 and 1997/98, the number of school children has grown, especially in the cities, and therefore so has the number of trips to school. While the number of children being driven to school by car during this period almost doubled, the number of walking and cycling trips to school increased only slightly. A similar trend has taken place in towns and rural areas, except that the number of cycling and walking trips to school has fallen by over half.

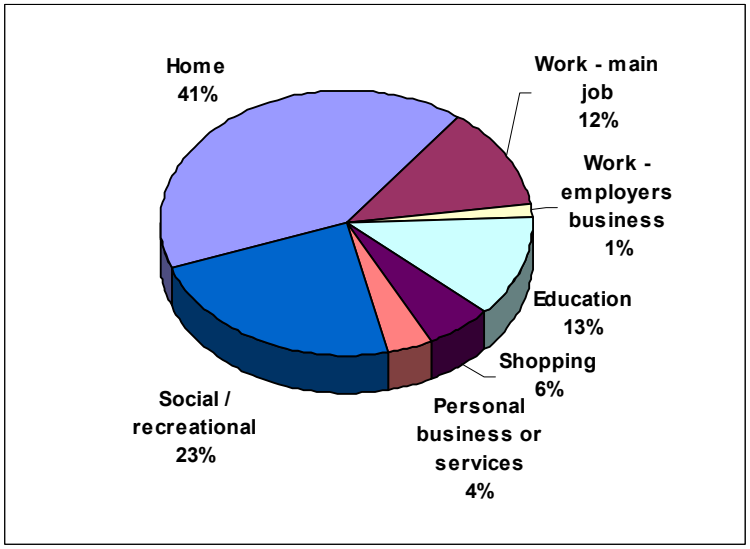
[91] Source: National Pedestrian Project, 2000, New Zealand Pedestrian Profile, National Pedestrian Project.
[92] Source: LTSA, Travel Survey Highlights - Cyclists, LTSA website.
[93] Source: LTSA, Travel Survey Highlights – School Children, LTSA website.

As can be seen from Figure 20, people most commonly walked for social and recreational reasons. The next most important purpose was to go shopping. Figure 21 shows that "the number of social and recreational (cycle) trips is second only to work-related trips among adults and trips to school among children." [94]



(Source: New Zealand Travel Survey 1997/98, page 40)

Figure 20: Trip Purpose – Walking



(Source: New Zealand Travel Survey 1997/98, page 40)

Figure 21: Trip Purpose - Cyclists

[94] It should be noted that while Figure 20 and Figure 21 show that 31% and 41% respectively, of trips were 'Home' this includes trips from work to home, school to home, etc. Trips for this purpose are simply trips returning from doing something else and are therefore ignored.

At the time of the 2001 Census, 4% of the workforce in the Bay of Plenty walked or jogged and 2% cycled to work. At a local level, the proportion of the workforce walking to work ranged from about 3% in the Western Bay of Plenty District to just over 7% in the Kawerau and Opotiki Districts(see Table 50). The proportion of the workforce cycling to work ranged from under 1% in the Western Bay of Plenty District to about 5% in Kawerau (see Table 50)[95].

Table 50: Main Means of Travel to Work – Walking and Cycling

1996	Walked or jogged	% of Employed Usually Resident Population 15 years and over	Bicycle	% of Employed Usually Resident Population 15 years and over
Western Bay of Plenty	645	4.2%	195	1.3%
Tauranga	1,218	3.8%	1,335	4.2%
Rotorua	1,452	5.2%	939	3.4%
Whakatane	903	7.1%	516	4.1%
Kawerau	246	9.4%	207	7.9%
Opotiki	231	7.9%	72	2.5%
BOP Region	4,695	5.0%	3,264	3.5%

2001	Walked or jogged	% of Employed Usually Resident Population 15 years and over	Bicycle	% of Employed Usually Resident Population 15 years and over
Western Bay of Plenty	588	3.4%	144	0.8%
Tauranga	1,356	3.5%	1,032	2.7%
Rotorua	1,272	4.5%	687	2.4%
Whakatane	789	6.0%	414	3.1%
Kawerau	156	7.0%	108	4.9%
Opotiki	213	6.9%	48	1.6%
BOP Region	4,374	4.3%	2,433	2.4%

(Source: Statistics New Zealand)

Table 50 also clearly demonstrates the reduction in walking and cycling as travel modes, between the two Censuses (especially sysling).

The 1997/98 New Zealand Household Travel Survey estimated that people in the Bay of Plenty made about 56.5 million walking trips a year. On average, this equated to each person in the region making 228 walking trips per year. The Survey also estimated that cyclists made about 6.4 million cycle trips a year and travelled about 17.9 million kilometres. On average, this equated to each person aged five years or more[96], cycling 87 kilometres per year.

[95] The part of the Taupo District in the Bay of Plenty region has been omitted from the Table because of the difficulty in determining the number of people that actually cycled to work on the day of the 1996 Census.
[96] In the 1997/98 survey, there were too few trips by children under five to enable calculation of reliable estimates for this age group.

The Survey found that the average duration for all modes of travel (except walking) in the Bay of Plenty was about 15 minutes. The average trip duration of a walking trip was about 11 minutes and 14 minutes for a cycle trip. Also, in terms of average weekly travelling time per person, rural people[97] spend less time walking and cycling than urban people[98].

At a sub-regional level, Table 51 shows that people living in rural areas and small urban centres made more walking trips per person than people living in Tauranga and Rotorua.

Table 51: Estimated Annual Number of Walking Trips (or Trip Legs)

	Estimated trips per person per year
BoP Region	228
Tauranga	232
Rotorua	269
Other Areas in the BOP	363

(Estimates based on the 1997/98 New Zealand Travel Survey)

However, when trip duration is considered (see Table 52), two-thirds of the trips made by people living in rural areas and smaller urban centres were for durations of less than five minutes.

Table 52: Duration of Walking Trips (or Trip Legs)

Trip Duration	BoP Region	Tauranga	Rotorua	Other
Under 5 min	50.1%	49.8%	25.3%	65.0%
5-10 min	5.8%	6.6%	6.0%	4.6%
10-<15 min	13.7%	13.6%	18.1%	11.2%
15-30 min	20.1%	21.5%	30.9%	12.0%
30min & over	10.4%	8.6%	19.8%	7.2%
Mean	11.5	11.6	15.5	9.0

(Source: New Zealand Travel Survey 1997/98)

While about half the walking trips in the region and in Tauranga were for durations of less than five minutes, only a quarter of the walking trips in Rotorua were for the same duration. Conversely, just under a third of the walking trips in the region and in Tauranga were for durations in excess of 15 minutes, while just over half the walking trips in Rotorua were for the same duration.

The New Zealand Travel Survey also found that the average trip length for all modes of travel (except pedestrian travel) in the Bay of Plenty was about 10 kilometres. The average trip length of a cycle trip was just less than three kilometres.

[97] Residents of towns with populations of less than 10,000 and rural areas.
[98] Residents living in towns or cities with populations of at least 10,000.

Table 53: Duration and Distance of Cycling Trips (or Trip Legs)

Duration	BoP Region
Under 5 min	30.8%
5-10 min	0.3%
10-<15 min	21.9%
15-30 min	40.6%
30min & over	6.5%

Distance	BoP Region
Under 1 km	24.4%
1-2km	17.4%
2-5km	40.4%
5-10km	17.9%

(Source: 1997/98 New Zealand Travel Survey)

As can be seen from Table 53 above, just under a third of the cycle trips recorded in the Survey lasted under five minutes and three-quarters of those trips were for distances of less than one kilometre.

12.4.2 Benefits of Walking and Cycling

From a land transport perspective, walking is important for:

- ***Environmental reasons*** – walking and cycling produces no polluting emissions and very little noise, uses no fossil fuels and therefore produces no greenhouse gases, does not contribute to traffic congestion and requires less road and parking space than motor vehicles.

- ***Access*** – for many people, particularly young people, walking and cycling provides independent modes of transport, giving them access to activities and services. Cycling extends the geographical range for trips usually made on foot and provides a low-cost transport alternative for short to medium length trips usually made by car.

12.4.3 Issues

Key issues relating to walking and cycling are:

- ***Transport and accessibility*** – the provision of safe pedestrian and cycle routes can improve people's ability to access facilities and services, especially for children, people on low incomes, people who do not have access to a car and people who cannot drive a car. In some cases, the design of the current roading network does not provide particularly well for the needs of pedestrians, for example:

  - lack of footpaths and pedestrian crossings on some roads;
  - inadequate sightlines for pedestrians;
  - lack of cycle lanes or wide shoulders on roads, or alternative cycle routes off the road;
  - intersections (particularly roundabouts) which do not always provide for the safe movement of cyclists;
  - lack of width between the road space and parking areas, thus increasing the risk of collisions between cyclists and opening car doors;
  - lack of alternative cycle routes on high-speed roads;

- narrow bridges forcing cyclists to merge into traffic lanes; and
- glass or other debris on the shoulder of the road, forcing cyclists in towards the traffic stream.

- ***Safety*** – accident statistics for the 1996 to 2000 period indicate that children up to five years and between 10 to 14 years of age in the region are over-represented as pedestrian casualties, in comparison to national and peer group figures (see).

Table 54: Pedestrian Accident Statistics

Local Authority	Number Killed or Injured (1996/00)	Age Groups Over-represented in Comparison to National and Peer Group Figures
Kawerau	3	<5, 10 - 14
Opotiki	6	<9 , 40 - 44
Rotorua	75	<14, 40 - 44
Tauranga	101	<5, 70+
Western Bay of Plenty	20	20 - 49
Whakatane	22	5 - 14, 25 - 29
Bay of Plenty Region	227	<5, 10 - 14

(Source: 1996/00 Road Safety Issues reports, LTSA)

Another safety issue for pedestrians is personal safety, both perceived and real. Increasingly, people are avoiding walking outside, particularly at night, due to fear of personal attack.

Over recent years cycling as a mode of transport to school has decreased as a result of more caregivers transporting children to school by motor vehicle. This raises road safety concerns due to increasing traffic congestion around school entrances.

Accident statistics for the 1996 to 2000 period indicate that children between five and nine years of age in the region are over-represented as cyclist casualties, in comparison to national and peer group figures (see Table 55). It should also be noted that 60% of those casualties occurred in the Tauranga District.

Table 55: Cyclist Accident Statistics

Local Authority	Number Killed or Injured (1996/00)	Age Groups Over-represented in Comparison to National and Peer Group Figures
Kawerau	0	
Opotiki	0	
Rotorua	37	15 - 19, 25 - 34
Tauranga	105	10 - 14, 50 - 54
Western Bay of Plenty	11	<9, 35 - 49
Whakatane	20	10 - 14, 30 - 34
Bay of Plenty Region	173	5 - 9

(Source: 1996/00 Road Safety Issues reports, LTSA)

Cycling is sometimes perceived as dangerous due to such factors as the vulnerability of cyclists, high traffic volumes, driver intolerance and narrow road widths.

The condition of roads can be an issue for cyclists. Examples of hazards include potholes, raised pavements, glass and debris on the road, rough surface at the road edge and recessed sump covers.

Another issue for pedestrians and young cyclists is the problem of cars parking on the footpath.

In some cases there can be conflicts of use between cyclists and pedestrians on shared paths.

Poor behaviour by motorists, cyclists and pedestrians can be a major cause of danger to all involved.

- ***Lack of Bicycle Storage Facilities*** - the lack of secure bicycle parking facilities is a major impediment to cyclists, particularly utility and commuter cyclists. The most obvious action for improving this situation is to provide well-designed bicycle parking facilities in town centres and at major Council facilities such as recreation centres and libraries. Another action would be to include bicycle-parking requirements in the District Plan for major people-generating facilities (e.g. cinemas), in the same way as there are minimum parking requirements for cars.

- ***Planning Issues*** – the design of new subdivisions and developments can have an effect on the attractiveness/ease of walking and cycling as transport modes. New subdivisions and developments should be designed to provide:

    - connectivity between streets;
    - adequate footpaths on both sides of the street;
    - well-lit footpaths;
    - roads of an adequate width to allow for the safe passage of cyclists;
    - preferable cycle lanes on arterial and collector roads; and
    - wheel crossings on the kerbs at intersections.

12.4.4 Forecasts:

Based on a number of assumptions[99], it is forecast that the number of walking and cycling trips that will take place in 2021 by territorial authority area are:

[99] That:
- the forecasted population projections for 2021 actually occur;
- the number of walking trips per capita for each territorial authority is the same as the regional average (unlikely); and
- the proportion of walking trips as a percentage of all modal trips does not change (unlikely).

Table 56: Forecasted Walking and Cycling Trips by 2021

Local Authority	Pedestrian Trips			Cyclist Trips		
	2001	2021	Change	2001	2021	Change
Kawerau	1,696,146	1,329,412	-366,734	192,130	150,588	(41,542)
Opotiki	2,315,010	2,658,824	343,813	262,231	301,176	38,945
Rotorua	14,600,609	15,861,258	1,260,649	1,653,874	1,796,673	142,799
Tauranga	21,041,379	33,647,870	12,606,491	2,383,448	3,811,440	1,427,992
Western BOP	9,145,436	16,452,617	7,307,181	1,035,943	1,863,659	827,716
Whakatane	7,701,420	7,609,736	-91,684	872,373	861,988	(10,385)
Bay of Plenty Region	56,500,000	77,559,716	21,059,716	6,400,000	8,785,525	2,385,525

As can be seen from the Table above, the major increase in walking and cycling trips is forecast to take place in Tauranga and the Western Bay of Plenty District, mirroring the projected increases in population for these two areas. For the same reason, a decrease in walking and cycling trips in Kawerau is forecast by 2021.

Chapter 13: Funding

13.1 Current Land Transport Funding Systems

Land transport infrastructure, road safety and passenger transport in New Zealand are currently funded from three sources:

- the National Roads Fund (NRF);
- local authorities (generally through rates, but also from other sources of revenue); and
- Tranz Rail.

As Tranz Rail is the owner of the national rail network infrastructure, it is wholly responsible for funding the maintenance of the current infrastructure and building any new infrastructure that it wishes to use.

The NRF is a dedicated fund operated by central government and administered by Transfund, into which all the revenues from Road User Charges, motor vehicle registration and licensing fees and a portion of the fuel excise duty on petrol, LPG and CNG, are paid.

Currently through the NRF, road users pay around 75% of the costs of the roading system and local authorities fund the remaining costs.

There are three main activities related to roads that are currently funded:

13.1.1 Road Safety

Through the New Zealand Road Safety Programme (formerly the Safety (Administration) Programme), central government purchases outputs delivered by the LTSA and the Police targeting safer people and operators, safer roads and rail, safer vehicles and safety management.

The Programme is prepared and administered by LTSA and funded from the NRP. The Programme also includes approved applications for community and local authority safety projects.

13.1.2 The Construction and Maintenance of Roads and Alternatives to Roads

Through the National Roading Programme (NRP) central government provides funding for building new roads, maintaining existing roads and implementing Alternatives to Roads projects. The NRP is prepared and administered by Transfund.

For state highways, the cost is paid for entirely out of the NRF. The cost of local roads is a shared cost between the NRF and territorial authorities. Territorial authorities fund their share of those costs from property rates.

Transfund's Financial Assistance Rates (FAR's) for the territorial authorities of the Bay of Plenty are:

Table 57: 2002/03 Financial Assistance Rates

	Maintenance Financial Assistance Rate	Construction Financial Assistance Rate
Kawerau	67%	72%
Opotiki	50%	55%
Rotorua	44%	49%
Tauranga	43%	48%
Western BoP	47%	52%
Whakatane	43%	48%
Whakatane SPR	100%	75%

(Source: 2001 – 2002 National Roading Programme)

Allocations by Transfund are based on Benefit-Cost calculations (for capital works), RAMM (for maintenance) and Efficiency Ratios (for Alternatives to Roads).

13.1.3 Passenger Transport

Through the NRP central government also provides funding for bus, ferry and rail public transport services administered by regional councils. The cost of subsidised passenger transport services is a shared cost between the NRF and regional councils.

Funding from Transfund is allocated across three categories:

- Patronage Funding - in November 2000, Transfund introduced patronage funding as an initiative to increase the number of people using public transport. Until the end of June 2002, Transfund will fund 60% of the cost of new passenger transport services and will also fund an average of $0.85 per passenger, where patronage has increased.

- Community Services –Transfund's financial assistance rate for community services is 40%. In the 2001/02 financial year, it will fund its share of the construction and maintenance of new bus shelters in Rotorua and Tauranga. The Rotorua and Tauranga District Councils will fund the other 60%.

- Social Services - Transfund and Environment B·O·P also contribute to two public transport social service programmes in the Bay of Plenty. They are:

    - Total Mobility, a taxi voucher scheme for people with disabilities and older people; and

- concession fares in Tauranga, for older people, school children and other targeted groups.

The financial assistance rate is 40%.

13.2 2002/03 Funding Levels

For the current financial year (2002/03) roading controlling authorities and Environment B·O·P will receive about $44 million from central government agencies to spend on roading, road safety[100] and passenger transport in the region (see Table 58).

Table 58: 2002/03 Land Transport Funding

	Transfund New Zealand Funding					NZ Road Safety Programme ($000)	Total ($000)
	Local Roads ($000)	Local Roads Admin ($000)	State Highways ($000)	Passenger Transport ($000)	Passenger Transport & RLTS Admin ($000)		
Kawerau DC	208.9	4.7				22.5	236.1
Opotiki DC	1,006.7	22.7				24.0	1,053.4
Rotorua DC	3,198.3	72.0		104.6	4.6	52.9	3,432.4
Tauranga DC	2,458.3	55.3		14.0		46.5	2,574.1
Western BoP DC	4,205.8	94.6				46.5	4,346.9
Whakatane DC	2,165.0	48.7				19.8	2,233.5
Whakatane SPR	779.4	17.5					796.9
Transit New Zealand			28,516.4				28,516.4
Environment B·O·P				687.6	33.7	80.0	801.3
Total	14,022.4	315.5	28,516.4	806.2	38.3	292.2	43,991.0

(Source: National Roading Programme 2002 – 2003, LTSA)

Although not shown, the region's local authorities will also contribute a substantial amount of funding towards maintaining and improving land transport in the region.

13.3 Problems with the Current Road Charging and Funding System

Problems with the current system include that it:

- results in users paying less than the costs they impose on roads and others, particularly at congested/peak times;
- focuses funding on smaller, shorter term roading improvements and forces current users to pay the full cost of such improvements up front;
- struggles to deal with the rapidly worsening congestion on urban corridors, and the demands placed on rural roads experiencing increased forestry and tourism traffic.

The current system also appears to advantage state highways over local roads, given the requirement on local authorities to fund their share of the costs of the latter.

[100] Figures for the New Zealand Road Safety Programme do include the number of Police hours funded for the Bay of Plenty region by LTSA.

13.4 Charging and Financing New Roads

The only ways to currently fund new roads in New Zealand that do not require special legislation, is through the NRF and/or local authority sources of revenue (e.g. property rates).

Other mechanisms exist to fund new roads, although they are not options that New Zealand law currently provides for. However, central government has recently announced that it is planning legislative changes to allow public/private partnerships and tolls.

13.4.1 Public/Private Partnerships (PPPs)

Two forms of public/private partnerships are Build-Own-Operate-Transfer (BOOT) and Design-Build-Fund-Operate (DBFO) schemes.

In general, under BOOT schemes the private sector contractor owns and operates the road for a period (say 30 years) at which point ownership is transferred to the public sector (usually but not always without compensation). Under DBFO schemes the private sector contractor builds and operates the road on behalf of a public sector owner.

The UK's experience with DBFO-type schemes has achieved the following benefits:

- The ability to undertake projects which had previously been blocked by constraints on capital expenditure.
- Substantial cost savings over traditional procurement methods.
- Consistent delivery on, or before, scheduled timescales.

These schemes pass many of the risks associated with large roading projects over to the private sector.

13.4.2 Congestion Pricing

Some of the urban corridors in Tauranga are beginning to experience serious congestion. One way to resolve congestion is to require those using the congested corridors to pay to keep them less congested (this is not an option that the law currently provides for). Users benefit from lower and more certain travel times and roading providers' gain an additional tool to encourage efficient use of their roads (e.g. by spreading demand outside the peak times). Alternatives like passenger transport would be placed on a more competitive footing.

Charging motorists to provide less-congested lanes raises a number of issues. Charging can:

- be perceived as an unfair additional taxation, particularly if the monies are not earmarked for projects of benefit to those paying;
- be heavily criticised if users, particularly low income earners, do not have alternative means of travel available to them;

- raise concerns about the potential misuse of personal information and invasion of personal privacy;
- raise concerns about the costs of any new technology and its compatibility with other forms of technology; and
- have significant traffic diversion impacts if not managed in a co-ordinated manner.

Overseas experience tends to indicate that such charging regimes are only likely to achieve acceptance if they:

- are preceded by a long consultation process;
- ensure the transparent allocation of the revenues on uses from which users will benefit;
- have been implemented in a regionally coherent manner; and
- have been clearly justified.

13.4.3 Regional Petrol Tax

As it's name suggests, a regional petrol tax is a levy placed on every litre of petrol sold in a region.

In 1992, the Local Government Act was amended to allow the Auckland, Waikato, Wellington, Canterbury and Otago Regional Councils to levy a regional petrol tax for the purposes of funding passenger services in their areas. The provisions of this amendment have now expired and are deemed to have been repealed.

For the 2000/01 financial year the four major oil companies (BP, Caltex, Mobil and Shell) sold 221,124,500 litres of petrol and 215,921,900 litres of diesel in the region.[101]

13.4.4 Tolling

Tolling is the other option that central government is considering legislating for. Tolling is an option that the Tauranga District Council adopted to fund the Tauranga Harbour Bridge, the Waikareao Expressway and associated works and Route K. However, in order for the District Council to implement a toll, it was necessary for central government to legislate.[102]

In Tauranga, charging for new roads directly via tolls has provided the means for the District Council to proceed with roading projects that otherwise would have been delayed.

[101] Source: Figures provided by Shell New Zealand Limited, from local authority petroleum tax returns.
[102] The legislation is:

- The Tauranga City Council and Mount Maunganui Borough Council (Tauranga Harbour Bridge) Empowering Act 1972 and associated Bylaws;
- The Tauranga District Council (Waikareao Expressway) Empowering Act 1989 and associated Bylaws; and
- The Tauranga District Council (Route K Toll) Empowering Act 2000.

Tolls provide a better signal to road users as to the true costs of their trips and ensure that only those using the road pay for it.

However, tolls can also have disadvantages such as:

- causing people to change their travel behaviour, by continuing to use other roads instead;
- manual tolls can cause traffic delays;
- electronic direct charges can raise concerns about technology compatibility and privacy; and
- raising accountability issues.

Overseas experience indicates that in order to be acceptable to road users, tolls should only be imposed where there are alternatives available and the funds raised are used in a transparent manner that benefits those paying.

13.5 Funding Plan

In submissions to the Proposed Waikato and Canterbury strategies (October 2001), Transit commented:

"A funding plan is required to fund the strategy. In the first instance, this funding plan needs to be based on existing funding sources, including rates funding (although it is anticipated that eventually there may be alternative sources of funding). Transit expects to work with (the Regional Council) and territorial authorities on the development of a funding plan. In the meantime, the need for a funding plan should be recognised in the strategy."