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Demographic Change and Transport Needs In the Waikato Region

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Abstract

This report has been commissioned by Environment Waikato (EW) as part of its review of the Land Transport Strategy for the Waikato region. The report identifies key population characteristics that impact on transport needs of the EW region and the constituent Territorial Authority (TA) areas. In this context, vulnerable locations and populations are identified. Future trends for the EW region and sub-regions are assessed by means of low, medium and high population growth scenarios, and the implications of the projected changes in population size and composition for transport needs are identified. A general theme throughout this report is that in many respect demographic change in the Waikato region is not that different from that in New Zealand as a whole, but there are sharp differences between the constituent TA areas. The report covers changes in population size and structure, ethnic structure, the labour force, income, housing tenure and motor vehicle ownership, deprivation and projections of locally generated trips, the number of motor vehicles and travel to work flows. It is noted that a comprehensive assessment of transport need should embed demographic change into an integrated model of economic change in the region, combined with scenarios relating to external factors and policy changes.

Key words: Waikato region, demographic change, transport need, scenario-based projections, sub-regional diversity

About the Population Studies Centre (PSC)

The PSC is a research centre that was established in 1982 by the inaugural Professor of Demography at the University of Waikato, Professor Ian Pool, FRSNZ. The research programme of the PSC addresses the most central questions of population studies relating to demographic transitions and to population distribution, and has linked these to economic, political and social transformations. The PSC conducts and co-ordinates a wide range of externally funded research projects on population issues, in close consultation with stakeholders and end users. The PSC remains the only research centre in New Zealand dedicated to research into the impact of demographic change at both national and regional levels. The PSC also has major international and cross-national research linkages, and acts as the Waikato node for the Building Research Capacity in the Social Sciences (BRCSS) network.

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Executive Summary

This report has been commissioned by Environment Waikato (EW) as part of its review of the Land Transport Strategy for the Waikato region.

The report identifies key population characteristics that impact on transport needs of the EW region and the constituent Territorial Authority (TA) areas. In this context, vulnerable locations and populations are identified.

Future trends for the EW region and sub-regions are assessed by means of low, medium and high population growth scenarios, and the implications of the projected changes in population size and composition for transport needs are identified.

Land transport is a complex phenomenon and demographic change is only one dimension of changes in transport flows and transport needs. Changes in other factors, such as economic conditions, public policies and technological change are not explicitly considered, except to the extent that they are consistent with the population change scenarios.

A general theme throughout this report is that in many respect demographic change in the Waikato region is not that different from that in New Zealand as a whole, but there are sharp differences between the constituent TA areas.

Total population growth in the Waikato region over the 1991-2001 period was 8.1 percent, compared with 10.8 percent for the nation. However, growth among the constituent TAs varied between minus 11.1 percent (South Waikato District) and plus 19.2 percent (Part Franklin District).

Using the medium growth scenario, the Waikato regional population is expected to grow 15.4 percent between 2001 and 2026, compared with 21.9 percent nationwide. Population growth in Hamilton City together with Waikato and Waipa Districts is equivalent to 94 percent of total growth, as some other parts of the region (Hauraki, Matamata-Piako, Otorohanga and South Waikato) are expected to experience population decline.

Comparing the low with the high growth scenario, Waikato population growth between 2001 and 2026 may be as low as 3 percent, or as high as 28 percent. South Waikato is the only TA area expected to lose population under low, medium and high growth assumptions.

Aggregate population change hides significant fluctuations across age groups. Small and large cohorts follow in quick succession, generating waves of age-specific population change. The changes are qualitatively similar for the Waikato as for the country as a whole, but again there are significant differences across TA areas.

Demographic total dependency (the population aged 0-14 plus 65 and over divided by the population 15-64) is higher in the EW region than nationally, and increases faster. Structural

ageing (the increase in the share of those aged 65 and over) is taking place in all TA areas between 2001 and 2026, with the projected increase ranging from 5.9 percentage points in Hamilton City to 20.3 percentage points in Hauraki District.

The proportion of the population aged 75 and over is growing faster in the Waikato region than in New Zealand as a whole, with implications for health care and transportation. Under the medium scenario, the aged 75 plus group ranges by 2026 from 15.5 percent of the total in Thames-Coromandel down to 6.8 percent in the Part Rotorua area.

The Waikato region has a higher proportion of Māori and lower proportions of Pacific and Asian populations than the nation. However, ethnic diversity is expected to increase further. The percentage European is expected to remain relatively high in Thames-Coromandel, Hauraki, Matamata-Piako and Waipa. The percentage Māori is projected to be about, or more than, double the national average in Waikato district, Otorohanga, South Waikato, Waitomo and Taupo. The Asian population in Hamilton City is expected to increase from 7 percent in 2001 to 13.2 percent in 2016, while the Pacific population is projected to increase from 3.4 percent in 2001 to 5 percent in 2016.

The Waikato region gains some population through internal migration, but net 1996-2001 internal migration rates varied between minus 9.9 percent (South Waikato) and plus 7.2 percent (Part Franklin). The 1996-2001 inflow rate of immigrants and returning New Zealanders from overseas was about 4.7 percent for the Waikato region as a whole, but 7.9 percent for Hamilton City.

Employment changes in the Waikato region mirror those of the nation. Buoyant economic conditions have led to an increase in employment. Yet 1991-2001 male full-time employment declined in Hauraki, Matamata-Piako and South Waikato. The proportion of those who are self-employed, employers, or unpaid family workers is somewhat higher in the Waikato than in the nation.

2001 median incomes ranged from $14,653 in Thames-Coromandel to $26,037 in Part Rotorua District. There has been a significant increase in income inequality in New Zealand since 1991. Until 2001 the Waikato growth in the inter quartile range (IQR) was similar to that of the nation. However, again there is considerable variation across the TAs. Income growth has been relatively strong among people living in Waikato District, Waipa District and Part Rotorua. Real income of people in the lower quartile declined over 1991-2001 in many parts of the Waikato region, particularly among Māori.

The projected growth in the number of households is faster than population growth. The Waikato region is expected to have growth in the number of households between 2001 and 2016 of between 11.5 percent (low scenario) and 23.8 percent (high scenario). With respect to Waikato households, the “two parents with one or more children” household remains the most common type, but the proportion of households that is of this type has declined from 35.3

percent in 1991 to 27.9 percent in 2001. The region again mirrors the trends of the nation, but with notable differences across the TA areas.

The percentage of Waikato people with no motor vehicle in their household has reduced from 7.3 percent in 1991 to 6.5 percent in 2001. Pre-school children and older persons are more likely to be in households without a motor vehicle.

Waitomo and South Waikato Districts have a relatively high percentage of the population in households without a motor vehicle. However, for the age group 75 plus, Hamilton City has the highest percentage of households with no car (25.9 percent in 2001). No access to a car is one indicator of deprivation. Deprivation can lead to social exclusion.

A lack of access to private motor vehicle transportation is an important issue among one parent and single person households, but the significance varies across Waikato's TA areas. More than a third of preschool children in South Waikato in one parent households do not have a motor vehicle in the household. In Hamilton City, with more extensive public transport available, single person households aged 65 and over are the relatively most likely to be without a car.

The percentage of owner-occupied dwellings in the Waikato region has reduced from 70.4 percent in 1991 to 64.4 percent in 2001. Hamilton City experienced the greatest decline in home ownership. This has implications for geographical mobility and the types of households occupying the available dwellings.

Considering the growth in the number of dwellings in the Waikato, close to a third of the additional 1991-2004 dwellings were added to the Hamilton City stock. Other parts of the region with dwelling construction in excess of 3000 units are Thames-Coromandel, Waikato, Waipa and Taupo.

Using the measure of deprivation derived from the 2001 Census, NZDep2001, the incidence of deprivation varies considerably between Waikato's TA areas, but also within these areas. Deprivation levels are high in Hauraki, South Waikato and Taupo, while low in Part Franklin, Matamata-Piako, Waipa and Part Rotorua.

Considering access to hospital services, some TAs in the Waikato are more isolated than others. With respect to tertiary hospital services, Thames-Coromandel, Waitomo, Taupo and Part Rotorua District have more than one third of their population needing to travel 90 minutes or more.

Using population projections and 1997/98 data on trips per year by vehicle drivers, locally generated trips are projected up to 2016. Under the medium growth scenario, the 2001-2016 growth in locally generated trips varies between minus 12 percent in South Waikato and plus 20.7 percent in Part Franklin.

Combining three assumptions of car ownership with three assumption of household growth, nine scenarios result with respect to projecting the number of motor vehicles. The high/high combination leads to a projected number of motor vehicles in 2016 in Hamilton City of about 100,000, compared with 68,000 in 2001.

There could be significant 2001-2016 decline in the number of motor vehicles of 10 percent or more in the Hauraki, Matamata-Piako, Otorohanga, South Waikato and Waitomo TA regions. On the other hand, growth of 40 percent or more in the number of motor vehicles is possible in the Thames-Coromandel, Waikato District, Hamilton City, Waipa District and Taupo District parts of the Waikato region.

Purely demographic projections suggest a growth in employment in the Waikato region overall of between 5 and 19 percent between 2001 and 2016. The TA regions with the largest growth are expected to be Part Franklin District and Hamilton City. Areas where there is demographically determined to be no employment growth, or a decline, are Hauraki, Matamata-Piako, Otorohanga, South Waikato District and Waitomo Districts.

Using age-specific travel to work data from the 2001 census and age-specific population projections, it is possible to project the travel to work flows in 2016. Using the medium projection, this suggests that by 2016 there may be 51,704 people both working and living in Hamilton City. Waikato District, Waipa District and Hamilton City form a triangle of inter-TA commuting flows which by 2016 may be in aggregate in excess of 15,000 persons.

Further demographically-based analysis of transport demand and need could be developed by means of gravity models of trip generation, as well as projections of modal split.

However, a comprehensive assessment of transport need should embed demographic change into an integrated model of economic change in the region, combined with scenarios relating to external factors and policy changes.

1 Introduction

1.1 Purpose of the Report

Environment Waikato (EW) has commissioned this report from the Population Studies Centre at the University of Waikato as part of its review of the Land Transport Strategy for the Waikato Region. The review being undertaken by EW is aimed at producing a regional strategy that will contribute to the government's vision of an integrated, safe, responsive and sustainable land transport system, and will meet the objectives of:

- Assisting economic development
- Assisting safety and personal security
- Improving access and mobility
- Protecting and promoting public health
- Ensuring environmental sustainability

In addition, the regional strategy must be compatible with the Land Transport Management Act, the New Zealand Land Transport Strategy, the National Energy Efficiency and Conservation Strategy and the Road Safety Strategy to 2010. The development of such a strategy requires a sound understanding of the current and future demographic characteristics of the Waikato region and the communities within this region. This report provides the information to develop this understanding.

The primary objectives of this particular report are therefore to:

1. Identify the key population characteristics that impact on transport needs of communities at the regional and territorial authority (TA) levels.
2. Analyze the implications of these characteristics, both static and dynamic, for land transport planning in the Waikato region paying special attention to identifying vulnerable populations and locations within the region and examining the consequences of the identified vulnerabilities for land transport planning.
3. To describe the challenges and opportunities resulting from the identified characteristics of communities, including projections of population growth or decline and projected changes in population structure.

4. To explicate the relationships between the identified population characteristics and New Zealand Land Transport Strategy objectives of safety and security, public health, and access and mobility for communities within the region.

1.2 Demographic Characteristics and the Land Transport System

Land transport is a complex phenomenon with observed traffic flows being determined by economic structure and market conditions, policies, the available infrastructure, transport technology, preferences of the public, and the size and composition of the population. This report is only concerned with the last of these determinants. Thus, the focus is on the size and geographic distribution of individuals and households in relation to transport needs. No attempt is made to assess the impact of a changing population on transport indirectly through the impact of population on the regional economy and the resulting effect on truck traffic and other traffic derived from economic activity (except for commuting). However, just on their own, the demographic characteristics of the population and labour force in a region have a profound impact on the demand for, and characteristics of, the region's land transport system. In the simplest decomposition possible, the volume of motor vehicle traffic can be expressed as:

Total motor vehicle traffic ≡ *Vehicle traffic per person* * *Population* (1)

The same identity can of course apply to other modes of transport. The guiding principle for assessing the impact of population change on transport in the present report is that what economists refer to as *ceteris paribus*, that is, an assessment of the impact assuming that all else remains the same. Thus, the effect of population change on car traffic can be assessed by assuming that car travel per person remains constant, although it is plausible that in reality population change brings about social and economic changes (e.g., a change in income) that affect car travel per person. The approach taken here is therefore that of a simple "what if" scenario approach in which the effect of population change on transport is considered under the assumption that travel per person remains constant, or changes to a much lesser extent than population over the period considered.

Besides population size, an important issue addressed in this report is population composition. Here, the impact on transport can be derived analogous to equation (1) by considering each population sub-group separately and then aggregating the components:

Total motor vehicle traffic =
Vehicle traffic per person in group 1 * *Population in group* 1 +
Vehicle traffic per person in group 2 * *Population in group* 2 +
…….+
Vehicle traffic per person in group n * *Population in group n* (2)

Demographic methods permit the calculation of the projected future population for sub groups (by type of locality) that are then aggregated as in equation (2) to assess the overall impact. The existing population structure in the Waikato region is discussed in Section 2, with some transport consequences of scenarios of population change (by means of official population projections) analysed in Section 6.

1.3 Some Determinants of Vehicle Kilometres Travelled per Person

The simplifying assumption of constant motor vehicle travel per person made above can to some extent be refined by examining the determinants of motor vehicles per person. Given the limited space available is not possible to cover all the possible factors that may impact on this variable. However, a selection is discussed in the following sub-sections.

1.3.1 Income

Gargett and Cosgrove (2004, p 1-2) find that, using Australian data, as per capita income rises so does car travel per person. However this effect diminishes as incomes increase so that larger and larger increases in income are required to elicit constant increases in car travel per person. Hirota and Poot (2005) conclude, using data from 68 cities in Europe, North America and the Asia-Pacific region, that as income increases by 1 percent, vehicle kilometres travelled (VKT) per capita increase by about 0.5 percent, which is consistent with the Australian finding.

Pucher & Renne's (2003) analysis of the 2001 National Household Travel Survey data from the United States (Center for Transportation Analysis, 2001), similarly finds a striking impact of income on land travel. They find that the primary determinant of car ownership, both in terms of whether or not a car is owned and the number of cars owned, is income and that the main determinant of mode of land transport is ownership/non-ownership of a motor vehicle. Interestingly they find that multiple vehicle ownership only marginally increases the number of vehicle trips made, though it has an adverse effect on the proportion of trips made by means other than private motor vehicles (Pucher & Renne, 2003, p 57).

In Section 3.2 we will consider changes in incomes for sub-regions in the Waikato. Given the above findings, such changes are likely to have an impact on traffic flows and transport need in the Waikato region. Issues of deprivation and social exclusion are addressed in Section 6. The ethnic composition of the population, which interacts with issues of income and deprivation, is considered in Section 2.3.

1.3.2 The cost of travel

Although VKT per person may have many determinants, it can be argued that the full cost of travel (such as the cost of purchase, maintenance and petrol of a car) is the most important factor to take into account. Standard economic theory would suggest that an increase in the price of private motor vehicle use (such as through the introduction of a toll on some roads at peak times) will indeed reduce VKT, although the consumer may also change his or her driving behaviour by taking an alternative route or by driving at off-peak times. In general, vehicle-related taxes can lead to a wide range of responses which may each have an environmental impact. Besides a possible change in VKT by means of a change in route and destinations and/or trip frequencies, these include the value of the car to buy and the related size of the engine, the age at which to replace the car, the number of passengers in the car (e.g. car pooling), the time of travel, the speed of travel, and other driving habits. Consequently, the calculation of travel demand elasticities is complex and has led to a wide range of different approaches in the literature. A meta-analysis of the literature is provided by Espey (1998). Hirota and Poot (2005) found that for a 1 percent increase in the private user cost per km, VKT per car decreases by 0.4 percent and that in addition traffic is more responsive to a fuel tax than an acquisition or ownership tax. The likelihood of travel cost change and its impact is beyond the scope of the purely demographic scenarios considered in this report.

1.3.3 The labour market

A very large proportion of the trips undertaken in motor vehicles in the western world are related to paid employment, hence the level and location of employment has a profound impact on the nature and volume of road traffic. There are a number of other ways in which the labour market and land transport system interact, mutually conditioning each other's development and affecting the overall economic prosperity of a region.

For instance it is well established that, in a given country, the output per capita of a city is a function of the size of the city (Prud'Homme, 2001, p 87). The larger the city, the higher the output per capita. This is due to a range of agglomeration advantages that have been studied extensively in the recent economics literature (e.g. Fujita and Thisse, 2002). One of these effects relates to what is called 'matching' in the labour market. In small labour markets it is less likely than in large labour markets that a worker will find exactly the right job, i.e., a job that will fully utilize skills and experience. Similarly, employers may not find in small labour markets the 'right' candidate for a job, but be forced to employ someone who is inadequately qualified. Hence in larger labour markets it is more likely that the right worker will be matched

with the right job and thus output per worker will be higher. What matters here though is not necessarily the absolute size of the labour market but rather the *effective size*, which is determined by the time workers are prepared to travel to access employment. Thus improvements in the land transport system that increase the speed at which workers can access employment will increase the productivity of an area by increasing the effective size of its labour market (Prud'homme & Chang-Woon, 1999; Prud'Homme, 2001). Labour force trends are considered in Section 3 of the report.

1.3.4 Gender and household type

In most countries considered in the literature women have different travel patterns from men, reflecting factors such as lower labour force participation, lower income levels, their traditional role in the family, the decision-making structure within households, the current age distribution, and physical vulnerability (Root *et al.*, 2000, p 369). This pattern has begun to change, though differences are still pervasive, but female utilization of land transport systems in western countries increasingly resemble men's. This is driven in part by changes in female participation in the labour market, and also by changes in household structure. However, women's continuing role as the primary provider of domestic and caring labour would seem to mitigate complete convergence. The number of households (and dwellings) and household structures are considered in Section 4 of the report.

1.3.5 Ageing

A salient feature of future population change in New Zealand is, as in many other countries, population ageing. O'Fallon and Sullivan (2003) briefly review the overseas literature on the land travel patterns of older people and, using data from the 1997/98 New Zealand Household Travel Survey (2000), examine the current and potential future patterns of transport, in particular by private motor vehicle, of the older population segments (60-64 and 65+) in New Zealand.

O'Fallon and Sullivan's (2003, p 2) review of articles by Burkhardt (1999), Coughlin & Lacombe (1997), Metz (2000), Rosenbloom (2001a, 2001b) and Tacken (1998) draws a number of conclusions with respect to travel patterns of older persons:

- The numbers of retired people holding drivers licenses and continuing to drive until much older ages has increased;
- The 65+ age group makes fewer trips per day (and decreasing even further with greater age), and these trips tend to be shorter, than in younger age groups;
- Older people travel fewer total kilometres per day;

- The primary focus of trips is social/recreational, shopping and personal business rather than work-related.

O'Fallon and Sullivan's (2003) consideration of the 1997/98 New Zealand Household Travel Survey (2000) data yields similar results, finding that in contrast to the 25-59 year old age group, the older New Zealanders have more days on which they do not participate in road travel at all, they take more trips as passengers than drivers, they make most of their trips between 9.30 am and 3.00 pm, and make fewer trips in the evening or at night time.

Davey and Nimmo (2003) undertook a more comprehensive review of older people and transport in New Zealand on behalf of the Land Transport Safety Authority, the Ministry of Transport and the Office for Senior Citizens. This paper painted a similar picture to that in O'Fallon and Sullivan (2003) but considered in detail the obstacles to mobility when private vehicle use is no longer an option for the older population. In particular they point to the difficulties associated with the use of public transport, such as distance from routes, access on and off the bus, timetabling, fares and facilities at bus stops and interchanges and the absence of public transport in rural areas and small towns (Davey & Nimmo, 2003, p 6). They also point to the higher accident rates associated with older drivers.

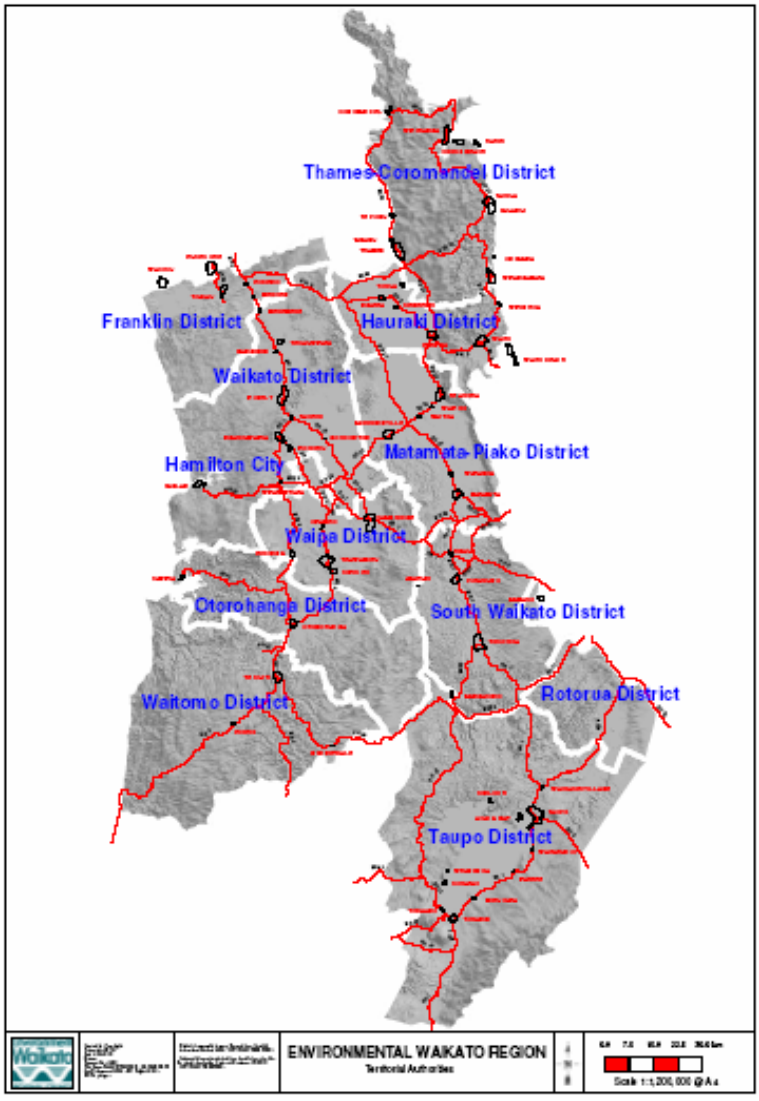
Pucher & Renne (2003) also find that the older age groups have distinctive patterns of land transport utilization but point to the national specificity of these patterns. American's population aged 65 and over; for example, make some 9 percent of their trips by non-motorized means while the German and Dutch in this older age group make over half their trips by walking or cycling, with even 75+ Dutch making a quarter of all there trips by bike (Pucher & Renne, 2003, p 70) . New Zealanders 65 and over make around a quarter of their trips by either bike or walking (O'Fallon & Sullivan, 2003, p 8, Table 6). While it is important to consider these variations in national travel mode preferences amongst the older persons, these cultural specificities should not obscure the central point that with an aging population there will be an increasing number of older drivers who are likely to continue driving for longer, particularly as in a car centred society (Social Exclusion Unit, 2003, p 39) ownership and use of private motor vehicles becomes central to preserving the mobility and independence of the older population (Pucher & Renne, 2003, p 70). Section 2.3 considers ageing and demographic scenarios that have different ageing implications are used in Section 6.

1.4 Data Sources

All data used in this report have been obtained from existing data sources, primarily from Statistics New Zealand. Much of this information is in the form of user-specified

unpublished tables that have been requested from Statistics New Zealand. Where possible the demographic variables considered are reported at the New Zealand, Environment Waikato Region and the constituent Territorial Authorities of the EW Region levels. Reporting information at the EW Region level has only been done where the necessary data from the relevant parts of the Rotorua and Franklin Districts could be obtained. The Waikato region constituent TA regions are: Part Franklin, Thames-Coromandel, Hauraki, Waikato, Matamata-Piako, Hamilton City, Waipa, Otorohanga, South Waikato, Waitomo, Taupo and Part Rotorua. A map is given in Figure 1. The extent to which the information on the Waikato region and sub-regions differs from that for total New Zealand will be highlighted.

Figure 1. Map of Waikato Region and the Constituent Territorial Authority Areas



The main sources for past demographic variables are the Statistics New Zealand, 1986-2001 Censuses of Population and Dwellings. Another source of a wide range of demographic trends is the annual publication *Demographic Trends*. Information on

travel behaviour was obtained from the Land Transport Safety Authority's (2000) Travel Survey Report "Increasing our understanding of New Zealanders' travel behaviour 1997/1998". Because the growth in the number of households can be gauged from the number of occupied dwellings, recent trends in building activity in the region, based on the Statistics New Zealand INFOS building consent information, are also considered.

A discussion of the cohort-component methodology used by Statistics New Zealand for population projections and the related methodologies of sub-national family, household and ethnic projections is beyond the scope of this report. Instead, the reader is referred to the following reports which include sections that outline the methodologies:

Statistics New Zealand, National Population Projections 2004 (base) Series 5 (16 December 2004)

Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) – 2026 (Updated 28 February 2005)

Statistics New Zealand, Subnational Family and Household Projections, 2001(base) – 2021 (27 August 2004)

Statistics New Zealand, Subnational Ethnic Population Projections: 2001(base)-2016 (December 2003).

2 Population Size and Change

2.1 Total Population Change

A good starting point is the population change experienced during the decade up to the last population census in 2001. Table 1 shows 1991-2001 population growth in the Waikato region[1]. Total New Zealand population growth over the decade was 10.8 percent. The Waikato region's population grew slower than the country. However, population growth varied considerably among Waikato's constituent TA areas. Particularly strong growth in excess of 15 percent occurred in Thames-Coromandel, Hamilton City and, probably as a result of 'spill over' from Auckland population growth, the Part Franklin area. Taupo also exhibits above NZ average growth, in marked contrast to the South Waikato which lost more than 10 percent of its population over the 1991-2001 decade. The Waitomo District population declined 6.3 percent.

[1] The total of the Constituent Territorial Authority Areas do not quite add to the total Waikato region as there are three Area Units in Taupo District (Te More, Taharua, Rangitaiki) and one in Waitomo District (Tirou) which are in other Regional Councils. The difference is only 345 people in 2001.

Table 1. Usually Resident Total Population, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authority	1991	2001	% Change
Part Franklin	12,105	14,427	19.2
Thames-Coromandel	21,750	25,176	15.8
Hauraki	17,043	16,764	-1.6
Waikato	37,413	39,855	6.5
Matamata-Piako	29,847	29,472	-1.3
Hamilton City	99,414	114,921	15.6
Waipa	36,690	40,293	9.8
Otorohanga	9,096	9,282	2.0
South Waikato	26,406	23,472	-11.1
Waitomo	10,092	9,456	-6.3
Taupo	27,978	31,521	12.7
Part Rotorua	3,537	3,432	-3.0
Waikato Region	**331,026**	**357,726**	**8.1**
New Zealand	3,373,926	3,737,280	10.8

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Table 2 contains the most recent projections for the usually resident population 2001-2026. The population projections have been calculated by means of a standard cohort-component methodology which starts with a base population by age and sex and location and then calculates year by year how each group is affected by births, deaths, internal migration and international migration. The assumptions used here are those of the medium projection of Statistics New Zealand, down to the Territorial Authority level. The assumptions include a slight downward trend in the national total fertility rate from 2.01 births per woman at present to 1.85 by 2016, but with some regional variation. The projections also assume a further increase in life expectance at birth of four to five years between now and 2026, with again a significant regional variation in the level.

The most difficult component of population change to project into the future is international migration. This is clear at the national level, but even more so at the regional level. Without the use of rather advanced stochastic projections or multi-regional econometric models, there is not much more that can be done than a rather subjective assessment of the extent to which past trends are likely to continue (albeit at an age-sex-location specific level) and this is precisely how the Statistics New Zealand projections are done. Past internal migration and immigration are considered in Section 2.3. The column with 2001-2011 percentage change in population is directly comparable to that of the 1991-2001 decade reported in Table 1.

Comparing Tables 1 and 2, the projected growth is similar to that observed over the last decade. However, Hauraki is expected to experience more significant population

decline over 2001-2011 than in the previous decade (-5.5 versus -1.6 percent). Otorohanga is also expected to face population decline, while Part Rotorua switches to positive growth. The projected growth in Hamilton City over the 2001-2011 period remains at 15 percent and, unlike the 1991-2001 decade, exceeds that of Thames-Coromandel considerably.

Table 2. Projected Usually Resident Total Population, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2001-2026 – Medium Projection

Territorial Authority	2001[2]	2011	2001-2011 % change	2016	2021	2026
Part Franklin	14,900	17,200	15.4	18,200	19,200	20,200
Thames-Coromandel	25,800	28,000	8.5	29,100	30,200	31,100
Hauraki	17,250	16,300	-5.5	15,900	15,550	15,100
Waikato	41,300	44,000	6.5	44,700	45,300	45,700
Matamata-Piako	30,300	30,000	-1.0	29,500	28,900	28,300
Hamilton City[1]	120,900	139,200	15.1	146,900	154,500	162,200
Waipa[1]	40,000	44,000	10.0	45,400	46,700	47,900
Otorohanga	9,590	9,350	-2.5	9,190	8,990	8,750
South Waikato	24,200	21,800	-9.9	21,000	20,000	18,950
Waitomo	9,780	9,550	-2.4	9,340	9,070	8,740
Taupo	32,500	35,200	8.3	35,800	36,300	36,600
Part Rotorua	3,560	3,660	2.8	3,680	3,680	3,650
Waikato Region	**369,800**	**397,800**	**7.6**	**408,400**	**418,100**	**426,800**
New Zealand	3,880,500	4,291,900	10.6	4,448,500	4,594,000	4,730,000

(1) The Hamilton City boundary changed on the 30th June 2004. These projections are for the new boundary which includes Temple View which was included in Waipa District previously.

(2) Numbers are different from the Census population of Table 1 due to an adjustment for census undercount.

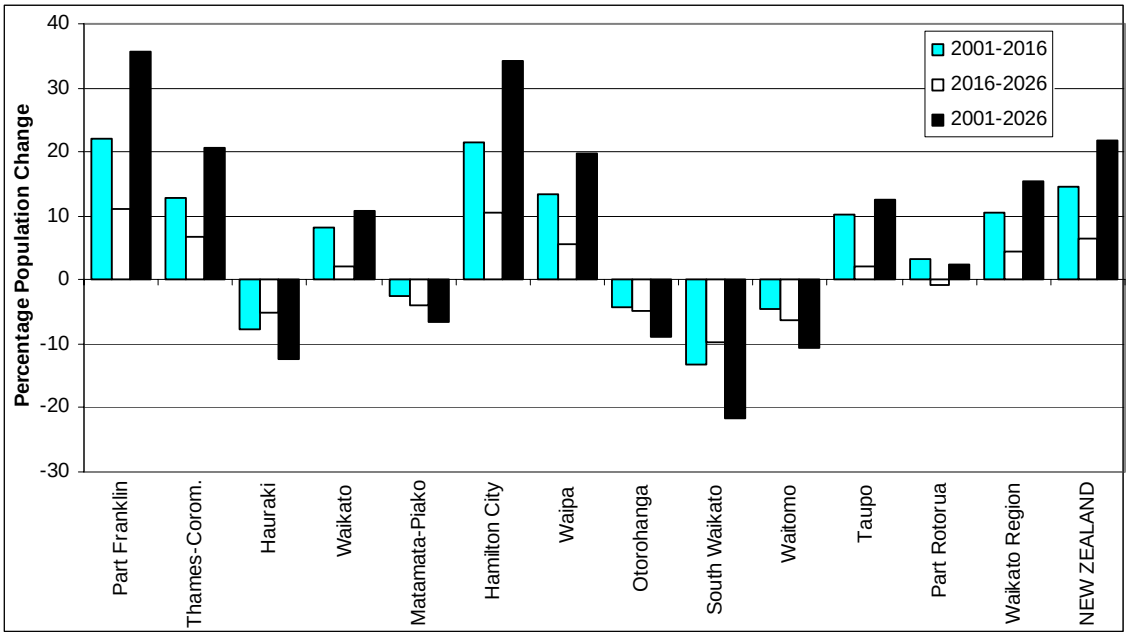
Sources: Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005; Statistics New Zealand, National Population Projections 2004 (base) Series 5.

Figure 2 shows the percentage change in the usually resident population for the periods 2001-2016, 2016-2026 and for 2001-2026. Hamilton City and Part Franklin are expected to continue to exhibit strong growth, well above the national average. Hamilton City and its contiguous territorial authorities of Waikato District and Waipa District are projected to grow by 53,600 people over the 2001-2026 period, some 94 percent of the region's total growth of 57,000. Thames-Coromandel, Waikato, Waipa, and Taupo are all expected to show positive growth throughout 2001-2026.

Part Rotorua is expected to show slow growth in the earlier period and some contraction in the latter. This area is small, 3,560 in 2001, and the overall 2001-2026 gain is less than 100. The South Waikato is projected to experience a considerable loss

of population over 2001-2026 of some 5,250 persons, which is close to 20 percent of its 2001 population.

Figure 2. Usually Resident Projected Population Change, Waikato Constituent Territorial Authority Areas[1], Waikato Region and New Zealand, 2001-2016, 2016-2021 and 2001-2026



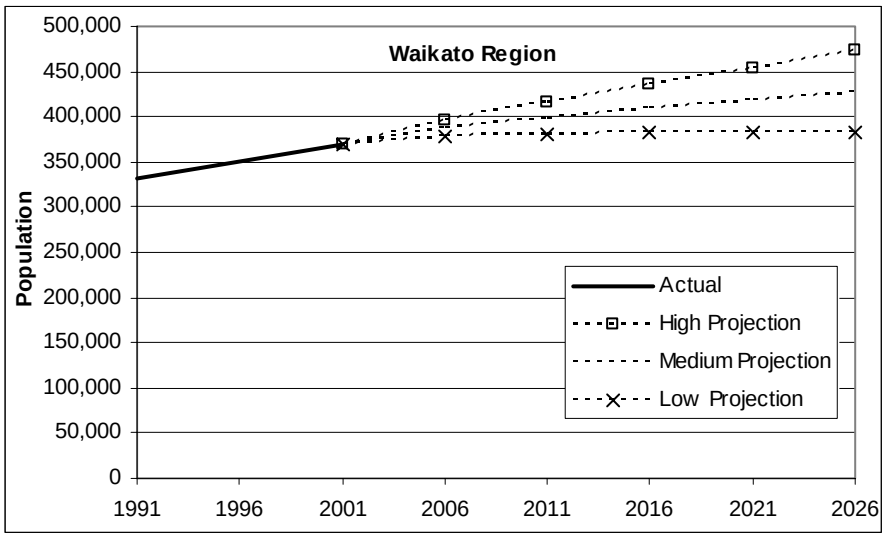
(1) The Hamilton City boundary changed on the 30th June 2004. These projections are for the new boundary which includes Temple View which was included in Waipa District previously.

Sources: Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005; Statistics New Zealand, National Population Projections 2004 (base) Series 5.

As noted earlier, the future trends discussed above are based upon what is known as the medium projections series. These projections, as their name suggests, assume medium levels of fertility, mortality and migration that reflect the recent experience. However, these levels vary by TA in accordance with past trends in the TA's fertility, mortality and migration. In addition to the medium series, Statistics New Zealand also produces a high and low series. The high series assumes high levels of fertility and migration, and low levels of mortality are assumed, while the low series assumes low levels of fertility and migration and high levels of mortality (Statistics New Zealand, 2005a).

Figure 3 shows the historical and projected usually resident population for each of the three scenarios (high, medium and low). As can be seen from this figure these projections result in markedly different population estimates for 2026, ranging for the total Waikato region from a low of 381,700, approximately 3 percent more than 2001, to 473,100 or some 28 percent more than 2001. In each of the three projections, population growth is levelling off over time, with the low projection generating slightly negative population growth (-1,100) for the Waikato region as a whole in 2021-2026.

Figure 3. Historical and Projected (High, Medium, Low) Usually Resident Population, Waikato Region, 1991-2026



Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.
Statistics New Zealand, Subnational Population Projections: 2001 (base) - 2026; Updated 28 February2005

Figure 4 shows the three projections, high, medium and low, for the EW region's constituent Territorial Authority areas. In all projections the two fastest growing areas for the 2001-2026 period are Part Franklin and Hamilton City.[2] Under the high projection Hamilton City and its contiguous territorial authorities of Waikato District and Waipa District grow by 78,400 people, which is about 76 percent of the regions total projected growth of 103,300. In the low projection, Hamilton City, Waikato District and Waipa District grow in total by 29,500 people, which is considerably more than the EW region's total projected growth of 11,900. This is the consequence of substantial population losses in some of the EW region's constituent TAs in the low projection. Under the high projection assumptions, South Waikato will be the only TA to loose population, a loss of 1,800 people or around 7 percent of its 2001 population. However, under the low projection assumptions several sub-regions will lose population, namely Part Rotorua (-9.3 percent of the 2001 population), Hauraki District (-25.2 percent), Matamata-Piako (-19.1 percent), Otorohanga (-21.2 percent), South Waikato (-35.7 percent) and Waitomo (-25.7 percent).

[2] Growth in Part Franklin of 23 percent for the low and 48 percent for the high projection, and growth in Hamilton City of 22 percent for the low and 47 percent for the high projection.

Figure 4. Historical and Projected (High, Medium, Low) Usually Resident Population, Waikato Constituent Territorial Authority Areas, 1991-2026

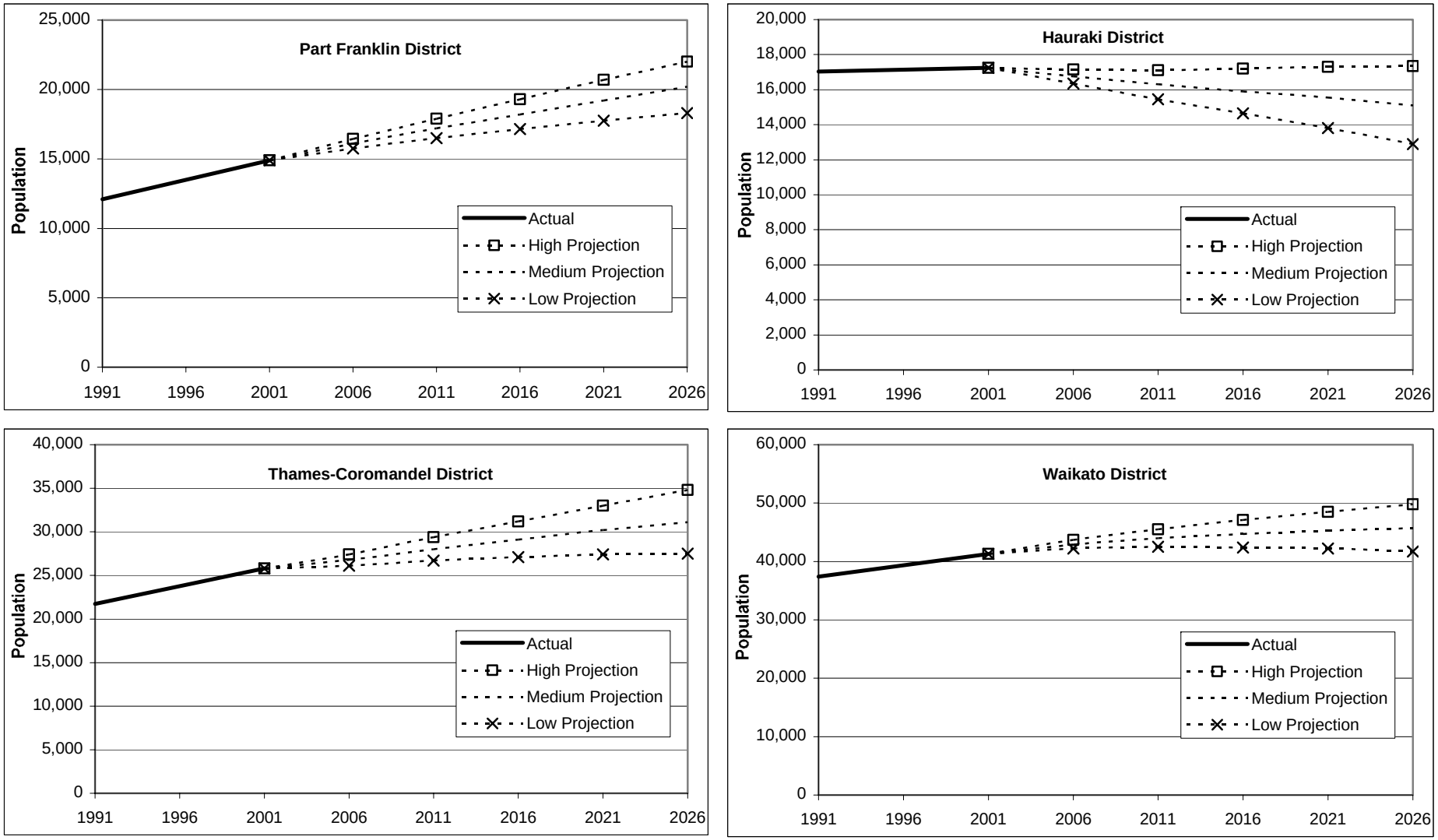


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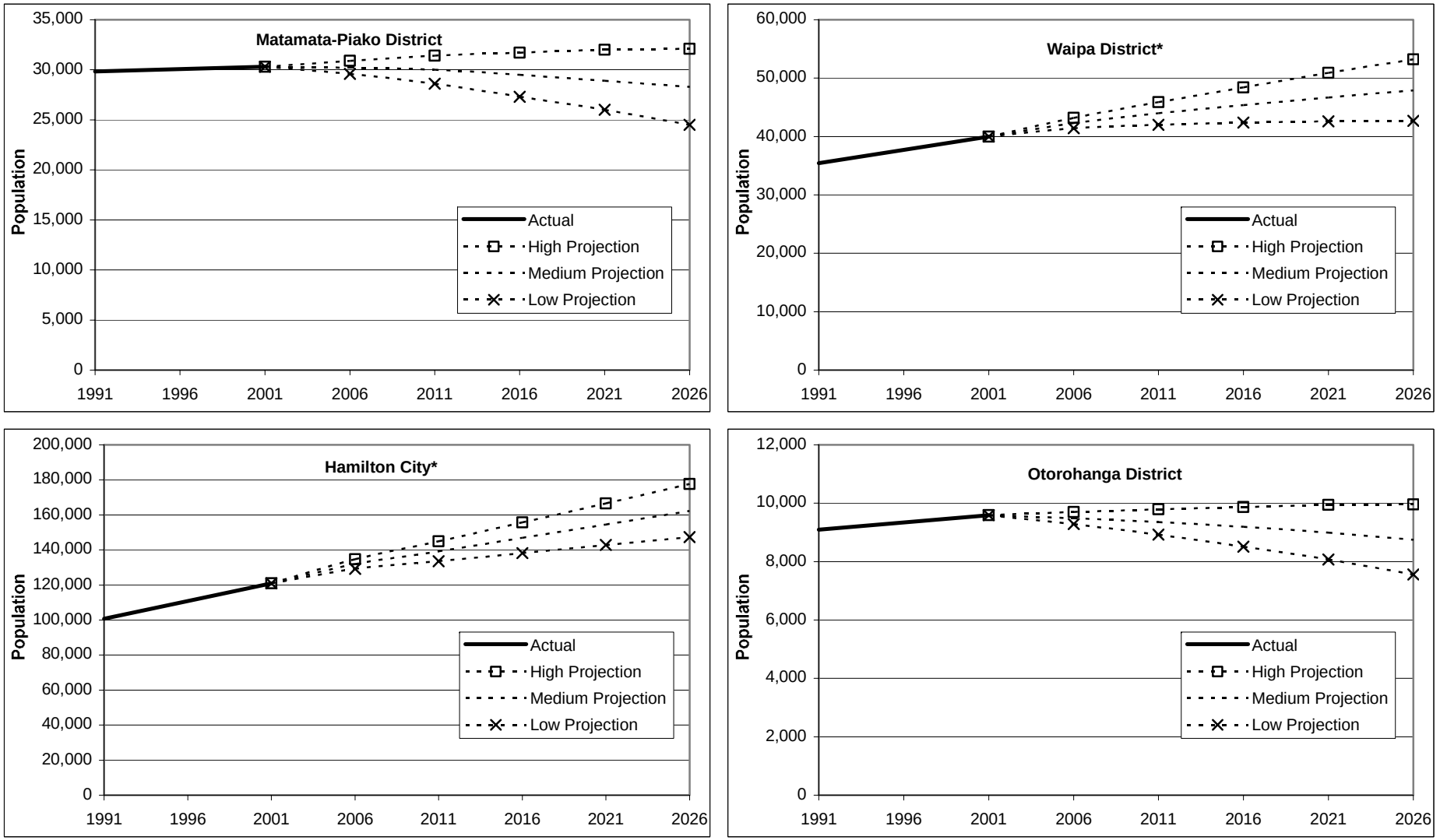
Figure 4. (continued)



* Hamilton City boundary change on the 30th June 2004, these projection are for the new boundary which includes Temple View which was in Waipa District.

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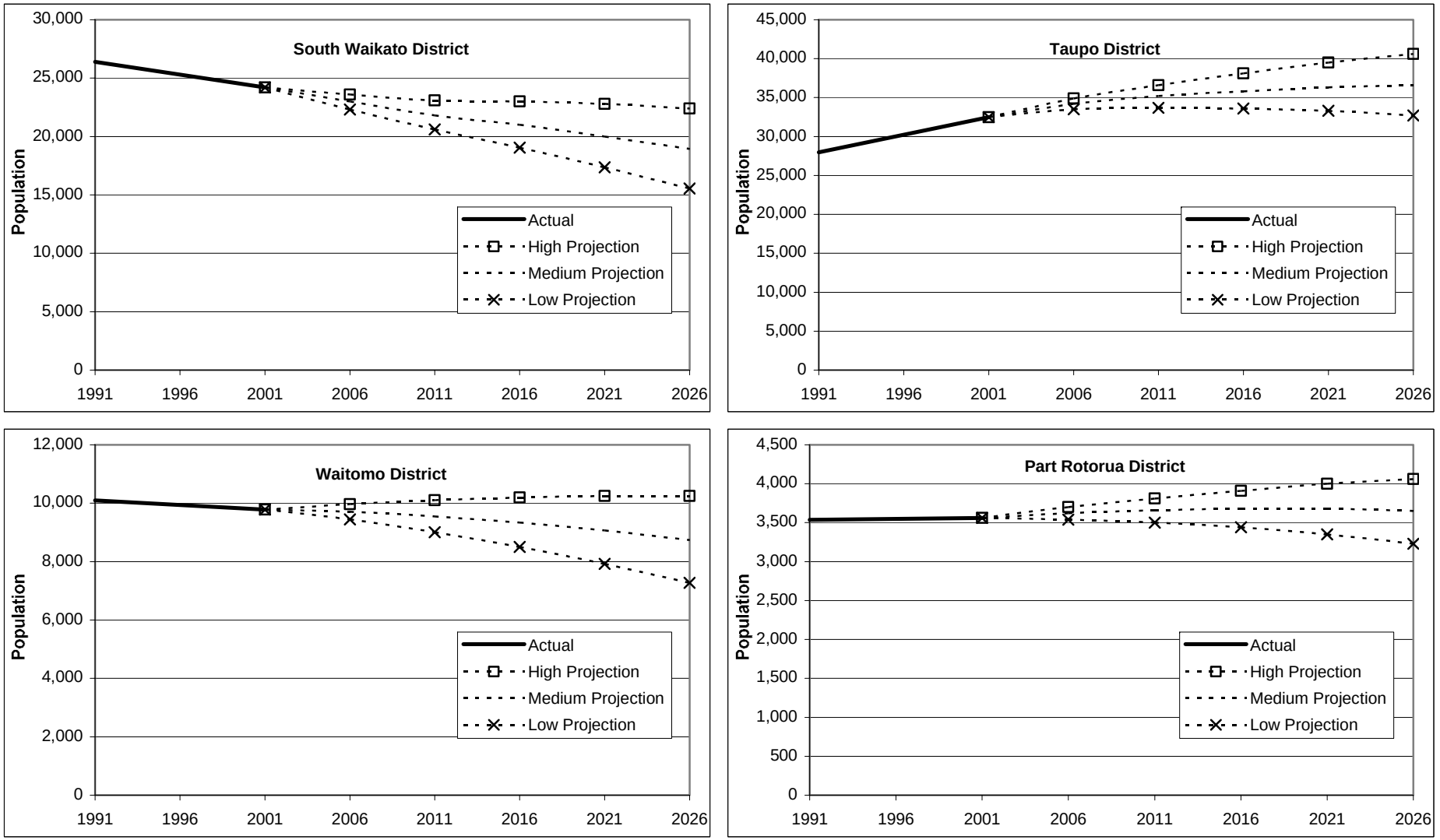
Figure 4. (continued)



Sources: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.
Statistics New Zealand, Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005

Summary

On the basis of the most recent Statistics New Zealand projections the EW region is projected to experience overall growth of between 3 and 28 percent of the 2001 usually resident population over the 2001-2026 period. This is between 11,900 and 103,300 additional people.

Under any of the three projection scenarios considered the highest rate of growth is in the portion of Franklin District in the EW area, probably driven by 'spillover' effects from Auckland population growth. However, this area provides a numerically small share of the total EW regional population. Thus, the bulk of the numerical increase in population is expected to occur in Hamilton City and the surrounding Waikato and Waipa districts. Thames-Coromandel and Taupo will also experience some growth under all of the three scenarios. South Waikato is the only sub-region that will lose population under any of the three scenarios.

2.2 Age Specific Population Change

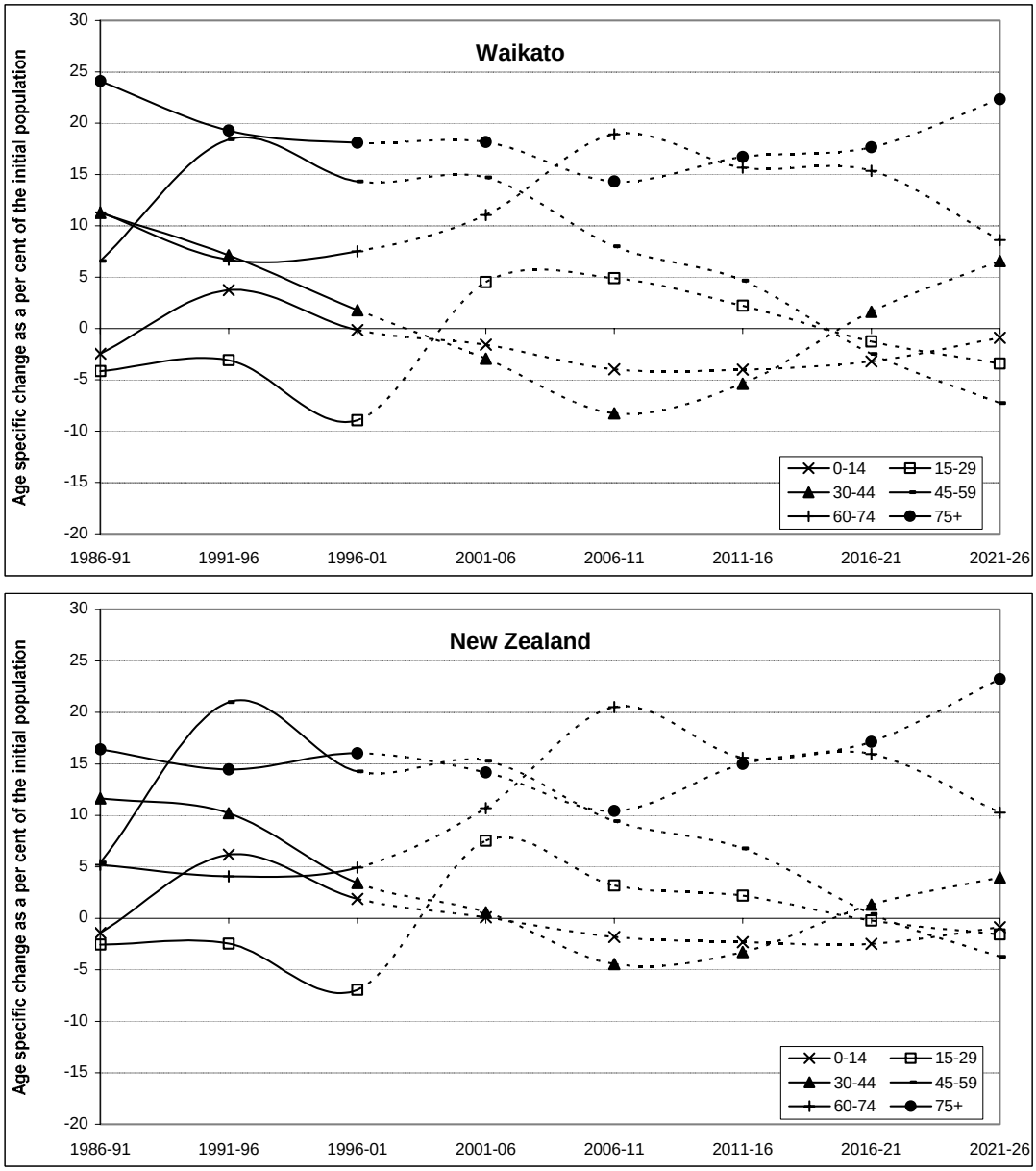
Figure 5 shows the historical and projected age-specific changes in population size for the Waikato region and New Zealand as a whole. The changes in the Waikato are qualitatively similar to those in New Zealand as a whole, but quantitatively somewhat different. The changes are measured as a percentage of the initial population size at the beginning of the intercensal period. The Figure shows that population size in an age group can change quite radically over a five-year period at rates that can vary from minus 10 to plus 25 percent. It can be seen from Figure 5 that for each age group, the differently sized population cohorts that move through the population structure create wave effects. "The problem posed by disordered cohort flows stems from the fact that social and economic policies normally address the needs of a particular life-cycle stage – education is delivered to children, labour market entry policies to young adults, family policies and housing to adults at parenting ages, savings and retirement to the old" (Lepina & Pool, 2000, p 399). Factors that can cause regions to have wave patterns different from those for New Zealand as a whole are regional differences in fertility, mortality and migration, ethnic composition and the socio-economic situation (Lepina & Pool, 2000; Pool & Cheung, 2003; Rindfuss, 1991).

As in any wave pattern, peaks are followed by troughs, and often by more peaks and troughs. The passage of such waves may result in on/off-again policies that respond to the numerical importance of certain age groups. The waves also generate changing fortunes in markets for goods and services that cater for specific age groups. It should be noted that the waves are frequently irregular, thus making policy formulation and planning increasingly difficult. A concomitant of this is that where wave patterns of

different age groups move in the same way, competing demands are generated that are often intergenerational.

As with total population change, the outcomes and projections for age-specific population change in the Waikato region as a whole are not that different from that of New Zealand as a whole (Figure 5). Between 1991 and 2001 Waikato had slightly higher growth than New Zealand in the age group 60 years and over. This reverses, when projecting into the future, to New Zealand having slightly higher growth in this age group. There is expected to be slightly more decline in the age groups under 15 and 30-44 in the Waikato than New Zealand for the period 2001 to 2016.

Figure 5. Population Waves: Historical and Projected Age Specific Change in Population Size, Waikato Region and New Zealand, 1986-2026



Sources: Statistics New Zealand, 1986-2001 Censuses of Population and Dwellings; Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005; Statistics New Zealand, National Population Projections 2004(base) Series 5.

Table 3 shows the proportion of the usually resident population in three broad age bands for both the past years 1991 and 2001 and for projection years 2016 and 2026. The three age bands are 0-14, 15-64 and 65 and over. These three bands loosely correspond to three phases of the life cycle: childhood, working age and retirement.

Overall, the proportion of people in the 15-64 age group declines for the Waikato less than one percentage point between 1991 and 2001 and is projected to decline a further three percentage points between 2001 and 2026. The proportions aged 15-64 are always somewhat lower than New Zealand as a whole. Conversely, demographic total dependency (the population aged 0-14 plus 65 and over divided by the population aged 15-64) is higher in the EW region than in New Zealand and increases faster. The demographic total dependency rate is 0.546 in the EW region in 1991 and increases to 0.647 in 2026, whereas the New Zealand rate is 0.527 in 1991 and increases to 0.590 in 2026.

Table 3 also shows that all sub-regions of the EW region are projected to experience declines between 2001 and 2026 in the shares of 15-64 age group though there are marked differences between TAs with declines ranging from 1.4 percentage points in Hamilton City to 8.1 percentage points in the Hauraki District.

In the period 1991 to 2001 the proportion of the population in the under 15 age group declined by 1.1 percentage points in the EW region, but is projected to decline a further 6 percentage points from 2001 to 2026. The proportion of the population in this age group for the Waikato remains slightly above the figure for New Zealand as a whole.

Again there are marked differences between TAs with the projected declines between 2001 and 2026 in the proportion of the population aged under 15 years ranging from 4 percentage points in Hamilton City to nearly 9 percentage points in Hauraki and South Waikato District.

For the age group 65 years and over there was 1.7 percentage points growth in the share between 1991 and 2001 in the EW region and there is projected to be 9.3 percentage points growth between 2001 and 2026. The Waikato region starts off just lower than New Zealand in the proportion of older persons but finished above the national average in 2026.

The structural ageing of the population (the increasing share of those aged 65 and over) is taking place in all Territorial Authority areas in the EW region between 1991 and 2026. The projected increases range from 5.9 percentage points in Hamilton City to 20.3 percentage points in Hauraki District.

Table 3. Age Composition of the Usually Resident Population (1991 and 2001) and Projected (2016 and 2026), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 – 2026

Territorial Authority	Under 15 years				15-64 years				65 years and over			
	1991	2001	2016	2026	1991	2001	2016	2026	1991	2001	2016	2026
Part Franklin	27.7	26.3	22.6	20.6	65.2	65.4	63.5	59.8	7.2	8.2	14.0	19.5
Thames-Coromandel	20.2	19.4	14.7	13.7	61.6	60.1	58.8	54.2	18.2	20.5	26.6	32.1
Hauraki	27.1	25.4	18.0	16.8	61.9	60.0	58.7	51.9	11.0	14.6	23.4	31.3
Waikato	28.0	26.9	21.8	19.9	63.7	63.3	63.6	59.3	8.3	9.8	14.6	20.8
Matamata-Piako	26.5	24.9	19.7	18.3	62.6	61.0	60.6	55.4	10.8	14.0	19.6	26.2
Hamilton City[1]	22.6	22.6	19.9	18.3	67.6	67.4	67.6	66.0	9.8	10.0	12.4	15.7
Waipa[1]	25.4	24.3	20.3	18.5	63.2	62.7	62.1	58.3	11.4	13.0	17.7	23.3
Otorohanga	27.7	25.9	21.4	20.8	64.2	64.6	64.7	61.6	8.1	9.5	13.7	17.7
South Waikato	29.8	28.8	22.1	20.3	64.3	61.5	62.0	57.7	5.9	9.8	15.9	22.1
Waitomo	28.2	26.4	22.3	20.6	63.0	62.6	61.2	56.6	8.8	11.0	16.5	22.8
Taupo	26.0	24.4	18.8	17.1	64.4	63.4	62.5	58.2	9.6	12.2	18.7	24.8
Part Rotorua	32.9	29.5	23.9	22.2	64.0	65.7	65.8	60.5	3.1	4.6	9.8	17.3
Waikato Region	**25.4**	**24.3**	**20.0**	**18.3**	**64.7**	**64.0**	**63.9**	**60.7**	**10.0**	**11.7**	**16.1**	**21.0**
New Zealand	23.2	22.7	18.9	17.2	65.5	65.3	65.6	62.9	11.3	12.1	15.5	19.9

(1) The Hamilton City boundary changed on the 30th June 2004. These projections are for the new boundary which includes Temple View which was included in Waipa District previously

Sources: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.
Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005
Statistics New Zealand, National Population Projections 2004(base) Series 5.

Table 4 provides a more refined age breakdown of the 2001 population, with each age group representing a stage in the life course. The relative youthfulness of the Waikato regional population is seen from the lower percentage in the age groups under 5, 5-14 and 15-24 than in the nation. The region has a smaller proportion of the population in the 25-44 and 45-64 age groups than the nation. There is also an interesting difference in the 65 plus group: the "old old" (75+) are underrepresented, while the "young old" 65-74 are overrepresented. There is, however, considerably variation across the TA areas. The "old old" group is relatively very small in Part Rotorua, Part Franklin, Otorohanga and South Waikato. In contrast, they are clearly overrepresented in Thames-Coromandel (8.4 percent versus 5 percent for the EW region). In this sub-region, the 65-74 share is nearly double that of the Waikato region as a whole (12.1 versus 6.7 percent). At the other end of the age spectrum, Thames-Coromandel has the relatively smallest pre-school population. The Thames-Coromandel age structure is clearly very different from the rest of the region, with the lowest percentages also for the 15-24 and 25-44 age groups.

Table 4. Age Composition of the Usually Resident Population, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2001

Territorial Authority	Age Group (years)							Total
	Under 5	5-14	15-24	25-44	45-64	65-74	75+	
Part Franklin	8.7	17.6	11.2	30.4	23.8	5.2	3.0	100.0
Thames-Coromandel	5.6	13.8	8.1	23.7	28.3	12.1	8.4	100.0
Hauraki	7.4	18.0	10.0	25.9	24.1	8.5	6.0	100.0
Waikato	8.3	18.5	12.4	28.6	22.4	5.8	4.0	100.0
Matamata-Piako	7.8	17.2	11.5	28.0	21.4	7.9	6.1	100.0
Hamilton City	7.6	15.0	18.3	29.6	19.5	5.4	4.7	100.0
Waipa	7.3	17.0	12.1	28.4	22.2	6.9	6.0	100.0
Otorohanga	7.9	18.0	14.0	29.8	20.8	5.8	3.7	100.0
South Waikato	9.2	19.6	12.1	28.3	21.1	6.3	3.5	100.0
Waitomo	8.4	18.0	12.2	28.1	22.3	6.6	4.4	100.0
Taupo	7.9	16.6	11.8	28.8	22.8	7.4	4.8	100.0
Part Rotorua	9.4	20.1	12.6	33.0	20.1	3.1	1.6	100.0
Waikato Region	**7.7**	**16.6**	**13.7**	**28.5**	**21.8**	**6.7**	**5.0**	**100.0**
New Zealand	7.2	15.4	13.5	29.7	22.1	6.6	5.5	100.0

Sources: Statistics New Zealand, 2001 Census of Population and Dwellings.

The population aged under 5 is relatively large in South Waikato and Part Rotorua, reflecting higher birth rates in these regions. The importance of the high school and student population for Hamilton City is conveyed clearly by the share of the population aged 15-24, which is 18.3 percent in Hamilton City, 13.7 percent for the Waikato region and 13.5 percent for New Zealand. The age group 45-64 has the smallest share in Hamilton City.

Given the potential implication of ageing of the regional population for transport needs, Table 5 splits the medium projections of Table 3 for the 65 plus age group into the "young old" and "old old" components. The information from the past censuses in 1991 and 2001 has been included for comparison. The trends are very clear. Both the share of the 65-74 age group and the share of the 75 years and over group increase steadily in all TA regions. What is significant to note is that structural ageing in terms of the proportion of the population aged 75 plus is proceeding faster in the Waikato region than in New Zealand as a whole. In 2001 the proportion aged 75 and over accounted for 5 percent in the Waikato region and 5.5 percent in New Zealand. By 2016, the projection suggest an increase to 9.7 percent in the Waikato region and 9.2 percent in New Zealand overall.

Table 5. Share of the "Young Old" and "Old Old" Usually Resident Actual Population (1991 and 2001) and Projected (2016 and 2026), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 – 2026

	65-74 years				75 years and over			
Territorial Authority	**1991**	**2001**	**2016**	**2026**	**1991**	**2001**	**2016**	**2026**
Part Franklin	4.7	5.2	8.9	11.1	2.5	3.0	5.1	8.3
Thames-Coromandel	11.8	12.1	14.6	16.6	6.4	8.4	12.0	15.5
Hauraki	6.5	8.5	13.0	16.2	4.5	6.0	10.4	15.1
Waikato	5.2	5.8	8.9	11.9	3.1	4.0	5.7	8.9
Matamata-Piako	6.6	7.9	9.8	13.5	4.2	6.1	9.8	12.7
Hamilton City[1]	5.8	5.4	7.0	8.5	4.1	4.7	5.4	7.3
Waipa[1]	6.5	6.9	9.4	12.2	4.9	6.0	8.3	11.1
Otorohanga	5.1	5.8	7.9	9.5	3.0	3.7	5.8	8.2
South Waikato	4.1	6.3	8.8	11.9	1.7	3.5	7.1	10.2
Waitomo	5.4	6.6	9.7	12.4	3.4	4.4	6.7	10.4
Taupo	6.3	7.4	10.6	13.2	3.2	4.8	8.1	11.7
Part Rotorua	2.5	3.1	6.5	10.4	0.7	1.6	3.3	6.8
Waikato Region	**6.1**	**6.7**	**9.0**	**11.2**	**3.8**	**5.0**	**7.1**	**9.7**
New Zealand	6.7	6.6	8.7	10.7	4.6	5.5	6.8	9.2

(1) The Hamilton City boundary changed on the 30th June 2004. These projections are for the new boundary which includes Temple View which was included in Waipa District previously.

Sources: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings; Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005
Statistics New Zealand, National Population Projections 2004(base) Series 5.

Table 5 displays again the marked variation in structural ageing across the constituent TAs of the Waikato region. With respect to the "old old" group, this variation has major implications for access to health care. Where secondary and tertiary health care are relatively close (as in Hamilton City) the proportion of the population most likely to require such health care is the smallest. In contrast, in more peripheral parts of the region (specifically Thames-Coromandel) the share of the old-old population is twice

that in Hamilton City. The "young-old" age group will continue to be relatively underrepresented in Hamilton City, Otorohanga and Part Rotorua.

2.3 Ethnic Structure

When reviewing statistics on ethnicity, it is important to note that census respondents can identify with more than one ethnic group. Aggregating across ethnic groups, the percentages therefore add up to more than 100 percent. The ethnic structure of the Waikato region is different to New Zealand as a whole as shown in Table 6. There is a higher proportion of Māori and relatively smaller Pacific and Asian populations. Over the time period 1991 to 2001 the region became more ethnically diverse and is projected to continue to do so. However, there are some notable differences across the Territorial Authority regions. In 2001 the percentage Māori ranged from 12.8 percent in Matamata-Piako to 37.4 percent in Waitomo District. Other regions with over one quarter of their population Māori are Waikato, Otorohanga, South Waikato and Taupo Districts. The Pacific group is relatively well represented in South Waikato with 12.1 percent, nearly double the national average. All other regions have below 4 percent of their population of Pacific ethnicity. The highest percentage of the Asian ethnic group is in Hamilton City, with the proportion being 7 percent. The enrolment of Asian students at Waikato's tertiary institutions is undoubtedly one factor. The Asian ethnic group in the other parts of the Waikato region accounts for less than three percent of the respective populations.

Statistics New Zealand has produced some subnational ethnic projections that enable an assessment of ethnic structure in 2016 in the Waikato region. While the percentage European and Māori are available for all TA areas of the region, the numbers of Pacific and Asian ethnicity in many TA regions were in the base year (2001) insufficient to project forward. The percentage European is expected to remain relatively high in Thames-Coromandel, Hauraki, Matamata-Piako and Waipa. The percentage Māori is projected to be about or more than double the national average in Waikato district, Otorohanga, South Waikato, Waitomo and Taupo (Table 7). The Asian population in Hamilton City is expected to increase from 7 percent in 2001 to 13.2 percent in 2016, while the Pacific population is projected to increase from 3.4 percent in 2001 to 5 percent in 2016. The Pacific ethnic group may account for as much as 17.3 percent of the South Waikato population by 2016.

Table 6. Usually Resident Population by Ethnicity (Total Response), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authority	European	Māori	Pacific	Asian	Other	Not Specified	Total
	1991 Census						
Part Franklin	82.5	17.2	1.5	1.7	[0.02]	1.3	100.0
Thames-Coromandel	89.9	12.0	0.6	0.7	0.1	1.0	100.0
Hauraki	86.8	14.9	1.1	0.9	[0.04]	1.0	100.0
Waikato	76.1	24.8	1.3	1.3	0.1	1.2	100.0
Matamata-Piako	90.6	9.9	0.5	1.1	0.1	0.3	100.0
Hamilton City	83.8	14.7	2.0	3.1	0.3	0.7	100.0
Waipa	88.8	13.0	0.8	0.8	0.1	0.7	100.0
Otorohanga	78.1	23.4	1.2	1.1	0.1	0.7	100.0
South Waikato	69.8	26.3	10.2	1.0	0.1	0.7	100.0
Waitomo	70.0	34.2	1.0	1.0	0.0	0.4	100.0
Taupo	73.7	29.4	2.1	0.8	0.1	0.5	100.0
Part Rotorua	88.4	14.2	0.7	0.6	0.0	0.9	100.0
Waikato Region	**82.1**	**18.1**	**2.1**	**1.6**	**0.1**	**0.8**	**100.0**
New Zealand	82.5	12.9	5.0	3.0	0.2	0.8	100.0
	2001 Census						
Part Franklin	79.6	18.0	1.8	2.4	0.1	6.3	100.0
Thames-Coromandel	87.2	14.3	1.4	1.1	0.2	4.9	100.0
Hauraki	84.9	18.2	1.6	1.5	0.1	2.9	100.0
Waikato	74.8	25.9	2.0	2.0	0.2	4.5	100.0
Matamata-Piako	86.8	12.8	1.0	2.1	0.1	3.2	100.0
Hamilton City	76.3	18.6	3.4	7.0	1.1	2.9	100.0
Waipa	87.2	14.7	1.6	1.5	0.2	2.8	100.0
Otorohanga	75.1	27.3	1.4	1.4	0.2	4.4	100.0
South Waikato	67.7	29.2	12.1	1.5	0.1	4.4	100.0
Waitomo	67.7	37.4	1.7	0.9	0.2	3.2	100.0
Taupo	73.8	27.8	2.7	1.4	0.2	5.3	100.0
Part Rotorua	84.7	18.6	1.2	0.6	0.1	4.5	100.0
Waikato Region	**78.6**	**20.4**	**2.9**	**3.4**	**0.5**	**3.7**	**100.0**
New Zealand	76.8	14.1	6.2	6.4	0.7	4.0	100.0

Note: Percentages add to more than 100% as a person can belong to more than one ethnic group.
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Table 7. Projected Usually Resident Population by Ethnicity (Total Response), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2016

Territorial Authority[1]	European		Māori		Pacific Peoples		Asian	
	N	%	N	%	N	%	N	%
Thames-Coromandel	27,000	90.6	4,700	15.8	nc	nc	nc	nc
Hauraki	13,200	83.5	3,800	24.1	nc	nc	nc	nc
Waikato	32,500	74.2	13,600	31.1	nc	nc	nc	nc
Matamata-Piako	24,200	85.2	4,800	16.9	nc	nc	nc	nc
Hamilton City	99,600	69.7	30,200	21.1	7,200	5.0	18,800	13.2
Waipa	40,100	87.6	7,900	17.2	nc	nc	nc	nc
Otorohanga	6,600	73.3	3,100	34.4	nc	nc	nc	nc
South Waikato	13,700	65.9	7,900	38.0	3,600	17.3	nc	nc
Waitomo	5,700	62.6	4,200	46.2	nc	nc	nc	nc
Taupo	26,300	75.8	11,100	32.0	nc	nc	nc	nc
Waikato Region	307,100	76.5	95,600	23.8	16,800	4.2	25,300	6.3
New Zealand	3,117,300	71.2	705,900	16.1	370,700	8.5	553,800	12.6

nc – Not calculated as 2001 numbers are too small.
(1) Part Franklin and Part Rotorua District is not available.
Note: Percentages add to more than 100% as a person can belong to more than one ethnic group.
Source: Statistics New Zealand, Subnational Ethnic Population Projections: 2001(base)-2016, medium series.

The ethnic groups differ in terms of their age structure. The information for 2001 can be seen in Table 8. For the Waikato region as a whole the Māori and Pacific People populations are much younger with 37.6 and 42.6 percent of their populations under 15 years respectively, compared to European and Asian populations with 23.2 and 26.4 per cent respectively in 2001. For age groups 65 years and over, Europeans had 13.2 per cent of their population in this age group compared to 4 percent for the Māori, Pacific and Asian ethnic groups. The 'working age' population 15-64 years was 70 percent of the total for the Asian ethnic group, 64 percent for the European group, 59 percent for Māori and 55 percent for Pacific people.

For age structure of the ethnic group there is some variation within the Territorial Authorities of the Waikato region in 2001. There is a higher percentage in the 15-24 years age group in Hamilton City for both Pakeha and Māori reflecting the presence of tertiary education institutions. This would also be the case for the Pacific and particularly the Asian ethnic groups, but a breakdown to TA level by age is not meaningful for these ethnic groups. In Thames-Coromandel there are a high percentage of those in the 65-74 years age group, as noted earlier. Table 8 shows that this is a feature of the European rather than of the Māori population in that region.

Table 8. Usually Resident Population by Ethnicity (Total Response) Age Group, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2001

Territorial Authorities	< 5	5-14	15-24	25-44	45-64	65-74	75+	Total
	European							
Part Franklin	8.6	17.7	10.3	30.1	24.6	5.5	3.2	100.0
Thames-Coromandel	5.5	13.5	7.4	22.7	28.9	12.8	9.0	100.0
Hauraki	7.1	17.5	9.4	25.2	24.9	9.3	6.6	100.0
Waikato	7.7	17.5	11.5	28.4	23.9	6.2	4.8	100.0
Matamata-Piako	7.4	16.8	10.8	27.9	21.9	8.5	6.6	100.0
Hamilton City	7.1	13.9	17.4	29.0	20.8	6.1	5.6	100.0
Waipa	7.1	16.7	11.4	28.2	22.8	7.2	6.6	100.0
Otorohanga	7.8	18.9	12.2	28.3	22.4	6.2	4.3	100.0
South Waikato	8.8	18.9	10.6	27.6	22.3	7.4	4.4	100.0
Waitomo	7.7	17.1	11.0	27.6	24.1	7.2	5.4	100.0
Taupo	7.3	15.6	10.4	28.0	24.2	8.5	5.8	100.0
Part Rotorua	9.4	20.3	13.0	32.9	19.9	2.7	1.7	100.0
Waikato Region	**7.3**	**15.9**	**12.7**	**27.9**	**23.0**	**7.4**	**5.8**	**100.0**
New Zealand	6.8	14.7	12.4	28.9	23.4	7.4	6.5	100.0
	Māori							
Part Franklin	13.5	23.5	16.0	27.9	15.1	3.1	0.7	100.0
Thames-Coromandel	12.1	24.7	13.8	27.3	16.0	4.3	1.8	100.0
Hauraki	12.3	27.1	14.8	26.7	14.7	3.1	1.1	100.0
Waikato	13.0	25.8	16.4	26.7	14.2	3.0	1.0	100.0
Matamata-Piako	13.5	26.5	17.1	26.4	13.6	2.1	1.0	100.0
Hamilton City	13.3	23.2	21.7	28.9	10.8	1.6	0.6	100.0
Waipa	12.4	26.4	17.4	26.5	13.9	2.6	0.9	100.0
Otorohanga	11.5	22.0	17.8	30.3	13.2	3.8	1.2	100.0
South Waikato	14.4	26.6	16.2	27.0	13.0	2.5	0.5	100.0
Waitomo	11.6	23.1	16.4	28.1	15.4	3.7	1.7	100.0
Taupo	12.3	24.7	16.4	28.4	14.3	3.2	1.0	100.0
Part Rotorua	13.1	25.8	17.8	28.2	13.6	1.9	0.5	100.0
Waikato Region	**12.9**	**24.7**	**17.9**	**27.8**	**13.2**	**2.6**	**0.9**	**100.0**
New Zealand	12.8	24.5	17.4	28.6	13.3	2.5	0.9	100.0
	Pacific Peoples[1]							
Waikato Region	**15.7**	**26.9**	**18.6**	**25.2**	**10.7**	**2.2**	**0.7**	**100.0**
New Zealand	14.1	24.8	17.8	27.8	12.2	2.3	1.0	100.0
	Asian[1]							
Waikato Region	**8.6**	**17.8**	**23.1**	**30.5**	**16.4**	**2.8**	**0.9**	**100.0**
New Zealand	7.7	15.9	21.5	33.8	17.0	2.9	1.1	100.0

(1) Small numbers in the majority of the Territorial Authorities means results are excluded.
Source: Statistics New Zealand, 2001 Census of Population and Dwellings.

2.4 Internal Migration

The internal migration statistics for the Territorial Authority regions in the Waikato region provide some information on one of the causes of population change in these regions. It is also useful to assess residential mobility within the region. It is important to note that the larger the region, the more likely residential change is expected to be within the area. For an assessment of population growth potential of the TA areas, the difference between the migration in and out of the area is of course more important.

The data on internal migration flows are reported in Table 9. The inflow in the five years from 1996 to 2001 is relatively the highest (more than double the proportion for the Waikato region as a whole) in the Part Franklin and Part Rotorua areas. In the case of Part Franklin, this is likely to be a spillover of metropolitan sprawl in Auckland. Other TAs with a net inflow are Thames-Coromandel, Waikato, Hamilton City, Waipa and Taupo District as well as the overall Waikato region. The largest net outflow occurred in South Waikato of 9.9 per cent with Waitomo and Part Rotorua District having an outflow of around 3 percent. Within the Waikato region, immigrants are primarily attracted to Hamilton City, which had the largest inflow (7.9 percent) in the five years from 1996 to 2001 from overseas.

Table 9. Internal Migration 2001 Census (address 5 years ago) Total Population (5 years and over), Waikato Constituent Territorial Authority Areas and Waikato Region, 2001

Territorial Authority	In Migration within NZ	From Overseas	Same Area	Not Specified	Total	Net Internal Migration
Part Franklin	28.6	3.3	57.0	11.1	100.0	7.2
Thames-Coromandel	24.6	3.6	64.5	7.3	100.0	2.3
Hauraki	25.2	2.4	66.1	6.3	100.0	-0.2
Waikato	24.6	3.1	65.1	7.2	100.0	0.6
Matamata-Piako	19.0	2.8	72.3	5.9	100.0	-1.9
Hamilton City	22.6	7.9	64.2	5.3	100.0	2.8
Waipa	23.2	4.2	67.7	4.9	100.0	0.8
Otorohanga	25.6	2.7	64.1	7.5	100.0	-2.0
South Waikato	15.6	2.5	74.9	7.0	100.0	-9.9
Waitomo	17.8	2.4	72.3	7.6	100.0	-3.0
Taupo	22.3	3.5	64.4	9.8	100.0	1.3
Part Rotorua	28.8	3.5	57.5	10.2	100.0	-2.9
Waikato Region	**13.4**	**4.7**	**75.4**	**6.6**	**100.0**	**0.4**

Source: Statistics New Zealand, 2001 Census of Population and Dwellings.

Table 10. Internal Migration 2001 Census (address 5 years ago) by Age Group, Waikato Constituent Territorial Authority Areas and Waikato Region, 2001

Territorial Authority	In Migration within NZ	From Overseas	Same Area	Not Specified	Total	Net Internal Migration
	5-14 years					
Part Franklin	30.8	3.2	54.6	11.3	100.0	9.0
Thames-Coromandel	26.7	4.0	61.0	8.3	100.0	2.1
Hauraki	28.3	1.8	63.0	6.9	100.0	0.5
Waikato	26.9	2.5	62.9	7.7	100.0	3.0
Matamata-Piako	21.7	2.9	68.8	6.7	100.0	1.0
Hamilton City	22.2	8.2	63.8	5.8	100.0	2.7
Waipa	26.0	4.1	64.1	5.8	100.0	5.3
Otorohanga	27.4	2.9	63.7	5.9	100.0	1.5
South Waikato	16.5	2.7	74.0	6.8	100.0	-9.3
Waitomo	20.3	2.3	69.0	8.3	100.0	0.5
Taupo	23.0	2.7	64.7	9.7	100.0	-0.6
Part Rotorua	29.7	3.5	57.6	9.2	100.0	2.6
Waikato Region	**14.0**	**4.5**	**74.5**	**7.0**	**100.0**	**1.4**
	15-64 years					
Part Franklin	30.1	3.5	55.0	11.4	100.0	8.0
Thames-Coromandel	27.1	4.4	60.5	7.9	100.0	2.6
Hauraki	25.6	2.9	64.9	6.6	100.0	-2.1
Waikato	25.6	3.6	63.6	7.2	100.0	0.2
Matamata-Piako	20.1	3.2	70.6	6.1	100.0	-3.9
Hamilton City	24.7	8.6	61.3	5.4	100.0	3.5
Waipa	24.4	4.8	65.9	4.9	100.0	-1.4
Otorohanga	27.7	2.8	61.1	8.4	100.0	-2.3
South Waikato	16.2	2.7	73.9	7.2	100.0	-11.2
Waitomo	19.4	2.6	70.5	7.5	100.0	-3.8
Taupo	23.5	4.2	61.9	10.4	100.0	1.3
Part Rotorua	29.2	3.6	56.9	10.3	100.0	-4.3
Waikato Region	**14.2**	**5.3**	**73.7**	**6.7**	**100.0**	**0.1**
	65 years and over					
Part Franklin	11.5	1.3	78.1	9.2	100.0	-1.5
Thames-Coromandel	15.2	1.1	78.8	4.8	100.0	1.5
Hauraki	20.2	1.1	74.4	4.3	100.0	7.5
Waikato	13.6	1.1	79.4	5.9	100.0	-2.6
Matamata-Piako	11.8	0.9	83.2	4.1	100.0	4.2
Hamilton City	9.3	2.1	84.3	4.3	100.0	-0.8
Waipa	13.9	1.2	81.2	3.7	100.0	5.3
Otorohanga	9.2	0.7	86.1	4.1	100.0	-7.8
South Waikato	10.2	1.0	82.2	6.6	100.0	-1.6
Waitomo	7.9	0.9	85.3	5.9	100.0	-2.3
Taupo	15.0	1.1	77.5	6.4	100.0	3.3
Part Rotorua	11.5	1.9	73.1	13.5	100.0	-17.3
Waikato Region	**7.8**	**1.4**	**85.9**	**5.0**	**100.0**	**1.1**

Source: Statistics New Zealand, 2001 Census of Population and Dwellings.

Table 10 expands the information of Table 9 by age group. The proportion staying at the same address is higher for the population 65 years and over, due to the lower residential mobility of this age group. The TA patterns with respect to net inflow and outflow are similar for the age groups 5-14 and 15-64 as for the total population in Table 9. The migration behaviour of the age group 65 years and over is quite different than the overall patterns across TAs. In the age group 65 years and over the largest net inflow occurred in Hauraki District at 7.5 percent with Waipa, Matamata-Piako and Taupo District also above 3 percent. The largest relative net outflow (17.3 percent) of persons aged 65 and over occurred in Part Rotorua District of as this area is rural and many older persons there are likely to move to towns and cities to retire.

3 Labour Force and Income

3.1 Labour Force Status

Work has an important link with transport, both in terms of commuting of workers between home and the work place and through the transport activity generated by the production of goods and services. In this section we will use New Zealand Census information to assess work trends in the Waikato since 1991. Other data sources, such as the Household Labour Force Survey, provide insufficient detail at the level of constituent TAs of the Waikato region. When considering the regional trends since 1991, it must be remembered that there have been major economic and policy changes that have impacted on the New Zealand labour market, such as the Employment Contracts Act 1991, the 1991 welfare reforms, the Employment Relations Act 1999, the increase in the school leaving age from 15 to 16 and the phased increase in the age of eligibility for national superannuation from 60 to 65 years that led to an increase in labour force participation of the 65 plus age group.

The labour force in the Waikato region has undergone a number of changes over the 1991-2001 period. Those working full-time made up 54.6 per cent of the population in 2001 compared to 51.3 per cent in 1991, with part-time work also increasing from 10.6 to 16.2 per cent (Table 11). Overall, the number of employed persons in the Waikato region increased from 1991 to 2001 by some 28,000, around 21 percent of the 1991 workforce, with more than half of this increase coming from growth in part-time employment. The share of those not in the labour force decreased from 30.5 to 22.9 per cent.

The 2001 census preceded the very buoyant economic conditions of recent years and Waikato unemployment declined from 7.5 percent in 1991 to 6.3 percent of the population in 2001 (Table 11). The corresponding unemployment rates

(unemployment as a proportion of the labour force) are 10.8 percent and 8.2 percent respectively. The trend to lower rates of unemployment has continued in the post census period with the December quarter 2004 unemployment rate being 3.1 percent for the Waikato region (Statistics New Zealand, 2005b). The composition of the population by labour force status is similar in the Waikato region to that of New Zealand as a whole.

Table 11. Percentage Distribution of Labour Force Status (15-64 years), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

District	1991					2001				
	Employed		Unemployed	Non-Labour Force	Total	Employed		Unemployed	Non-Labour Force	Total
	Full-time	Part-time				Full-time	Part-time			
Part Franklin	56.5	10.7	5.8	27.0	100.0	60.9	15.4	4.6	19.1	100.0
Thames-Coromandel	44.2	11.5	8.0	36.3	100.0	50.1	18.0	5.6	26.4	100.0
Hauraki	48.5	10.2	9.0	32.3	100.0	51.7	16.6	7.1	24.6	100.0
Waikato	49.5	10.0	7.5	33.0	100.0	54.4	15.6	6.9	23.1	100.0
Matamata-Piako	56.7	10.8	5.5	27.0	100.0	59.2	16.3	4.4	20.2	100.0
Hamilton City	51.4	10.6	8.3	29.6	100.0	52.7	15.8	7.6	23.8	100.0
Waipa	54.3	11.0	6.2	28.5	100.0	59.3	16.6	4.2	19.9	100.0
Otorohanga	52.6	10.7	5.9	30.8	100.0	54.3	16.0	4.3	25.3	100.0
South Waikato	49.2	9.4	8.5	33.0	100.0	51.9	14.9	8.0	25.3	100.0
Waitomo	48.9	10.8	7.4	33.0	100.0	56.6	17.2	5.2	21.0	100.0
Taupo	49.2	11.5	8.5	30.8	100.0	53.7	17.6	6.1	22.6	100.0
Part Rotorua	61.2	11.9	4.8	22.1	100.0	66.5	16.4	3.3	13.8	100.0
Waikato Region	**51.3**	**10.6**	**7.5**	**30.5**	**100.0**	**54.6**	**16.2**	**6.3**	**22.9**	**100.0**
New Zealand	51.5	10.8	7.4	30.3	100.0	55.2	15.8	5.9	23.1	100.0

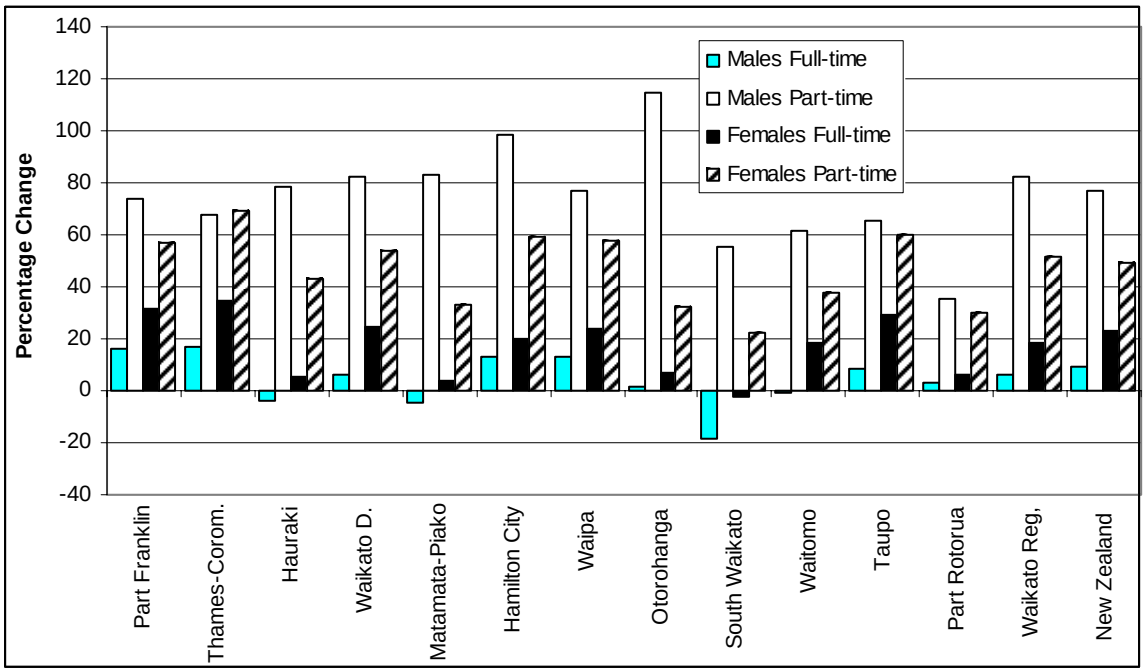
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Across the Territorial Authorities of the Waikato region there are some differences in the labour force status composition that reflect differences in the demographic composition of the population and differences in economic structure. Part Rotorua District in 2001 had the highest percentage in full-time employment and the lowest percentages unemployed and in the non-labour force (Table 11). Thames-Coromandel District had the lowest percentage of people in full-time employment and the highest percentage in part-time employment and non-labour force, reflecting the older age structure discussed in the previous section. Waitomo and Taupo District also had a high percentage of the population in part-time employment while South Waikato has a relatively low level of part-time employment. Other regions which had a relatively high percentage in full-time employment are Part Franklin, Matamata-Piako and Waipa District. Unemployment is comparatively high in Hauraki, Hamilton City and South Waikato District. The 2001 unemployment rates (as a percentage of the labour

force) are 9.4 percent, 10.0 and 10.7 percent respectively (calculated from the shares in Table 11).

Figure 6 shows the growth of both full and part-time work by gender for the 1991-2001 decade. Full-time employment of both males and females has generally increased in the Waikato region with only the South Waikato showing declines for both males and females and Hauraki, Matamata-Piako and, marginally, Waitomo showing declines for males alone. Increases in male full-time employment have been smaller than for females. Part-time employment has increased in the Waikato's constituent TAs with percentage increases in male part-time employment being larger than female. Again these changes are in line with those of New Zealand as a whole.

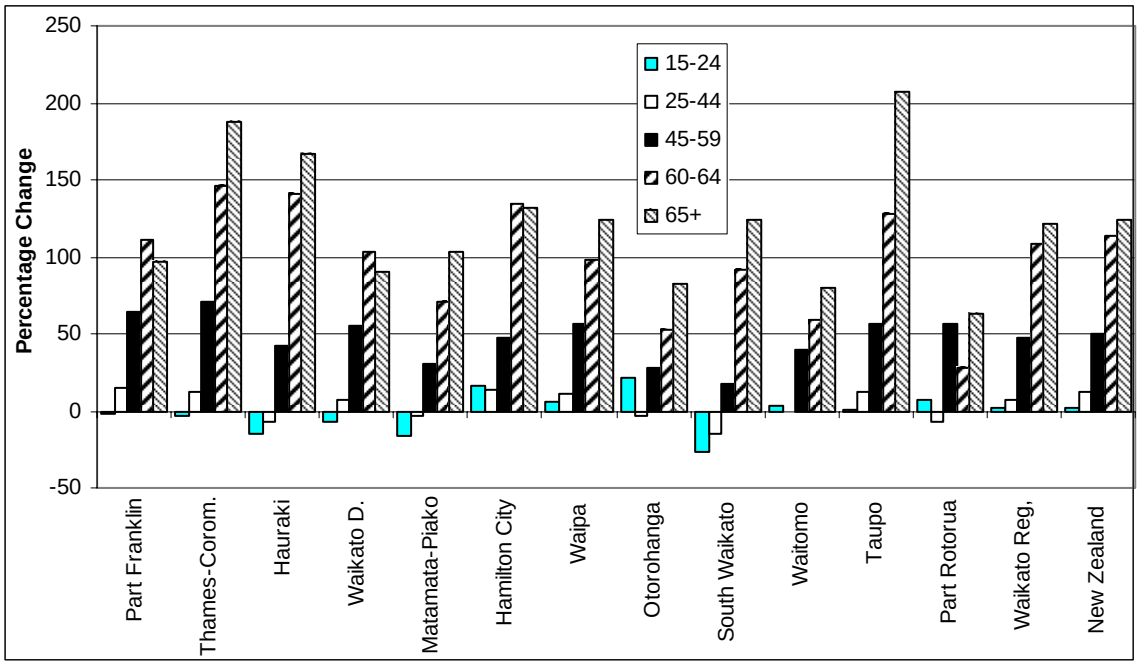
Figure 6. Percentage Change in Full- and Part-Time Employment 1991 to 2001 by Gender (15-64 years), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand



Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Figure 7 shows changes in the labour force by age group. These changes reflect the ageing of the population structure with strong percentage growth in the older age groups accompanied by weak growth or declines in the younger age groups. The entire Waikato region follows a pattern very similar to New Zealand though several TAs (Hauraki, Matamata-Piako and particularly South Waikato), stand out from this pattern, with percentage declines in both the 15-24 and 25-44 age groups. There has been rapid employment growth in the age group 65 plus in Thames-Coromandel and Taupo (reflecting fast population growth in this age group), although the numbers are relatively small.

Figure 7. Percentage Change in Employment 1991 to 2001 by Age Group, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand



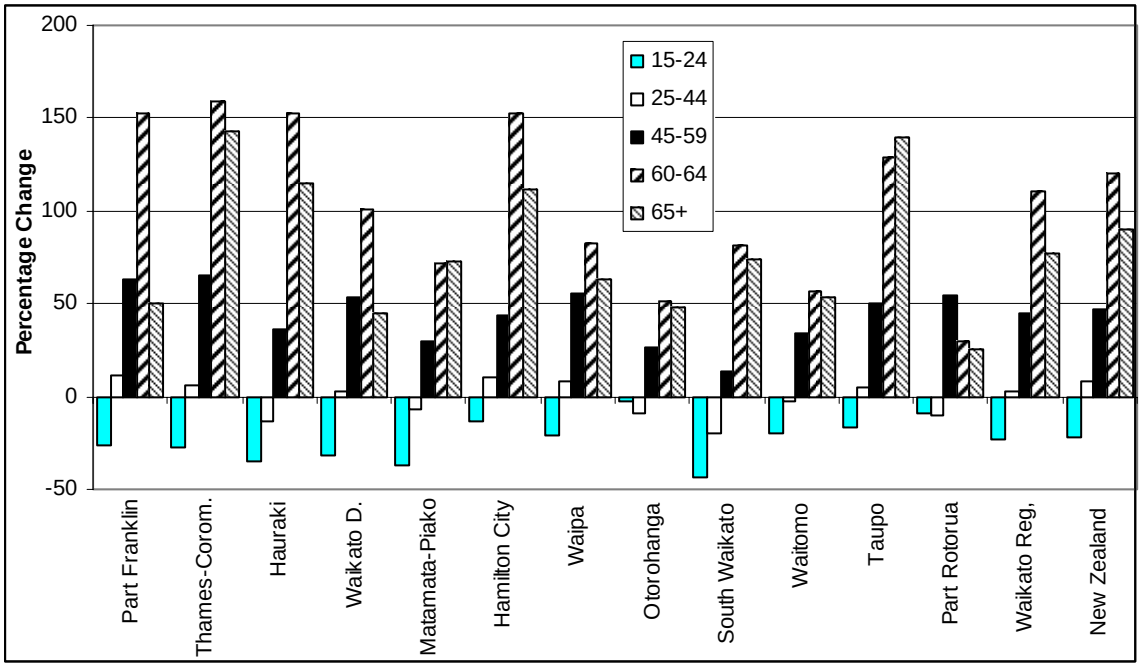
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Figures 8 and 9 consider full-time employment and part-time employment respectively. In Figure 8 we see that the constituent TAs of the Waikato region follow a similar pattern to New Zealand as a whole with declines or weak percentage growth in full-time employment in the younger age groups and stronger growth in the older age groups, with the largest percentage growth occurring in the 60-64 age group (related to the change in superannuation eligibility referred to earlier). The South Waikato, particularly, and Hauraki, along with Matamata-Piako have particularly poor (negative) growth in full-time employment in the younger age groups.

Taupo and Thames-Coromandel experienced growth in full-time employment in the oldest age group, 65+ well above both that of the Waikato region as a whole and New Zealand 1991-2001. It should be remembered that the absolute numbers of persons 65+ in full-time employment is relatively small, around 2.2 percent of those employed full-time in the Waikato region in 2001.

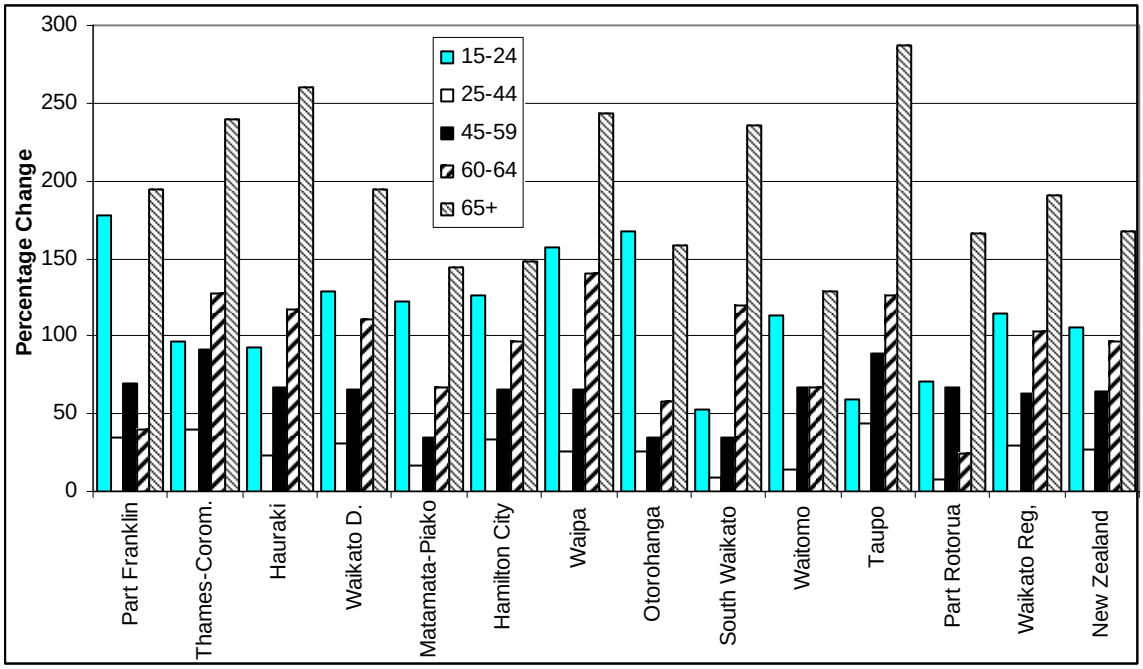
The general pattern for growth in part-time employed for both the Waikato region and New Zealand as a whole is one of strong growth in the youngest (15-24) age group (many of whom are students working part-time), low growth in the 25-44 age group followed by increasing levels of growth in the older age groups with the oldest age group showing the highest level of growth (Figure 9). Again some caution in interpretation is warranted as less than 10 percent of the part-time workforce was in the 65+ age group in the Waikato region in 2001.

Figure 8. Percentage Change in Full-Time Employment 1991 to 2001 by Age Group, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand



Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Figure 9. Percentage Change in Part-Time Employment 1991 to 2001 by Age Group, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand



Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Table 12 shows the labour force status of the Māori and non-Māori population aged 15-64 in 2001. The proportion of Māori 15-64 in full-time employment is less in all TAs than non-Māori by between 7.9 (Thames-Coromandel) and 25.2 (Waitomo)

percentage points with the proportion of Māori in full-time employment in the Waikato being 3.8 percentage points lower than the national figure.

For part-time work the differential between Māori and non-Māori participation is lower than that found for full-time work with differences ranging from 4.1 percentage points below the non-Māori rate (Waikato district) to 0.6 percentage point more than the non-Māori rate (Taupo district).

Table 12. Percentage Distribution of Labour Force Status (15-64 years), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2001

Territorial Authority	Māori					Non-Māori				
	Employed		U/E	Non-Labour Force	Total	Employed		U/E	Non-Labour Force	Total
	Full-time	Part-time				Full-time	Part-time			
Part Franklin	48.8	13.6	11.6	26.0	100.0	63.4	15.8	3.1	17.7	100.0
Thames-Coromandel	43.3	16.9	10.8	29.0	100.0	51.2	18.2	4.7	25.9	100.0
Hauraki	38.1	14.6	14.4	32.9	100.0	54.4	17.0	5.7	22.9	100.0
Waikato	37.8	12.5	15.1	34.6	100.0	59.7	16.6	4.2	19.4	100.0
Matamata-Piako	43.5	13.8	12.0	30.8	100.0	61.3	16.7	3.4	18.6	100.0
Hamilton City	40.3	14.2	14.9	30.5	100.0	55.3	16.2	6.1	22.4	100.0
Waipa	45.5	14.8	10.2	29.5	100.0	61.5	16.9	3.2	18.4	100.0
Otorohanga	36.5	14.8	8.7	40.0	100.0	60.9	16.6	2.6	19.9	100.0
South Waikato	42.6	13.7	13.6	30.1	100.0	55.5	15.4	5.7	23.4	100.0
Waitomo	40.7	17.4	9.9	32.0	100.0	65.9	16.9	2.5	14.7	100.0
Taupo	40.7	18.0	11.6	29.7	100.0	58.6	17.4	4.1	19.9	100.0
Part Rotorua	50.4	16.3	8.1	25.2	100.0	70.0	16.3	2.2	11.5	100.0
Waikato Region	**41.1**	**14.7**	**13.0**	**31.1**	**100.0**	**57.8**	**16.6**	**4.7**	**20.9**	**100.0**
New Zealand	44.9	13.7	12.0	29.3	100.0	56.8	16.1	5.0	22.2	100.0

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

The Māori unemployment share varies between 2.3 (Thames-Coromandel) and 4.0 (Waitomo) times the rate for non-Māori with the unemployment share for Māori in the Waikato region being over 8 percentage points higher than the non-Māori. The Māori unemployment share in the Waikato is above New Zealand's and the non-Māori unemployment share is below. The corresponding Waikato unemployment rates are 18.9 percent and 5.9 percent respectively.

3.2 Employment Status

Table 13 shows the distribution of those in work between various employment statuses, for persons aged 15 to 64. Engagement in paid labour is the single largest category in constituent TAs of the Waikato region. However, the overall level of

participation in paid labour is 4.1 percentage points lower than the national figure for 2001. Conversely the proportion of those who are self employed or employers is somewhat higher in the Waikato region than the nation, as is the proportion in unpaid family work. The proportion of self employed is generally higher in TAs predominantly involved in agricultural production, perhaps due to the prevalence of family owned and operated farms. This latter point is borne out by the comparatively high rates of unpaid family labour in those TAs.

Table 13. Percentage Distribution of Employment Status (15-64 years), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

District	1991					2001				
	Paid Empl-oyee	Empl-oyer	Self-Empl-oyed[1]	Unpaid Family Worker	Total	Paid Empl-oyee	Empl-oyer	Self-Empl-oyed[1]	Unpaid Family Worker	Total
Part Franklin	67.0	10.8	19.5	2.8	100.0	67.0	9.6	18.9	4.5	100.0
Thames-Coromandel	65.6	12.2	19.7	2.5	100.0	63.1	12.9	20.5	3.4	100.0
Hauraki	64.0	10.9	22.5	2.5	100.0	65.3	10.8	20.3	3.6	100.0
Waikato	68.4	11.0	18.1	2.6	100.0	67.9	11.3	17.1	3.8	100.0
Matamata-Piako	62.8	13.2	22.0	2.0	100.0	65.9	11.5	19.2	3.4	100.0
Hamilton City	85.7	6.1	7.4	0.7	100.0	84.7	5.8	8.3	1.2	100.0
Waipa	70.7	11.1	16.5	1.7	100.0	71.2	10.7	15.1	2.9	100.0
Otorohanga	55.1	14.4	27.0	3.5	100.0	58.7	15.3	20.4	5.5	100.0
South Waikato	77.6	9.2	11.6	1.6	100.0	78.1	9.1	10.6	2.2	100.0
Waitomo	68.6	10.8	17.1	3.5	100.0	69.8	9.3	15.8	5.2	100.0
Taupo	77.7	8.8	11.6	1.8	100.0	74.5	10.6	12.5	2.4	100.0
Part Rotorua	49.9	14.7	31.7	3.7	100.0	56.1	17.1	21.6	5.2	100.0
Waikato Region	**74.0**	**9.6**	**14.6**	**1.8**	**100.0**	**74.1**	**9.4**	**13.9**	**2.7**	**100.0**
New Zealand	79.8	7.7	11.1	1.4	100.0	78.2	7.6	12.2	2.0	100.0

(1) Without Paid Employees.
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Over the 1991-2001 period, the distribution of those in work between employment statuses for the Waikato region is relatively stable with absolute percentage point changes within categories being under 1 percentage point. This differs slightly from the national pattern which saw declines in the proportion of paid employment, as opposed to a slight increase in the Waikato region, and increases in self-employment, versus a decline in the Waikato region. In all constituent TAs of the Waikato region, the share of unpaid family worker increased over the 1991-2001 period, as it did for New Zealand as a whole.

This overall pattern is not consistent across all the Waikato areas TAs with Taupo, for example, experiencing a relatively large decline in the proportion in paid employment

of 3.2 percentage points and, perhaps paradoxically, an increase in the proportion of employers (1.8 percentage points). Thames-Coromandel also experienced a large decline in the proportion in paid employment (2.5 percentage points) with the proportions in the other three categories increasing modestly. Conversely Part Rotorua experienced a large increase in paid employment of nearly 7 percentage points, a decline in self employment of over 10 percentage points and above average increases in both employers and unpaid labour. Similarly the proportion of paid employment in Otorohanga increased by nearly 4 percentage points while self employment fell by nearly 7 percentage points and unpaid labour increased by 2 percentage points, the largest increase in this category in the Waikato region.

3.3 Occupational Status

Table 14 shows the occupational structure of employment in the Waikato region by TA and nationally in 2001. The Waikato region has similar percentages employed as Trades Workers, Plant & Machine Operators & Assemblers, Labourers & Related Elementary Service Workers and Service & Sales Workers as New Zealand as a whole. For Legislators, Administrators & Managers, Professionals, Technicians & Associate Professionals Clerks the proportion of employment in these categories is less than that for New Zealand by about 2 percentage points. The only category in which a large and obvious disparity exists between the Waikato and New Zealand is in that of Agriculture & Fishery Workers where, perhaps unsurprisingly given the significance of dairy farming in the Waikato, the proportion of employment is 6 percentage points higher than for New Zealand.

Differences between the TAs reflect the economic activities carried out in the TA with largely rural TAs having high levels of employment in the Agriculture & Fishery Workers category while Hamilton City has a higher proportion of 'white collar' employment, though this effect is mitigated to some extent in the Waikato and Waipa TAs by their proximity to Hamilton City.

Table 14. Percentage Distribution of Occupations (15-64 years), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2001

Territorial Authority	Legislators, Administrators & Managers	Profes-sionals	Technicians & Associate Professionals	Clerks	Service & Sales Workers	Agriculture & Fishery Workers	Trades Workers	Plant & Machine Operators & Assemblers	Labourers & Related Elementary Service Workers	Not Specified	Total
Part Franklin	10.9	9.1	7.9	10.5	9.2	19.4	10.5	11.0	5.2	6.2	100.0
Thames-Coromandel	13.6	10.1	7.6	9.4	16.0	10.5	11.0	9.0	7.0	5.7	100.0
Hauraki	8.6	7.6	7.1	8.6	12.8	23.0	8.6	11.7	6.6	5.5	100.0
Waikato	10.2	11.4	8.7	10.1	10.5	18.8	9.0	9.7	5.6	6.0	100.0
Matamata-Piako	9.0	7.5	6.4	9.0	10.8	27.0	7.8	12.3	4.9	5.3	100.0
Hamilton City	12.1	16.8	12.7	14.2	15.3	2.4	8.9	7.4	5.9	4.4	100.0
Waipa	11.4	12.1	9.4	10.6	13.8	16.6	8.7	8.4	4.5	4.4	100.0
Otorohanga	8.9	6.6	5.3	6.8	9.1	36.6	6.7	7.9	4.8	6.9	100.0
South Waikato	8.3	9.2	6.0	9.1	12.0	18.2	8.2	14.8	8.5	5.6	100.0
Waitomo	8.7	8.5	5.7	7.7	11.3	24.9	6.0	13.5	7.0	6.2	100.0
Taupo	13.4	9.4	8.1	9.0	19.3	11.1	8.6	8.9	6.7	5.7	100.0
Part Rotorua	7.1	7.3	4.5	5.5	7.3	45.8	4.7	8.5	3.5	4.7	100.0
Waikato Region	**11.1**	**12.0**	**9.3**	**11.0**	**13.7**	**13.7**	**8.7**	**9.4**	**5.9**	**5.1**	**100.0**
New Zealand	12.6	14.0	11.1	12.7	14.3	7.7	8.5	8.4	5.8	5.0	100.0

Source: Statistics New Zealand, 2001 Censuses of Population and Dwellings.

3.4 Personal Income

Personal income is important as this is suggestive of the spending power people have. We noted in the introductory section that the demand for transport has a clear positive relationship with income. Table 15 reports personal income in 1991 and 2001. The income for 1991 is inflation adjusted so that the income is directly comparable to the spending power of 2001 income. Using the CPI for March 1991 and March 2001, it was found that prices increased by 18.1 percent over the decade. The 1991 dollar figures in the Table are therefore 1.181 times those reported in the 1991 census. No account has been taken of a difference in inflation in the Waikato region compared with national inflation.

Table 15. Personal Income (in 2001 dollars), Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authority	1991 (inflation adjusted)				2001			
	Lower Quartile	Median	Upper Quartile	IQR	Lower Quartile	Median	Upper Quartile	IQR
Part Franklin	9,474	17,392	30,321	20,847	9,295	20,764	37,238	27,944
Thames-Coromandel	9,328	13,838	23,821	14,492	8,809	14,653	27,163	18,355
Hauraki	9,074	14,945	26,713	17,639	8,521	15,253	28,998	20,476
Waikato	8,946	15,611	28,400	19,454	10,160	20,100	35,782	25,622
Matamata-Piako	9,860	17,558	30,256	20,396	8,625	18,263	34,244	25,619
Hamilton City	9,346	17,358	31,227	21,880	8,283	17,938	34,332	26,049
Waipa	9,343	16,755	29,780	20,437	10,072	19,784	35,628	25,556
Otorohanga	8,397	15,319	27,809	19,412	7,873	17,676	32,398	24,525
South Waikato	8,702	16,286	32,396	23,694	8,303	17,627	34,446	26,143
Waitomo	8,381	14,384	25,246	16,865	8,866	17,446	30,524	21,658
Taupo	9,102	16,007	28,870	19,768	9,273	17,894	32,425	23,151
Part Rotorua	9,068	19,340	32,697	23,629	12,132	26,037	42,308	30,177
Waikato Region	**9,223**	**16,363**	**29,529**	**20,306**	**8,842**	**18,055**	**33,765**	**24,922**
New Zealand	9,403	16,701	30,380	20,977	8,904	18,545	34,732	25,828

Lower Quartile refers to a level of income that is such that 25 percent of the population earns less income than that level. 50 percent of the population earns less than the median income. 25 percent of the population earns more than the upper quartile. The IQR (Inter-quartile range) is the difference between the 25th and 75th percentile.
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

The median individual income in both 1991 and 2001 was lower in the Waikato than nationally. For Waikato region the median and upper quartile income increased over the time period by $1,692 and $4,236 respectively while the lower quartile declined by $381. The inter quartile range (IQR), that is the gap between the 75th and 25th percentile increased by $4,600, similar to the national increase of $4,800. Increases in the IQR are indicative of increasing inequality in the distribution of income which can be associated with increases in deprivation, and hence are of concern from a social policy perspective (see also e.g. Karagedikli et al. 2000).

Between the Territorial Authority areas of the Waikato region there is considerable variation. In 2001 the Median incomes ranged from a low of $14,653 in Thames-Coromandel District to $26,037 in Part Rotorua District. Part Rotorua District is predominately a farming area with high levels of labour market participation (see Table 15) while Thames-Coromandel District has a relatively large proportion of retirees who, while they maybe asset rich, are only receiving modest current incomes. Hauraki also stands out as also having a low median income. Excluding Part Rotorua District, other areas with high incomes are Part Franklin, Waikato District and Waipa District. These same regions have high Upper Quartiles. The lowest lower quartile income level in 2001 is found for Otorohanga, where 25 percent of the population aged 15 and over earned less than $7,873.

Considering individual income by ethnicity, median Māori income in both 1991 and 2001 is lower than non-Māori income in the Waikato region (Table 16). The gap between Māori and non-Māori median incomes for the region in fact increased by around $380 over the 1991-2001 period, although Māori median income as a percentage of non-Māori income increased slightly from 70 percent in 1991 to 71 percent in 2001. Compared to New Zealand Māori median income, Māori median income in the Waikato is lower in both 1991 and 2001, 93 and 92 percent of the national figure respectively, whereas the non-Māori median income figure is higher than the national median in both years. The IQR for individual Māori incomes 1991-2001 for the Waikato region increases by around $4,800 dollars whereas the IQR for Māori nationally increased by $5,370. The comparable figures for the non-Māori population are an increase in IQR for the region of $4,700 versus $4,850 nationally. Effectively the inequality in the distribution of Māori income increased in the Waikato somewhat less than in the nation. For the Non-Māori the increase in inequality has been very similar to that of the nation.

Individual Māori median incomes rose by between $520 (Otorohanga) and $6,400 (Part Rotorua) in the Waikato region while non-Māori median incomes rose by between $360 (Hauraki) and $6,800 (Part Rotorua) in the same period. Figure 10 shows the changes in median personal income for Māori and non-Māori in this period by quartile. The personal median income of the lower quartile falls in all but two regions, Waipa and Part Rotorua, for Māori while the median and upper quartiles show increases with, usually, growth in the upper quartile exceeding that of the median. This result implies increasing inequality in the income distribution within the Māori ethnic group. For non-Māori the pattern is similar overall, though more mixed at a TA level, with a number of exceptions to the general pattern, notably Part Rotorua. Again the pattern of lower increases in the lower quartiles implies increasing inequality in the income distribution of individuals.

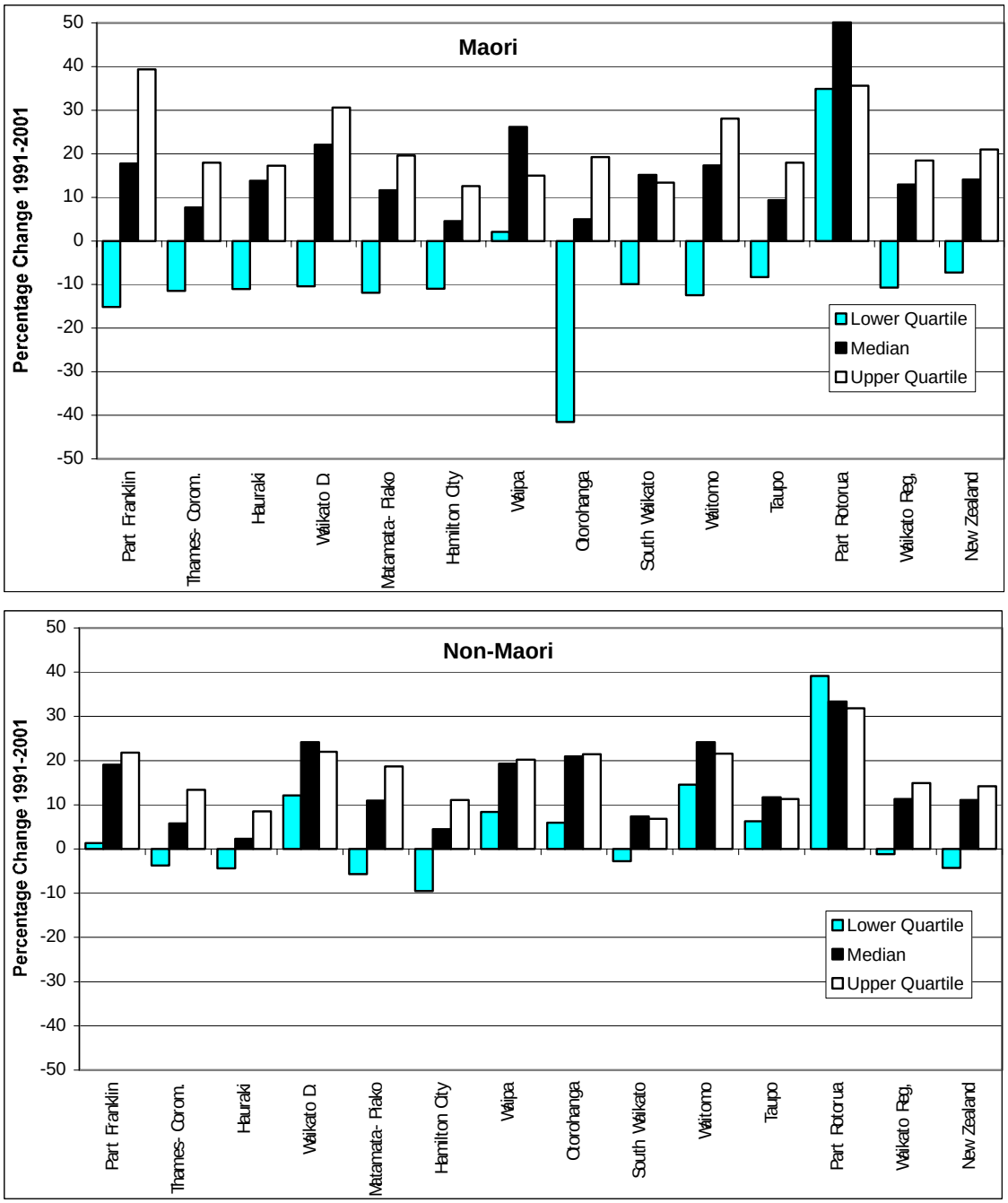
Table 16. Personal Income (in 2001 dollars) by Ethnicity, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authority	Māori				Non-Māori			
	Lower Quartile	Median	Upper Quartile	IQR	Lower Quartile	Median	Upper Quartile	IQR
	1991 (inflation adjusted)							
Part Franklin	7,345	12,274	19,653	12,308	9,922	18,743	31,848	21,927
Thames-Coromandel	7,756	12,106	20,882	13,126	9,445	14,014	24,272	14,827
Hauraki	7,306	11,548	20,228	12,922	9,300	15,463	27,608	18,308
Waikato	7,328	11,491	19,584	12,256	9,437	16,929	30,256	20,820
Matamata-Piako	7,064	11,695	20,429	13,365	10,138	18,251	31,017	20,879
Hamilton City	7,459	13,296	23,247	15,787	9,601	18,100	32,202	22,601
Waipa	6,738	11,878	23,861	17,123	9,672	17,257	30,471	20,799
Otorohanga	6,380	10,476	18,182	11,802	9,344	17,072	29,787	20,443
South Waikato	7,285	12,712	24,958	17,673	9,181	17,484	34,197	25,016
Waitomo	7,277	11,179	18,634	11,357	9,241	16,071	28,264	19,023
Taupo	7,343	12,282	21,701	14,358	9,724	17,469	31,111	21,387
Part Rotorua	6,644	12,719	24,113	17,469	9,573	20,270	33,529	23,956
Waikato Region	**7,269**	**12,110**	**21,770**	**14,500**	**9,585**	**17,203**	**30,819**	**21,235**
New Zealand	7,648	12,991	22,924	15,276	9,604	17,190	31,232	21,628
	2001							
Part Franklin	6,233	14,457	27,396	21,163	10,054	22,311	38,793	28,739
Thames-Coromandel	6,867	13,039	24,628	17,761	9,092	14,827	27,523	18,430
Hauraki	6,501	13,145	23,721	17,220	8,893	15,822	29,966	21,073
Waikato	6,563	14,027	25,581	19,018	10,580	21,019	36,914	26,334
Matamata-Piako	6,224	13,058	24,434	18,210	9,564	20,254	36,822	27,258
Hamilton City	6,642	13,897	26,165	19,524	8,686	18,919	35,763	27,077
Waipa	6,876	14,985	27,428	20,552	10,488	20,585	36,642	26,154
Otorohanga	3,731	10,994	21,679	17,948	9,904	20,652	36,176	26,272
South Waikato	6,565	14,643	28,300	21,736	8,930	18,773	36,519	27,588
Waitomo	6,374	13,115	23,867	17,494	10,588	19,953	34,351	23,763
Taupo	6,735	13,431	25,601	18,866	10,335	19,514	34,644	24,309
Part Rotorua	8,959	19,091	32,693	23,734	13,324	27,036	44,214	30,889
Waikato Region	**6,492**	**13,679**	**25,788**	**19,296**	**9,474**	**19,152**	**35,413**	**25,939**
New Zealand	7,092	14,827	27,737	20,646	9,197	19,094	35,671	26,474

Lower Quartile refers to a level of income that is such that 25 percent of the population earns less income than that level. 50 percent of the population earns less than the median income. 25 percent of the population earns more than the upper quartile. The IQR (Inter-quartile range) is the difference between the 25th and 75th percentile.

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Figure 10. Percentage Change in Real Personal Income[1] from 1991 to 2001, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand



(1) Inflation adjusted to 2001 level. Using the CPI for March 1991 and March 2001 to get a factor of 1.181.
Lower Quartile is what 25th person income of one to 100 people from lowest to highest.
Median is what 50th person income of one to 100 people from lowest to highest.
Upper Quartile is what the 75th person income of one to 100 people from lowest to highest.
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

4 Households and Dwellings

For a given population, a change in the distribution of this population across households and dwellings is likely to impact on transport demand. For example, persons who do not own a motor vehicle are more likely to require public transport when they are in a single person households than when they are in a household with another adult present, who may possible own a vehicle.

4.1 Household Structure

There has been considerable change in the number of people in different types of households over the 1991 to 2001 period. This can be seen from Table 17. While the "two parents with one or more children" household remains the most common type, the proportion of households that is of this type has declined from 35.3 percent in 1991 to 27.9 percent in 2001 in the Waikato region. There is not a large difference between the Waikato and New Zealand distributions across household types, with New Zealand having a slightly lower proportion of Couple Only households and slightly more One Person households.

Couple Only households in the Waikato have increased from 24.2 percent to 26.2 percent of the total, with Single Person households also increasing from 18.1 to 22.0 percent. Parent Plus households also increased slightly from 7.4 to 9.2 percent between 1991 and 2001. One Parent and Non Family households remained reasonable stable at (9.5 to 9.7 percent, and 5.5 to 5.0 percent respectively).

For the Territorial Authorities of the Waikato region there is some difference in the distribution of household structure in 2001. Thames-Coromandel District has a higher proportion of Couple Only and Single Person household and lower proportion of Parent Plus and Two Parent households. A reason for this is the older age structure of this region. Among older people, Couple Only and Single Person households are naturally more prevalent. Cities are known for more diverse household structures and Hamilton City indeed a higher proportion of One Parent, Parent Plus and Non Family households, and a lower proportion of Couple Only and Two Parent households. South Waikato and Waikato District also have a high proportion of One Parent households. The latter regions have with Hamilton City in common Parent Plus households in excess of 10 percent of the total. We can also note the distinct distribution of household types in Part Rotorua District, due to the rural nature of this district. It has an exceptionally high percentage of Two Parent households (42.9 percent) and low percentages of Couple Only, One Parent and Single Person households.

Table 17. Percentage Distribution of Household Type, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authorities	Couple Only	Two Parent	One Parent	Parent Plus	Non Family	Single Person	Total
				1991			
Part Franklin	23.5	42.6	8.2	8.4	3.9	13.4	100.0
Thames-Coromandel	33.4	26.7	7.6	4.5	3.6	24.2	100.0
Hauraki	24.8	37.3	9.6	6.0	3.4	19.0	100.0
Waikato	22.7	39.5	10.1	8.9	3.9	14.8	100.0
Matamata-Piako	26.6	38.6	6.9	6.2	4.0	17.8	100.0
Hamilton City	22.0	31.0	10.6	8.0	8.9	19.5	100.0
Waipa	25.4	37.9	8.7	6.4	4.1	17.6	100.0
Otorohanga	22.4	40.4	8.4	7.5	4.0	17.4	100.0
South Waikato	21.2	40.4	11.0	8.6	4.4	14.4	100.0
Waitomo	23.0	36.0	10.2	8.4	4.1	18.2	100.0
Taupo	25.2	34.8	9.6	8.0	3.9	18.6	100.0
Part Rotorua	19.5	53.8	4.4	8.3	3.3	10.7	100.0
Waikato Region	**24.2**	**35.3**	**9.5**	**7.4**	**5.5**	**18.1**	**100.0**
New Zealand	23.9	33.3	9.3	7.4	5.9	20.2	100.0
				2001			
Part Franklin	28.0	34.8	9.2	9.9	2.4	15.7	100.0
Thames-Coromandel	34.7	20.4	8.2	5.5	3.1	28.2	100.0
Hauraki	28.8	26.2	9.8	7.9	3.3	24.0	100.0
Waikato	25.3	32.2	10.3	10.5	3.2	18.5	100.0
Matamata-Piako	28.9	30.4	8.0	6.7	3.2	22.9	100.0
Hamilton City	22.5	25.0	10.7	11.0	8.4	22.5	100.0
Waipa	28.0	31.6	8.4	7.7	3.6	20.8	100.0
Otorohanga	26.6	32.9	8.2	8.3	3.1	20.9	100.0
South Waikato	24.2	30.5	10.9	9.9	3.1	21.4	100.0
Waitomo	25.3	29.5	9.4	9.4	3.8	22.6	100.0
Taupo	28.3	26.0	9.7	9.2	3.9	22.8	100.0
Part Rotorua	25.1	42.9	6.5	7.9	2.5	15.0	100.0
Waikato Region	**26.2**	**27.9**	**9.7**	**9.2**	**5.0**	**22.0**	**100.0**
New Zealand	25.3	27.5	9.5	9.3	5.3	23.2	100.0

Note: Parent Plus Household: a family plus additional people in household. This can include two or more families living in the same household. A family consists of the following types: couple only, two parent and one parent. Non-Family Household: household of related or non-related people which are not a family defined as above.

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

4.2 Motor Vehicle Ownership

The households/dwellings questionnaire of the population census includes a question on the availability of motor vehicles in the household (excluding motor bikes and scooters). This information can be linked to demographic information on the members

of the household. This can be used to derive an indicator of a person's relative access to private motor vehicle transport and, consequently, the likelihood of diminished mobility. The indicator used here is the percentage of people with no motor vehicles in their household. For the Waikato region as a whole, the percentage of people with no motor vehicle in their household has reduced from 7.3 percent to 6.5 percent (see Table 18). During the 1990s, the real price of car ownership has declined due to the removal of tariffs on imported cars and this is reflected in the growth in car ownership. The percentage of people with no motor vehicle in their household is actually less in the Waikato region than in New Zealand as a whole. Another interesting observation that can be made from Table 18 is that preschool children and older persons are more likely to be in households without a motor vehicle. For the oldest age group of 75 years and over, 26.6 percent did not have a motor vehicle in the household in 1991, but this percentage declined by 2001 to 21.5 percent. Access to a motor vehicle is among this group greater in the Waikato than in New Zealand as a whole.

Looking across the constituent Territorial Authorities in the Waikato region, it can be seen that Waitomo and South Waikato District are the sub-regions with a relatively high percentage of the population in households without a motor vehicle, 9.1 and 8.8 percent in 2001 respectively. In rural parts of the Waikato region, there is almost always a motor vehicle in the household (particularly in Part Rotorua and Part Franklin).

This pattern of relatively high or low motor vehicle ownership is replicated across most age groups. However, the exception is the age group of 75 years and older, where Hamilton City has the highest percentage of households with no car. More than one quarter of the "old old" population in Hamilton lives in a household that does not own a motor vehicle. In a city such as Hamilton there is better access to public transport than in other parts of the region, a larger proportion of retired persons in retirement homes, and smaller distances to services. It is clear, nonetheless, that ageing in urban areas will have significant implications for transport needs in those areas.

The previous analysis can be refined somewhat further. Besides just looking at age, it is also possible to disaggregate the information in Table 18 by household type. Table 19 reports the percentage of persons in households with no motor vehicles by three selected household types in 2001. There are some interesting patterns and differences that clearly link with transport needs. Individuals in Two Parent households are much more likely to have a Motor Vehicle than individuals in One Parent and Single Person households. This is true for all age groups. There is little difference in this respect in the Waikato region vis-à-vis the rest of New Zealand. In the Waikato region, people in Two Parent households without a car constitute only 1.8 per cent of the total

population in these households, compared to 16.9 percent and 22 percent in One Person and Single Person households respectively.

Table 18. Percentage of People with No Motor Vehicle in their Household, by Age Group, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authorities	Under 5	5-14	15-24	25-44	45-64	65-74	75+	Total
	1991							
Part Franklin	6.5	5.3	4.4	3.7	2.7	6.7	18.3	4.7
Thames-Coromandel	6.4	4.3	6.7	4.6	3.8	7.7	25.4	6.3
Hauraki	10.1	6.2	8.5	5.5	3.5	10.3	26.2	7.2
Waikato	11.9	8.2	8.1	5.5	5.1	11.9	26.9	7.8
Matamata-Piako	5.2	4.3	4.9	3.1	2.9	8.0	25.4	4.9
Hamilton City	9.6	7.3	9.2	5.6	5.2	13.7	31.7	8.2
Waipa	5.8	4.8	4.7	3.3	3.3	9.4	23.1	5.2
Otorohanga	4.9	4.5	6.3	3.0	2.9	10.0	15.9	4.6
South Waikato	14.6	10.8	12.4	7.9	6.0	13.1	25.4	10.1
Waitomo	14.0	9.6	13.3	7.9	7.3	14.8	34.4	10.7
Taupo	11.9	9.3	10.5	6.2	4.7	8.5	17.4	8.1
Part Rotorua	1.6	1.5	4.2	1.5	2.6	3.7	0.0	2.3
Waikato Region	**9.4**	**6.9**	**8.3**	**5.2**	**4.5**	**10.7**	**26.6**	**7.3**
New Zealand	10.3	7.7	9.1	6.1	5.6	13.3	31.7	8.6
	2001							
Part Franklin	5.0	4.1	5.2	3.1	2.3	4.2	13.3	3.7
Thames-Coromandel	7.0	5.4	8.3	5.4	3.4	6.0	19.8	6.4
Hauraki	8.5	6.7	6.3	5.7	3.5	6.9	22.6	6.6
Waikato	9.3	6.6	7.1	4.9	3.7	9.0	19.7	6.4
Matamata-Piako	5.4	3.3	4.9	3.2	3.2	4.9	20.1	4.7
Hamilton City	8.8	7.2	7.2	6.0	4.8	9.5	25.9	7.4
Waipa	5.3	3.3	3.7	2.8	2.3	6.0	21.1	4.3
Otorohanga	6.6	4.1	5.0	4.5	2.7	6.7	21.2	5.2
South Waikato	13.2	9.2	11.5	8.1	5.7	8.9	20.0	9.1
Waitomo	10.5	9.2	11.0	6.8	6.1	9.5	17.6	8.8
Taupo	9.5	7.6	10.0	5.8	3.8	6.1	16.6	6.9
Part Rotorua	1.9	1.3	2.2	2.0	0.9	3.2	5.6	1.9
Waikato Region	**8.3**	**6.2**	**7.1**	**5.2**	**3.9**	**7.4**	**21.5**	**6.5**
New Zealand	7.6	6.0	7.6	5.3	4.4	8.9	24.2	6.8

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

Table 19 clearly identifies the situations in which access to a private motor vehicle is the least. It is certainly not an issue among Two Parent households (the high percentage for persons aged 75 plus in Taupo being an anomaly due to small numbers of two parent households in that age group). It is an important issue among One Parent and Single Person households and it is sub-region specific. More than a third of

preschool children in South Waikato in one parent households do not have a motor vehicle in the household. Motor vehicle ownership in this region is also low for single person households aged 65-74. For the 65 plus age group in single person households, however, the highest percentage of such persons without a motor vehicle can be found in Hamilton City, more than a quarter for the 65-74 age group and close to 45 percent for the 75+ age group.

Table 19. Percentage of People with No Motor Vehicle in their Household, by Selected Household Types and Age Group, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 2001

Territorial Authorities	Under 5	5-14	15-24	25-44	45-64	65-74	75+	Total
	Two Parent households							
Part Franklin	0.4	1.2	0.4	0.7	0.6	0.0	0.0	0.7
Thames-Coromandel	2.0	1.3	1.5	1.3	1.3	3.4	0.0	1.4
Hauraki	3.2	2.5	0.8	2.1	0.7	0.0	0.0	2.0
Waikato	2.7	2.1	2.2	1.6	1.3	1.7	0.0	1.9
Matamata-Piako	1.5	0.9	0.8	0.6	0.9	0.0	8.3	0.8
Hamilton City	3.1	2.2	2.1	1.8	1.1	2.8	2.8	2.0
Waipa	1.2	1.1	0.9	0.7	0.5	6.4	5.6	0.9
Otorohanga	3.0	1.8	0.7	1.8	0.6	0.0	0.0	1.8
South Waikato	6.1	4.0	4.5	3.2	3.2	8.0	0.0	4.0
Waitomo	5.1	3.6	4.8	2.9	1.2	0.0	0.0	3.6
Taupo	2.9	2.1	2.8	2.1	1.4	6.1	28.6	2.3
Part Rotorua	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.3
Waikato Region	**2.7**	**2.0**	**2.0**	**1.6**	**1.2**	**2.7**	**3.1**	**1.8**
New Zealand	2.5	1.8	1.9	1.6	1.3	3.4	5.3	1.8
	One Parent households							
Part Franklin	19.6	14.5	17.7	12.7	6.7	10.0	16.7	13.3
Thames-Coromandel	24.0	15.3	14.1	14.5	11.1	17.6	12.5	15.5
Hauraki	29.0	17.4	16.2	17.8	8.8	0.0	16.7	18.1
Waikato	29.7	18.5	19.0	17.1	15.2	16.7	12.5	19.2
Matamata-Piako	27.0	12.6	9.9	13.9	7.1	11.1	10.0	13.3
Hamilton City	25.4	18.0	12.3	16.5	10.3	13.1	16.4	16.4
Waipa	23.5	10.2	10.7	10.6	7.4	5.0	17.4	11.6
Otorohanga	23.1	11.3	14.7	12.1	14.3	0.0	14.3	16.2
South Waikato	34.7	23.2	20.8	21.3	13.7	23.1	27.3	23.1
Waitomo	25.8	25.0	25.8	23.0	21.2	20.0	12.5	23.1
Taupo	25.5	19.8	20.3	16.9	14.4	17.6	20.0	19.4
Part Rotorua	25.0	12.5	12.5	22.2	0.0	0.0	0.0	14.7
Waikato Region	**26.7**	**17.1**	**14.8**	**16.2**	**11.0**	**14.1**	**15.4**	**16.9**
New Zealand	26.1	17.2	14.3	16.0	11.0	14.9	15.3	16.5

(continues next page)

Table 19. (continued)

Territorial Authorities	15-24	25-44	45-64	65-74	75+	Total
	Single Person household					
Part Franklin	10.0	9.0	12.9	14.9	38.5	15.1
Thames-Coromandel	43.5	17.0	13.6	19.0	36.7	22.3
Hauraki	20.0	13.7	11.3	21.6	40.2	21.3
Waikato	25.0	11.2	14.3	24.3	41.0	21.7
Matamata-Piako	21.6	12.1	14.4	17.5	39.3	21.3
Hamilton City	28.8	16.7	16.5	25.6	44.7	25.1
Waipa	16.7	10.8	11.5	19.6	40.4	21.0
Otorohanga	5.6	17.8	8.8	15.0	32.6	16.3
South Waikato	20.0	16.7	16.1	23.5	36.2	21.4
Waitomo	18.8	15.0	19.8	19.1	37.5	22.3
Taupo	28.9	13.0	10.8	18.2	30.9	18.4
Part Rotorua	10.0	10.5	7.7	14.3	20.0	9.3
Waikato Region	**24.3**	**14.3**	**14.5**	**21.4**	**39.9**	**22.0**
New Zealand	26.4	16.0	16.4	24.0	43.5	24.6

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

4.3 Dwelling Tenure

It is useful to gauge trends in building activity that determine where new households are going to be located. There is obviously an associated need for infrastructure to provide access and mobility for these household. At the same time, it is also useful to consider whether such new dwellings are owner or rented, as this has implications for the geographical mobility of the people and the types of households that are likely to occupy the dwellings. The percentage of dwellings owner-occupied with or without a mortgage in the Waikato region has reduced over time from 70.4 per cent in 1991 to 64.4 per cent in 2001. This can be seen from Table 20. The Waikato region has gone from being somewhat below the New Zealand home ownership rate in 1991 to being close to the New Zealand level in 2001.

There have been significant changes across the Waikato's TA regions in terms of changes in home ownership. Hamilton City experienced the greatest decline in home ownership and had by 2001 the lowest home ownership rate at 58.9 percent. Waitomo and Taupo District also had low home ownership rates in 2001 of 60.9 and 61.0 percent respectively. The highest home ownership rates can be found in 2001 in Waipa District, followed by Part Franklin, Hauraki and Matamata-Piako Districts. There was only one TA region in which home ownership actually increased over the 1991-2001 period, namely Otorohanga District.

Table 20. Percentage of Dwellings which are Owned either With or Without a Mortgage, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991 and 2001

Territorial Authorities	1991	2001	Percentage Point Change
Part Franklin	na	70.0	na
Thames-Coromandel	71.9	66.9	-5.0
Hauraki	72.3	69.9	-2.4
Waikato	68.4	66.9	-1.5
Matamata-Piako	69.3	68.3	-1.0
Hamilton City	69.5	58.9	-10.6
Waipa	74.1	70.8	-3.3
Otorohanga	63.1	66.3	3.2
South Waikato	71.7	64.8	-6.9
Waitomo	65.4	60.9	-4.5
Taupo	65.9	61.0	-4.8
Part Rotorua	na	64.1	na
Waikato Region	**70.4**	**64.4**	**-6.0**
New Zealand	72.4	64.6	-7.8

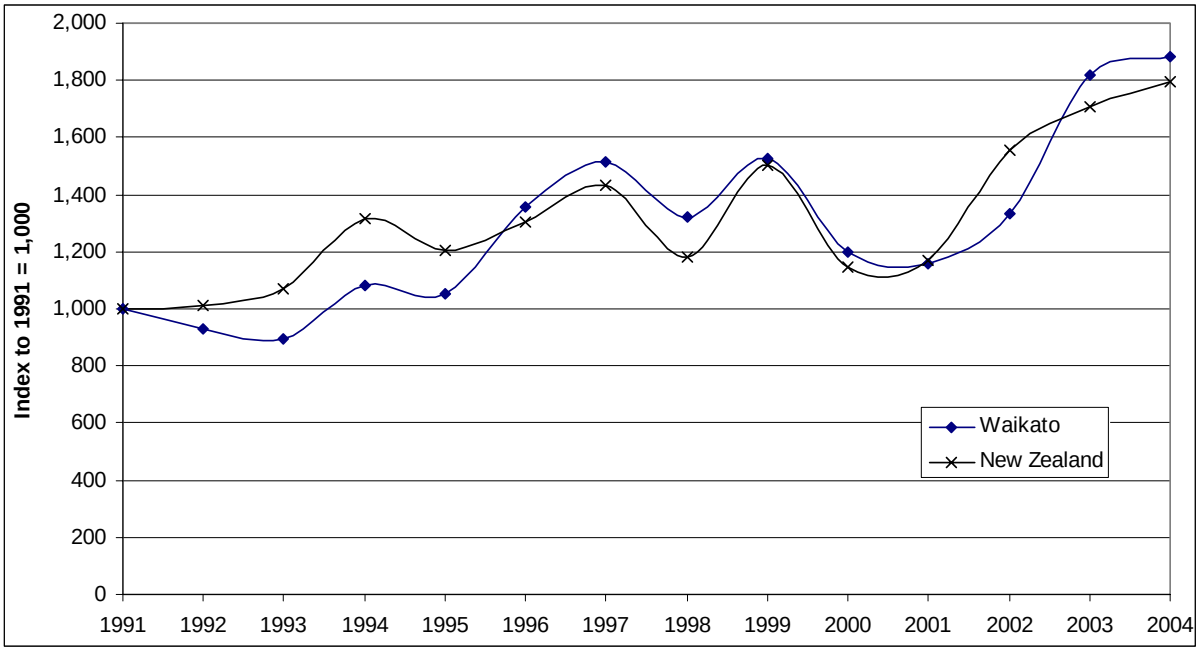
Note: information was not available for Part Franklin and Part Rotorua in 1991
Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

4.4 Building Consents

Turning now to the creating of new households through building activity, the post 1991 levels of dwelling construction are displayed in Figure 11. To permit a simple comparison of the New Zealand and Waikato trends, both have been indexed to a base of 1000 in 1991. Figure 11 clearly displays the cyclical nature of dwelling construction, with an underlying upward trend in both the Waikato and New Zealand as a whole. As is well known, dwelling construction has been particularly strong during the last three years, with the Waikato growth being stronger than nationwide growth. However, the figure clearly shows that there is strong co-movement in Waikato and national dwelling construction: the cyclical patterns are highly correlated.

Table 21 provides a breakdown in building consents by the TA regions of the Waikato. Close to a third of the additional Waikato dwellings are added to the Hamilton City stock. Other parts of the region with dwelling construction 1991-2004 in excess of 3000 units are Thames-Coromandel, Waikato, Waipa and Taupo. These are also the parts of the region that have experienced a significant upward trend in recent years. Dwelling construction is trendless in Hauraki and relatively minimal in Matamata-Piako, Otorohanga, South Waikato and Waitomo. The changes over the 1991-2004 period are clearly displayed in Figure 12, in which the levels of dwelling construction are indexed to a base of 1000 for the 1991-93 period.

Figure 11. New Dwelling Building Consents Index to 1991 Level, Waikato Region and New Zealand, 1991-2004



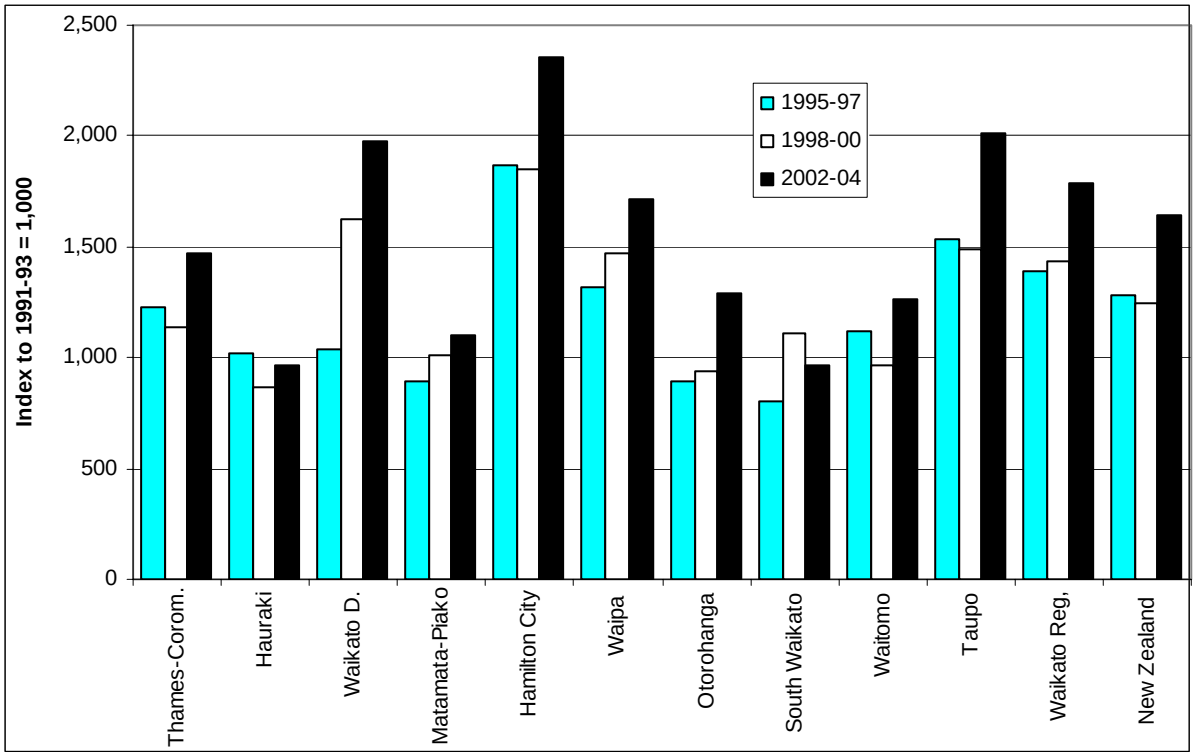
Source: Statistics New Zealand, INFOS Building Consent Information.

Table 21. New Dwelling Building Consents, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991-2004

Territorial Authorities	Average Annual Number of Building Consents				Total Consents 1991-2004
	1991-93	1995-97	1998-00	2002-04	
Thames-Coromandel	341	417	387	501	5,653
Hauraki	95	96	82	91	1,211
Waikato	155	161	253	306	3,019
Matamata-Piako	112	100	113	123	1,545
Hamilton City	459	860	851	1,083	11,076
Waipa	186	245	273	318	3,532
Otorohanga	27	24	26	35	387
South Waikato	27	21	30	26	349
Waitomo	19	21	18	24	288
Taupo	193	296	287	389	4,043
Waikato Region	**1,707**	**2,374**	**2,446**	**3,043**	**32,770**
New Zealand	17,998	23,009	22,398	29,515	322,396

Source: Statistics New Zealand, INFOS Building Consent Information.

Figure 12. New Dwelling Building Consents Index to 1991-93 Level, Waikato Constituent Territorial Authority Areas, Waikato Region and New Zealand, 1991-2004



Source: Statistics New Zealand, INFOS Building Consent Information.

5 Social Exclusion and Deprivation

5.1 Social Exclusion

The concept of social exclusion has no clear and uncontested meaning (Peace, 2001, p 17). However, for practical purposes one can accept the working definition used by the British government's Social Exclusion Unit (SEU). They define exclusion as 'what can happen when people or areas suffer from a combination of linked and mutually reinforcing problems'. Included amongst the domains of social exclusion recognized by the SEU are those resulting from low income and poverty; unemployment; low education and skills; bad health; inadequate housing; inadequate means of transport; crime and fear of crime; fragile social support and social capital; negative spillover effects from the neighbourhood, and exclusion from financial services, social services, leisure services, or civic and civil participation (e.g., Bradshaw *et al.*, 2004, p 5).

When thinking of the link between transport and social exclusion the key concept is that of accessibility, that is, the ability of people to get to key services at reasonable cost, in reasonable time and with reasonable ease (Social Exclusion Unit, 2003, p 1).

When appropriate transport is not available individuals and communities maybe excluded from:

- Access to work:
- Access to learning:
- Access to healthcare:
- Access to shops and financial services
- Access to social, cultural, and sporting activities:

Unable to access these activities and services, individuals are prevented from breaking out of a cycle of social exclusion while communities are left isolated and/or unable to attract investment (Social Exclusion Unit, 2003, p 2).

Implicit in the SEU definition of exclusion is an idea of time. A particular deprivation, such as lack of income may persist over time and then be reinforced by other deprivations, such as being unable to afford appropriate training, resulting in exclusion from some key area of social life, such as participation in the labour market. Hence individual exclusion might be thought of as individual deprivation over time, and social exclusion as an aggregate of the individual exclusion measures (Bossert *et al.*, 2004, p 2). Thus, aggregate measures of deprivation can be seen as strongly indicative of social exclusion. Such measures are discussed in the next section.

5.2 Deprivation

Deprivation can be understood as a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs. This may take the form of either material deprivation, that is disadvantage pertaining to material apparatus, goods, services, resources, amenities, the physical environment and location of life, or, social deprivation, pertaining to the roles, relationships, functions, customs, rights and responsibilities of membership of society and its subgroups (Townsend (1987) cited in Salmond and Crampton (2002, p 35).

In New Zealand various measures of deprivation have been developed at both the individual and area levels (see for example Salmond, Crampton, King and Waldegrave (2005) and Salmond and Crampton (2002) respectively). The measure of deprivation used here is NZDep2001.

NZDep2001 is an area measure of deprivation reported at, generally, standard Statistics New Zealand census area unit (CAU) level and is calculated on the basis of the following variables drawn from the New Zealand census of population and dwellings 2001:

- The proportion of people aged 18-59 receiving a means-tested benefit
- The proportion of people aged 18-59 unemployed
- The proportion of people living in (equivalised3) households with incomes below a certain level
- The proportion of people with no access to a telephone
- The proportion of people with no access to a car
- The proportion of people less than 60 years living in a one parent family
- The proportion of people aged 18-59 with no qualifications
- The proportion of people not living in own home
- The proportion of people living in (equivalised) households below a bedroom occupancy threshold.

Details of the various variables and a fuller explanation of the calculation of NZDep2001 can be found in Salmond and Crampton (2002).

When interpreting the NZDep2001 score, larger numbers represent higher levels of deprivation than lower numbers. NZDep2001 scores for the EW region range from a minimum deprivation score of 871 in the Huntington CAU in Hamilton City to slightly less than 1285 in the Huntly West CAU of the Waikato Territorial Authority. High NZDep2001 scores are likely to imply a greater need for public transport.

Table 22 shows both the proportion of the population resident in mesh blocks with NZdep2001 scores less than or equal to 900, between 900 and 1100, and over 1100. It can be seen that there is considerable variation between TAs in the proportion of their population living in mesh blocks with NZdep2001 scores in excess of 1100, ranging from none in Part Rotorua to around a third in the South Waikato.

The comparison between TAs should not obscure the considerable heterogeneity that exists within TAs in terms of mesh block deprivation scores. For instance, Matamata-Piako has an overall population weighted median NZDep score of around 960 but contains the Waharoa CAU which has a score of about 1250, the second highest in the EW region. Similarly the South Waikato district has CAUs with comparatively low NZdep2001 scores, such as Wawa (NZdep2001 score 911) while overall having a third of its population living in high NZdep score areas such as Tokoroa Central (NZdep2001 score 1188).

[3] The term equivalisation refers to an adjustment procedure undertaken to control for the effects of a variable such as, in this case, household composition.

Table 22. Percentage of the Population Residing in Meshblocks with NZDep2001 Scores in Specified Ranges by Waikato Constituent Territorial Authority Areas and Waikato Region

Territorial Authority	<=900	>900 & <1,100	>=1,100	Population
Part Franklin	4.4	85.4	10.2	14,427
Thames-Coromandel	1.8	83.3	14.9	25,176
Hauraki	0.8	71.4	27.8	16,764
Waikato	10.5	65.7	23.8	39,855
Matamata-Piako	6.9	84.3	8.8	29,472
Hamilton City	14.5	66.8	18.7	114,921
Waipa	16.3	78.6	5.1	40,293
Otorohanga	2.7	78.2	19.0	9,282
South Waikato	2.7	64.4	33.0	23,472
Waitomo	5.2	73.8	20.9	9,456
Taupo	5.1	67.3	27.5	31,521
Part Rotorua	22.1	77.9	0.0	3,432
Waikato Region	**9.6**	**72.1**	**18.3**	**357,726**

Source: Salmond, C., & Crampton, P. (2002). *NZdep2001 index of deprivation*. Wellington: Department of Public Health, Wellington School of Medicine and Health Sciences.

5.3 Access to Hospitals

For the land transport planning objectives of improving access and mobility, as well as protecting and promoting public health, it is useful to investigate the time it takes to reach medical services at various levels. In this section we consider travel times to different levels of hospitals. These travel times take into account the different road and weather conditions faced, in addition to speed restrictions and possible congestion when travelling through an urban area. The information on hospitals has been sourced from English (1998). Two types of hospitals are considered:

Secondary hospitals – These are equipped to cater for most of the local population's health needs, and so offer 24-hour acute secondary (specialist) services. Secondary hospitals contain intensive care units, but where patients need prolonged ventilation or tertiary surgical management, they would be transferred to a tertiary hospital.

Tertiary hospitals – Tertiary hospitals are national-level institutions. They are characterised by specialised high-tech services that are usually of high cost and low volume. They have a greater number of sub-specialists with 'on site', as opposed to 'on call' specialists. At this advanced level, these hospitals have many 24-hours 7 days resources, and have most major modern diagnostic services. They provide a rapid retrieval and primary response service within their geographic area, and also perform sub-acute and secondary hospital services.

Table 23 shows for the Waikato region and the constituent TA regions how much time it takes to travel to secondary or tertiary hospital services, based on 1996 census data. In the Waikato region as a whole, 57.1 percent of the population has to travel 30 minutes of more to reach a secondary or tertiary hospital. The percentage is only slightly higher (57.3 percent) with respect to travelling to a tertiary hospital. The greater travel times to a tertiary hospital do become clearer when considering the percentage of people who need to travel 60 or 90 minutes or more to a hospital: that is 27.8 percent and 8.2 percent respectively for a secondary hospital and 34.3 and 17.0 percent respectively for a tertiary hospital. Some Territorial Authority regions in the Waikato are more isolated from hospital services than others. For Secondary services Thames-Coromandel District is particularly isolated, but Waitomo and Taupo are also isolated to some extent. For Tertiary services, Part Rotorua District is added to the previously mentioned regions.

Table 23. Percentage of the Population outside Specified Times from Secondary Hospitals and above and Tertiary Hospitals, Waikato Constituent Territorial Authority Areas and Waikato Region, 1996

Territorial Authority	Secondary or above[1]			Tertiary[2]		
	30 min or more	1 hr or more	1½ hrs or more	30 min or more	1 hr or more	1½ hrs or more
Part Franklin	100.0	13.1	0.9	100.0	13.1	0.9
Thames Coromandel	100.0	100.0	76.3	100.0	100.0	77.2
Hauraki	100.0	95.9	0.3	100.0	100.0	4.3
Waikato	54.1	6.8	0.1	54.1	6.8	0.1
Matamata-Piako	99.4	1.2	0.0	99.4	6.9	0.0
Hamilton City	0.0	0.0	0.0	0.0	0.0	0.0
Waipa	40.4	0.8	0.0	40.4	0.8	0.0
Otorohanga	100.0	35.3	1.5	100.0	35.3	1.5
South Waikato	100.0	32.1	0.0	100.0	94.3	5.9
Waitomo	100.0	100.0	35.4	100.0	100.0	36.7
Taupo	100.0	96.4	19.7	100.0	100.0	100.0
Part Rotorua	81.1	0.0	0.0	100.0	100.0	100.0
Waikato Region	**57.1**	**27.8**	**8.2**	**57.3**	**34.3**	**17.0**

(1) Waikato, Tauranga, Rotorua and Middlemore Hospital

(2) Waikato and Middlemore Hospital

Source: Commissioned analysis by Lars Brabyn, GIS specialist, Department of Geography, University of Waikato. For Pool, I., Baxendine, S., Cochrane, W., & Katzenellenbogen, J. (forthcoming). New Zealand Regions, 1986-2001: Health, *Population Studies Centre Discussion Paper*. Hamilton: University of Waikato.

6 Scenarios and Transport-Related Projections

In this section we project a number of transport-related indicators to 2016, based on the most recent (February 2005) sub-national population projections. The Low, Medium and High population growth assumptions are considered synonymous to low, medium and high growth scenarios. Under the low growth scenario, the population of the entire EW region is projected to grow only 3.4 percent between 2001 and 2016. Under the medium growth scenario, growth of the usually resident population is expected to be 10.4 percent over the 2001-2016 period. The high growth scenario expects population growth over this period to be 17.6 percent. The simple methodology adopted here, that was already outlined in Section 1 is considered to be reasonable for the 2001-2016 period, but there are too many unknown factors to make projecting further out, while technically straightforward, a credible exercise.

6.1 Trips by Vehicle Drivers

We first consider the number of trips per capita per year. Table 24 contains the age-specific number of trips per capita derived from the 1997/98 Travel Survey. The largest number of trips are made in the 35 to 49 age group. This life course perspective on trips made is then applied to the actual age distribution in 2001 and the projected age distribution in 2016 in the Waikato region and the constituent TA regions.

Table 24. Trips a Year by Vehicle Drivers and Estimated Trips per Capita, New Zealand, 1997/98

Age Group (years)	Million Trips a Year for Vehicle Drivers in New Zealand	Estimated Population at 31 Dec 1997	Trips per Capita
15-19	144.2	271,670	531
20-24	262.8	270,340	972
25-29	313.5	285,720	1,097
30-34	359.9	296,760	1,213
35-39	456.7	307,390	1,486
40-44	384.4	274,390	1,401
45-49	336.4	251,820	1,336
50-54	247.5	211,110	1,172
55-59	173.6	174,210	996
60-64	127.4	139,340	914
65-69	105.5	133,860	788
70-74	80.8	117,320	689
75-79	58.6	88,220	664
80+	23.8	100,050	238

Sources: Land Transport Safety Authority (2000) *Travel Survey Report: increasing our understanding of New Zealanders' travel behaviour 1997/1998*, Wellington: Land Transport Safety Authority
Statistics New Zealand, Demographic Trends 1998, Wellington: Statistics New Zealand, Table 1.6.

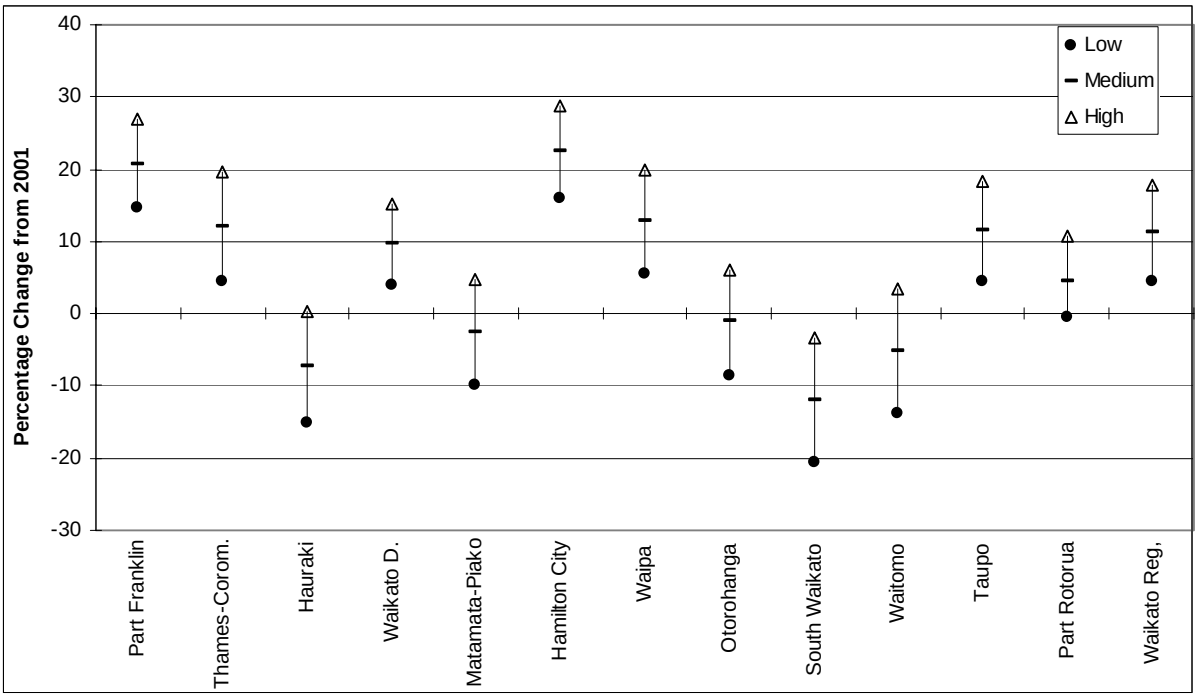
The trips per capita are applied to the projected Territorial Authority age-specific population using the High, Medium and Low series. By aggregating over age groups, the overall projected number of trips for a region is then obtained. The results are reported in Table 25. It is important to note that these projected trips are based on the usually resident population and the regional totals do not reflect the trips of those who travel through an area, or to a Waikato area from another area. For instance, Hauraki District is projected to have a negative growth in "locally generated" trips but this area has large volumes of through traffic between Auckland and the Bay of Plenty. Other regions which are likely to have a drop in the "locally generated" number of trips are Matamata-Piako, Otorohanga, South Waikato and Waitomo Districts. The largest growth in the number of locally generated trips is projected for Hamilton City, under all three scenarios, followed by Part Franklin District.

Table 25. Number of Locally Generated Trips per Year (Millions) Estimated and Projected, Waikato Constituent Territorial Authority Areas and Waikato Region, 2001 and 2016

Territorial Authority	2001	2016 (million trips p.a.)			Percentage Change 2001-16		
		Low	Medium	High	Low	Medium	High
Part Franklin	12.0	13.7	14.4	15.2	14.7	20.7	26.9
Thames-Coromandel	20.9	21.8	23.4	25.0	4.5	12.1	19.6
Hauraki	13.4	11.3	12.4	13.4	-15.0	-7.3	0.3
Waikato	32.2	33.5	35.3	37.1	4.1	9.6	15.3
Matamata-Piako	23.5	21.2	22.9	24.6	-9.9	-2.7	4.7
Hamilton City	97.2	112.7	119.0	125.3	16.0	22.4	28.8
Waipa	31.8	33.6	35.9	38.1	5.5	12.7	19.8
Otorohanga	7.5	6.9	7.5	8.0	-8.6	-1.1	6.2
South Waikato	18.4	14.6	16.2	17.7	-20.6	-12.0	-3.5
Waitomo	7.6	6.6	7.2	7.9	-13.8	-5.1	3.4
Taupo	25.9	27.1	28.9	30.7	4.5	11.4	18.3
Part Rotorua	2.8	2.8	2.9	3.1	-0.5	4.4	10.9
Waikato Region	**292.9**	**306.2**	**325.6**	**345.1**	**4.6**	**11.2**	**17.8**

The percentage changes in local trip generation are also displayed in Figure 13. The projected change in the number of trips in Hauraki and the South Waikato is negative or zero in all three scenarios. In contrast, the number of trips increases by at least 10 percent in Part Franklin and Hamilton City, even in the low growth scenario. It should be stressed that these projection exercises do not take into account changes in travel behaviour due to changing socio-economic conditions, transport-related policies or changes in the available infrastructure.

Figure 13. Projected Percentage Change in the Number of Locally Generated Trips per Year, Waikato Constituent Territorial Authority Areas and Waikato Region, 2001-2016



6.2 The Number of Motor Vehicles

Using the sub-national household projections, it is possible to project the number of motor vehicles in the Waikato region and the constituent TA regions. The household projections are given in Table 26. To take account of the impact of through-traffic from the Auckland and Bay of Plenty regions, household growth in those regions is also taken into account. Table 26 shows that household growth in the Waikato is expected to be less than in New Zealand over the 2001-2016 period in all three scenarios, with regional rates of household growth varying between 11.5 percent (Low scenario) and 23.8 percent (High scenario). These can be compared to the earlier mentioned population growth of 3.4 percent and 17.6 percent respectively. Thus, as is well known, the growth in the number of households is much faster than the growth in the population. Growth in the number of households in the Auckland and Bay of Plenty regions, however, is expected to be much stronger than in the Waikato region.

Under the high growth scenario, all TA areas are expected to experience an increase in the number of households by 2016, ranging from 2.3 percent in South Waikato to 32.4 percent in Thames-Coromandel. Even under the low growth scenario, the increase in the number of households will exceed 10 percent in five of the constituent TAs of the

Waikato region, namely Thames-Coromandel, Waikato, Hamilton-City, Waipa and Taupo.

To consider the implications of the projected growth in the number of households for car ownership, an estimate of the number of motor vehicles per household will need to be applied to the projected number of households. The rate of growth in car ownership, however, depends on many economic and other factors. Although motor vehicle ownership has been clearly trending upwards in the past, it is by no means certain that this will continue into the future. It was therefore considered prudent to allow for three assumptions with respect to future ownership of motor vehicles. In the Low scenario, ownership in 2016 is lower than it was in 1991. In the medium scenario, the ownership rates remain the same as those in 2001. Ownership rates in the high scenario are as much above the 2001 rates as those of the low scenario are below the 2001 rates. The actual changes in the past and the assumed changes in the number of motor vehicles per household are reported in Table 27.

Table 26. Number of Households Projected and Percentage Change, Waikato Constituent Territorial Authority Areas, Waikato, Auckland and Bay of Plenty Region and New Zealand 2001 and 2016

Territorial Authority[1]	2001	2016			Percentage Change		
		Low	Medium	High	Low	Medium	High
Thames-Coromandel	11,100	12,900	13,800	14,700	16.2	24.3	32.4
Hauraki	6,600	6,600	6,900	7,300	0.0	4.5	10.6
Waikato	14,300	16,200	16,700	17,400	13.3	16.8	21.7
Matamata-Piako	11,400	11,200	11,800	12,500	-1.8	3.5	9.6
Hamilton City	44,100	52,000	54,800	57,700	17.9	24.3	30.8
Waipa	15,100	17,300	18,100	19,000	14.6	19.9	25.8
Otorohanga	3,200	3,200	3,400	3,600	0.0	6.3	12.5
South Waikato	8,600	7,600	8,200	8,800	-11.6	-4.7	2.3
Waitomo	3,600	3,500	3,700	4,000	-2.8	2.8	11.1
Taupo	12,200	13,900	14,500	15,200	13.9	18.9	24.6
Waikato Region	**136,400**	**152,100**	**160,100**	**168,800**	**11.5**	**17.4**	**23.8**
New Zealand	1,440,600	1,645,300	1,732,600	1,825,600	14.2	20.3	26.7
Auckland Region	419,400	536,100	562,700	590,500	27.8	34.2	40.8
Bay of Plenty Region	93,100	112,500	120,200	128,300	20.8	29.1	37.8

(1) The part of Franklin and Rotorua Territorial Authority was unavailable.
Source: Statistics New Zealand, Subnational Family and Household Projections, 2001(base) – 2021

A total of nine different scenarios results when we combine the low, medium and high scenarios for household growth with the three scenarios for car ownership rates. The estimated number of private motor vehicles in an area and the projected number for 2016 under one of the nine scenarios can be found in Table 28. This is done by appling the three scenarios for the average number of motor vehicles to the three scenarios for the household projections. The results show that the number of motor

vehicles in the Auckland and Bay of Plenty regions continue to increase, even under the low car ownership, low household growth scenario. For the Waikato this is not the case, although in the low/low scenario the decline in the number of motor vehicles is only 5 percent below the 2001 number. However, the growth of car ownership in the Auckland and Bay of Plenty regions is important to the Waikato region, as such cars are likely to make trips to the Waikato region, or come through the region.

Table 27. Number of Motor Vehicles per Household, Actual 1991 and 2001 and Projected 2016, Waikato Constituent Territorial Authority Areas, Waikato, Auckland and Bay of Plenty Region and New Zealand

Territorial Authority	1991	2001	Change	Projected[1] 2016		
				Low	Medium	High
Part Franklin	1.68	1.91	0.23	1.57	1.91	2.26
Thames-Coromandel	1.32	1.45	0.13	1.26	1.45	1.64
Hauraki	1.41	1.54	0.13	1.35	1.54	1.73
Waikato	1.52	1.72	0.20	1.42	1.72	2.03
Matamata-Piako	1.50	1.64	0.15	1.43	1.64	1.86
Hamilton City	1.43	1.55	0.12	1.37	1.55	1.73
Waipa	1.56	1.74	0.18	1.46	1.74	2.01
Otorohanga	1.50	1.69	0.19	1.40	1.69	1.98
South Waikato	1.36	1.49	0.13	1.29	1.49	1.68
Waitomo	1.35	1.55	0.19	1.26	1.55	1.84
Taupo	1.41	1.61	0.20	1.32	1.61	1.90
Part Rotorua	1.71	1.93	0.23	1.59	1.93	2.28
Waikato Region	**1.45**	**1.61**	**0.16**	**1.38**	**1.61**	**1.84**
New Zealand	1.44	1.59	0.15	1.36	1.59	1.81
Auckland Region	1.49	1.66	0.17	1.40	1.66	1.91
Bay of Plenty Region	1.41	1.57	0.16	1.33	1.57	1.80

(1) Low = 2001 Number of Motor Vehicles - 1.5 x 1991-2001 Change, Medium = 2001 Number of Motor Vehicles; High = 2001 Number of Motor Vehicles + 1.5 x 1991-2001 Change

Source: Statistics New Zealand, 1991 and 2001 Censuses of Population and Dwellings.

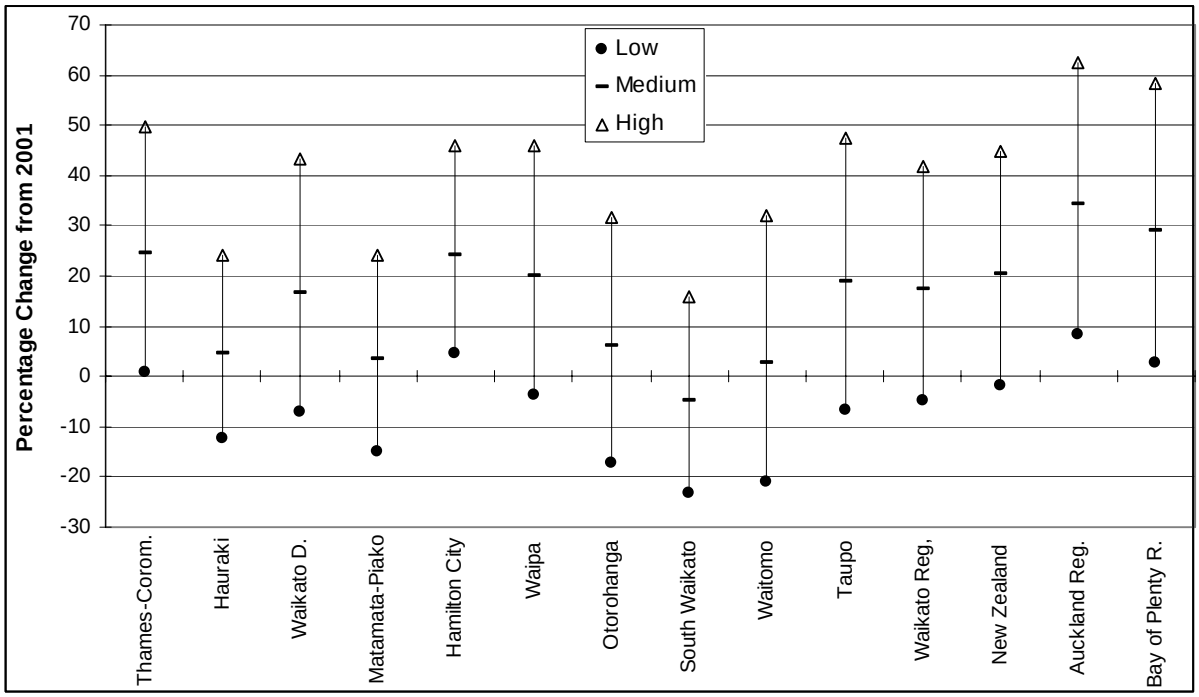
Under the high household growth combined with high car ownership scenario, the total number of motor vehicles in New Zealand in 2016 would exceed 3.3 million, of which a third can be found in the Auckland region. The number of motor vehicles in Hamilton City would be in 2016 about 100,000, compared with about 68,000 in 2001. The percentage growth rates for the 2001-2016 period are depicted in Figure 15.

Figure 14 shows that there could be a significant decline of 10 percent or more in the total number of locally owned cars in the Hauraki, Matamata-Piako, Otorohanga, South Waikato and Waitomo TA areas. On the other hand, growth of 40 percent or more in car ownership is possible in the Thames-Coromandel, Waikato District, Hamilton City, Waipa District and Taupo District parts of the Waikato region.

Table 28. Estimated Number of Private Motor Vehicles in a Area by Various Projection Scenarios, Waikato Constituent Territorial Authority Areas, Waikato, Auckland and Bay of Plenty Region and New Zealand, 2001 and 2016

Territorial Authority	2001	Low car ownership			Medium car ownership			High car ownership		
		Low No. HH	Medium No. HH	High No. HH	Low No. HH	Medium No. HH	High No. HH	Low No. HH	Medium No. HH	High No. HH
Thames-Coromandel	16,120	16,270	17,405	18,540	18,734	20,041	21,348	21,199	22,678	24,156
Hauraki	10,143	8,893	9,297	9,836	10,143	10,604	11,219	11,394	11,912	12,602
Waikato	24,664	22,966	23,675	24,667	27,941	28,803	30,010	32,915	33,931	35,353
Matamata-Piako	18,738	15,962	16,818	17,815	18,409	19,396	20,546	20,856	21,974	23,277
Hamilton City	68,329	71,364	75,207	79,187	80,569	84,908	89,401	89,775	94,609	99,616
Waipa	26,261	25,319	26,489	27,807	30,087	31,478	33,043	34,855	36,467	38,280
Otorohanga	5,421	4,495	4,776	5,057	5,421	5,759	6,098	6,347	6,743	7,140
South Waikato	12,789	9,810	10,584	11,359	11,302	12,194	13,086	12,794	13,804	14,814
Waitomo	5,572	4,404	4,655	5,033	5,417	5,726	6,191	6,430	6,797	7,349
Taupo	19,624	18,280	19,069	19,989	22,358	23,323	24,449	26,436	27,577	28,909
Waikato Region	**219,649**	**209,440**	**220,456**	**232,436**	**244,931**	**257,814**	**271,824**	**280,422**	**295,171**	**311,211**
New Zealand	2,285,102	2,239,810	2,358,655	2,485,259	2,609,801	2,748,277	2,895,796	2,979,792	3,137,900	3,306,332
Auckland Region	694,588	751,741	789,040	828,023	887,860	931,913	977,954	1,023,979	1,074,786	1,127,885
Bay of Plenty Region	145,707	149,742	159,991	170,773	176,069	188,120	200,797	202,395	216,248	230,821

Figure 14. Percentage Change from 2001 of Number of Private Motor Vehicles per Region using the Extremes of the Projections, Waikato Constituent Territorial Authority Areas, Waikato, Auckland and Bay of Plenty Region and New Zealand, 2001-2016



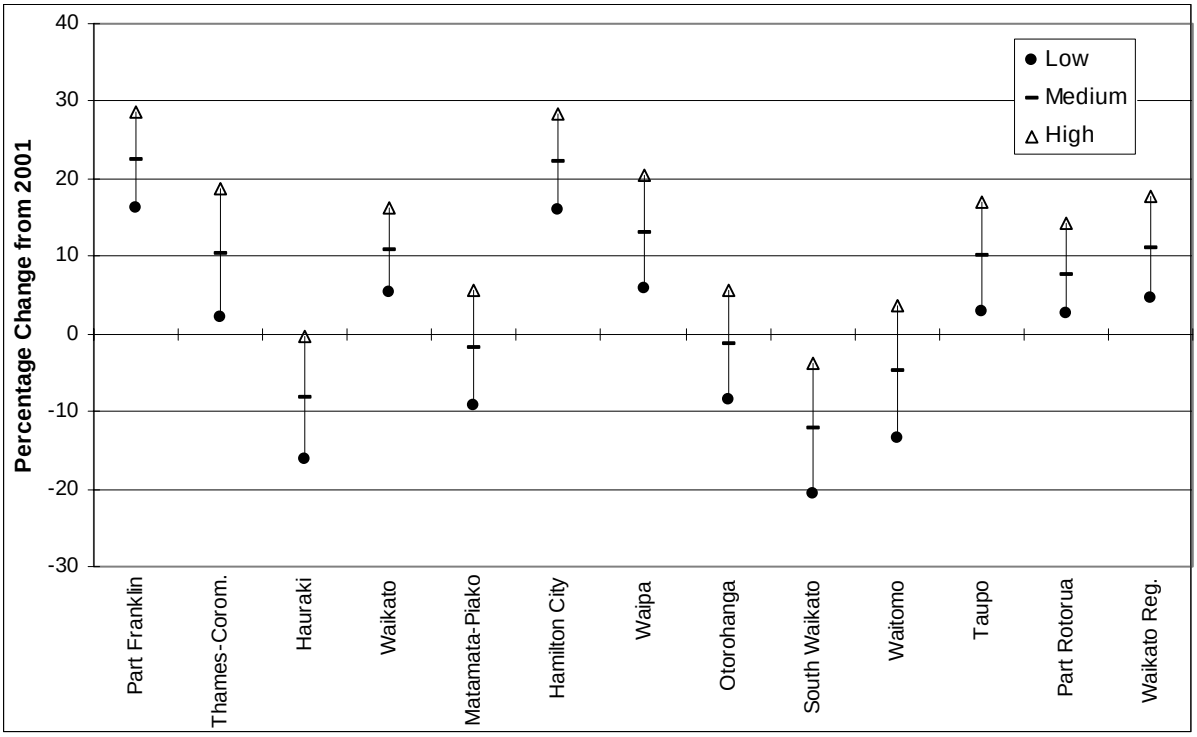
6.3 Travel to Work

In this final sub-section we will consider the implications of employment trends for travel to work. Employment trends over 1991-2001 were already discussed in Section 3.1. Age-specific employment rates for age groups 15-24, 25-44, 45-64 and 65+ as in 2001 were applied to the corresponding age-specific projections for 2016 for the relevant Territorial Authority regions. The calculation was done for each of the three population growth scenarios: low, medium and high. It should be stressed that such employment projections are purely demographically driven and do not take into account changes in economic conditions that may vary across the parts of the Waikato region between now and 2016. However, the results are nonetheless considered indicative of a potential for low or high employment growth.

The results are shown in Figure 15. The demographic projections suggest a growth in employment in the Waikato region overall of between 5 and 19 percent between 2001 and 2016. The TA regions with the largest growth are expected to be Part Franklin District and Hamilton City. Areas where there is projected to be no employment growth or a decline are Hauraki, Matamata-Piako, Otorohanga, South Waikato District and Waitomo Districts. Of these, the South Waikato District is projected to have the

largest employment decline. The projected changes in employment displayed in Figure 15 have implications for people's travel to work, that will be discussed later in this section.

Figure 15. Projected Usually Resident Percentage Change in Employment[1], Waikato Constituent Territorial Authority Areas[2] and Waikato Region, 2001-2016



(1) Persons working full- or part-time estimated using the 2001 age-specific employment rate applied to the age-specific projections for 2016.

(2) The Hamilton City boundary changed on the 30th June 2004. The projections are for the new boundary which includes Temple View, which was in Waipa District previously.

Sources: Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005.; Statistics New Zealand, 2001 Census of Population and Dwellings.

Table 29 shows the commuter flows in the Waikato region. For example, of the 53,082 employed persons residing in Hamilton City in 2001, 39,306 also worked in Hamilton City, while 1,995 worked in Waikato District. The largest inflow into Hamilton City is 5,031 workers from Waikato district, followed by 3,894 workers from Waipa district. More detail on communities from and to Hamilton City in 2001 is given in Table 30. With respect to the selected communities displayed the largest inflow is from Cambridge: 1,131 employed persons. The table also clearly shows that community flows are predominately unidirectional with the flows to a workplace in Hamilton City being much higher than the opposite flows. However, the flows from and to Morrinsville are relatively somewhat more balanced, while the flows from and to Huntly are in net terms towards Huntly. A detailed discussion of the 2001 patterns in the journey to work in Hamilton City, and changed over the 1986-2001 period, can be found in Belliss (2004).

Table 29. Employed Usual Residence to Workplace Travel for Waikato Constituent Territorial Authority Areas, 2001

Workplace Address	Usual Residence											
	Part Franklin	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton City	Waipa	Otorohanga	South Waikato	Waitomo	Taupo	Part Rotorua
Part Franklin	2,586	15	9	87	0	18	0	0	0	0	3	0
Thames-Coromandel	3	7,848	654	24	33	45	9	3	3	0	0	0
Hauraki	6	198	4,539	21	69	48	12	3	0	0	9	0
Waikato	36	12	21	8,229	108	1,995	339	9	12	3	9	0
Matamata-Piako	3	21	168	144	10,659	423	159	0	141	0	3	3
Hamilton City	27	60	57	5,031	621	39,306	3,894	117	117	24	30	0
Waipa	3	6	3	309	117	1,311	11,028	216	66	27	6	0
Otorohanga	0	0	3	15	3	111	363	2,949	3	138	9	0
South Waikato	6	12	3	18	126	78	135	9	7,305	3	195	27
Waitomo	3	3	3	6	3	36	81	201	15	3,402	24	3
Taupo	0	3	3	3	6	39	9	12	42	6	10,593	51
Part Rotorua	0	0	6	0	3	0	0	0	0	3	72	1,125
Waikato Region not further defined	45	99	60	372	165	972	378	75	117	54	66	9
New Zealand not further defined	1,167	1,731	1,107	2,745	1,761	7,164	2,688	669	1,476	711	2,436	231
Outside Region	3,231	345	423	762	285	1,536	453	48	255	108	597	408
Total	7,116	10,353	7,059	17,766	13,959	53,082	19,548	4,311	9,552	4,479	14,052	1,857

Source: Statistics New Zealand, 2001 Census of Population and Dwellings.

Table 30. Travel to Workplace for Selected Communities To and From Hamilton City, 2001

Community	To Hamilton City	From Hamilton City
Huntly[1]	255	270
Ngaruawahia[2]	648	231
Raglan[3]	240	18
Morrinsville[4]	264	180
Cambridge[5]	1,131	255
Te Awamutu/Kihikihi[6]	792	297

(1) Huntly East and West Area Units.
(2) Ngaruawahia Area Unit.
(3) Raglan Area Unit.
(4) Morrinsiville East and West Area Units.
(5) Cambridge North, Central and West, and Leamington West and East Area Units.
(6) Te Awamutu East, West, Central and South, Kihikihi Flat and Kihikihi Area Units.
Source: Statistics New Zealand, 2001 Census of Population and Dwellings.

Using the age-specific employment by usual residence of the worker, 2001 census information on travel to work can be used to project forward the travel to work flows in 2016. This has been done for the medium population growth projection. The results, aggregated over the four age groups 15-24, 25-44, 45-64 and 65+ can be found in Table 31. Besides the absolute numbers, the percentage changes 2001-2016 are also given in the table.

Table 31 displays the typical features of flows across geographical area. Analogous to the gravity law, such flows are larger for nearby regions (i.e. inversely related to distance) and also proportional to the total number in the destination as well as in the origin. In the case of travel to work, the table shows that the further the distance between a residential area and a workplace area, the smaller the traffic flow. In contrast, the larger the number of jobs in the workplace area or the larger the number of residents in the residential area, the larger the commuting traffic flow. The biggest numbers can be found on the main diagonal of the matrix, signalling that much of the travel to work traffic occurs within the TA area. It should be noted that for a relatively large proportion of people the workplace address in the Waikato region could not be assigned to one of the constituent TAs, is outside the region, or was not reported at all. These “irregular” categories carry over into the projections.

Table 31 shows that projected travel to work flows in 2016 within TAs is the largest, as expected, in Hamilton City with 51,704 people projected to work and live in Hamilton City in 2016. Intra-TA commuting of about 10,000 persons or more can also be found in Waikato District, Matamata-Piako, Waipa and Taupo. Waikato District, Waipa District and Hamilton City form a triangle of inter-TA commuting flows of, in aggregate, about 15,000 persons. Travel from home in Waikato or Waipa Districts to work in Hamilton City is projected to be 5,839 and 4,342 persons respectively. In the

opposite direction (from a home in Hamilton City to work in Waikato and Waipa Districts) the flows are projected to be 2,610 and 1,719 respectively.

The projected percentage changes reflect primarily the projected changes in the population with jobs in each of the TAs. In turn, these changes are closely related to the projected population changes, such as shown in Figure 2 of this report. Thus, the projected 2001-2016 growth in the number of employed persons with a usual residence in Hamilton City is 22.1 percent, leading to an increase in specific travel to work flows varying between 17.7 percent (to Waitomo workplaces) and 22.7 percent (to Otorohanga, South Waikato workplaces). Sub-regions where projected employed population is expected to decline generate generally declining travel to work flows, although in some cases (Matamata-Piako and Waitomo) there is expected to be a mixture of growing and declining flows.

As in the previous sub-sections, it is useful to consider the sensitivity of the results to the choice of scenario. We saw already in Figure 15 how the sub-regions of Waikato region differed in terms of expected employment growth under the low, medium and high population growth scenarios. We saw from Table 31 that the percentage changes in travel to work flows resulting from the projected employment changes are often quite similar to the projected employment changes themselves. Figure 16 shows the percentage change in the number of employed persons with their workplace in the same TA region as their residence. Figure 16 is very similar to Figure 15. The TA regions with the largest growth in intra-TA commuting are expected to be Part Franklin District and Hamilton City. Areas where there is projected to be no intra-TA commuting growth or a decline are Hauraki, Matamata-Piako, Otorohanga, South Waikato and Waitomo Districts.

Table 31. Projected (Medium) Employed Usual Residence to Workplace Travel (2016) for Waikato Constitutional Territorial Authority Areas and Percentage Change from 2001 to 2016

Workplace Address	Usual Residence											
	Part Franklin	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton City[1]	Waipa[1]	Otorohanga	South Waikato	Waitomo	Taupo	Part Rotorua
	Numbers 2016											
Part Franklin	3,590	20	6	97	0	24	0	0	0	0	3	0
Thames-Coromandel	8	9,236	599	28	37	58	10	4	3	3	0	3
Hauraki	20	234	4,427	22	73	63	10	3	0	0	3	0
Waikato	56	15	20	9,947	101	2,610	364	12	13	6	10	0
Matamata-Piako	3	24	155	170	11,001	551	181	3	130	4	8	6
Hamilton City	36	72	49	5,839	594	51,704	4,342	123	115	30	32	7
Waipa	10	8	2	371	116	1,719	12,882	216	57	29	7	3
Otorohanga	0	0	0	21	2	154	410	3,115	2	142	7	0
South Waikato	9	14	7	17	126	111	153	8	6,907	0	213	38
Waitomo	0	3	0	4	2	42	87	201	11	3,436	28	0
Taupo	0	4	0	4	2	52	10	12	36	3	12,657	56
Part Rotorua	0	0	2	0	2	4	0	0	0	3	96	1,328
Waikato Region not further defined	49	112	64	428	178	1,278	439	83	108	56	82	9
New Zealand not further defined	1,550	2,045	1,088	3,296	1,870	9,427	3,100	695	1,409	723	2,885	270
Outside Region	4,164	416	411	885	297	1,993	546	50	241	100	716	434
Total	9,495	12,203	6,829	21,130	14,402	69,790	22,534	4,525	9,033	4,534	16,747	2,152

(continues on next page)

Table 31. (continued)

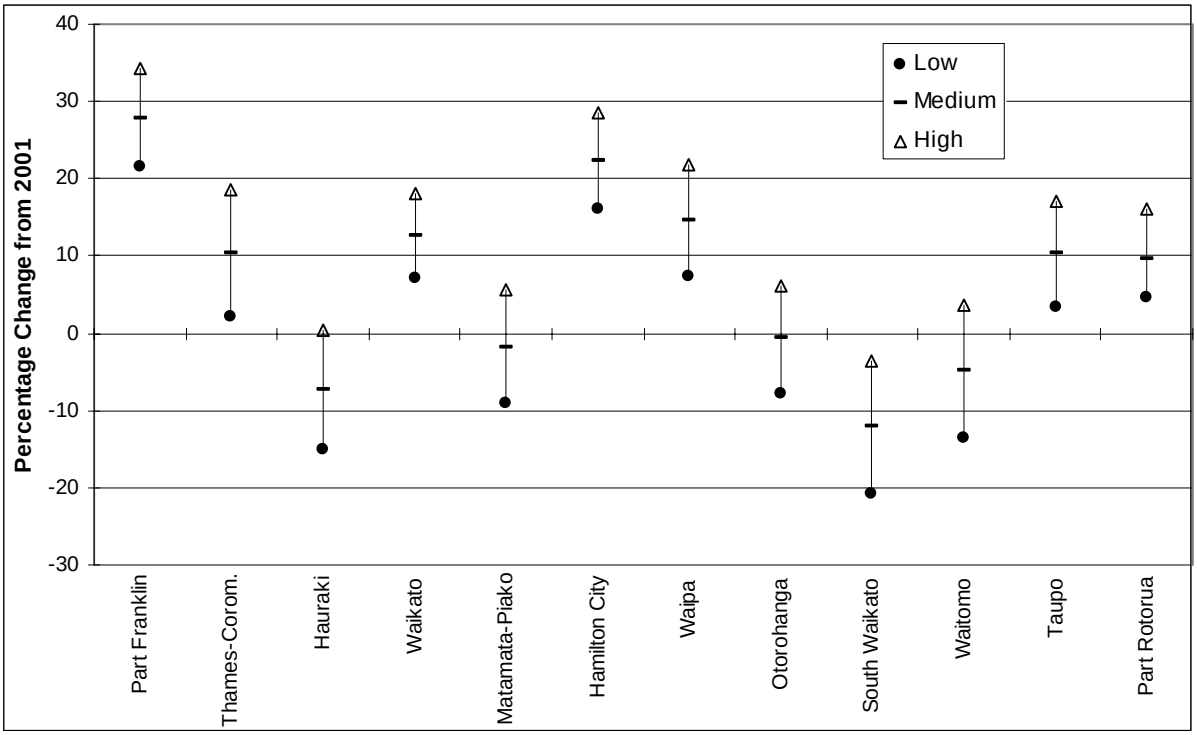
Workplace Address	Usual Resident											
	Part Franklin	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton City[1]	Waipa[1]	Otorohanga	South Waikato	Waitomo	Taupo	Part Rotorua
	Percentage Change 2001-2016[2]											
Part Franklin	27.8			7.2								
Thames-Coromandel		10.3	-13.1		7.8	19.4						
Hauraki		12.9	-7.4		1.3	21.9						
Waikato				12.6	-11.3	21.6	6.2					
Matamata-Piako			-14.2	12.1	-1.8	20.0	9.7		-16.0			
Hamilton City		7.8	-14.0	8.1	-8.5	22.2	9.6	-1.1	-11.0	3.6	8.0	
Waipa				10.5	-5.8	21.8	14.7	-4.9	-15.3	0.6		
Otorohanga						22.4	10.8	-0.7		-5.7		
South Waikato					-4.6	22.7	10.8		-12.1		2.7	7.1
Waitomo						17.7	9.2	-4.4		-4.9	7.3	
Taupo						22.7			-14.3		10.3	8.0
Part Rotorua											9.3	9.5
Waikato Region not further defined	23.5	8.9	-3.9	7.9	-1.1	22.2	15.0	-0.5	-14.1	-7.1	14.9	
New Zealand not further defined	21.6	10.4	-6.9	11.9	1.2	22.3	13.4	-2.1	-11.4	-3.9	9.2	8.9
Outside Region	18.2	11.0	-9.6	6.4	-1.9	21.6	13.1	-1.3	-13.6	-9.9	10.2	2.8
Total	22.4	10.4	-8.2	10.7	-1.8	22.1	13.1	-1.4	-12.2	-4.8	10.0	7.7

(1) Hamilton City boundary change on the 30th June 2004, these projection are for the new boundary which includes Temple View which was in Waipa District. The 2001 census information of workplace used the old boundaries. But the projection used the new populations. Resulting in a small discrepancy between the results.

(2) The numbers used in the calculation of the change are different from those in Table 29 as they are based on the base year population of the official projections.

Sources: Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005.
Statistics New Zealand, 2001 Census of Population and Dwellings.

Figure 16. Projected Percentage Change in the Residence to Workplace Flows within the Same Waikato Constituent Territorial Authority Area[1], 2001-2016



(1) The Hamilton City boundary changed on the 30th June 2004. These projections are for the new boundary which includes Temple View which was previously in Waipa District. The 2001 census information of workplace used the old boundaries, but the projections are based on the new boundaries. The effect of this on the resulting travel to work projections at the TA level is very small.

Sources: Statistics New Zealand, Medium Subnational Population Projections: 2001 (base) - 2026; Updated 28 February 2005; Statistics New Zealand, 2001 Census of Population and Dwellings.

7 Summary of Characteristics of the Sub-Regions

This report has described a range of aspects of demographic and related socio-economic changes in the Waikato region that may have an impact on transport needs. This section summarises the findings for each of the 12 Waikato constituent TA areas separately. This highlights the extent to which a particular sub-region stands out in terms of specific statistical measures.

Part Franklin District

Part Franklin District is an affluent and fast growing area in the Waikato region. The District had the fastest total population growth of the sub-regions over the 1991-2001 period (19.2 percent). A major contribution factor is the 'spill over' from Auckland population growth. Part Franklin had the highest net 1996-2001 inward internal migration (7.2 percent). In terms of age composition, the "old old" group (aged 75 and over) is relatively very small in Part Franklin. Part Franklin has high median and upper quartile incomes. The level of deprivation

is low, with 10.2 percent of the population in meshblocks with a score of 1100 or more (18.3 percent for the entire Waikato region). Part Franklin has a relatively high percentage in full-time employment. The Māori unemployment share is 3.7 times the share for non-Māori in this sub-region. Households have almost always a motor vehicle and Part Franklin has one of the highest home ownership rates among the sub-regions. Using population projections and 1997/98 data on trips per year by vehicle drivers, the 2001-2016 growth in locally generated trips is among the highest (20.7 percent under the medium growth scenario).

Thames-Coromandel District

The Thames-Coromandel District is characterised by a relatively older population, with many retired persons and a continuing influx of retirees. The percentage of European ethnicity in the population is expected to remain relatively high. The region had strong 1991-2001 population growth (in excess of 15 percent), with further strong population growth expected throughout 2001-2026. The number of households may increase by one third and car ownership may grow by 40 percent or more between 2001 and 2016 (high growth scenario). Persons aged 75 and over are clearly overrepresented in Thames-Coromandel (8.4 percent in 2001, increasing to 15.5 percent in 2026 under the medium scenario). In this sub-region, the share of the 65-74 age group in 2001 is nearly double that of the Waikato region as a whole (12.1 versus 6.7 percent). At the other end of the age spectrum, Thames-Coromandel has the relatively smallest pre-school population. The age structure is very different from the rest of the region, with the lowest percentages also for the 15-24 and 25-44 age groups. Related to the age structure is that Thames-Coromandel District has relatively higher proportions of Couple Only and Single Person households and lower proportions of Parent Plus and Two Parent households. The District had the lowest 2001 percentage of people in full-time employment and the highest percentage in part-time employment and non-labour force. However, there has been rapid 1991-2001 employment growth in the age group 65 and over (reflecting fast population growth in this age group). Median income in 2001 was the lowest among the sub-regions ($14,653). Dwelling construction 1991-2004 has been relatively high (in excess of 3000 units). With respect to secondary hospital services, Thames-Coromandel District is particularly isolated. More than two thirds of the District's population needs to travel 90 minutes or more to reach secondary or tertiary hospital services.

Hauraki District

The Hauraki District is characterised by population decline and a contracting sub-regional economy. Hauraki is expected to experience more significant population decline over 2001-2011 (medium projection) than in the previous decade (-5.5 versus -1.6 percent). Under the low projection assumptions, 2001-2026 population loss may be one quarter. The population is ageing rapidly. The sub-region is projected to experience the relatively largest decline between 2001 and 2026 in the proportion of the population aged under 15 years (9 percentage points, medium projection) and in the 15-64 age group (8.1 percentage points). The

percentage of European ethnicity is expected to remain relatively high. Net 1996-2001 internal migration is negative overall, but Hauraki District has the largest net inflow (7.5 percent) in the age group 65 years and over. The unemployment rate is comparatively high in Hauraki District (9.4 percent in 2001) and 1991-2001 male full-time employment declined (even among young males). Hauraki also stands out as also having a low median income. Deprivation levels are on average high. Yet the home ownership rate is high as well, but dwelling construction is trendless. With respect to private motor vehicle trips, Hauraki District is projected to have negative growth in locally generated trips but this area has large volumes of through traffic between Auckland and the Bay of Plenty. The number of cars owned in the region could decline by 10 percent (2001-2016, low scenario) and the projected change in the number of locally generated trips is negative or zero in all three scenarios. There is also expected to be intra-TA commuting decline.

Waikato District

This District has unique features that reflect the mixture of communities in the area. The District has relatively fast population growth, net inward migration and high median income. There is also a high proportion of Māori and a high proportion of one parent households. The growth of Waikato District is strongly linked with that of Hamilton City. The latter, together with the contiguous TAs of Waikato District and Waipa District are projected to grow by 53,600 people over the 2001-2026 period, some 94 percent of the region's total growth of 57,000 (medium projection). In Waikato District, over one quarter of the population is Māori and projected to increase to double the national average percentage. Income growth has been strong. The District had high median and upper quartile 2001 income. Dwelling construction 1991-2004 has been in excess of 3000 units. Even under the low growth scenario, the 2001-2016 increase in the number of households is expected to exceed 10 percent. The number of motor vehicles may grow as much as 40 percent (high growth scenario). Intra-TA commuting was high in 2001 (8,229 persons) and may be about 10,000 persons by 2016. Travel from home in Waikato District to work in Hamilton City is projected to be 5,839 in 2016 (medium projection). In the opposite direction (from a home in Hamilton City to work in Waikato Districts) the flow is projected to be 2,610 persons.

Matamata-Piako District

This District is characterised by a relatively high percentage of population of European ethnicity and relatively low levels of deprivation. Nonetheless, the projections suggest future population and employment decline and associated declines in the number of vehicles and locally-generated trips. Matamata-Piako has the lowest percentage of Māori ethnicity among the sub-regions (12.8 percent in 2001). The District has a relatively high percentage in full-time employment, but 1991-2001 male full-time employment declined, even among the 15-44 age group. Deprivation is relatively low (with an overall population-weighted median NZDep2001 score of around 960) but the District contains the Waharoa Census Area Unit

which has a score of about 1250, the second highest in the Waikato region. Matamata-Piako District had a relatively high home ownership rate in 2001. Projected future population decline may lead to a drop in the locally generated number of motor vehicle trips and a decline in the area's stock of cars (low scenario). Intra-district commuting in 2001 was just over 10,000 persons. With respect to future commuting flows between the District and other TA areas, there is expected to be a mixture of growing and declining flows.

Hamilton City

Hamilton City constitutes the urban core of the Waikato region and has consequently many features that are different from other parts of the region, but typical for a city. These include the more extensive availability of public transport, the greater percentage of non-family and "parent-plus" households, the large proportion of students in the population, the presence of a hospital providing tertiary health services, the high proportion of the population in managerial, professional or technical employment, and a relatively high proportion of immigrants. The city has also experienced rapid population growth. Projected growth through net inward migration and natural increase over the 2001-2011 period remains at 15 percent (medium projection). In all projections the two fastest growing areas in the Waikato over 2001-2026 are Part Franklin and Hamilton City. While all sub-regions of the Waikato region are projected to experience declines between 2001 and 2026 in the shares of 15-64 age group, this decline is the least in Hamilton City (1.4 percentage points). The 2001-2026 decline in the share of the population aged under 15 years is also least in Hamilton City (under 4 percentage points). The importance of the high school and student population for Hamilton City is conveyed clearly by the share of the population aged 15-24, which is 18.3 percent in Hamilton City, 13.7 percent for the Waikato region and 13.5 percent for New Zealand. Paradoxically, while secondary and tertiary health care are in closest proximity in Hamilton City, the proportion of the population most likely to require such health care (those aged 65 and over) is the relatively smallest. Among Waikato sub-regions, Hamilton City has the highest percentage of Asian ethnicity (7 percent in 2001 and expected to increase to 13.2 percent in 2016). Among the age group of 75 years and older, Hamilton City has the highest percentage of households with no car (25.9 percent in 2001). Moreover, among single person households in 65-74 age group more than a quarter do not have a motor vehicle and this increases to close to 45 percent for the 75+ age group. Hamilton City experienced the greatest 1991-2001 decline in home ownership in the Waikato and had by 2001 the lowest home ownership rate (58.9 percent). Yet close to a third of the additional 1991-2004 Waikato dwellings were added to the Hamilton City stock. Among Waikato TA areas, the largest growth in the number of locally generated trips is projected for Hamilton City. Under the high population growth combined with high car ownership scenario, the number of motor vehicles in Hamilton City would be in 2016 about 100,000, compared with about 68,000 in 2001. Projected travel to work flows in 2016 within Waikato's TAs are the largest in Hamilton City, with 51,704 people projected to work and live in the city at that time. Waikato District, Waipa

District and Hamilton City form a triangle of inter-TA commuting flows which by 2016 may be in aggregate in excess of 15,000 persons.

Waipa

Waipa District is a fast growing and affluent part of the Waikato region. Similar to Waikato District (but to a greater extent), population growth in Waipa District is linked that of Hamilton City. Waipa population growth over 2001-2011 is projected to be 10 percent (medium growth scenario) and the population could exceed 50,000 by 2021 (high growth scenario). Waipa District is relatively homogeneous and prosperous, with high full-time employment rates, high incomes and a very low degree of deprivation. Only five percent of the population resides in meshblocks with an NZDep2001 score of 1100 or more. The percentage of European ethnicity is expected to remain relatively high in Waipa. Māori in Waipa have had relatively better outcomes with respect to income. Personal median income of Māori in the lower quartile of the distribution has fallen over 1991-2001 has declined throughout the Waikato, except in Waipa (and Part-Rotorua). Given the relatively high incomes, it is not surprising that Waipa District had the highest home ownership rates among the sub-regions in 2001. The level of dwelling construction has been high. From 2001 to 2016, the increase in the number of households is expected to be between 14.6 percent (low growth scenario) and 25.8 percent (high growth scenario). In the latter scenario, growth of 40 percent or more in car ownership is possible. Travel from home in Waipa District to work in Hamilton City may increase to 4,342 persons by 2016 (medium scenario), an increase of 9.6 percent over the 2001 flow.

Otorohanga

The Otorohanga District has experienced relatively slow population growth between 1991 and 2001 (2.0 percent). This is likely to be followed by population decline between 2001 and 2011 (2.5 percent, medium projection). Under the low projection assumptions, population decline could be as much as 21.2 percent between 2001 and 2026. The population aged 65 and over is relatively small (9.5 percent in 2001), while the percentage Māori is high (27.3 percent in 2001). The percentage Māori is projected to be roughly double the national average in 2016, or even greater. Economically, the sub-region has a mixture of outcomes. The proportion the population in paid employment in Otorohanga increased by nearly 4 percentage points while self employment fell by nearly 7 percentage points and unpaid labour increased by 2 percentage points, the largest increase in this category in the Waikato region. A relatively large proportion of Otorohanga's population has low income: 25 percent of the population aged 15 and over earned less than $7,873 in 2001 – the smallest lower quartile income level among the sub-regions. Particularly Māori on low incomes faced a significant decline in real income over 1991-2001. For Non-Māori, real income of the lower quartile actually increased. Moreover, while the level of dwelling construction since 1991 has been very little, Otorohanga is the only Waikato constituent TA area in which home ownership

actually increased over the 1991-2001 period. Future population decline is expected to lead to a drop in locally generated motor vehicle trips, the local total number of cars, and intra-TA area commuting under the low growth scenario.

South Waikato

South Waikato District experienced significant population decline over the 1991-2001 period, and is the only Waikato TA area expected to lose population in the future under low, medium and high growth assumptions (although the number of households will increase under the high growth scenario). Population decline over the 1991-2001 period was 11.1 percent. This was largely due to net outward migration. South Waikato had the most negative 1996-2001 internal migration rate among the Waikato constituent TA areas, namely minus 9.9 percent. Future population loss until 2026 could vary between 35.7 percent (low growth scenario) and 7.4 percent (high growth scenario). South Waikato's population is youthful (28.8 percent under 15 years of age in 2001). Compared with the other TA areas, South Waikato is projected to have one of the largest declines in the population under 15 (nearly 9 percentage points). South Waikato has in common with Part Rotorua a relatively large proportion of the population aged less than five years (9.2 percent in 2001) and a relatively small proportion aged 65 and over (9.8 percent in 2001). Close to 30 percent of the population are Māori and the percentage Māori will remain more than double the national average in the future. However, Pacific peoples are also very well represented in South Waikato at 12.1 percent of the population, nearly double the national average. The Pacific ethnic group may account for as much as 17.3 percent of the South Waikato population by 2016. South Waikato has the greatest extent of deprivation among Waikato TA areas in 2001. One third of the population did reside in meshblocks with an NZDep2001 score of 1100 or more, with Tokoroa Central having an NZDep2001 score of 1188. South Waikato has a relatively low level of part-time employment and high unemployment. The 2001 unemployment rate was 10.7 percent. Full-time employment of both males and females has generally increased in the Waikato region over 1991-2001, with only the South Waikato District showing declines for both males and females, even for the younger workers. The Māori unemployment rate in 2001 was 19.5 percent, nearly three times the non-Māori rate. South Waikato has the highest proportion of One Parent households among Waikato TA areas and a relatively high percentage of the population in households without a motor vehicle (8.8 percent in 2001). More than a third of preschool children in South Waikato in one parent households do not have a motor vehicle in the household. Population decline is associated with minimal dwelling construction activity, a drop in the "locally generated" number of trips, and a decline in the number of cars.

Waitomo

Waitomo District also lost population over the 1991-2001 decade, but to a lesser extent than South Waikato. The Waitomo District population declined 6.3 percent. Under the low projection assumptions, the population may decline further by one quarter by 2026. Of all

Waikato constituent TA areas, Waitomo has the highest percentage Māori (37.4 percent in 2001). This may increase to close to half the population by 2016. Waitomo has a high percentage of the population in part-time employment. The district has the largest gap in full-time employment between Māori and Non-Māori. The proportion of Māori aged 15-64 in full-time employment was 25.2 percentage points less than the proportion of Non-Māori in 2001. Waitomo had a low home ownership rate in 2001 of 60.9 percent. There has been very little dwelling construction. A relatively high percentage of the population lives in households without a motor vehicle (8.8 percent in 2001). Access to secondary or tertiary hospital services is relatively bad. Due to the projected population decline, there is likely to be a decline in the number of locally generated trips, motor vehicles (but not in medium scenario) and commuting flows.

Taupo

Like Otorohanga, South Waikato and Waitomo Districts, the percentage Māori in Taupo District was in 2001 close to or more than double the national average. However, unlike Otorohanga, South Waikato and Waitomo Districts, Taupo District's population grew strongly over the 1991-2001 period and is projected to continue to grow strongly in the future. This is due to a combination of natural increase and net internal migration. Net 1996-2001 migration was positive for age groups 15-64 and 65 years and over, but negative for age group 5 to 14 years. Taupo District, like Waitomo District and Thames-Coromandel, has a high percentage of the population in part-time employment. For part-time work the differential between Māori and non-Māori participation is lower than that found for full-time work with differences ranging from 4.1 percentage points below the non-Māori rate (Waikato district) to 0.6 percentage point more than the non-Māori rate (Taupo district). Taupo (and Thames-Coromandel) experienced growth in full-time employment in the oldest age group, 65+, well above both that of the Waikato region as a whole and New Zealand 1991-2001. Taupo District had a low home ownership rate in 2001 of 61.0 percent, but dwelling construction 1991-2004 was in excess of 3000 units. Further high levels of construction may be expected as even under the low growth scenario, the increase in the number of households is expected to exceed 10 percent between 2001 and 2016. This will also increase the demand for motor vehicles relatively strongly. Intra-TA commuting exceeded 10,000 persons in 2001 and may increase more than 10 percent over the 2001-2016 period. For secondary or tertiary hospital services Taupo District is isolated to some extent.

Part Rotorua

Part Rotorua District in the Environment Waikato Region is the smallest constituent TA area, with a 2001 population of 3,432. The population declined by 3 percent over the 1991-2001 decade but is expected to increase by 2.8 percent over the 2001-2011 decade (medium projection scenario). However, under the low projection assumptions, Part Rotorua could lose 9.3 percent of the 2001 population by 2026. The post 65 age group is relatively very small in

Part Rotorua, and will continue to be underrepresented. The population aged less than 5 years is relatively large, reflecting higher birth rates in this sub-region. Part Rotorua District has a distinct distribution of household types in due to the rural nature of this district. In 2001, it had an exceptionally high percentage of Two Parent households (42.9 percent) and low percentages of Couple Only, One Parent and Single Person households. The district has had a high rate of inward and outward internal migration, but net internal migration over the 1996-2001 period was negative and around 3 percent of the 2001 population. The largest relative net outflow of persons aged 65 and over occurred in Part Rotorua District (17.3 percent), as this area is rural and many older persons there are likely to move to towns and cities to retire. Part Rotorua had the relatively highest level of median income in 2001, $26,037, and 1991-2001 income growth has been relatively strong. Part Rotorua District is predominately a farming area with high levels of labour market participation. Individual Māori median incomes rose by $6,400 in real terms over the 1991-2001 period, while non-Māori median incomes rose by $6,800. For both Māori and non-Māori real income increased from the lower quartile to the upper quartile of the income distribution. Part Rotorua District has the lowest extent of deprivation among the TA areas. There are no meshblocks in the District with a deprivation index of 1100 or more. There is almost always a motor vehicle in households in Part Rotorua. The number of locally generated trips may decrease over the 2001-2016 period by 0.5 percent (low growth scenario) or increase by 10.9 percent (high growth scenario). With respect to tertiary hospital services, Part Rotorua District is somewhat isolated.

8 Future Directions for Research

The assessment of the impact of future demographic change on transport demand and need has been made in this report in a very simple quantitative fashion that was outlined in Section 1. This involves measuring some aspect of transport for groups of the population, assuming that the underlying behaviour remains the same, and then projecting the population and transport need forward based on demographic projection methods. There are of course more sophisticated, model-based, approaches that could be adopted for a more in-depth analysis. For example, gravity models of trip generation can be estimated with existing trip data and future flows can be projected by applying such models to future projected population data. In addition it would be useful to consider the "modal split", i.e. the distribution of the population across different modes of transportation. With respect to travel to work, it is in this context also worthwhile to consider trends in working from home.

Beyond calculations that keep vehicle kilometres travelled (VKT) per capita constant, one could also consider macroeconomic changes such as changes in real income that affect VKT per capita. An assumption on future income growth leads then to a prediction of VKT per capita, which combined with population growth, generates predictions of total traffic flows.

Freight transport can be included as a type of derived traffic. This is effectively what Gargett and Cosgrove (2004) did for predicting traffic growth in Australian cities. However, a comprehensive assessment of transport need should embed demographic change into an integrated model of economic change in the region, combined with scenarios relating to external factors and policy changes.

The information on trips used in this report was based on the 1997/98 travel survey. If new data become available, it will be useful to link such data to demographic characteristics in the EW region and the constituent TA areas.

Because traffic accidents have a clear link with age (as is reflected in e.g. insurance premiums), it is plausible to predict that population ageing may reduce the total number of accidents. Such effects of demographic change on safety and accidents were beyond the scope of this report.

One theme that is repeated throughout the report is that while the Waikato region changes in many ways demographically like New Zealand overall, there are major differences between the constituent TA areas. The diversity increases of course the smaller the geographical areas are that are considered. In this respect, it would be useful to consider demographic change within the Hamilton City boundaries as the city's population is large (one third of the EW region's total), but there are major differences in demographic and socio-economic profiles across areas within the city. Sub-city analysis was also beyond the scope of the report.

The demographic projections used in this report are those provided by Statistics New Zealand. Their medium projection is intended to provide a consistent set of sub-national projections that links to national population change under the medium projection assumptions. Such projections treat in a sense all regions equally in terms of information used. It may be useful to develop separate population projections for the Waikato region that take regionally-specific information from a range of informed sources into account. More sophisticated projection methodologies, such as stochastic projections, can also be applied. An important source of uncertainty is the likely fluctuations in international migration, which have led to very volatile population change in the past and can continue to have a major impact on population growth prospects for the Waikato region in the future.

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