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End-user Informed Demographic Projections for Hamilton up to 2041

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HAMILTON NEW ZEALAND

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Abstract
This report provides a set of projections of the population of Hamilton City and the larger Hamilton Zone. The projections have been calculated by means of the cohort component model. The projections can be considered alongside official Statistics New Zealand projections, but differ from the latter in terms of assumptions made about net migration. These assumptions constitute a number of scenarios that were informed by the Hamilton City Council and local consultations. These scenarios are linked to the potential impact of a number of economic development activities. The report also contains projections of the number of households, the labour force and two ethnic groups: Māori and New Zealand Europeans. In addition, a dwellings-based methodology is used to produce small area (Census Area Unit) projections. Across the scenarios, Hamilton City's projected population growth over the next two decades ranges from 13.8 percent to 36.0 percent. This is between 1.5 to 12.2 percentage points higher than the corresponding projected national growth.

Keywords: cohort component model, population, household, labour force, ethnicity, scenario, small area

JEL Classification: J11

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Executive Summary

This report provides a set of projections of the population of Hamilton City and the larger Hamilton Zone. The projections have been calculated by means of the cohort component model. The projections can be considered alongside official Statistics New Zealand projections, but differ from the latter in terms of assumptions made about net migration.

These assumptions constitute a number of scenarios that were informed by the Hamilton City Council and by local consultations. These scenarios are linked to the potential impact of a number of economic development activities. The translation of these possible developments into implications for population growth was done by means of the methodology previously adopted in the Western Bay of Plenty Smart Growth Project.

The report also contains projections of the number of households, the labour force and two ethnic groups: Māori and New Zealand Europeans. In addition, a dwellings-based methodology is used to produce small area (Census Area Unit) projections.

While the original calculations were done with a 2001 population base, the projections have been checked against estimates of the 2006 usually resident population that takes 2006 census information into account. The projected and estimated 2006 populations are very similar.

Generally the further into the future the population is projected, the wider the range of projected numbers. Taking two decades as a horizon, the projected population ranges from about 154,000 to 184,000 across the range of scenarios. The corresponding 2006-26 population growth is 13.8 percent and 36.0 percent respectively.

Further out, the 2041 population is projected to be between 173,000 and 213,000 when taking the economic development projects into account. In the latter case, 16.8 percent would be aged 0-14 and 18.1 percent aged 65 and over. In the former case, these percentages are 16.2 percent and 21.7 percent respectively. A faster growing population remains more youthful.

Again taking economic development projects into account, the Hamilton Zone population is projected to be in 2041 between about 203,000 and 244,000. Consequently, the City would account for 85.2 percent and 87.3 percent respectively of the Zone population.

Using a series of assumptions on trends in living arrangements, the number of families in Hamilton City is projected to grow from 35,155 in 2006 to 53,869 in 2041. Similarly, growth in the number of households is projected to be from 48,600 in 2006 to 78,422 in 2041. Only one scenario was considered here.

Labour force projections are based on assumed trends in labour force participation across age-gender groups. Three scenarios have been considered. Assuming increasing labour force participation rates until 2021 among women and older workers, the Hamilton City labour force is projected to grow from around 71,000 in 2006 to about 105,000 in 2041, a growth of nearly 48 percent. The proportion of the labour

force in the oldest age group considered, those aged over 65, is projected to nearly treble in size from between one and two percent of the total in 2006 to over five percent in 2041.

Ethnic population projections depend on how the concept of ethnicity is operationalised and on assumptions about 'inter-ethnic migration'. One projection was carried out of the Māori population and of the European / NZ European population. The number of persons reporting Māori ethnic affiliation is projected to rise by 82 percent over the 2006-2041 period. The growth in the Māori population is being particularly pronounced in the 65 and over age group, where the projection suggests a more than five fold increase. For the European/NZ European group, the number identifying in these categories is projected to increase overall by a mere 7.5 percent although for the 65 and over category there is a projected doubling of the population between 2006-2042.

A dwelling based methodology has been used to project the population of the constituent Census Area Units (CAUs) of Hamilton City. Rapid growth in the number of households will occur in most of the CAUs that are part of so-called Growth Cells. Much of the projected growth within the Hamilton City boundaries is expected to occur during the first half of the 2006-2041 period.

An improved methodology for projecting populations of specific sub-national areas is based on inward and outward migration propensities of the population rather than net migration levels. This methodology will be adopted in a future project.

1 Introduction

The Hamilton City Council (HCC) approached the Population Studies Centre (PSC) of the University of Waikato in late 2005 with a request to prepare population projections for Hamilton City that incorporate local information by experts and end-users with respect to the assumptions that drive the projections. After discussion between HCC and PSC it was also decided that there was a need to vary assumptions to conduct scenario-based calculations that provide a sensitivity analysis and assessment of robustness of the projected trends. The assumptions used can therefore be different from those adopted in official Statistics New Zealand (SNZ) projections.

Subsequent to further consultation between PSC and HCC it was resolved to conduct the project in several phases. Firstly, to meet the immediate needs of HCC for information to feed into their strategic planning process, population projections for the Hamilton City area and Hamilton Zone as a whole were prepared in 2006. Secondly, the Hamilton City projections formed the basis of a set of projections of the number of households, the labour force and an ethnic projection (only for Māori and European/NZ European ethnic groups). Thirdly, after incorporating feedback from HCC on the projections developed in the first phase of the project, population and household projections at the area unit level were developed in 2007.

The projections reported here do take some 2006 census data into account (specifically, on the census night population), although additional information for Hamilton City has only become available after the project was completed. Nonetheless, the estimated 2006 population that is the basis of the projections reported here is very similar to the population estimate that will be the basis of new official population projections. A follow-on project involves calculating 'enduser informed' population projections for Hamilton City, Waikato District Council and Waipa District Council. This project is being conducted as an input into formulation of the Hamilton Sub-regional Growth Strategy. The results of this project will be discussed in a future report.

The present report is divided into ten sections. Section 2 briefly discusses the sources of the data used in preparing the population projections and the HCC's role in this. Section 3 outlines the approach we have taken to developing these projections – basically the cohort component method with migration assumptions augmented with HCC provided data and a modification of the time-variant net migration profile, as successfully used by Bedford (2005) in the Western Bay of Plenty SmartGrowth project. Section 4 covers our finding for the eight projection scenarios we have formulated. Section 5 reports the projections for the Hamilton Zone. Sections 6, 7 and 8 cover household, labour force and ethnic projections respectively. Section 9 focuses on Census Area Unit (CAU) projections. Some conclusions are drawn in Section 10.

2 Data

The data used in the formulation of these projections came from two sources, SNZ and the HCC. The former data came predominantly from the Census of Population and Dwellings, the SNZ subnational population projections series and the reported assumptions underlying these projections. The latter consisted of HCC building

consent data and estimates of the employment effects of various economic development initiatives being undertaken in and around Hamilton City.[1]

3 Methodology

3.1 Cohort-component model

The most common methodology for population projections is the cohort component model. This is the methodology used by Statistics New Zealand (SNZ), which is the major supplier of data on current and projected population size, growth and structure for New Zealand regions and districts. In recent years new methodologies have been developed for population projections, such as stochastic and microsimulation approaches (see, e.g., Dharmalingam and Pool, 2006). However, these methodologies are highly data and computing intensive. We adopt here the conventional cohort-component model because this approach allows readily a comparison between our alternative projections and the official projection series. This methodology is also appropriate given our limited available data.

Figure 1 describes the general approach used in population projections. The current population (base population) is first defined, and then assumptions are made about demographic changes to this population, using the cohort component model. This is a stock-flow model that is based on the following fundamental 'accounting identity' of population growth:

usually resident population in area *i* at the *end* of year *t*
= usually resident population in area *i* at the *beginning* of year *t*
+ births to mothers residing in area *i during* year *t*
– deaths of residents of area *i during* year *t*
+ inward migration from other regions and from overseas into region *i during* year *t*
– outward migration of residents from area *i* to other regions or to overseas *during* year *t*

Starting with a given base year population, the population 12 months later is then calculated with the equation above. This defines the base population of the following year. This procedure is repeated for each year through to the end of the projection period. This is done for both genders. Separate assumptions are used for each of the demographic 'drivers'. Births are derived by multiplying age specific fertility rates by the numbers of women of childbearing ages (13-49). Deaths are derived by multiplying age- and gender-specific mortality rates by the numbers of people of each age and gender. In the basic projections used here, inward and outward migration is combined into age-sex specific levels of net migration. The procedure for deriving estimates of net migration is described in Section 3.4 below.

[1] These estimates were obtained by Paul Gower, senior policy analyst with HCC, through consultation with various local organisations.

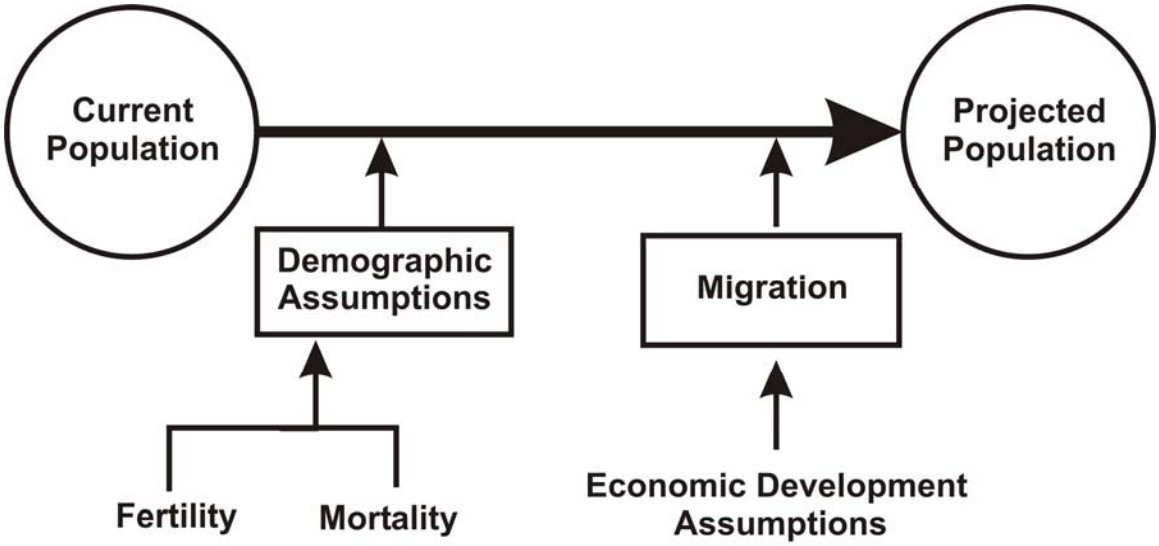


Figure 1: The end-user informed cohort component model

The impact of major urban development drivers in Hamilton on the net migration assumptions is explicitly taken into account. The combination of demographic change assumptions and urban development assumptions, when applied to the current population, allows the calculation of possible future populations. Such calculations are referred to as population *projections* rather than population *forecasts*, because they depend on sets of assumptions and no explicit assessment is made of the relatively likelihood of the assumptions being correct in the future. Varying the assumptions across projections simply permits a sensitivity analysis that provides a relatively broad range of possible outcomes.

3.2 Base population

The base population used for all projections is the estimated usually-resident population for Hamilton City as at June 2006. Hamilton City was defined using the current Hamilton City Council boundaries. The 2006 Census night population counts provided us with useful information about the Hamilton City population in 2006. The basic assumption made is that the 2001-2006 growth in the total population in Hamilton city on census night is about the same as the 2001-06 growth in the estimated population usually resident in Hamilton as at June. This assumption is reasonable as long as the fraction of the total population who were just visiting Hamilton on census night and the fraction of Hamilton's usually resident population who were temporarily away from Hamilton on census night had not changed between 2001 and 2006. Equivalently, the usually resident population in Hamilton in 2006 was estimated by taking the ratio of the usually resident population as estimated in June 2001 to the 2001 Census night population count, and multiplying that ratio by the final 2006 Census night population count (which was 132,060).[2] The resulting estimated usually resident population of Hamilton City on 30 June 2006 was 135,233.[3]

[2] The 30 June date is used to maintain comparability with the SNZ projections, the population at 30 June being the basis for the SNZ projections.

[3] The official subnational population estimate for Hamilton City in June 2006 released on 23 October 2007 was 134,400, i.e. 833 less than the base population used in this paper.

3.3 Fertility and mortality

In all projections, the 'medium' fertility and mortality assumptions provided by SNZ were used. We believe that the assumptions used by SNZ in their Hamilton City population projections are adequate for our purposes. The alternative would have been to develop our own age-specific fertility and age- and gender-specific mortality assumptions for Hamilton City. As past fertility and mortality rates for Hamilton City are based on the official deaths and births statistics, the SNZ assumptions are an appropriate starting point. Future mortality and fertility rates can be varied using local assumptions on the composition of the population, for example by ethnicity. In principle, future mortality and fertility assumptions could also take into account economic and social trends. However, at this stage we incorporate the consequences of local development into the migration assumptions and make the implicit assumption that these developments do not have a direct impact on the fertility and mortality assumptions.

3.4 Net migration

For sub-national projections, the projection methodology employed by SNZ involves the estimation of net migration for each territorial authority in each year. SNZ prepare three projections, based on 'low', 'medium', and 'high' levels of national net migration. The total net migration assumed by SNZ for Hamilton City under each of these scenarios is presented in Table 1.

Table 1: SNZ net migration estimates for Hamilton City 2001-2026

Five-year period ending 30 June	***Net migration over five years***		
	'Low' series	**'Medium' series**	**'High' series**
2006	+3000	+5000	+7000
2011	-500	+1500	+3500
2016	+500	+2500	+4500
2021	+500	+2500	+4500
2026	+500	+2500	+4500

The SNZ methodology also requires the specification of a total net migration profile by age and sex. This profile specifies the proportion of net migration that is assumed to occur among people of each age and sex, and the same profile is applied in each year. In developing their net migration profile, SNZ uses census-based estimates of net migration as well as information provided by local authorities on proposed developments in their districts/cities that are likely to have an impact on population movement and change, and data from arrival and departure cards on people leaving or entering the country for twelve months or more. The net migration profile is then held constant and the total net migration of each TLA (including Hamilton City) is calculated and applied in deriving the projections.

In this report we adopt a different methodology to the net migration profile. The key difference is that rather than a single net migration profile which is invariant over time, we allow the profile to change to reflect changes in the underlying New Zealand population structure. This approach was employed in the Western Bay of Plenty SmartGrowth project (Bedford, 2005). However we further modify this methodology as follows. Rather than simply scaling the net migration profile up or down in order to match the projected net migration, we allow the net migration for each five-year age

group to scale up or down depending on whether that five-year age group is a net in-migrant age group (an age group where net migration is expected to be positive) or a net out-migrant age group (an age group where net migration is expected to be negative).

Following the SmartGrowth methodology (Bedford, 2005), the SNZ migration profile for Hamilton City was first expressed as a proportion of the estimated national population, and then these proportions were used to calculate estimated migration profiles for successive periods using a projected national population for those periods.[4] These migration profiles were then scaled so that the total net migration matched the projected net migration for the year. However, scaling was conducted differently for net in-migrant and net out-migrant age groups, such that high overall net migration resulted in greater net in-migration among net in-migrant age groups and lower out-migration among net out-migrant age groups. This differs significantly from SNZ methodology where high net migration results in both greater net in-migration among net in-migrant age groups and greater out-migration among net out-migrant age groups.

As the structure of the New Zealand population changes, the assumed profile of net migration changes under this method to reflect the new population structure. Further, in high net migration years there is greater net in-migration among net in-migrant age groups and lower out-migration among net out-migrant age groups (and in low net migration years there is lower net in-migration among net in-migrant age groups and greater out-migration among net out-migrant age groups). Note that this methodology does not affect the total of projected net migration, only the distribution of that net migration by age and sex. Table 2 illustrates the effect of this methodology (SmartGrowth+) by comparison with the 'medium' migration profile employed by Statistics New Zealand in their population projections for Hamilton City.

3.5 Additional net migration resulting from development activities

In addition to the 'standard' net migration assumptions presented above, in some scenarios additional net migration was assumed to have resulted from the specific development activities of Hamilton City Council and other local organisations. These activities are summarised in Table 3, and included development of industry clusters in light aviation and agri-biotech, and the ongoing expansion of the Innovation Park.

For each new job created as a result of these development activities, no multiplier effect was assumed (i.e. the total employment effect was assumed to be the direct employment created by the development activities only). For each job, 0.5 workers were assumed to migrate to Hamilton City from elsewhere.[5] The total population effect (which would include all family members of migrants) was assumed to be 2.8 times the number of migrant workers (or 1.4 times the number of jobs created by the development activities). Over the period 2007-2023, this represents an aggregate additional population of 5,600 persons to Hamilton City.

[4] A 'medium' national population projection by sex and single year of age, developed by the Population Studies Centre earlier, was used in these calculations.

[5] Other jobs created are assumed to either be taken by locals previously unemployed or not in the labour force, or by commuters from outside HCC boundary.

One future development that has not been taken into account is the completion of the Hamilton-Auckland expressway. An assessment of the impact of such a major infrastructure project on the city's population is beyond the scope of the present project. However, Section A1 of the Appendix reviews some of the important issues and recent literature.

Table 2: Comparison of net migration between SNZ methodology and the SmartGrowth+ methodology

Age	*2006 SNZ*	*2006 SmartGrowth+*	*2031 SNZ*	*2031 SmartGrowth+*
0-4	-112.9	-43.7	-56.5	-47.6
5-9	+59.1	+33.8	+29.6	+27.5
10-14	+354.8	+199.1	+177.4	+155.5
15-19	+1467.7	+878.5	+733.9	+693.3
20-24	+881.7	+508.5	+440.9	+452.9
25-29	-1596.8	-621.8	-798.4	-799.2
30-34	-220.4	-80.3	-110.2	-95.0
35-39	-5.4	-2.1	-2.7	-2.4
40-44	+96.8	+55.2	+48.4	+46.4
45-49	+102.2	+62.0	+51.1	+51.7
50-54	-43.0	-17.3	-21.5	-21.7
55-59	-53.8	-22.2	-26.9	-32.3
60-64	-16.1	-6.5	-8.1	-12.7
65-69	+26.9	+17.0	+13.4	+28.6
70-74	+75.3	+42.9	+37.6	+81.1
75-79	+5.4	+3.2	+2.7	+5.3
80-84	+16.1	+9.7	+8.1	+17.7
85+	-37.6	-16.2	-18.8	-49.0
Total	**+1000**	**+1000**	**+500**	**+500**

Table 3: Net migration effects of development activities

	Year					
	2007	**2008**	**2009**	**2010**	**2011**	**2012-2023 per annum**
FTE growth						
Light aviation cluster	+100	+100	+100	+100	+100	-
AgResearch	+20	+20	+20	+20	+20	-
Innovation Park						
- Stage III	+100	+100	+100	-	-	-
- Adjoining development	+33	+33	+34	-	-	-
- Further stages	-	-	+200	+200	+200	+200
Total Direct Employment (DEF)	+253	+253	+454	+320	+320	+200
Total Employment Effect (TEF = DEF x 1.0)	+253	+253	+454	+320	+320	+200
Total Migration Effect (MEF = TEF x 0.5)	+127	+127	+227	+160	+160	+100
Population Effect (PEF = MEF x 2.8)	+354	+354	+636	+448	+448	+280

4 Population Projections for Hamilton City 2001-2041

4.1 Projection scenarios

In total, eight scenarios have been projected for Hamilton City. All scenarios use the same 'medium' fertility and mortality assumptions. The eight scenarios are:

1. A 'zero' net migration scenario;
2. A 'zero' net migration scenario, including the population effects of the development activities;
3. A 'medium' net migration scenario;
4. A 'medium' net migration scenario, including the population effects of the development activities;
5. A 'high' net migration scenario;
6. A 'high' net migration scenario, including the population effects of the development activities;
7. A 'low' net migration scenario;
8. A 'low' net migration scenario, including the population effects of the development activities;

The relationship between these scenarios and SNZ's scenarios, and the assumptions and methodology used to derive them are presented in Figure 2. As noted above, Scenario 1 ('zero net migration') provides a hypothetical base case scenario where the only population effects are caused by fertility and mortality. Scenario 2 ('zero net migration, with development') provides a useful comparison, which allows us to determine the effects of the development activities in isolation, by comparing with Scenario 1. Scenarios 3, 5, and 7 contain no development activities and use the SmartGrowth+ methodology for determining the net migration profiles over time. They provide a useful comparison with SNZ's medium projection to determine the effects of using the SmartGrowth+ methodology on the projections obtained. Scenarios 4, 6, and 8 all use the SmartGrowth+ methodology and include the effects of development activities. These are the three scenarios which are of greatest interest to this project.

The population projections to 2031 derived under each scenario by gender and broad age category are summarised in Appendix Table A1a, and compared with the existing 'medium' population projection scenario developed by SNZ. Comparing Scenario 1 and Scenario 2 gives an idea of the population impact of the assumed development activities. The total population impact of the development activities is the difference between a projected population of 156,429 (Scenario 1) and 162,958 (Scenario 2), i.e. an additional population of 6,529 by 2031. The compares with the assumed population effect of 5,600 based on Table 3.

Most scenarios provide significantly higher projected populations in 2026 than SNZ's medium population projection for Hamilton City. One important difference is the lower 2006 population (3,333 less) in the SNZ projections. Without the development activities, the 2026 projected population varies between 155,756 (Scenario 5) and 177,584 (Scenario 7). With the development activities, the 2026 projected population varies between 162,059 (Scenario 6) and 183,886 (Scenario 8). These numbers may be compared with 162,200 in the final year (2026) of the SNZ medium projection.

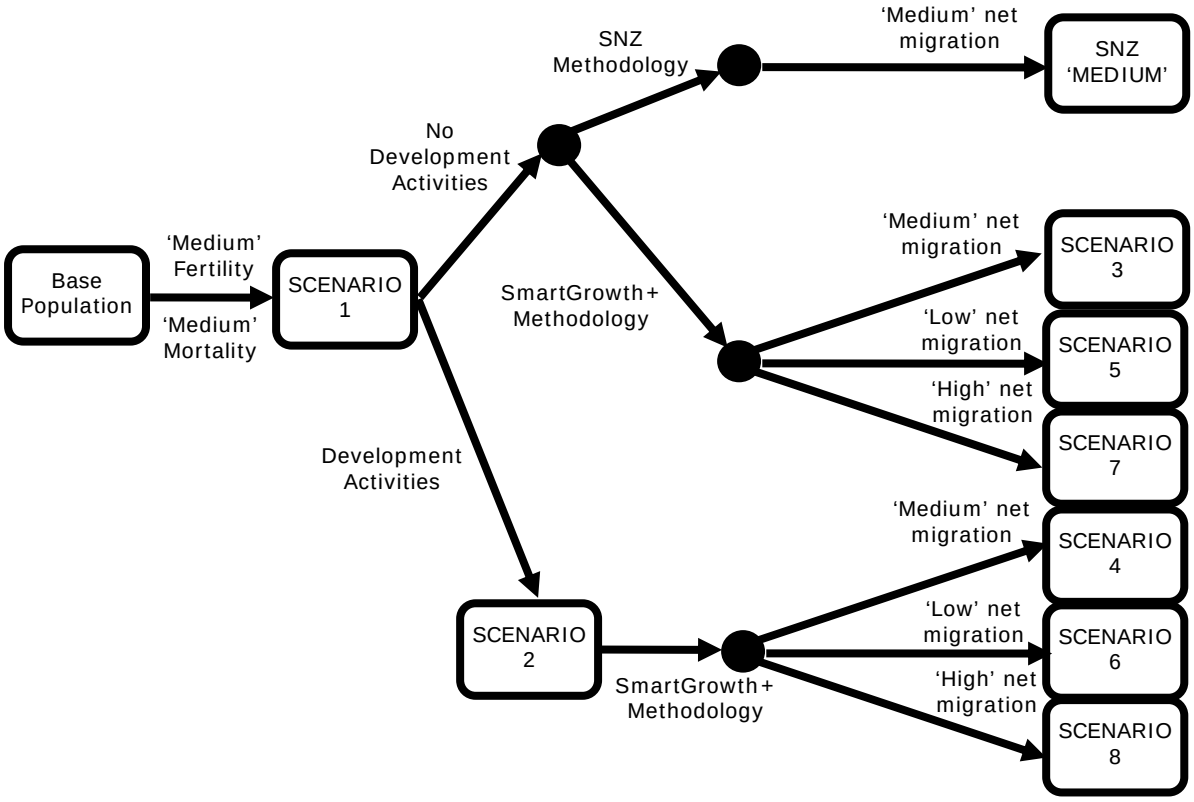


Figure 2: Relationship between population projection scenarios

Scenarios 3, 5, and 7 suggest that, in the absence of the population effects of the development activities the population of Hamilton City will grow to between about 160,000 and 188,000 by 2031. Adding the population effects of the development activities increases the total projected population to between 166,000 and 194,000, with the medium scenario projecting the population of Hamilton City to be about 180,500 in 2031.

Table A1b shows the projected intercensal growth in the population by broad age category. The table shows that there is a possibility of decline in the future population aged 0-14, even in the presence of the development activities. In Scenarios 1 and 2, the 0-14 age group is starting to decline from 2011. Development activities combined with 'low' net migration also leads to a decline in this age group, but at a lesser rate. As expected, the relatively fastest population growth occurs for the age group 65+. For several scenarios and intercensal periods, a five-year growth rate in excess of 20 percent is expected.

As noted earlier, the projections of Scenarios 4, 6, and 8 represent the projected population for Hamilton when the population effects of development activities are included. These projections are presented in Appendix Table A2 for each successive year from 2006 until 2041. They show a projected population for Hamilton City in 2041 of between about 173,000 and 213,000, with the medium scenario projecting the population to be 193,000. These total population projections over time are illustrated by Appendix Figure A2, which clearly shows that the further out is the projection horizon, the greater is the range of the projected population.

The age-sex profile of the population projection for Scenario 4 in 2031, represented by a population pyramid, is presented in Appendix Figure A3 along with the 2001 base population. As can be seen, all of the significant population growth has occurred from ages 20 and above, with substantial growth in the retirement-age population consistent with most population projections for New Zealand. Specific to Hamilton, with a large net inflow of young adults for work or education, is the relatively rapid growth in the age cohorts 20-24 and 25-29.

4.2 Projections for 2006 compared with 2006 actual data

To test the validity of our population projection methodology, the estimated 2006 population for the medium migration scenarios (Scenarios 3 and 4) was compared with data based on the 2006 Census. Table 4 shows that the Scenarios are very close in terms of total population at 6 March 2006 (Census date), and that the estimated usually resident population on Census date would be well within the range implied by the high and low scenarios. This validity is perhaps unsurprising given that the scenarios were scaled to the estimated usually resident population at 30 June 2006, as noted in Section 3.2 above.

Table 4: Comparison of 2006 projected population with 2006 data

Age	Estimated Usually Resident Population (at 30 June 2006)[6]	Scenario 3 / 4 (at 30 June 2006)	Projected minus estimated
Age 0-14	29,165	28,849	**-316**
Age 15-39	54,970	55,526	**556**
Age 40-64	36,826	37,450	**624**
All	134,400	135,233	**833**

5 Hamilton Zone Projection

The Hamilton Zone includes all of Hamilton City and parts of Waikato[7] and Waipa district councils[8] (see Figure 3). Population projections for the Hamilton Zone have been prepared for Scenarios 4, 6, and 8 (see above), that is using the 'SmartGrowth+' methodology and taking into account the population effects of economic development activities. The effect of including the additional CAU from Waikato and Waipa districts is to increase the 2006 population from 135,233 (Hamilton City alone, all scenarios) to 161,644 (Hamilton Zone, all scenarios). The population of the Zone is about 20 percent greater than of the City in 2006. The projected population for the Hamilton Zone in 2041 ranges from around 203,000 (Scenario 6) to about 244,000 (Scenario 8) compared with 173,000 (Scenario 6) and 213,000 (Scenario 8) for Hamilton City alone. These projections suggest that the population of Hamilton City will grow a little faster than the population of Hamilton Zone. By 2041, the population of the Zone would be about 15 to 17 percent greater than of the City.

[6] The estimated usually resident population in June 2006, based on 2006 census data, was released by Statistics New Zealand on 23 October 2007.

[7] Matangi, Taupiri Community, Eureka, Gordonton, Tamahere-Tauwhare, Horotiu, Te Kowhai, Whatawhata, Ngaruawahia and Kainui CAU.

[8] Ohaupo, Temple View (prior to its incorporation into Hamilton city), Ngahinapouri, Lake Cameron and Kaipaki CAU.

Detailed results for these projections are shown in Appendix Table A3, by broad age category, for the period 2006-2041. Appendix Figure A4 graphically depicts the evolution of the projected population of the Zone under the three projection scenarios. Again it should be noted that the further out the projection horizon, the greater is the range of projected population. Appendix Figure A5 shows the age pyramid for Scenario 4 in 2031 (compare with Appendix Figure A3 for Hamilton City alone). Ageing of the population in both absolute and relative terms is clear from comparing the 2001 pyramid with both the City (Figure A3a) and Zone (Figure A5) pyramids. The 2031 age pyramids are quite similar, but the greater number (and proportion) of the population aged 85 plus in the City is noticeable. This is plausible given that the City can provide specialised medical care and residential facilities for this age group.

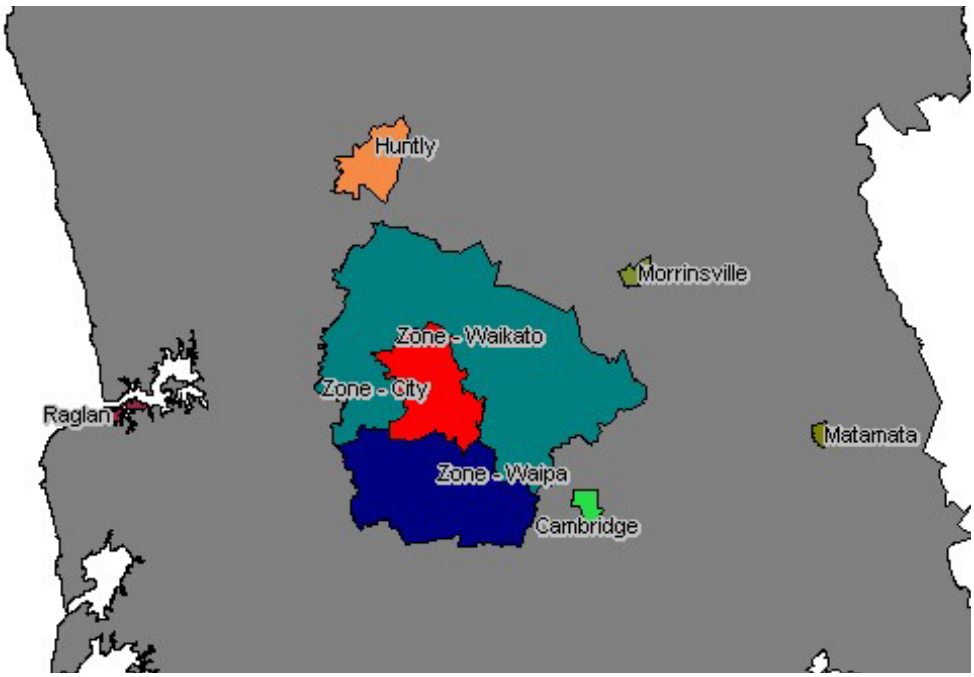


Figure 3: The Hamilton Zone

6 Household Projections

The base population for these projections of families and households 2006-2041 is that generated by Scenario 4 (Smartgrowth Medium projection with economic development) of our population projections.

6.1 Derivation of number of persons per living arrangement type

The number of persons living in a particular living arrangement type is derived by multiplying the age and gender specific living arrangement type rate (LATR) by the number of persons in that age and gender group. LATR can be thought of as the probability of an individual being in a particular living arrangement. SNZ derive three different series of LATRs:

1 Variant A, assuming that LATRs remain constant at the 2001 levels;
2 Variant B, assuming that LATRs change linearly between 2001 and 2021 based on an assessment of observed trends between 1986 and 2001 and likely future trends;

3 Variant C assuming that LATRs change linearly between 2001 and 2021 according to the linear trend observed between 1986 and 2001.

Variant B is considered by SNZ to provide the best basis for assessing future family and household changes and is used in these projections. SNZ LATRs are only available up to 2021. We have held LATR constant at the 2021 levels for the balance of the projection period, i.e. until 2041.

6.2 Average number of families per family household

In calculating the number of family households from the number of families an adjustment must be made for the existence of multi-family households. On the basis of historical trends Variant B used in these projections assumes linear growth in the average number of families per household until 2021. We have held the average number of families per family household constant at the 2021 levels for the balance of the projection period i.e. until 2041.

6.3 Average number of people per other multi-person household

To convert the number of persons in multi-person non-family households to household numbers, the number of persons in multi-person non-family households is divided by an estimate of the average number of persons in such households. On the basis of historical trends Variant B used in these projections assumes linear growth in the average number of persons in multi-person non-family households until 2021. We have held the average number of persons in multi-person non-family households constant at the 2021 levels for the balance of the projection period i.e. until 2041.

6.4 Derivation of families and households[9]

The numbers of families and households are derived from the number of people in each living arrangement type. The number of families is the sum of couple without children families, two-parent families and one-parent families. The number of couple without children families is calculated by dividing the total number of partners (male and female combined) in couple without children families by two. Similarly, two-parent families are calculated by dividing the total number of partners/parents (male and female combined) in two-parent families by two. For one-parent families, the number of families is the same as the number of parents (male and female combined) in one-parent families.

$$\text{Number of families} = \frac{\textit{number of partners in couple without children families}}{2} + \frac{\textit{number of partners / parents in two - parent families}}{2} + \textit{number of parents in one parent families}$$

The number of families is then used to derive the number of households. Adjustment factors for households containing more than one family and for the average number of

[9] The methodology adopted here is similar to that used by SNZ. See Statistics New Zealand (2004).

people living in 'other multi-person' households are separately calculated from an analysis of available historical data. The number of one-person households is the same as the number of people in one-person households.

$$\text{Number of households} = \frac{\textit{number of families}}{\textit{average number of families per family household}} + \frac{\textit{number of people in other multi person households}}{\textit{average household size of other multiperson households}} + \textit{number of one person households}$$

6.5 Household projections Hamilton 2006-2042

Table 5 shows the projected number of families and households for the 2006-2041 period, using the Scenario 4 (Smartgrowth Medium projection with economic development) population and the SNZ Variant B LATR, average number of families per family household and average number of people per other multi-person household assumptions. Yearly household projections are shown in Appendix Table A4.

Table 5: Projected numbers of families and households 2006-2041

Year at 30 June	*Family type*				*Household type*			
	Couple without children	Two-parent	One-parent	Total	Family	Other multi person	One person	Total
2006	13,951	14,064	7,141	35,155	33,999	3,690	10,911	48,600
2011	16,048	14,509	7,864	38,421	37,085	3,899	12,250	53,235
2016	18,206	14,914	8,584	41,703	40,177	4,068	13,805	58,050
2021	20,261	15,309	9,348	44,918	43,190	4,214	15,559	62,963
2026	21,746	16,163	9,854	47,764	45,927	4,353	17,329	67,610
2031	23,013	16,871	10,281	50,165	48,236	4,445	19,077	71,757
2036	24,133	17,397	10,627	52,157	50,151	4,526	20,685	75,362
2041	25,211	17,760	10,898	53,869	51,797	4,619	22,006	78,422

Table 6 is the SNZ Medium series 2001(base) to 2021 - Projected Families and Households projection and is included here for comparative purposes.

Table 6: SNZ Medium Series 2001(base) to 2021 - Projected families and households

Year at 30 June	*Family type*				*Household type*			
	Couple without children	Two-parent	One-parent	Total	Family	Other multi person	One-person	Total
2006	13,300	13,300	8,000	34,600	33,300	4,200	11,300	48,800
2011	14,800	13,300	8,600	36,700	35,300	4,400	12,500	52,300
2016	16,800	13,300	9,200	39,200	37,600	4,600	14,000	56,200
2021	18,800	13,200	9,800	41,700	39,800	4,800	15,800	60,400

Table 7 reports the projected number of families and households in the years following scheduled census years. This was done at the request of HCC for there own internal planning needs. The table is constructed on the same basis as Table 5, i.e.

using the Scenario 4 (Smartgrowth Medium projection with economic development) population and the SNZ Variant B LATR, average number of families per family household and average number of people per other multi-person household assumptions. Again, further details regarding the methodology used here can be found in Statistics New Zealand (2004).

Table 7: Projected number of families and households 2007-2042 (Census Years +1)

Year at 30 June	*Family type*				*Household type*			
	Couple without children	Two-parent	One-parent	Total	Family	Other multi person	One-person	Total
2007	14,359	14,152	7,283	35,797	34,606	3,731	11,173	49,510
2012	16,469	14,589	8,005	39,066	37,694	3,932	12,554	54,181
2017	18,608	14,992	8,734	42,337	40,771	4,097	14,148	59,017
2022	20,554	15,478	9,448	45,480	43,731	4,242	15,905	63,879
2027	21,996	16,304	9,939	48,239	46,384	4,372	17,672	68,429
2032	23,235	16,976	10,350	50,560	48,616	4,461	19,393	72,471
2037	24,347	17,469	10,681	52,497	50,478	4,545	20,946	75,969
2042	25,429	17,833	10,953	54,215	52,130	4,638	22,275	79,041

7 Labour Force Projections

Projections of the future labour force have been obtained by applying age and gender specific assumptions about future trends in labour force participation rates to the projected population. The labour force participation rate (LFPR) is defined as follows:

$$LFPR = \frac{Labour\ Force}{Working\ Age\ Population} = \frac{(Unemployed + Employed + Unpaid\ in\ Family\ Business)}{Working\ Age\ Population}$$

It should be noted that the official labour market statistics used in New Zealand are those derived from the household labour force survey (HLFS) which uses a definition of the working age population as the population aged 15 years and over. This is in contrast to the common international practice, and past practice in New Zealand, of defining the working age population as those aged 15-64 years of age. The justification for the current HLFS practice is that New Zealand lacks an official retirement age and the more limited 15-64 age range no longer reflects current labour market trends. Whatever the merits of this view, the difference between labour force participation rates calculated on the 15-64 population and the more expansive 15+ population are non-trivial. Hence care must be taken when comparing labour force participation rates between countries and studies to ensure that consistent denominators are used. Both the 15-64 and the 15+ based LFPR are reported here. Projections for Hamilton's labour force in the period 2006 – 2041 have been prepared using the 'medium smart growth with economic development scenario (Scenario 4, see above) under three different sets of assumptions.

7.1 Labour force projection scenario 1 (LFPS1)

Under this LFPS it is assumed that age and gender specific participation rates remain at the level of the average for 2000-2005. These rates are shown in Table 8 and have been derived from the HLFS.

Table 8: Labour force participation rates, scenario LFPS1

Age	*Male*	*Female*	*Total*
15-19	53.9	52.9	53.4
20-24	79.7	67.3	73.5
25-29	89.9	70.2	79.7
30-34	91.5	67.0	78.7
35-39	92.0	72.8	82.0
40-44	92.1	79.6	85.7
45-49	92.1	82.1	87.0
50-54	90.1	76.5	83.3
55-59	83.8	64.2	73.9
60-64	64.7	41.0	52.6
65+	13.7	5.6	9.2

Source Statistics New Zealand. (2006). *Labour Market Statistics 2005*. Wellington: Statistics New Zealand.

It should be noted that the 2000-2005 period was one in which the labour market was particularly buoyant with overall participation rates three to four percentage points higher than at the beginning of the 1990s.

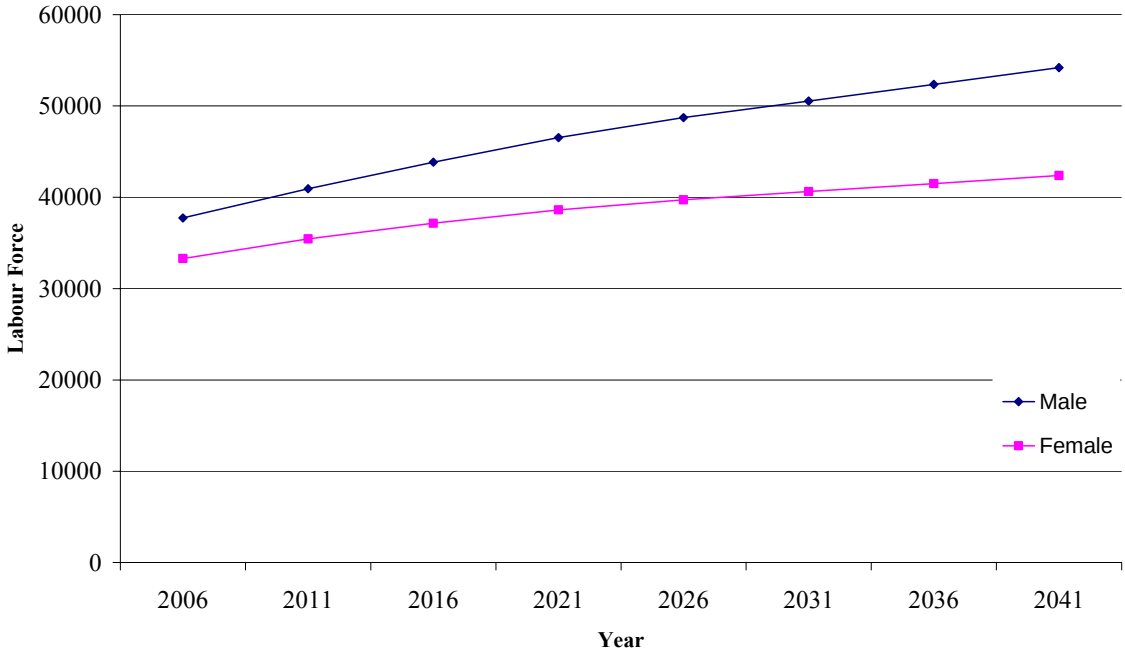


Figure 4: The projected labour force, census years 2006-2041, LFPS1

Figure 4 shows the growth of the projected labour force for the census years 2006-2041 while detailed results by age group, gender and overall participation rates are to be found in the Appendix Tables A5 and A6. The labour force under LFPS1 is projected to grow from around 71,000 in 2006 to about 97,600 in 2041 with the proportion of the labour force over 50 projected to grow by six percentage points from 21.5 percent of the labour force in 2006 to 27.7 percent in 2041. The number of people in the labour force in the oldest age group considered, those aged over 65, is

projected to triple in size from 1,210 to 3,502 under this scenario. Age sex pyramids for the projected labour force in 2006 and 2041 are shown in the Appendix, Figure A6.

7.2 Labour force projection scenario 2 (LFPS2)

Bryant et al. (2004) observe that, while overall levels of labour market participation in New Zealand are not dissimilar to the OECD median, the participation rate of women aged 25-34 is relatively low by OECD standards. In this scenario it is assumed that changes in government policy result in substantial increases in the participation rates of 25-34 year old women. This is not implausible given the recent attention that this matter has received in policy circles (see for instance the Treasury (2005) workshop on labour force participation and economic growth, the preceding workshop on productivity (The Treasury, 2004) and the responsiveness of female participation rates to changes in policy settings (Jaumotte, 2003). The following assumptions underpin this scenario:

1. As it is deemed unlikely that there will be a reversal in the pattern of high levels of participation in post secondary education, participation rates in the 15-24 age group are static at the average for the 2000-2005 period for males. Female rates for the 15-19 age group are similarly held static.
2. Age-specific participation rates for males are held at the average for the 2000-2005 period for the 2006-2041 period.
3. Female participation rates for 2021 in the 20 to 44 age group are set to levels based on Bryant et al. (2004, p.5), modified to reflect the average age specific rates for the 2000-2005 period. Other female age groups are at the average for the 2000-2005 period.
4. Female participation rates in the 20 to 44 age group rise in a linear fashion between 2006 and 2021.
5. Post 2021 female participation rates are static at 2021 levels.

The 2021 participation rates for males and females used in this scenario LFPS2 are shown in Table 9. Figure 5 shows the growth of the projected labour force under LFPS2 for the census years 2006-2041 while detailed results by age group, gender and overall participation rates are to be found in Appendix Tables A7 and A8. The labour force under LFPS2 is projected to grow from around 71,000 in 2006 to about 98,200 in 2041, i.e, by about 38 percent. Growth in the number and proportion of the labour force over 50 is the same as in LFPS1.

Women aged 25-44 account for 43.2 percent of the female labour force in 2006, as compared with women aged 45-64 who account for 31.2 percent. However, despite the increasing female labour force participation of younger women assumed in this scenario LFPS2, labour force growth is faster for the second group than for the first. Growth of the female labour force 25-44 over the period 2006-2041 is projected to be 31.6 percent with this scenario, as compared with 45.9 percent for the 45-64 age group. The age sex pyramid of the projected labour force in 2041 under LFPS2 is included in the Appendix Figure A6.

Table 9: **Labour force participation rates LFPS2**

		Age Group										
Year	Gender	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+

2006	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	67.3	70.2	67.0	72.8	79.6	82.1	76.5	64.2	41.0	5.6
2011	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	69.3	71.1	69.8	75.2	80.1	82.1	76.5	64.2	41.0	5.6
2016	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	71.2	72.1	72.7	77.6	80.6	82.1	76.5	64.2	41.0	5.6
2021	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	73.2	73.0	75.6	80.0	81.1	82.1	76.5	64.2	41.0	5.6
2026	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	73.2	73.0	75.6	80.0	81.1	82.1	76.5	64.2	41.0	5.6
2031	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	73.2	73.0	75.6	80.0	81.1	82.1	76.5	64.2	41.0	5.6
2036	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	73.2	73.0	75.6	80.0	81.1	82.1	76.5	64.2	41.0	5.6
2041	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	73.2	73.0	75.6	80.0	81.1	82.1	76.5	64.2	41.0	5.6

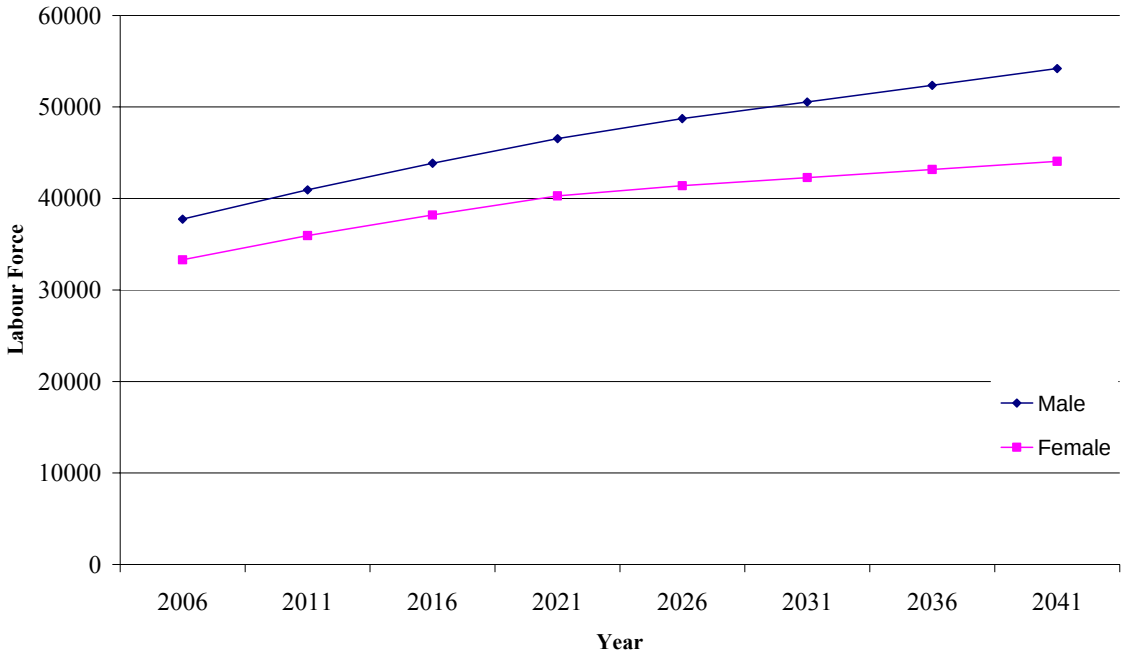


Figure 5: Projected labour force, census years 2006-2041, LFPS2

7.3 Labour force projection scenario 3 (LFPS3)

This final labour force projection scenario assumes that, in response to government initiatives to increase the overall levels of participation in the labour force, participation rates increase in a linear fashion from 2006 to 2021 before stabilising. The rates for 2021 are again derived from Bryant et al. (2004) modified to reflect the average age specific rates for the 2000-2005 period and are shown in Table 10.

Table 10: Labour force participation rates LFPS3

		Age Group										
Year	Gender	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+

2006	Male	53.9	79.7	89.9	91.5	92.0	92.1	92.1	90.1	83.8	64.7	13.7
	Female	52.9	67.3	70.2	67.0	72.8	79.6	82.1	76.5	64.2	41.0	5.6
2011	Male	55.6	81.4	90.9	93.1	93.6	93.7	93.5	91.2	85.5	66.4	15.5
	Female	54.7	69.0	71.9	68.6	74.5	81.4	84.2	78.7	66.0	42.7	7.6
2016	Male	57.3	83.1	91.9	94.7	95.2	95.2	95.0	92.2	87.3	68.2	17.3
	Female	56.4	70.7	73.7	70.3	76.3	83.2	86.2	80.8	67.8	44.3	9.5
2021	Male	59.0	84.8	92.9	96.3	96.8	96.8	96.4	93.2	89.0	69.9	19.1
	Female	58.1	72.4	75.5	72.0	78.0	85.0	88.3	83.0	69.6	46.0	11.5
2026	Male	59.0	84.8	92.9	96.3	96.8	96.8	96.4	93.2	89.0	69.9	19.1
	Female	58.1	72.4	75.5	72.0	78.0	85.0	88.3	83.0	69.6	46.0	11.5
2031	Male	59.0	84.8	92.9	96.3	96.8	96.8	96.4	93.2	89.0	69.9	19.1
	Female	58.1	72.4	75.5	72.0	78.0	85.0	88.3	83.0	69.6	46.0	11.5
2036	Male	59.0	84.8	92.9	96.3	96.8	96.8	96.4	93.2	89.0	69.9	19.1
	Female	58.1	72.4	75.5	72.0	78.0	85.0	88.3	83.0	69.6	46.0	11.5
2041	Male	59.0	84.8	92.9	96.3	96.8	96.8	96.4	93.2	89.0	69.9	19.1
	Female	58.1	72.4	75.5	72.0	78.0	85.0	88.3	83.0	69.6	46.0	11.5

Figure 6 shows the growth of the projected labour force under LFPS3 for the census years 2006-2041 while detailed results by age group, gender and overall participation rates are to be found in the Appendix Table A9 and A10.

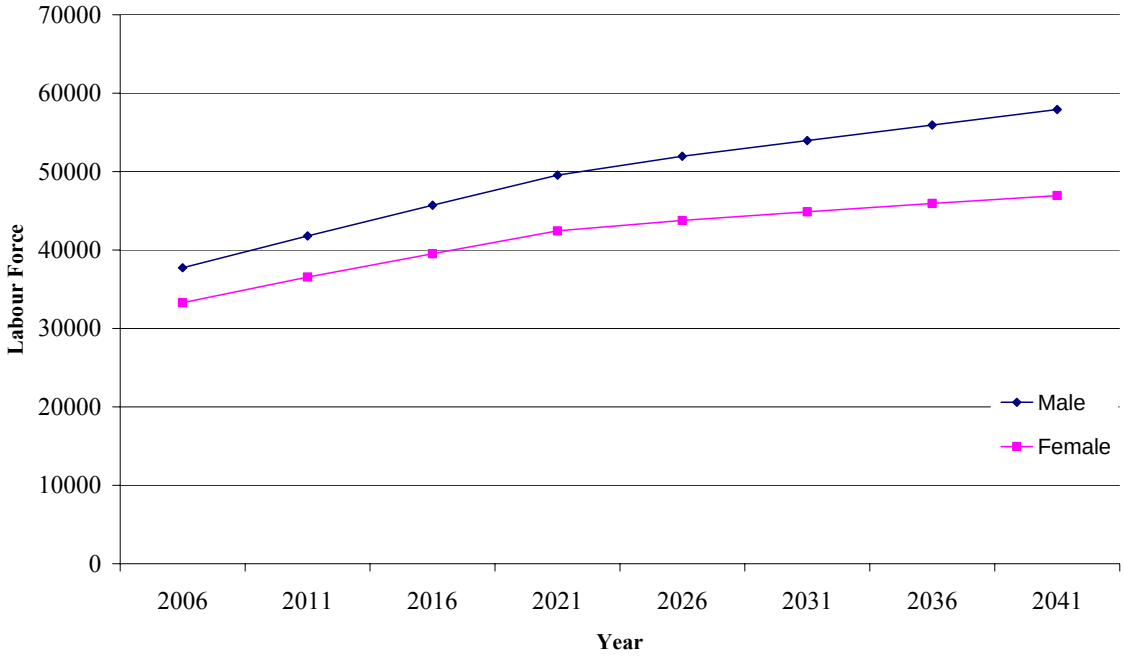


Figure 6: Labour force census years 2006-2041 LFPS3

The labour force under LFPS2 is projected to grow from around 71,000 in 2006 to about 105,000 in 2041, a growth of nearly 48 percent. The proportion of the labour force over 50 projected to grow by eight percentage points from 21 percent of the labour force in 2006 to 29 percent in 2041. The proportion of the labour force in the oldest age group considered, those aged over 65, is projected to nearly treble in size from between one and two percent of the total in 2006 to over five percent in 2041. The age pyramid for the projected labour force in 2041 under LFPS3 is included in

Appendix Figure A6. The relatively large percentage of workers aged 65 and over under this scenario can be clearly seen from Figure A6.

8 Ethnic population projections

The concept of an ethnic group refers to a group of people who have some or all of the following characteristics:[10]

- a common proper name;
- one or more elements of common culture which need not be specified, but may include religion, customs, or language;
- unique community of interests, feelings and actions;
- a shared sense of common origins or ancestry; and
- a common geographic origin.

Ethnicity is a matter of self perceived identity and cultural affiliation, as against say the concepts of race, ancestry, nationality or citizenship. Hence membership of one ethnic group does not preclude membership of others, i.e. people can belong to more than one ethnic group.

Three common methods of operationalising the concept of ethnicity are currently used in New Zealand:

- *Prioritisation*
  Individuals are assigned to a unique ethnic group by means of a set of rules. For instance, the preferred practice by Statistics New Zealand was until recently to prioritise the Māori ethnicity over all other groups and Pacific peoples over Pakeha, hence a person claiming Samoan-Māori ethnicity was classed as Māori, Samoan–Pakeha as Samoan, and only those claiming sole Pakeha ethnicity as Pakeha.
- *Single/combination output*
  People are assigned to the group that they report. In the above example Samoan-Māori, Samoan-Pakeha and Pakeha would each constitute discrete ethnic groups.
- *Total response*
  People are counted in each ethnicity they report. In the example used here Samoan-Māori would contribute one to each of the Samoan and Māori ethnicities, Samoan-Pakeha one to each of the Samoan and Pakeha ethnicities and a sole Pakeha response to the Pakeha ethnicity. The obvious difficulty with this approach is that the number of responses will exceed the number of members of the population.

Statistics New Zealand have abandoned the use of prioritisation for standard outputs, moving to either single/combination output or total response dependent upon the purpose. These projections reported here have used the Statistics New Zealand concept of total response ethnicity and hence these projections should therefore be considered separately. The totals will not correspond to the total projected population, as there are more responses than individuals.

[10] From: Statistics New Zealand (2005, p.2).

Ethnic population projections were prepared only for the European/New Zealand European and Māori ethnicities, and only for Scenario 3 (Smartgrowth Medium projection without economic development).[11] The standard cohort component model was applied separately for each ethnicity, using the 'medium' fertility, mortality, and net migration assumptions provided by SNZ. The key difference was again the use of the SmartGrowth+ methodology in developing the migration profile.

Given the definition of ethnicity above, an additional consideration in ethnic population projections is the possibility that people migrate between ethnicities. This 'inter-ethnic migration' occurs whenever a person changes their ethnicity. In these projections the inter-ethnic migration assumptions provided by SNZ, as summarised in Table 11, were used.

Table 11: SNZ net inter-ethnic migration rates for Hamilton City 2001-2016

Five-year period ending 30 June	*Net migration*	
	European/NZ European	**Māori**
2006	+0.0%	-1.6%
2011	+0.0%	-1.6%
2016	+0.0%	-1.5%

Appendix Table A11 shows the results of this projection. The number of persons reporting Māori ethnic affiliation is projected to rise by 82 percent over the 2006-2041 period. The growth in the Māori population is particularly pronounced in the 65 and over age group, where the projection suggests a more than five fold increase. The population increase is less at younger ages, but even the age group 0-14 is expected to increase by 61 percent over this period.

For the European/NZ European group, the number identifying in these categories is projected to increase overall by a mere 7.5 percent. In fact, most age groups are expected to decline: -8.7 percent for 0-14, -2.9 percent for 15-30; -15 percent for 40-64. For the 65 and over category there is a projected doubling of the population between 2006-2042.

9 Census Area Unit (CAU) Projection

This section reports the results of our population projections for the constituent CAUs of the HCC area. These projections do not use the cohort component method directly but are instead dwelling driven, that is, derived from the number of occupied dwellings projected to be in a given CAU, and constrained to give results consistent with the whole city projections given in Scenario 4 of Section 4, and the household projections in Section 6.[12] On the basis of information provided by the HCC the CAUs in the HCC area were divided into two groups: CAUs that had been designated

[11] The effect of economic development on the ethnic population could not be determined without making assumptions about the ethnic composition of migration relating to the economic development activities. No data was available on which to base these assumptions, so these projections ignore the effects of the economic development activities.

[12] A similar approach was used for example in the United Kingdom by the Cambridgeshire County Council, see Head (2005).

as being part of so-called Growth Cells by HCC; and CAUs that are outside such cells. Table 11 lists the CAUs in the Growth Cells.

Table 12: **CAUs in Growth Cells**

	Growth Cell			
CAU in Growth Cell	***Peacockes***	***Rotokauri***	***Rototuna***	***Unallocated***
	Peacockes	Burbush Rotokauri	Flagstaff Huntington Horsham Downs Sylvester Rototuna	

The 'Unallocated' Growth Cell contains growth that is anticipated to occur by the HCC but that has not as yet been allocated to any particular area within the HCC boundary. The methodology used in the CAU projection is as follows:

1. For each census year, using the data provided by HCC, the projected number of occupied dwellings in each CAU in the Growth Cells was calculated along with unallocated growth which was treated as occurring in a 'virtual' CAU of no area.[13] For CAUs in Growth Cells (excluding the 'virtual' CAU) where HCC projected growth commenced after 2006, the number of occupied dwellings for each year from 2006 till 2042 was obtained by linear extrapolation of historic trends in that CAU. This was observed to have minimal effect upon the housing stock of the affected CAU.
2. The aggregate number of occupied dwellings for each census year in the non-growth cell CAU was calculated by deducting the aggregate number of projected occupied dwellings in growth cell CAUs from the projected number of households in that year.
3. The aggregate number of occupied dwellings for each census year in the non-growth cell CAU was allocated to individual CAU on the basis of a linear extrapolation of the historic trend in growth of occupied dwellings in that CAU.
4. Having created projections of the number of occupied dwellings in each CAU in the HCC area for the period 2006-2041 this information was used to produce the CAU population projections according to the following equation:

$$P_i(t) = \frac{s_i(06)H_i(t)}{\sum_i s_i(06)H_i(t)} PH(t)$$

Where $P_i(t)$ = the population of CAU i in year t.

[13] The HCC provided data on projected building in each CAU in each growth cell on a yearly basis. This was derived from their knowledge of the likely pattern of subdivision. The stock of occupied dwellings in the year t was calculated by adding the projected building of dwellings in year t to the stock of occupied dwellings in year t-1. This assumes that all building in one period becomes occupied by March the following year, March being the month in which the census has been conducted since 1961.

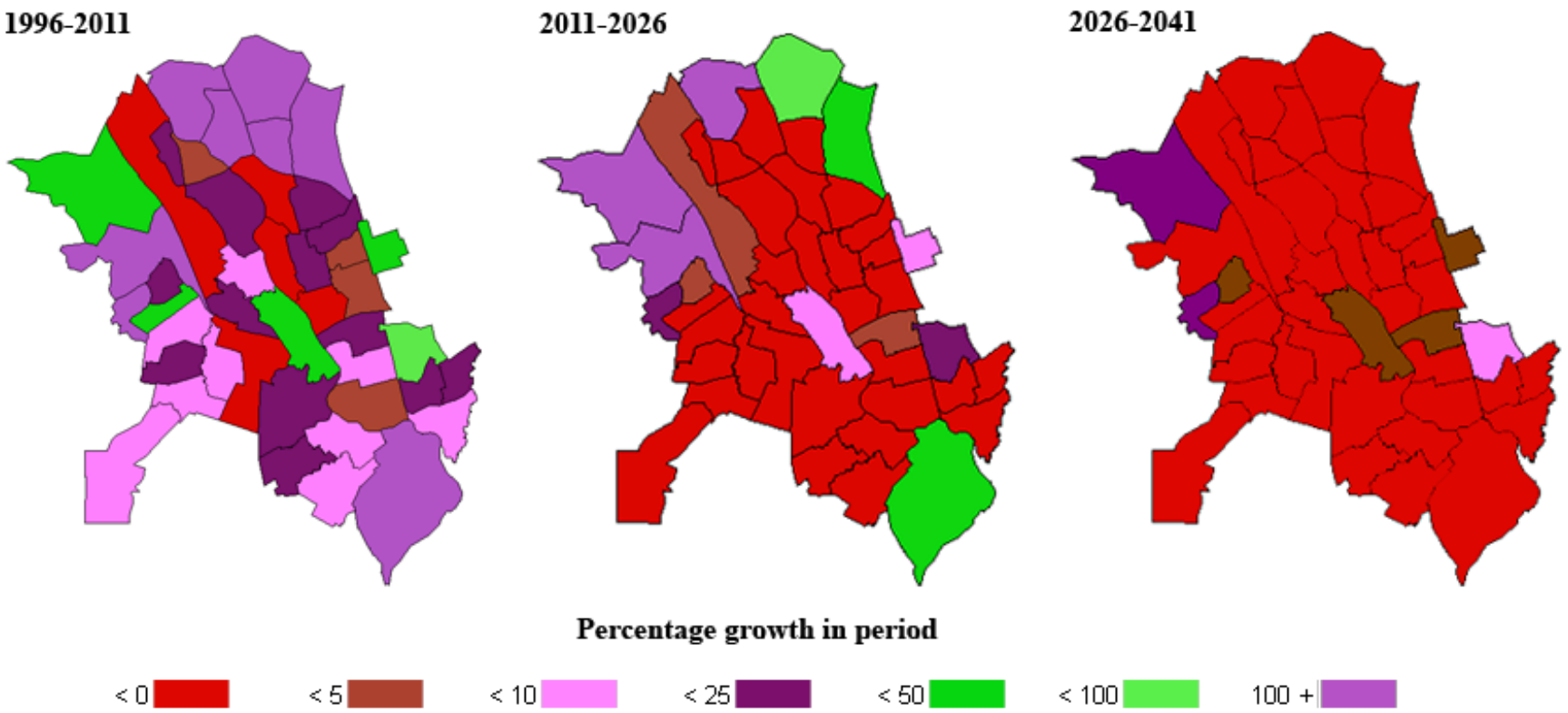
$s_i(06)$ = the average household size in CAU *i* in 2006[14]
$H_i(t)$ = the number of households (dwellings) of CAU *i* in year *t*
$PH(t)$ = the projected population of Hamilton in year *t*

Detailed results are shown in Appendix Table A12.

Rapid growth in the number of households will naturally occur in most of the CAUs that are part of the Growth Cells. The number of households is likely to increase sharply in Burbush, Horsham Downs, Sylvester, Rotokauri, Peacockes and Huntington. However, outside the Growth Cells, there is also likely to be rapid growth in the number of households in a number of CAUs. For example, over the period 2011 to 2041, the number of households outside the growth cells is expected to increase by more than 10 percent in Brymer, University, Peachgrove, Te Rapa, Crawshaw, Temple View, Hamilton Central, Hamilton Lake, Melville, Dinsdale North and Fairview Downs. In existing suburbs, much of this growth is of course likely to arise by means of infill housing or apartment-style high density building (particularly in the central area).

Much of the projected growth within the Hamilton City boundaries is expected to occur during the first half of the 2006-2041 period. Figure 7 shows the resulting population growth, based on Appendix Table A12. The Figure compares growth over three consecutive fifteen year periods: 1996-2011, 2011-2026 and 2026-2041. As Figure 7 shows, population growth is negative in many CAUs beyond 2026, although the number of households may remain stable or increase. A decline in the number of households over the 2026-2041 period is only expected in Franklin Junction, Insoll and Claudelands. Population ageing and growth in the number of single person households are factors contributing to the continued growth in the number of households in CAUs where the population is static or declining.

[14] The average household size for the 'virtual' CAU in 2006 was not calculated in the normal manner i.e. by dividing the CAU population by the number of households in the CAU but rather was assigned a value equal to the population weighted average of household size for the Growth Cell CAU.



* Note growth in the 'virtual' CAU is not reflected in this figure

Figure 7: Percentage growth by CAU in the Hamilton City Council area

10 Conclusion

This report has considered a number of scenarios for Hamilton City population change over the period 2006-2041. These scenarios should be seen as a useful tool for comparing the possible effects of various factors; namely migration and economic development, on the demographic future of Hamilton. The resulting projections can be seen alongside and compare with the official projections for Hamilton City.

Generally the further into the future the population is projected the wider the range of projected numbers. Taking two decades as a horizon, the projected population ranges from about 154,000 under Scenario 1 to 184,000 under Scenario 6. The corresponding 2006-26 population growth is 13.8 percent and 36.0 percent respectively. This can be compared with the recently released national population projections that give a range of 12.3 percent to 23.8 percent national population growth over this period (Statistics New Zealand, 2007). This would suggest that the Hamilton City population may grow between 1.5 to 12.2 percentage points faster than what is expected at the national level. Clearly, such population growth will have a wide range of implications for local level planning and policy.

It should be noted that in recent years additional methodologies have been developed that overcome some of the limitations of the standard cohort component model that was used here. These methods include the calculation of probabilistic sub-national population forecasts. Wilson and Bell (2007) provide an example with respect to Queensland Australia. One of the main benefits of the probabilistic methodology is that a statement can be made about the likelihood that population projections are outside a particular range, such as the one given above.

Another improvement that can be made is to split net migration of a region into its inward and outward components. This has major advantages over allocation of net migration rather artificially across age groups. By calculating gross inward and outward migration through multiplying the population 'at risk' of migration by a migration propensity, migration is treated more equivalently to fertility and mortality as a demographic process. This is the methodology adopted by Wilson and Bell (2007) and will also be used in a follow-on project for the Hamilton sub-regional growth strategy. The SmartGrowth+ methodology adopted in the present report is somewhat of an intermediate approach between the standard net migration model and the more advanced methodology based on gross migration propensities.

It is clear that the smaller the geographical area under consideration, the more affected that area is by inward and outward migration. For very small areas, the cohort component method is then not the appropriate technique for deriving population projections. In the present report, the methodology used for projecting the population of Census Area Units within the city is based on an assessment of the available stock of dwellings, new subdivision development, infill housing and assumptions of average household size. A similar methodology was adopted in the United Kingdom by Cambridgeshire County (see Head, 2005). However, for the purpose of small area population forecasting there are also alternative methodologies in the literature. For example, Chi and Voss (2005) use a spatio-temporal regression model. The consideration of such methodologies does have additional data requirements and was beyond the scope of the present report.

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Appendix

A1 A note on the population impact of the Hamilton-Auckland expressway

In discussion with both the HCC and other groups consulted in the preparation of this report, there has been considerable speculation about the effect of the Hamilton-Auckland expressway on the future population of Hamilton City. Unfortunately an authoritative quantitative assessment lies beyond the scope of this report and would require, in all likelihood, the use of resource intensive techniques such as general equilibrium modelling. This note does not attempt to derive a quantification of the likely effects but rather 'maps' some of the thinking around the impact of infrastructural investment on population growth.

As a starting point let us take the labour market effects of the expressway as presented in the stylised diagram below.

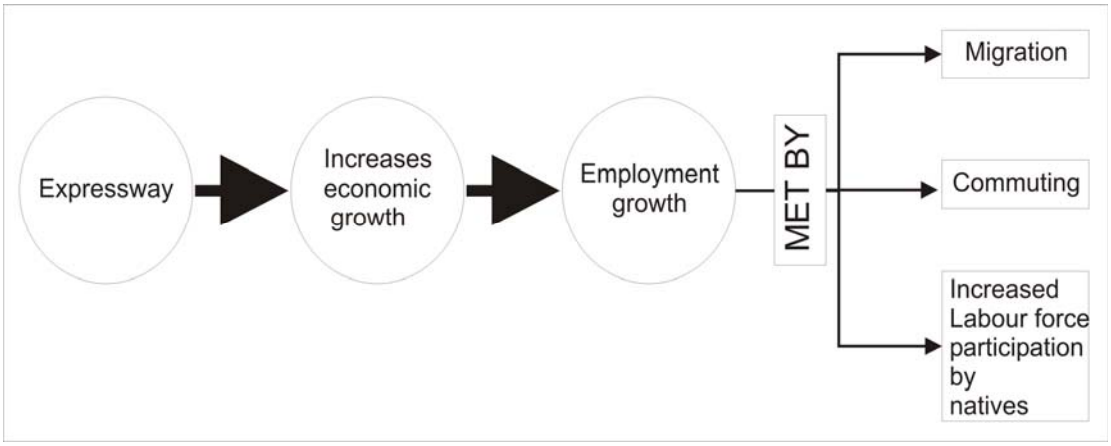


Figure A1: Labour market impact of the expressway

This approach abstracts from any non-labour market effects the expressway might have. For instance it is at least plausible that, the reduction in transit time between Hamilton and Auckland might lead the older persons in Auckland to consider Hamilton more favourably as a retirement location. They could take advantage of the differential in property prices (both between Hamilton and Auckland and Hamilton and alternative retirement destinations) and the centrality of Hamilton's location, while being able to retain regular contact with their established social network in Auckland. While such non-labour market channels merit further consideration we have not considered them here.

The first question that arises in this approach is 'what is the effect of investment in land transport infrastructure on economic growth?' Here the evidence is somewhat sparse and a little ambivalent but the consensus position would seem to be that; '*there are theoretical and practical reasons to expect that road transport investments might in general be expected to have modest beneficial effects on the wider economy in advanced economies, although in certain extreme circumstances negative effects could be anticipated.*' (Preston and Holvad, 2005, p. 26). The kind of multiplier found by Preston and Holvad for the 'whole economy' effect of investment in transport was found to be around 1.4, though this was expected to vary with the price elasticity of

the final product market, the extent of increasing returns to scale and forward and backward linkages, the extent of agglomeration economies and with market power (measured by price mark-ups or the number of firms in the market). A distinction must be made here between a one-off effect of economic expansion, measured by means of a multiplier, and the possibility that the rate of economic growth might be permanently higher as a consequence of the new infrastructure. It is clear that even a small impact on the growth rate (the so-called dynamic benefit) may in the long run exceed a relatively large one-off economic expansion (the comparative static benefit) due to the compounding nature of economic growth. In a meta-analysis of the impact of government expenditures on economic growth, Nijkamp and Poot (2004) found that across a large number of studies the evidence of a positive impact of infrastructure on long-run growth was stronger than for many other types of government expenditure, except for education expenditure.

The actual processes through which investment can influence economic growth are varied and complex but using key questions posed by the influential SACTRA (Standing Advisory Committee on Trunk Road Assessment) report (1999) Preston and Holvad (2005) summarises them as follows:

a. Is there reason to expect that investment or innovation will increase or decrease? If so, in aggregate or only in one region at the expense of another? The literature suggests that transport investments can stimulate investments in other sectors and can promote knowledge spillovers and hence innovation. Furthermore, although there will usually be important displacement effects between regions (see below) there may also be aggregate increases.
b. Are there likely to be favourable effects on incentives for productivity improvement? Theoretical work suggests that transport investments may promote productivity, principally through the promotion of agglomeration benefits – which may be thought of as external economies of scale.
c. Are there important consequences for productivity in the transport-using sector to be considered? Transport investments may also promote technology shifts and internal economies of scale in certain transport and transport-using sectors, such as distribution industries, and hence boost productivity.
d. Is there an effect on the efficiency of resource allocation? The likely impacts of transport investments on the wider economy will be improved resource allocation and welfare gains. However, there may be circumstances where transport investments exacerbate market imperfections.
e. Is it likely that there will be any material effect on the integration of the market? Transport investments, by reducing imperfections in product and factor markets (especially land and labour) and by promoting linkages throughout the economy, might be argued to enhance market integration.

While positive effects are generally expected, it is important to note the potential for negative effects on local economies – one instance of which is what is known as the *Two-way road argument.* This argument is that that transport improvements can harm a local or regional economy, by exposing indigenous firms to competition from stronger rivals outside the area. Here improved transport links behave in a way similar to the removal or reduction of a trade barrier. Hence there can be winners and losers from the improvement, depending on for example the structure of local and regional economies (Standing Advisory Committee on Trunk Road Assessment, 1999, p. 27).

It can be also argued that firms do not make adjustments to changing circumstances in a smooth manner but rather make such decisions as relocating production in response to some critical threshold being crossed. As transport costs typically only make up a small proportion of the total costs faced by a firm it would seem unlikely that small changes in transport costs or times would trigger relocation decisions.[15] From our conversations with the HCC and other parties it would seem that the expressway would reduce travel times from Hamilton-Auckland by around 10 percent – it's worth thinking about this in terms of fluctuations in the cost of diesel (an increase of around 57 percent between August 2004 and August 2006 (Ministry of Economic Development, 2006))

Taking the various effects and countervailing tendencies into account it would seem that the effect on economic growth in Hamilton of the expressway will be modest. If the economic impact is modest it would then follow that the impact on the labour market in and around Hamilton would also be modest and the consequent population effects similarly limited in size and scope. However, carrying out an empirical analysis for Germany, Seitz (2000) estimated that differences in regional infrastructure explain up to 20 percent of the observed interregional disparities in employment growth in that country.

Returning to the figure above, any increase in demand for labour in Hamilton would be met from three sources, increased participation in the labour market by native Hamiltonians, commuting from outside of the HCC area, and migration into the HCC area. The last of these obviously has the largest population effect for Hamilton City. The interaction between migration and commuting is of interest as individuals may combine migration and commuting decisions – i.e. individuals may migrate to an area contiguous with the HCC area then commute to employment within the HCC area. Improved access to areas contiguous with the HCC could result in some out migration from Hamilton City as those now resident relocate residence but not employment.

There has been some discussion of an increase in the number of commutes between Auckland and Hamilton as a result of the expressway. Goodyear (2006) considers this, though not in depth. Based on 2001 census commuting data she finds that some 510 Hamilton City, 360 Waikato District and 117 Waipa District residents have Auckland place of work addresses. For Hamilton this represents less than 1 percent of the persons employed at that time. It would seem unlikely that the expressway would make Hamilton-Auckland commuting more than a marginal effect in the foreseeable future. Speculatively, one could suggest that the expressway would make locating midway between Hamilton and Auckland more attractive as individuals would be more readily able to participate in either labour market – particularly in the case of duel earner households. A worthwhile project would be to analyse the commuting patterns which Hamilton participates in, thus gaining some insight into the spatial scope of the functional economic area focused on Hamilton and its interactions with other surrounding areas. The CAU level commuting matrix from the 2006 Census would be the obvious starting point for any such analysis. Using 2001 Census data, as a base, Baxendine et al. (2005) projected travel to work between Territorial

[15] Barrett (1999) cites UK evidence that transport accounted for 7.1 percent of costs of manufacturing, 12.1 percent of costs of services and 16.4 percent of costs of distribution industries. More recently, an OECD study found that in developed countries transport costs are typically between 2 to 4 percent of the total cost of production (Preston and Holvad, 2005, p. 8).

Authorities within the Waikato Region in 2016. This was based on age-specific employment rates in 2001 and official age-specific population projections for 2016.

A2 Additional tables & figures

Table A1a: Hamilton City population projections, using 2001 population base

Scenario		*1*	*2*	*SNZ Med*	*3*	*5*	*7*	*4*	*6*	*8*
2006	All	135233	135233	131,900	135233	135233	135233	135233	135233	135233
	Age 0-14	29540	29540	28,800	28849	29040	28664	28849	29040	28664
	Age 15-39	53484	53484	53,800	55526	54671	56354	55526	54671	56354
	Age 40-64	38575	38575	36,200	37450	37950	36967	37450	37950	36967
	Age 65+	13634	13634	13,100	13407	13573	13248	13407	13573	13248
2011	All	141081	143383	139,200	142525	140142	144900	144827	142443	147202
	Age 0-14	29839	30336	29,400	28999	28618	29377	29497	29116	29874
	Age 15-39	53138	54011	54,300	57004	54481	59500	57877	55354	60374
	Age 40-64	42558	43421	40,400	41252	41642	40878	42116	42506	41742
	Age 65+	15548	15615	15,100	15270	15400	15145	15336	15467	15212
2016	All	146350	150209	146,900	150702	145647	155743	154561	149505	159601
	Age 0-14	29549	30311	29,300	29315	28103	30514	30077	28865	31276
	Age 15-39	52724	54139	56,000	59943	55959	63906	61358	57375	65321
	Age 40-64	45099	46534	43,400	42917	42957	42886	44352	44393	44322
	Age 65+	18978	19224	18,200	18528	18627	18436	18774	18873	18683
2021	All	150616	156094	154,500	158827	150896	166738	164305	156374	172216
	Age 0-14	28335	29334	29,100	29691	27606	31760	30691	28606	32760
	Age 15-39	50352	52336	58,900	62319	57411	67225	64302	59394	69209
	Age 40-64	49184	51160	44,900	44563	43572	45542	46539	45548	47518
	Age 65+	22745	23264	21,600	22254	22307	22210	22773	22826	22729
2026	All	153938	160240	162,200	166681	155756	177584	172983	162059	183886
	Age 0-14	26615	27702	29,600	30115	27360	32861	31202	28447	33948
	Age 15-39	48902	51091	61,000	63040	57198	68880	65229	59386	71068
	Age 40-64	51484	53625	46,100	46929	44619	49219	49070	46760	51359
	Age 65+	26936	27822	25,500	26597	26580	26625	27483	27466	27511
2031	All	156429	162958	-	173928	159939	187895	180457	166468	194424
	Age 0-14	25122	26204	-	30501	27275	33726	31583	28357	34808
	Age 15-39	48689	50798	-	63371	56673	70062	65480	58782	72171
	Age 40-64	51795	53894	-	49352	45388	53290	51451	47487	55389
	Age 65+	30823	32061	-	30704	30603	30817	31942	31842	32055

Table A1b: Hamilton City population projections, intercensal population growth by age group

Scenario		1	2	SNZ Med	3	5	7	4	6	8
2006	All	4.3	6.0	5.5	5.4	3.6	7.1	7.1	5.3	8.9
to	Age 0-14	1.0	2.7	2.1	0.5	-1.5	2.5	2.2	0.3	4.2
2011	Age 15-39	-0.6	1.0	0.9	2.7	-0.3	5.6	4.2	1.2	7.1
	Age 40-64	10.3	12.6	11.6	10.2	9.7	10.6	12.5	12.0	12.9
	Age 65+	14.0	14.5	15.3	13.9	13.5	14.3	14.4	14.0	14.8
2011	All	3.7	4.8	5.5	5.7	3.9	7.5	6.7	5.0	8.4
to	Age 0-14	-1.0	-0.1	-0.3	1.1	-1.8	3.9	2.0	-0.9	4.7
2016	Age 15-39	-0.8	0.2	3.1	5.2	2.7	7.4	6.0	3.7	8.2
	Age 40-64	6.0	7.2	7.4	4.0	3.2	4.9	5.3	4.4	6.2
	Age 65+	22.1	23.1	20.5	21.3	21.0	21.7	22.4	22.0	22.8
2016	All	2.9	3.9	5.2	5.4	3.6	7.1	6.3	4.6	7.9
to	Age 0-14	-4.1	-3.2	-0.7	1.3	-1.8	4.1	2.0	-0.9	4.7
2021	Age 15-39	-4.5	-3.3	5.2	4.0	2.6	5.2	4.8	3.5	6.0
	Age 40-64	9.1	9.9	3.5	3.8	1.4	6.2	4.9	2.6	7.2
	Age 65+	19.8	21.0	18.7	20.1	19.8	20.5	21.3	20.9	21.7
2021	All	2.2	2.7	5.0	4.9	3.2	6.5	5.3	3.6	6.8
to	Age 0-14	-6.1	-5.6	1.7	1.4	-0.9	3.5	1.7	-0.6	3.6
2026	Age 15-39	-2.9	-2.4	3.6	1.2	-0.4	2.5	1.4	0.0	2.7
	Age 40-64	4.7	4.8	2.7	5.3	2.4	8.1	5.4	2.7	8.1
	Age 65+	18.4	19.6	18.1	19.5	19.2	19.9	20.7	20.3	21.0
2026	All	1.6	1.7	-	4.3	2.7	5.8	4.3	2.7	5.7
to	Age 0-14	-5.6	-5.4	-	1.3	-0.3	2.6	1.2	-0.3	2.5
2031	Age 15-39	-0.4	-0.6	-	0.5	-0.9	1.7	0.4	-1.0	1.6
	Age 40-64	0.6	0.5	-	5.2	1.7	8.3	4.9	1.6	7.8
	Age 65+	14.4	15.2	-	15.4	15.1	15.7	16.2	15.9	16.5

Table A2: Hamilton City population projections: annual projections 2006-2041

Scenario		*4*	*6*	*8*
2006	All	*135233*	*135233*	*135233*
	Age 0-14	28849	29040	28664
	Age 15-39	55526	54671	56354
	Age 40-64	37450	37950	36967
	Age 65+	13407	13573	13248
2007	All	*137054*	*136604*	*137503*
	Age 0-14	28897	28998	28800
	Age 15-39	56054	54858	57223
	Age 40-64	38009	38488	37545
	Age 65+	14095	14260	13935
2008	All	*138825*	*137911*	*139736*
	Age 0-14	28976	28975	28979
	Age 15-39	56486	54953	57991
	Age 40-64	38774	39233	38331
	Age 65+	14590	14751	14434
2009	All	*140880*	*139489*	*142266*
	Age 0-14	29148	29033	29264
	Age 15-39	56973	55106	58813
	Age 40-64	39812	40250	39391
	Age 65+	14946	15100	14798
2010	All	*142801*	*140920*	*144675*
	Age 0-14	29308	29066	29549
	Age 15-39	57392	55195	59562
	Age 40-64	40891	41305	40494
	Age 65+	15209	15353	15070

Scenario		*4*	*6*	*8*
2011	All	*144827*	*142443*	*147202*
	Age 0-14	29497	29116	29874
	Age 15-39	57877	55354	60374
	Age 40-64	42116	42506	41742
	Age 65+	15336	15467	15212
2012	All	*146784*	*143886*	*149672*
	Age 0-14	29611	29081	30135
	Age 15-39	58735	55894	61551
	Age 40-64	42835	43191	42496
	Age 65+	15602	15720	15490
2013	All	*148733*	*145310*	*152144*
	Age 0-14	29733	29044	30414
	Age 15-39	59471	56310	62605
	Age 40-64	43466	43784	43165
	Age 65+	16063	16171	15961
2014	All	*150678*	*146719*	*154623*
	Age 0-14	29849	28994	30694
	Age 15-39	60097	56617	63553
	Age 40-64	43986	44261	43727
	Age 65+	16746	16848	16650
2015	All	*152620*	*148118*	*157109*
	Age 0-14	29963	28933	30981
	Age 15-39	60603	56802	64380
	Age 40-64	44404	44633	44190
	Age 65+	17650	17749	17558

Scenario		*4*	*6*	*8*
2016	All	*154561*	*149505*	*159601*
	Age 0-14	30077	28865	31276
	Age 15-39	61358	57375	65321
	Age 40-64	44352	44393	44322
	Age 65+	18774	18873	18683
2017	All	*156511*	*150893*	*162111*
	Age 0-14	30200	28802	31584
	Age 15-39	61858	57693	66008
	Age 40-64	44841	44694	44994
	Age 65+	19611	19704	19525
2018	All	*158463*	*152277*	*164632*
	Age 0-14	30321	28741	31884
	Age 15-39	62425	58080	66760
	Age 40-64	45277	44930	45625
	Age 65+	20441	20527	20363
2019	All	*160416*	*153653*	*167159*
	Age 0-14	30441	28686	32180
	Age 15-39	63033	58507	67553
	Age 40-64	45691	45133	46244
	Age 65+	21251	21328	21183
2020	All	*162364*	*155020*	*169689*
	Age 0-14	30563	28639	32470
	Age 15-39	63669	58962	68375
	Age 40-64	46100	45321	46869
	Age 65+	22032	22098	21975

Table A2. continued

Scenario		4	6	8
2021	All	*164305*	*156374*	*172216*
	Age 0-14	30691	28606	32760
	Age 15-39	64302	59394	69209
	Age 40-64	46539	45548	47518
	Age 65+	22773	22826	22729
2022	All	*166246*	*157723*	*174748*
	Age 0-14	30823	28586	33045
	Age 15-39	64660	59553	69764
	Age 40-64	46738	45512	47951
	Age 65+	24025	24072	23987
2023	All	*168171*	*159053*	*177269*
	Age 0-14	30959	28579	33326
	Age 15-39	64965	59665	70262
	Age 40-64	47130	45654	48590
	Age 65+	25117	25154	25090
2024	*All*	*169797*	*160080*	*179494*
	Age 0-14	31041	28526	33543
	Age 15-39	65112	59624	70596
	Age 40-64	47594	45856	49317
	Age 65+	26051	26074	26038
2025	*All*	*171402*	*161082*	*181700*
	Age 0-14	31122	28483	33752
	Age 15-39	65195	59526	70861
	Age 40-64	48250	46234	50248
	Age 65+	26834	26839	26839

Table A2. continued

Scenario		4	6	8
2026	All	*172983*	*162059*	*183886*
	Age 0-14	31202	28447	33948
	Age 15-39	65229	59386	71068
	Age 40-64	49070	46760	51359
	Age 65+	27483	27466	27511
2027	All	*174541*	*163009*	*186051*
	Age 0-14	31278	28415	34133
	Age 15-39	65252	59239	71262
	Age 40-64	49614	46992	52213
	Age 65+	28397	28363	28443
2028	All	*176060*	*163918*	*188181*
	Age 0-14	31353	28390	34310
	Age 15-39	65294	59108	71476
	Age 40-64	50124	47182	53041
	Age 65+	29290	29238	29354
2029	All	*177550*	*164795*	*190283*
	Age 0-14	31429	28373	34480
	Age 15-39	65332	58977	71682
	Age 40-64	50614	47338	53864
	Age 65+	30176	30107	30256
2030	All	*179015*	*165644*	*192363*
	Age 0-14	31506	28362	34646
	Age 15-39	65383	58861	71899
	Age 40-64	51068	47447	54662
	Age 65+	31059	30975	31156

Scenario		4	6	8
2031	All	*180457*	*166468*	*194424*
	Age 0-14	31583	28357	34808
	Age 15-39	65480	58782	72171
	Age 40-64	51451	47487	55389
	Age 65+	31942	31842	32055
2032	All	*181879*	*167268*	*196467*
	Age 0-14	31648	28343	34952
	Age 15-39	65471	58585	72349
	Age 40-64	51993	47695	56264
	Age 65+	32767	32646	32901
2033	All	*183274*	*168038*	*198487*
	Age 0-14	31701	28320	35082
	Age 15-39	65514	58429	72590
	Age 40-64	52479	47856	57075
	Age 65+	33580	33434	33740
2034	All	*184636*	*168770*	*200479*
	Age 0-14	31746	28290	35201
	Age 15-39	65586	58296	72866
	Age 40-64	52924	47979	57843
	Age 65+	34381	34205	34569
2035	All	*185960*	*169459*	*202436*
	Age 0-14	31784	28255	35314
	Age 15-39	65694	58190	73187
	Age 40-64	53334	48075	58566
	Age 65+	35147	34938	35369

Scenario		*4*	*6*	*8*
2036	All	*187239*	*170099*	*204355*
	Age 0-14	31820	28215	35424
	Age 15-39	65824	58100	73535
	Age 40-64	53733	48166	59275
	Age 65+	35863	35617	36122
2037	All	*188473*	*170687*	*206233*
	Age 0-14	31851	28170	35532
	Age 15-39	65904	57962	73833
	Age 40-64	54480	48607	60328
	Age 65+	36238	35948	36540
2038	All	*189673*	*171237*	*208084*
	Age 0-14	31880	28119	35640
	Age 15-39	66015	57843	74172
	Age 40-64	55095	48925	61242
	Age 65+	36683	36350	37029
2039	All	*190842*	*171749*	*209908*
	Age 0-14	31905	28062	35748
	Age 15-39	66101	57706	74482
	Age 40-64	55634	49157	62088
	Age 65+	37201	36824	37591
2040	All	*191981*	*172226*	*211707*
	Age 0-14	31929	27999	35858
	Age 15-39	66195	57573	74802
	Age 40-64	56057	49275	62816
	Age 65+	37799	37380	38231
2041	All	*193092*	*172670*	*213484*
	Age 0-14	31953	27931	35972
	Age 15-39	66312	57452	75156
	Age 40-64	56693	49744	63623
	Age 65+	38134	37543	38733

Table A3: Hamilton Zone projections, using 2001 population base

Scenario		4	6	8
2006	*All*	*161644*	*161644*	*161644*
	Age 0-14	34607	34801	34418
	Age 15-39	65016	64134	65874
	Age 40-64	46043	46565	45535
	Age 65+	15978	16144	15817
2007	*All*	*163626*	*163175*	*164076*
	Age 0-14	34572	*34675*	34472
	Age 15-39	65533	64310	66732
	Age 40-64	46989	47494	46497
	Age 65+	16533	16695	16375
2008	*All*	*165556*	*164640*	*166470*
	Age 0-14	34541	34540	34543
	Age 15-39	66020	64460	67555
	Age 40-64	47928	48414	47456
	Age 65+	17068	17226	16915
2009	*All*	*167772*	*166377*	*169163*
	Age 0-14	34579	34462	34697
	Age 15-39	66633	64741	68501
	Age 40-64	48965	49428	48517
	Age 65+	17594	17747	17447
2010	*All*	*169859*	*167972*	*171740*
	Age 0-14	34588	34341	34834
	Age 15-39	67234	65014	69430
	Age 40-64	49925	50360	49504
	Age 65+	18112	18258	17971

Scenario		4	6	8
2011	*All*	172057	*169666*	*174441*
	Age 0-14	34616	34225	35002
	Age 15-39	67940	65397	70459
	Age 40-64	50881	51286	50490
	Age 65+	*18621*	18758	18490
2012	*All*	174193	*171287*	*177091*
	Age 0-14	34624	*34082*	35160
	Age 15-39	68706	65843	71546
	Age 40-64	51335	51700	50983
	Age 65+	*19529*	19662	19402
2013	*All*	176331	*172898*	*179754*
	Age 0-14	34662	33959	35357
	Age 15-39	69479	66298	72638
	Age 40-64	51774	52096	51464
	Age 65+	*20417*	20545	20295
2014	*All*	178472	*174502*	*182429*
	Age 0-14	34720	33849	35582
	Age 15-39	70266	66768	73743
	Age 40-64	52199	52476	51934
	Age 65+	*21286*	21409	21169
2015	*All*	180615	*176100*	*185117*
	Age 0-14	34807	33760	35843
	Age 15-39	71057	67242	74851
	Age 40-64	52612	52843	52394
	Age 65+	22139	22256	22028

Scenario		4	6	8
2016	*All*	*182758*	*177690*	*187813*
	Age 0-14	34924	33694	36143
	Age 15-39	72230	68240	76204
	Age 40-64	52629	52671	52596
	Age 65+	22975	23085	22872
2017	*All*	*184913*	*179283*	*190529*
	Age 0-14	35117	*33700*	36520
	Age 15-39	72847	68678	77002
	Age 40-64	52981	52831	53135
	Age 65+	23969	24074	23872
2018	*All*	*187072*	*180872*	*193256*
	Age 0-14	35317	33720	36900
	Age 15-39	73463	69117	77801
	Age 40-64	53333	52979	53687
	Age 65+	24959	25056	24869
2019	*All*	*189229*	*182452*	*195989*
	Age 0-14	35524	33753	37282
	Age 15-39	74067	69541	78588
	Age 40-64	53694	53127	54257
	Age 65+	25943	26031	25862
2020	*All*	*191377*	*184019*	*198719*
	Age 0-14	35736	33797	37661
	Age 15-39	74650	69944	79355
	Age 40-64	54068	53276	54850
	Age 65+	26923	27002	26852

Table A3 continued

Scenario		4	6	8
2021	*All*	*193511*	*185566*	*201440*
	Age 0-14	35952	33855	38037
	Age 15-39	75180	70274	80085
	Age 40-64	54478	53471	55476
	Age 65+	27899	27967	27841
2022	*All*	*195639*	*187101*	*204158*
	Age 0-14	36169	*33920*	38405
	Age 15-39	75498	70394	80599
	Age 40-64	54893	53650	56124
	Age 65+	29080	29137	29031
2023	*All*	*197736*	*188603*	*206852*
	Age 0-14	36380	33990	38759
	Age 15-39	75663	70367	80956
	Age 40-64	55450	53957	56930
	Age 65+	30243	30289	30206
2024	*All*	*199521*	*189789*	*209235*
	Age 0-14	36524	34002	39037
	Age 15-39	75564	70080	81046
	Age 40-64	56045	54287	57789
	Age 65+	31387	31420	31364
2025	*All*	*201270*	*190936*	*211586*
	Age 0-14	36655	34009	39291
	Age 15-39	75292	69623	80957
	Age 40-64	56810	54772	58832
	Age 65+	32513	32531	32505

Scenario		4	6	8
2026	*All*	*202981*	*192042*	*213902*
	Age 0-14	36765	34006	39517
	Age 15-39	74850	69004	80694
	Age 40-64	57745	55411	60062
	Age 65+	33620	33620	33630
2027	*All*	*204654*	*193107*	*216183*
	Age 0-14	36854	*33989*	39713
	Age 15-39	74804	68788	80817
	Age 40-64	58275	55626	60905
	Age 65+	34721	34704	34748
2028	*All*	*206280*	*194123*	*218419*
	Age 0-14	36922	33958	39881
	Age 15-39	74758	68569	80944
	Age 40-64	58818	55847	61767
	Age 65+	35782	35748	35827
2029	*All*	*207861*	*195090*	*220612*
	Age 0-14	36971	33916	40023
	Age 15-39	74681	68322	81035
	Age 40-64	59404	56099	62688
	Age 65+	36805	36754	36866
2030	*All*	*209398*	*196011*	*222765*
	Age 0-14	37002	33860	40141
	Age 15-39	74578	68050	81102
	Age 40-64	60029	56379	63655
	Age 65+	37789	37722	37867

Scenario		4	6	8
2031	*All*	*210892*	*196887*	*224878*
	Age 0-14	37016	33791	40238
	Age 15-39	74479	67771	81180
	Age 40-64	60663	56673	64629
	Age 65+	38735	38651	38830
2032	*All*	*212345*	*197717*	*226953*
	Age 0-14	36999	*33696*	40301
	Age 15-39	74469	67573	81358
	Age 40-64	61202	56877	65502
	Age 65+	39675	39570	39792
2033	*All*	*213745*	*198490*	*228980*
	Age 0-14	36957	33578	40335
	Age 15-39	74490	67394	81577
	Age 40-64	61747	57097	66372
	Age 65+	40552	40421	40695
2034	*All*	*215098*	*199212*	*230963*
	Age 0-14	36897	33444	40350
	Age 15-39	74516	67214	81808
	Age 40-64	62319	57349	67265
	Age 65+	41367	41206	41540
2035	*All*	*216407*	*199885*	*232908*
	Age 0-14	36826	33298	40354
	Age 15-39	74555	67038	82062
	Age 40-64	62907	57627	68165
	Age 65+	42119	41922	42327

Table A3 continued

Scenario		*4*	*6*	*8*
2036	*All*	217675	*200512*	*234816*
	Age 0-14	36750	33147	40354
	Age 15-39	74593	66855	82321
	Age 40-64	63523	57937	69086
	Age 65+	42809	42573	43056
2037	*All*	218905	*201096*	*236692*
	Age 0-14	36672	32991	40353
	Age 15-39	74624	66665	82570
	Age 40-64	64193	58300	70064
	Age 65+	43416	43139	43704
2038	*All*	220094	*201633*	*238532*
	Age 0-14	36597	32836	40358
	Age 15-39	74688	66500	82864
	Age 40-64	64852	58662	71021
	Age 65+	43957	43635	44289
2039	*All*	221245	*202126*	*240339*
	Age 0-14	36525	32679	40369
	Age 15-39	74737	66325	83135
	Age 40-64	65548	59054	72022
	Age 65+	44435	44068	44812
2040	*All*	222360	*202579*	*242116*
	Age 0-14	36460	32526	40392
	Age 15-39	74802	66162	83428
	Age 40-64	66243	59448	73017
	Age 65+	44855	44442	45279
2041	*All*	*223442*	*202993*	*243866*
	Age 0-14	36405	32379	40428
	Age 15-39	74903	66026	83766
	Age 40-64	67270	60315	74209
	Age 65+	44865	44273	45462

Table A4: Hamilton City household projections, scenario 4 based

	Couple without children	Two-parent	One-parent	Total	Family	Other multiperson	One-person	Total
2006	13951	14064	7141	35155	33999	3690	10911	48600
2007	14359	14152	7283	35797	34606	3731	11173	49510
2008	14772	14241	7426	36444	35218	3773	11438	50429
2009	15192	14330	7570	37097	35835	3815	11705	51356
2010	15617	14419	7716	37756	36458	3857	11976	52291
2011	16048	14509	7864	38421	37085	3899	12250	53235
2012	16469	14589	8005	39066	37694	3932	12554	54181
2013	16895	14670	8148	39718	38307	3966	12861	55136
2014	17327	14751	8292	40374	38925	4000	13172	56099
2015	17764	14832	8437	41036	39549	4034	13487	57070
2016	18206	14914	8584	41703	40177	4068	13805	58050
2017	18608	14992	8734	42337	40771	4097	14148	59017
2018	19015	15071	8886	42975	41369	4126	14494	59991
2019	19426	15150	9038	43618	41972	4155	14845	60974
2020	19841	15229	9193	44266	42579	4184	15200	61964
2021	20261	15309	9348	44918	43190	4214	15559	62963
2022	20554	15478	9448	45480	43731	4242	15905	63879
2023	20849	15648	9549	46046	44275	4269	16255	64802
2024	21146	15819	9650	46615	44822	4297	16610	65731
2025	21445	15991	9752	47188	45373	4325	16968	66667
2026	21746	16163	9854	47764	45927	4353	17329	67610
2027	21996	16304	9939	48239	46384	4372	17672	68429
2028	22248	16445	10024	48717	46844	4390	18018	69254
2029	22502	16586	10109	49197	47305	4408	18368	70083
2030	22757	16728	10195	49680	47769	4426	18721	70918
2031	23013	16871	10281	50165	48236	4445	19077	71757
2032	23235	16976	10350	50560	48616	4461	19393	72471
2033	23458	17080	10419	50957	48997	4477	19712	73188
2034	23682	17186	10488	51355	49380	4493	20034	73909
2035	23907	17291	10557	51755	49765	4510	20358	74634
2036	24133	17397	10627	52157	50151	4526	20685	75362
2037	24347	17469	10681	52497	50478	4545	20946	75969
2038	24562	17542	10735	52838	50806	4563	21208	76578
2039	24777	17614	10789	53181	51135	4582	21472	77191
2040	24994	17687	10844	53524	51466	4601	21738	77805
2041	25211	17760	10898	53869	51797	4619	22006	78422

Table A5: Hamilton City labour force projections, LFPS1

	Age	*15-19*	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*65+*	*Total*
2006	Male	3192	5838	4716	3908	3975	3995	3785	3298	2712	1546	777	37744
	Female	3092	4975	3995	3099	3551	3744	3896	3164	2289	1049	433	33288
	Total	6284	10813	8711	7008	7527	7740	7681	6462	5000	2595	1210	71032
2011	Male	3282	6007	5657	4221	3839	4069	4146	3776	3003	2022	913	40935
	Female	3031	4978	4508	3406	3299	3977	4018	3705	2614	1429	485	35450
	Total	6313	10985	10166	7627	7138	8046	8164	7481	5617	3451	1398	76385
2016	Male	3314	6165	6032	5204	4145	3901	4194	4109	3425	2231	1136	43855
	Female	3083	4904	4638	3926	3627	3672	4235	3802	3050	1626	587	37150
	Total	6397	11069	10670	9129	7772	7573	8429	7911	6475	3857	1722	81005
2021	Male	3393	6190	6209	5565	5130	4202	4020	4161	3738	2552	1382	46541
	Female	3160	4963	4586	4038	4194	4023	3913	4008	3136	1901	709	38632
	Total	6552	11153	10795	9603	9324	8225	7933	8169	6874	4452	2092	85173
2026	Male	3391	6308	6223	5735	5452	5161	4287	3958	3763	2775	1664	48717
	Female	3157	5057	4631	3977	4284	4617	4238	3677	3285	1945	858	39726
	Total	6548	11365	10854	9711	9736	9778	8526	7635	7048	4720	2522	88442
2031	Male	3392	6243	6361	5745	5609	5469	5230	4202	3567	2783	1943	50543
	Female	3157	5001	4725	4012	4207	4703	4835	3962	3002	2030	993	40626
	Total	6549	11244	11086	9756	9815	10172	10064	8165	6569	4813	2937	91170
2036	Male	3457	6213	6294	5871	5623	5627	5548	5121	3794	2643	2175	52365
	Female	3217	4975	4672	4099	4246	4620	4934	4517	3242	1856	1118	41494
	Total	6673	11187	10966	9970	9869	10247	10482	9637	7035	4499	3293	93859
2041	Male	3502	6315	6266	5820	5743	5641	5705	5436	4633	2815	2314	54190
	Female	3259	5056	4649	4060	4336	4662	4845	4613	3701	2008	1189	42376
	Total	6761	11371	10915	9880	10078	10303	10551	10049	8334	4823	3502	96566

Table A6: Hamilton City LFPS1 participation rates

Year	Gender	*Labour Force*	*Population*		*Participation Rate*	
			15+	15-64	15+	15-65
2006	Male	37744	50479	44823	74.8	84.2
	Female	33288	55905	48153	59.5	69.1
	Total	71032	106384	92977	66.8	76.4
2011	Male	40935	55174	48527	74.2	84.4
	Female	35450	60155	51466	58.9	68.9
	Total	76385	115330	99993	66.2	76.4
2016	Male	43855	59943	51674	73.2	84.9
	Female	37150	64541	54035	57.6	68.8
	Total	81005	124484	105710	65.1	76.6
2021	Male	46541	64644	54578	72.0	85.3
	Female	38632	68970	56263	56.0	68.7
	Total	85173	133614	110841	63.7	76.8
2026	Male	48717	68874	56756	70.7	85.8
	Female	39726	72908	57543	54.5	69.0
	Total	88442	141782	114298	62.4	77.4
2031	Male	50543	72570	58418	69.6	86.5
	Female	40626	76304	58513	53.2	69.4
	Total	91170	148874	116932	61.2	78.0
2036	Male	52365	76005	60171	68.9	87.0
	Female	41494	79415	59386	52.2	69.9
	Total	93859	155420	119557	60.4	78.5
2041	Male	54190	79077	62229	68.5	87.1
	Female	42376	82062	60775	51.6	69.7
	Total	96566	161139	123004	59.9	78.5

Table A7: Hamilton City labour force projections, LFPS2

	Age	*15-19*	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*65+*	*Total*
2006	Male	3192	5838	4716	3908	3975	3995	3785	3298	2712	1546	777	37744
	Female	3092	4975	3995	3099	3551	3744	3896	3164	2289	1049	433	33288
	Total	6284	10813	8711	7008	7527	7740	7681	6462	5000	2595	1210	71032
2011	Male	3282	6007	5657	4221	3839	4069	4146	3776	3003	2022	913	40935
	Female	3031	5123	4569	3553	3408	4004	4018	3705	2614	1429	485	35939
	Total	6313	11130	10227	7774	7247	8072	8164	7481	5617	3451	1398	76874
2016	Male	3314	6165	6032	5204	4145	3901	4194	4109	3425	2231	1136	43855
	Female	3083	5191	4764	4264	3867	3720	4235	3802	3050	1626	587	38187
	Total	6397	11355	10796	9468	8012	7621	8429	7911	6475	3857	1722	82043
2021	Male	3393	6190	6209	5565	5130	4202	4020	4161	3738	2552	1382	46541
	Female	3160	5398	4773	4560	4610	4101	3913	4008	3136	1901	709	40268
	Total	6552	11588	10981	10125	9740	8303	7933	8169	6874	4452	2092	86809
2026	Male	3391	6308	6223	5735	5452	5161	4287	3958	3763	2775	1664	48717
	Female	3157	5500	4819	4491	4709	4706	4238	3677	3285	1945	858	41385
	Total	6548	11808	11042	10225	10161	9867	8526	7635	7048	4720	2522	90101
2031	Male	3392	6243	6361	5745	5609	5469	5230	4202	3567	2783	1943	50543
	Female	3157	5439	4917	4530	4624	4794	4835	3962	3002	2030	993	42283
	Total	6549	11682	11278	10275	10232	10263	10064	8165	6569	4813	2937	92826
2036	Male	3457	6213	6294	5871	5623	5627	5548	5121	3794	2643	2175	52365
	Female	3217	5411	4862	4628	4667	4709	4934	4517	3242	1856	1118	43160
	Total	6673	11623	11156	10499	10290	10336	10482	9637	7035	4499	3293	95524
2041	Male	3502	6315	6266	5820	5743	5641	5705	5436	4633	2815	2314	54190
	Female	3259	5499	4838	4584	4765	4752	4845	4613	3701	2008	1189	44052
	Total	6761	11814	11104	10404	10508	10393	10551	10049	8334	4823	3502	98242

Table A8: Hamilton City LFPS2 participation rates

Year	Gender	*Labour Force*	*Population*		*Participation Rate*	
			15+	15-64	15+	15-65
2006	Male	37744	50479	44823	74.8	84.2
	Female	33288	55905	48153	59.5	69.1
	Total	71032	106384	92977	66.8	76.4
2011	Male	40935	55174	48527	74.2	84.4
	Female	35939	60155	51466	59.7	69.8
	Total	76874	115330	99993	66.7	76.9
2016	Male	43855	59943	51674	73.2	84.9
	Female	38187	64541	54035	59.2	70.7
	Total	82043	124484	105710	65.9	77.6
2021	Male	46541	64644	54578	72.0	85.3
	Female	40268	68970	56263	58.4	71.6
	Total	86809	133614	110841	65.0	78.3
2026	Male	48717	68874	56756	70.7	85.8
	Female	41385	72908	57543	56.8	71.9
	Total	90101	141782	114298	63.5	78.8
2031	Male	50543	72570	58418	69.6	86.5
	Female	42283	76304	58513	55.4	72.3
	Total	92826	148874	116932	62.4	79.4
2036	Male	52365	76005	60171	68.9	87.0
	Female	43160	79415	59386	54.3	72.7
	Total	95524	155420	119557	61.5	79.9
2041	Male	54190	79077	62229	68.5	87.1
	Female	44052	82062	60775	53.7	72.5
	Total	98242	161139	123004	61.0	79.9

Table A9: Hamilton City labour force projections, LFPS3

	Age	*15-19*	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*65+*	*Total*
2006	Male	3192	5838	4716	3908	3975	3995	3785	3298	2712	1546	777	37744
	Female	3092	4975	3995	3099	3551	3744	3896	3164	2289	1049	433	33288
	Total	6284	10813	8711	7008	7527	7740	7681	6462	5000	2595	1210	71032
2011	Male	3386	6137	5720	4295	3905	4138	4212	3819	3064	2077	1031	41784
	Female	3130	5105	4622	3492	3378	4067	4120	3809	2688	1487	657	36554
	Total	6516	11242	10343	7787	7283	8205	8331	7628	5752	3564	1688	78337
2016	Male	3522	6432	6166	5386	4288	4034	4327	4202	3565	2352	1429	45704
	Female	3285	5154	4872	4123	3800	3838	4450	4016	3221	1759	1002	39521
	Total	6807	11586	11039	9509	8088	7872	8776	8219	6787	4111	2431	85225
2021	Male	3712	6592	6416	5858	5396	4416	4210	4303	3968	2760	1919	49549
	Female	3470	5343	4934	4342	4494	4296	4211	4347	3401	2133	1463	42434
	Total	7183	11935	11350	10200	9890	8713	8421	8649	7369	4893	3382	91983
2026	Male	3711	6718	6431	6036	5735	5424	4490	4093	3994	3001	2310	51942
	Female	3467	5443	4982	4276	4591	4931	4561	3988	3563	2183	1769	43753
	Total	7178	12162	11412	10312	10325	10355	9051	8080	7556	5184	4079	95695
2031	Male	3712	6649	6573	6047	5899	5748	5477	4345	3786	3010	2698	53943
	Female	3467	5383	5084	4313	4508	5023	5203	4297	3255	2278	2049	44859
	Total	7179	12032	11657	10361	10406	10771	10680	8642	7042	5288	4746	98803
2036	Male	3783	6617	6504	6180	5914	5914	5811	5295	4027	2858	3018	55921
	Female	3533	5355	5026	4407	4550	4933	5310	4898	3515	2084	2306	45917
	Total	7315	11972	11530	10587	10464	10847	11120	10193	7542	4942	5325	101837
2041	Male	3832	6726	6475	6127	6040	5929	5975	5621	4918	3044	3212	57898
	Female	3579	5442	5002	4365	4646	4978	5214	5002	4013	2254	2451	46947
	Total	7411	12168	11477	10492	10686	10907	11189	10623	8931	5298	5663	104845

Table A10: Hamilton City LFPS3 participation rates

Year	Gender	*Labour Force*	*Population*		*Participation Rate*	
			15+	15-64	15+	15-65
2006	Male	37744	50479	44823	74.8	84.2
	Female	33288	55905	48153	59.5	69.1
	Total	71032	106384	92977	66.8	76.4
2011	Male	41784	55174	48527	75.7	86.1
	Female	36554	60155	51466	60.8	71.0
	Total	78337	115330	99993	67.9	78.3
2016	Male	45704	59943	51674	76.2	88.4
	Female	39521	64541	54035	61.2	73.1
	Total	85225	124484	105710	68.5	80.6
2021	Male	49549	64644	54578	76.6	90.8
	Female	42434	68970	56263	61.5	75.4
	Total	91983	133614	110841	68.8	83.0
2026	Male	51942	68874	56756	75.4	91.5
	Female	43753	72908	57543	60.0	76.0
	Total	95695	141782	114298	67.5	83.7
2031	Male	53943	72570	58418	74.3	92.3
	Female	44859	76304	58513	58.8	76.7
	Total	98803	148874	116932	66.4	84.5
2036	Male	55921	76005	60171	73.6	92.9
	Female	45917	79415	59386	57.8	77.3
	Total	101837	155420	119557	65.5	85.2
2041	Male	57898	79077	62229	73.2	93.0
	Female	46947	82062	60775	57.2	77.2
	Total	104845	161139	123004	65.1	85.2

Table A11: Ethnic projections 2006-2041

Year	*Age*	*Euro*	*Māori*	*Year*	*Age*	*Euro*	*Māori*	*Year*	*Age*	*Euro*	*Māori*
2006	*All*	*97274*	*27264*	**2016**	*All*	*100227*	*33025*	**2026**	*All*	*103263*	*39268*
	0-14	18982	9284		0-14	18195	11053		0-14	17816	12405
	15-39	36448	11856		15-39	34742	13611		15-39	36513	16569
	40-64	29319	5330		40-64	30655	7000		40-64	26988	7747
	65+	12525	795		65+	16634	1361		65+	21945	2546
2007	*All*	*97608*	*27792*	**2017**	*All*	*100548*	*33634*	**2027**	*All*	*103497*	*39919*
	0-14	18865	9386		0-14	18032	11129		0-14	17888	12550
	15-39	36159	12028		15-39	35209	14002		15-39	36395	16784
	40-64	29760	5534		40-64	30170	7048		40-64	26747	7895
	65+	12824	844		65+	17137	1455		65+	22467	2690
2008	*All*	*97901*	*28329*	**2018**	*All*	*100872*	*34246*	**2028**	*All*	*103711*	*40580*
	0-14	18712	9502		0-14	17895	11226		0-14	17950	12696
	15-39	35902	12207		15-39	35609	14367		15-39	36256	17005
	40-64	30181	5732		40-64	29730	7105		40-64	26531	8050
	65+	13107	888		65+	17637	1547		65+	22973	2828
2009	*All*	*98160*	*28877*	**2019**	*All*	*101196*	*34860*	**2029**	*All*	*103903*	*41244*
	0-14	18526	9632		0-14	17786	11344		0-14	17997	12838
	15-39	35675	12394		15-39	35921	14704		15-39	36088	17228
	40-64	30582	5923		40-64	29353	7176		40-64	26353	8216
	65+	13377	928		65+	18136	1637		65+	23465	2962
2010	*All*	*98391*	*29437*	**2020**	*All*	*101517*	*35473*	**2030**	*All*	*104070*	*41914*
	0-14	18315	9778		0-14	17704	11479		0-14	18020	12976
	15-39	35480	12588		15-39	36241	15010		15-39	35904	17457
	40-64	30960	6106		40-64	28939	7260		40-64	26204	8390
	65+	13636	964		65+	18633	1724		65+	23942	3091
2011	*All*	*98699*	*30007*	**2021**	*All*	*101833*	*36089*	**2031**	*All*	*104214*	*42590*
	0-14	18076	9868		0-14	17633	11635		0-14	18021	13141
	15-39	35366	12806		15-39	36617	15309		15-39	35721	17643
	40-64	31093	6301		40-64	28380	7279		40-64	25989	8556
	65+	14163	1032		65+	19202	1867		65+	24482	3250
2012	*All*	*99000*	*30594*	**2022**	*All*	*102141*	*36714*	**2032**	*All*	*104330*	*43273*
	0-14	17851	9980		0-14	17608	11793		0-14	18001	13306
	15-39	35269	13028		15-39	36840	15592		15-39	35551	17842
	40-64	31204	6491		40-64	27930	7324		40-64	25807	8728
	65+	14676	1095		65+	19763	2005		65+	24971	3396
2013	*All*	*99299*	*31192*	**2023**	*All*	*102440*	*37343*	**2033**	*All*	*104419*	*43963*
	0-14	17653	10114		0-14	17623	11949		0-14	17960	13476
	15-39	35180	13250		15-39	36913	15861		15-39	35394	18052
	40-64	31292	6673		40-64	27588	7394		40-64	25654	8903
	65+	15174	1155		65+	20317	2139		65+	25410	3531
2014	*All*	*99602*	*31802*	**2024**	*All*	*102728*	*37979*	**2034**	*All*	*104487*	*44660*
	0-14	17478	10268		0-14	17665	12104		0-14	17907	13652
	15-39	35101	13473		15-39	36850	16118		15-39	35240	18269
	40-64	31364	6849		40-64	27350	7488		40-64	25537	9084
	65+	15659	1211		65+	20862	2269		65+	25804	3655
2015	*All*	*99911*	*32422*	**2025**	*All*	*103003*	*38620*	**2035**	*All*		
	0-14	17336	10446		0-14	17734	12255		0-14		
	15-39	35242	13748		15-39	36612	16361		15-39		
	40-64	31202	6964		40-64	27256	7608		40-64		
	65+	16131	1265		65+	21402	2397		65+		

Table A11 continued

Year	*Age*	*Euro*	*Māori*
2036	*All*	*104575*	*46078*
	0-14	17768	14026
	15-39	34935	18662
	40-64	25370	9481
	65+	26501	3909
2037	*All*	*104597*	*46796*
	0-14	17687	14213
	15-39	34792	18848
	40-64	25311	9696
	65+	26807	4040
2038	*All*	*104608*	*47522*
	0-14	17600	14402
	15-39	34683	19055
	40-64	25254	9907
	65+	27071	4159
2039	*All*	*104608*	*48255*
	0-14	17511	14592
	15-39	34580	19275
	40-64	25219	10121
	65+	27298	4267
2040	*All*	*104598*	*48995*
	0-14	17418	14784
	15-39	34501	19514
	40-64	25393	10374
	65+	27286	4323
2041	*All*	*104579*	*49742*
	0-14	17327	14976
	15-39	35406	20172
	40-64	24911	10245
	65+	26934	4349

Table A12: Hamilton City population projections 2006-2041, by 2006 Census Area Unit

AU_NAME	*Actual*	*Projected Dwellings*							*Actual*	*Projected Population*						
	2006	*2011*	*2016*	*2021*	*2026*	*2031*	*2036*	*2041*	*2006*	*2011*	*2016*	*2021*	*2026*	*2031*	*2036*	*2041*
Queenwood	1122	1192	1205	1215	1220	1222	1223	1223	3021	3100	3044	2994	2946	2901	2866	2838
Porritt	588	659	681	697	705	715	724	728	1689	1828	1834	1832	1818	1810	1810	1803
Pukete West	675	747	768	783	790	799	806	810	2100	2245	2240	2228	2206	2190	2183	2171
Dinsdale South	1431	1554	1589	1615	1628	1642	1654	1659	4005	4200	4172	4136	4089	4050	4027	4001
Burbush	72	86	101	916	5001	6153	6153	6153	204	236	268	2374	12714	15366	15169	15024
Brymer	723	981	1125	1232	1291	1367	1449	1485	2289	2998	3340	3568	3667	3814	3992	4053
Horsham Downs	804	1567	2331	3094	3094	3094	3094	3094	2586	4867	7032	9105	8930	8773	8660	8577
Riverlea	939	1007	1024	1037	1043	1049	1053	1055	2532	2622	2591	2559	2524	2493	2472	2452
Bader	1302	1405	1434	1455	1466	1477	1486	1489	3762	3920	3886	3847	3801	3761	3736	3709
University	1473	1851	2050	2199	2280	2383	2494	2544	4968	6028	6487	6784	6900	7085	7319	7394
Silverdale	873	954	982	1002	1013	1024	1035	1040	2514	2654	2652	2640	2617	2600	2594	2581
Hillcrest West	1176	1277	1307	1330	1341	1353	1364	1368	3576	3748	3728	3699	3658	3626	3608	3585
Enderley	1449	1555	1580	1599	1608	1616	1623	1625	3894	4034	3983	3932	3878	3829	3795	3764
Peachgrove	1191	1312	1381	1432	1460	1493	1527	1542	2841	3022	3090	3126	3124	3139	3170	3171
Hamilton East	1332	1402	1418	1430	1435	1438	1439	1439	3663	3723	3657	3597	3540	3486	3444	3411
Naylor	1662	1769	1788	1803	1809	1813	1815	1815	4221	4337	4259	4189	4123	4059	4010	3972
Pukete	819	882	898	910	915	921	925	927	2400	2495	2468	2439	2407	2379	2360	2341
Maeroa	1359	1471	1509	1538	1552	1568	1583	1589	3603	3765	3753	3730	3693	3665	3651	3631
Frankton Junction	759	787	794	798	800	801	800	799	1674	1677	1642	1611	1583	1556	1535	1519
Bryant	2094	2296	2355	2399	2421	2445	2467	2476	5730	6066	6044	6005	5944	5897	5874	5840
Beerescourt	1227	1331	1364	1389	1402	1415	1428	1433	3108	3256	3242	3219	3186	3160	3147	3128
Chedworth	1224	1332	1366	1392	1405	1418	1431	1437	3540	3719	3706	3682	3645	3616	3602	3582
Insoll	750	789	792	795	795	794	792	790	2580	2620	2556	2501	2455	2409	2370	2343
Te Rapa	132	139	144	148	150	152	154	155	225	228	230	230	229	228	229	228
Crawshaw	918	1052	1098	1133	1151	1173	1195	1205	2835	3136	3182	3201	3190	3193	3212	3207
Sylvester	54	975	2134	2468	2468	2468	2468	2468	177	3086	6561	7400	7258	7130	7039	6971
Rotokauri	60	407	1020	2368	2368	2368	2368	2368	186	1219	2967	6716	6587	6471	6388	6327
Rototuna	1083	1103	1123	1143	1143	1143	1143	1143	3177	3124	3090	3067	3008	2955	2918	2890

Table A12 continued

AU_NAME	*Actual*	*Projected Dwellings*							*Actual*	*Projected Population*							
Temple View	330	375	388	397	402	407	413	415	1344	1475	1481	1479	1468	1462	1462	1456
Peacocke	156	423	674	674	674	674	674	674	459	1202	1861	1815	1780	1749	1726	1710
Clarkin	1047	1119	1133	1144	1149	1153	1156	1156	3006	3101	3052	3006	2961	2919	2887	2861
Claudelands	1002	1042	1037	1034	1032	1025	1016	1012	2382	2391	2313	2250	2200	2148	2102	2073
Chartwell	879	946	964	977	984	990	996	998	2352	2444	2419	2393	2362	2336	2318	2301
Hamilton Central	1302	1485	1589	1666	1708	1760	1815	1840	2697	2969	3087	3158	3175	3214	3272	3284
Swarbrick	1482	1620	1663	1696	1712	1730	1747	1754	4068	4293	4282	4259	4217	4187	4173	4150
Hamilton Lake	1512	1677	1734	1776	1798	1823	1848	1859	3879	4153	4172	4169	4139	4123	4125	4110
Melville	1590	1734	1791	1834	1856	1881	1905	1916	4755	5007	5024	5017	4980	4958	4958	4938
Glenview	1842	2010	2056	2091	2108	2127	2143	2150	5088	5360	5328	5284	5226	5178	5152	5118
Nawton	1593	1724	1765	1797	1813	1829	1845	1851	4434	4632	4609	4576	4527	4488	4468	4441
Dinsdale North	1326	1469	1516	1552	1570	1591	1612	1621	3768	4029	4042	4035	4004	3986	3985	3969
Fairview Downs	1119	1322	1409	1473	1508	1551	1596	1616	3333	3802	3936	4015	4031	4073	4138	4150
Grandview	1050	1141	1169	1190	1201	1212	1222	1226	2988	3136	3121	3099	3066	3040	3026	3008
Flagstaff	1449	1478	1507	1537	1537	1537	1537	1537	3768	3711	3677	3656	3586	3522	3477	3444
Huntington	1278	1787	2296	2805	2805	2805	2805	2805	3828	5168	6451	7687	7539	7406	7311	7241
Virtual CAU	0	0	0	0	0	2358	5341	8134	0	0	0	0	0	6027	13477	20328
Hamilton	**46248**	**53235**	**58050**	**62963**	**67610**	**71757**	**75362**	**78422**	**129249**	**144827**	**154561**	**164305**	**172983**	**180457**	**187239**	**193092**

Notes:

1. Grey fill indicates CAU in Growth Cell
2. Columns may not sum to column totals due to rounding
3. Actual refers to 2006 Census of Population and Dwellings counts; projections have a 2001 base (series 4 of Table A1a).

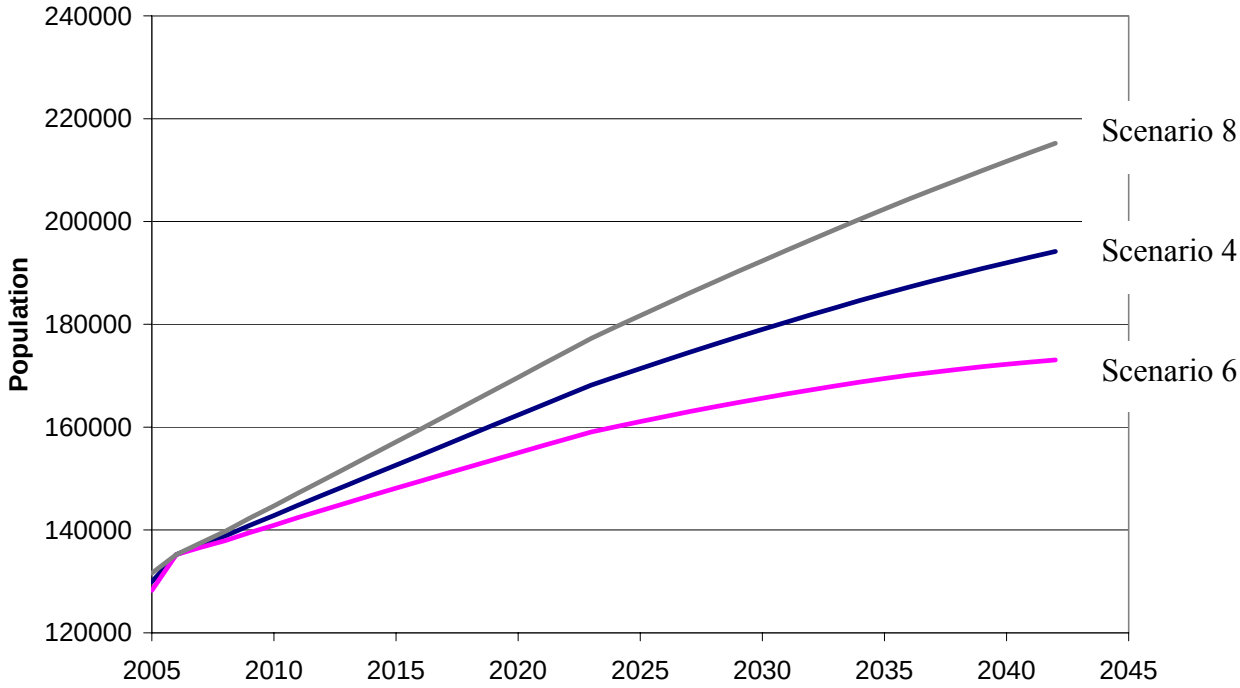
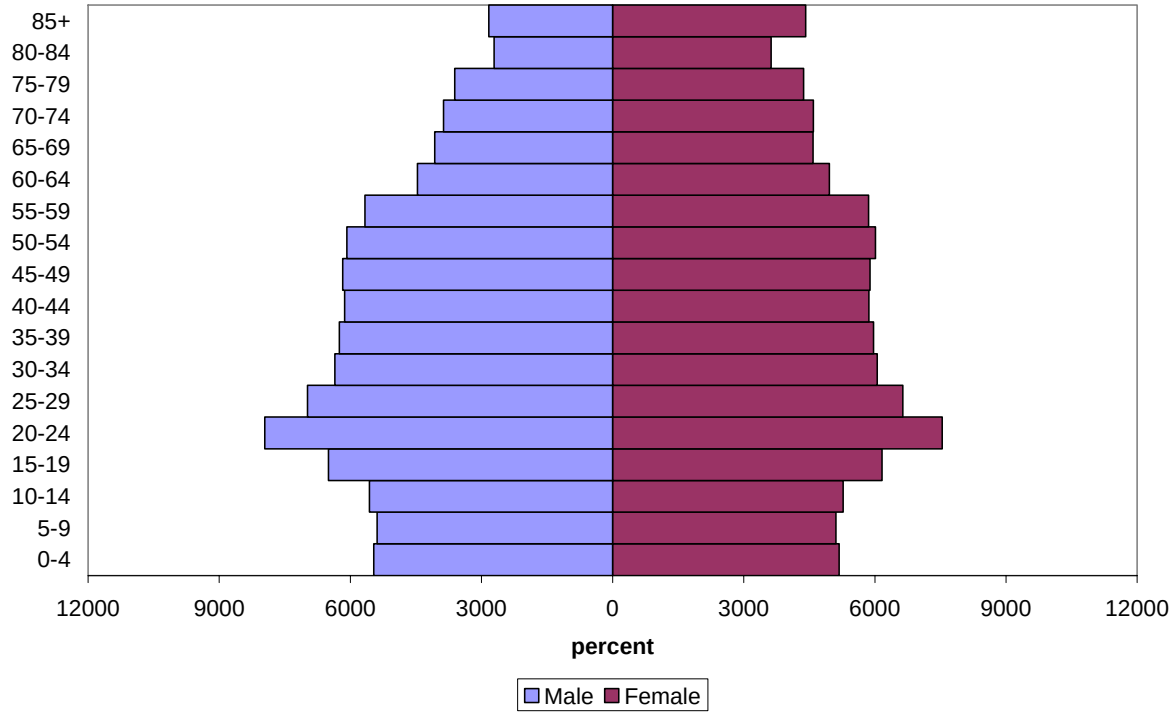


Figure A2: Hamilton City estimated population growth 2005-2041 (using SmartGrowth + and additional development activities)

(a) Hamilton City projected population 2031 (Scenario 4)



(b) Hamilton City census night usually-resident population 2001 (Base population for projections)

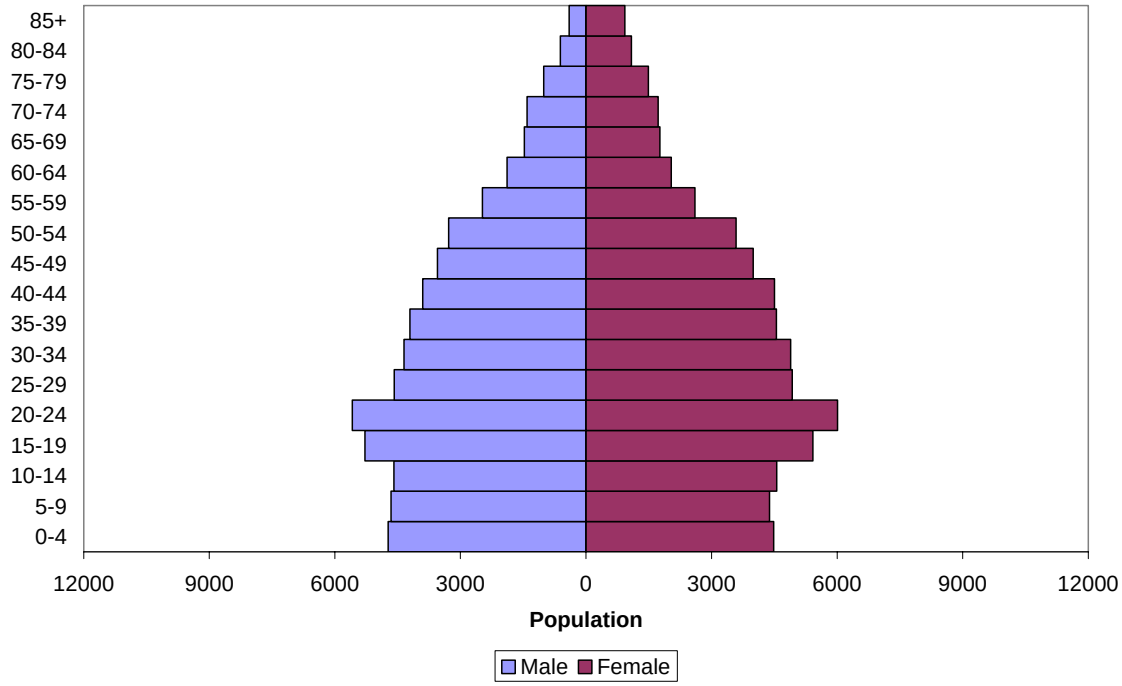


Figure A3: Age pyramids of the projected Hamilton City population and base population

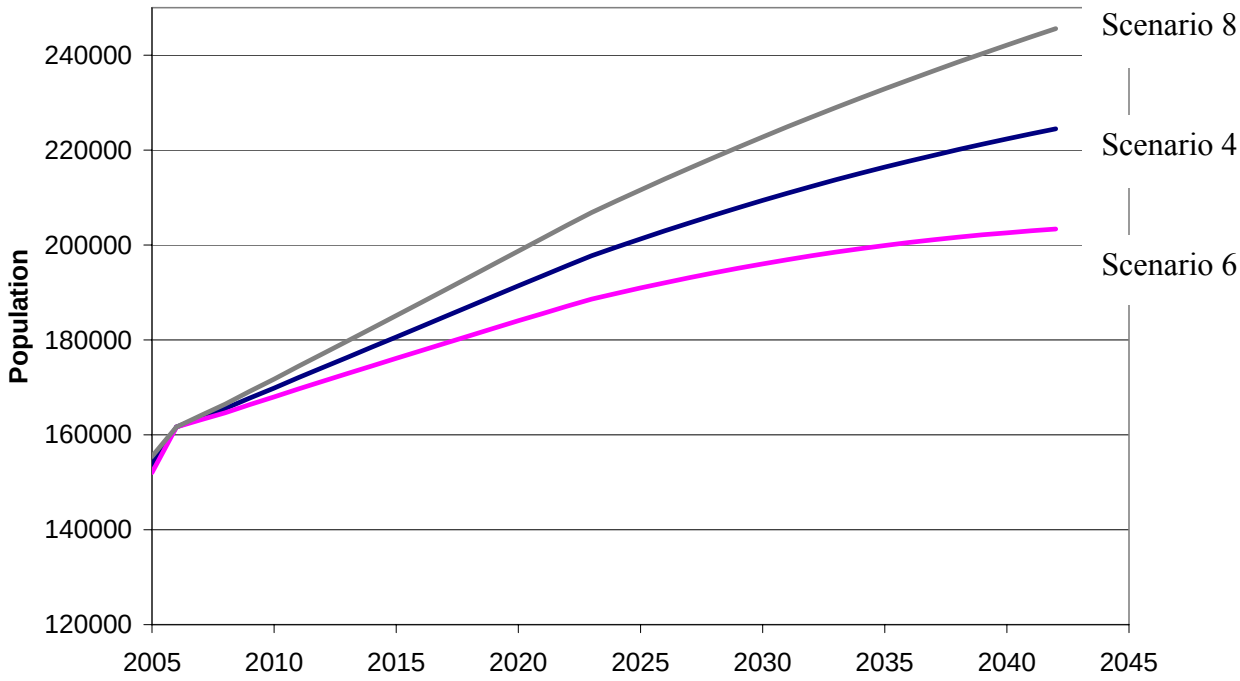


Figure A4: Hamilton Zone estimated population growth 2006-2041 (using SmartGrowth + and additional development activities)

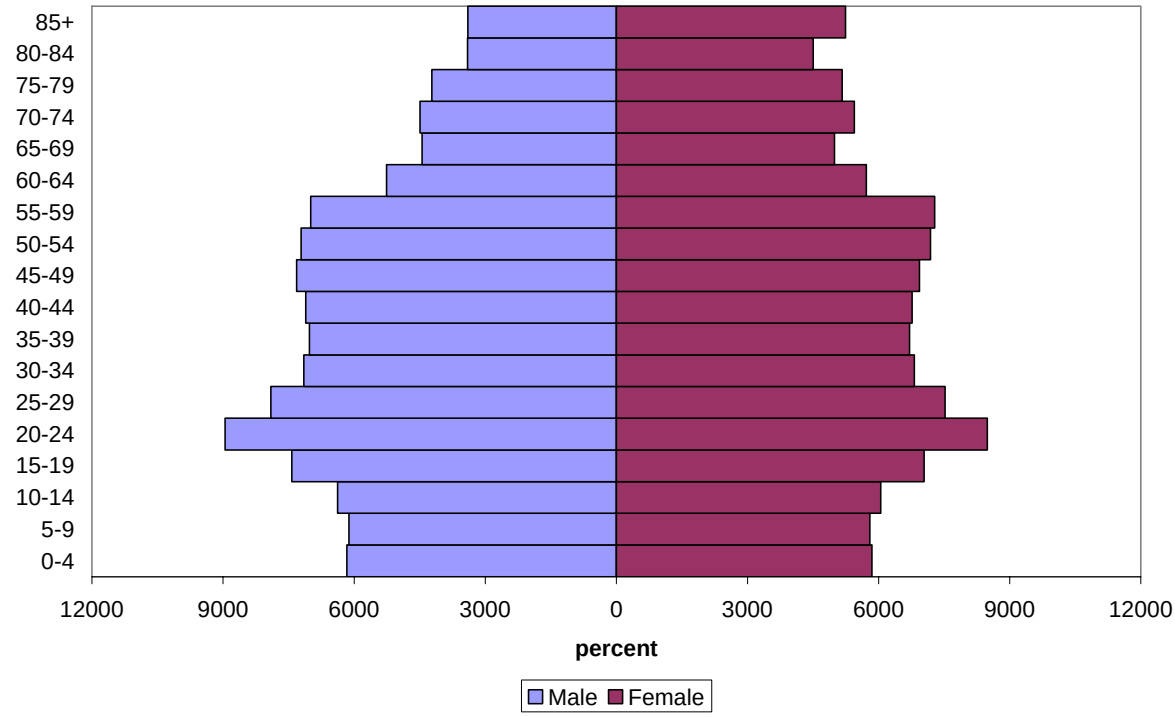


Figure A5: Age pyramid of the projected Hamilton Zone population 2031 (Scenario 4).

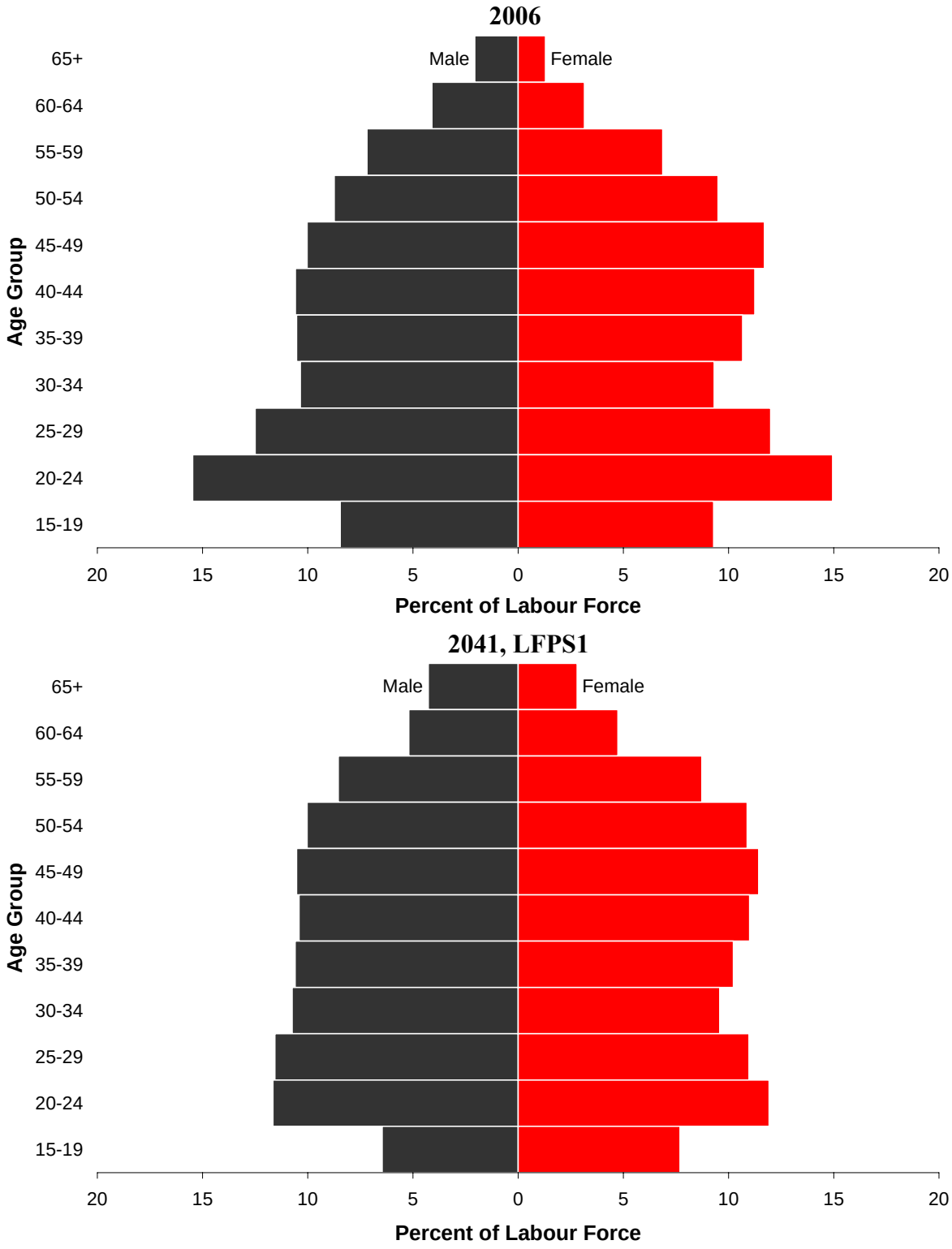
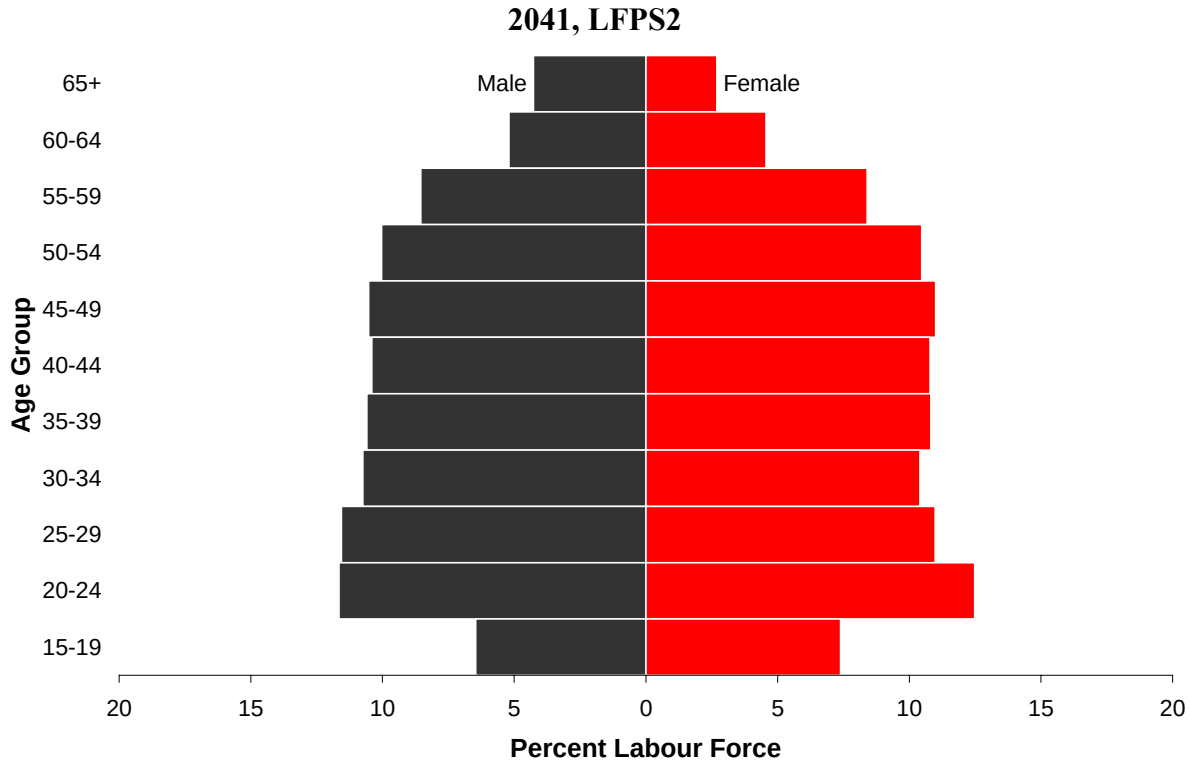
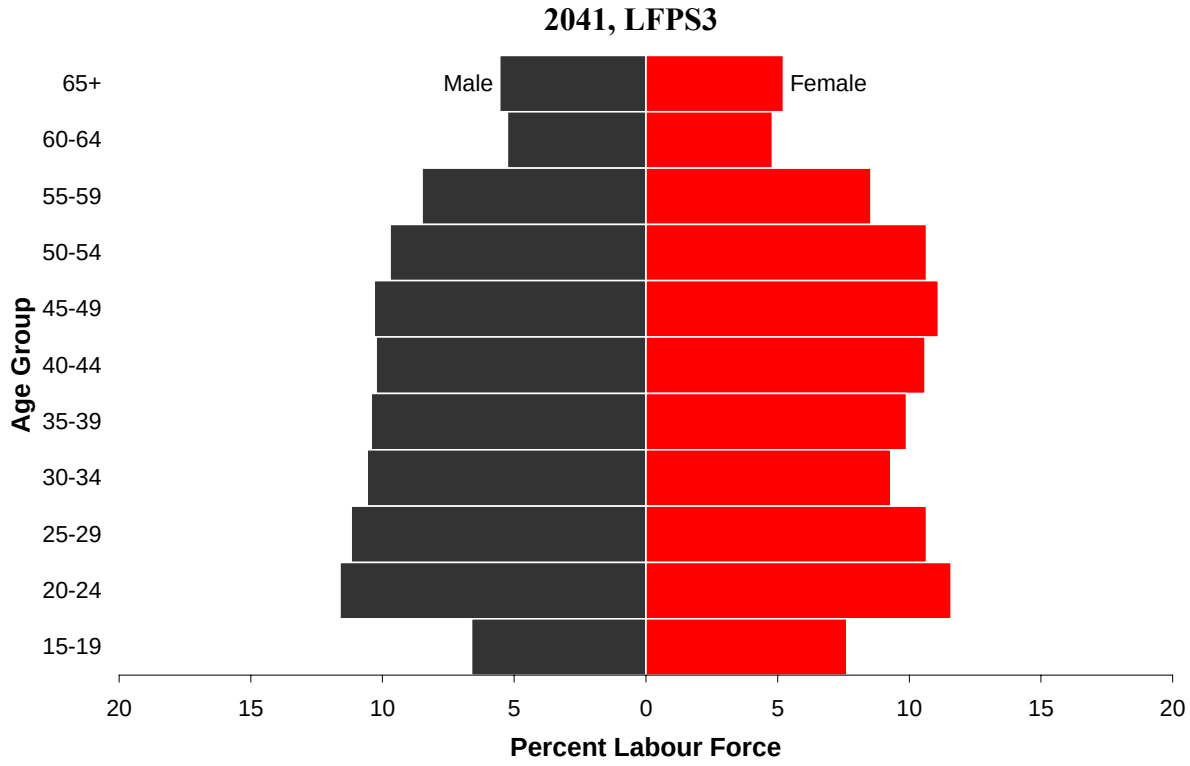


Figure A6: Hamilton City labour force projections 2006 – 2041, Age structure of the labour force 2006 and 2041

Figure A6 continued





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