Technical Note 48 – WRTM 2018 Update, 3 Stage Model Forecasts

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Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
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1 Introduction

The Waikato Regional Transportation Model (WRTM) suite includes:

- A 3-stage model of vehicle trips only which separately represents two-hour periods in the morning peak, interpeak, and evening peak periods.
- A 4-stage model of person trips which separately represents two-hour periods in the morning and interpeak periods. There is no PM peak 4-stage model.

Both models have been updated to reflect 2018 using input demographics from Census. Validation of the 3-stage model is reported in Technical Note 39, while Technical Note 47 documents the 4-stage model validation.

This technical note documents forecasts from the 3-stage model, including inputs and outputs. It is noted that the future year road networks and demographics are the same in the 3- and 4-stage models.

Forecast scenarios have been produced for the years 2025, 2035, 2045, and 2055.

2 Future Year Road Network

Changes to the road network were provided by the WRTM User Group members in differs forms and with different levels of detail.

Changes added for each forecast year in the Hamilton area are shown below. Changes included over time for other areas are provided in Appendix A, while Appendix B contains model extracts for each change.

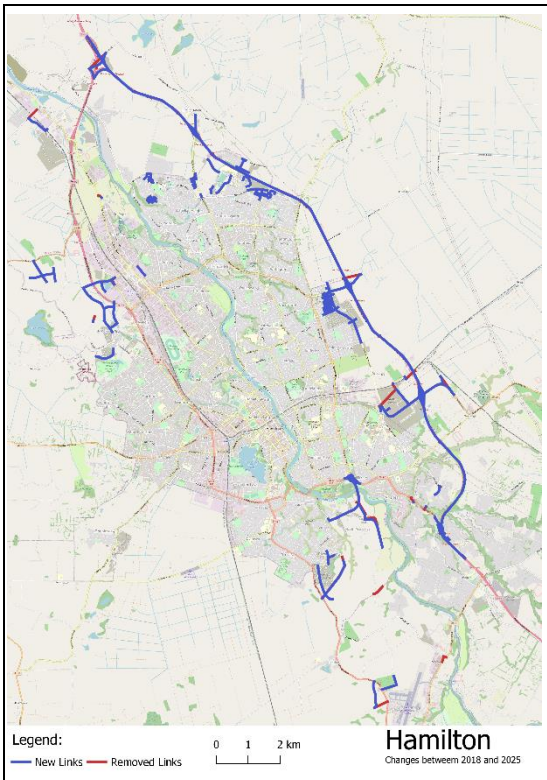


Figure 2-1: Changes in Hamilton added to 2025

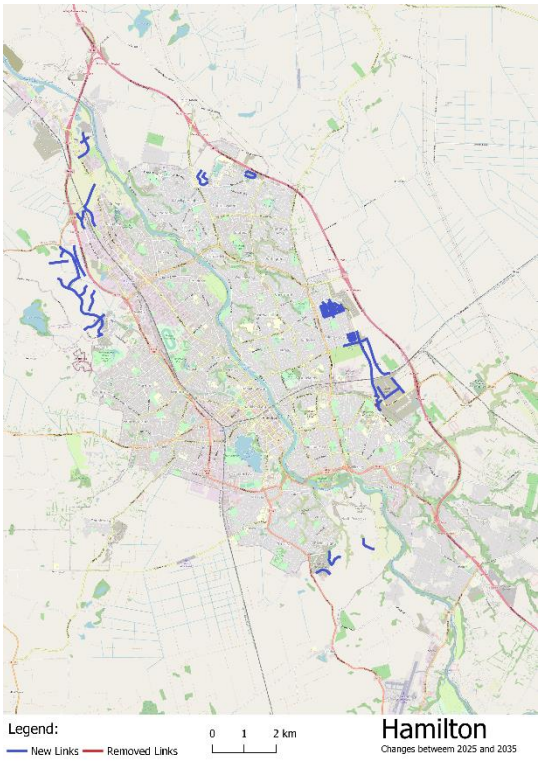


Figure 2-2: Changes in Hamilton added to 2035

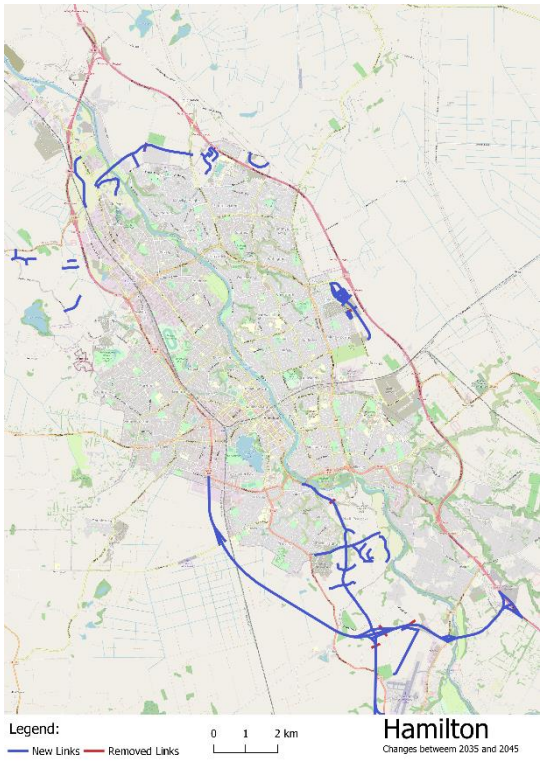


Figure 2-3: Changes in Hamilton added to 2045

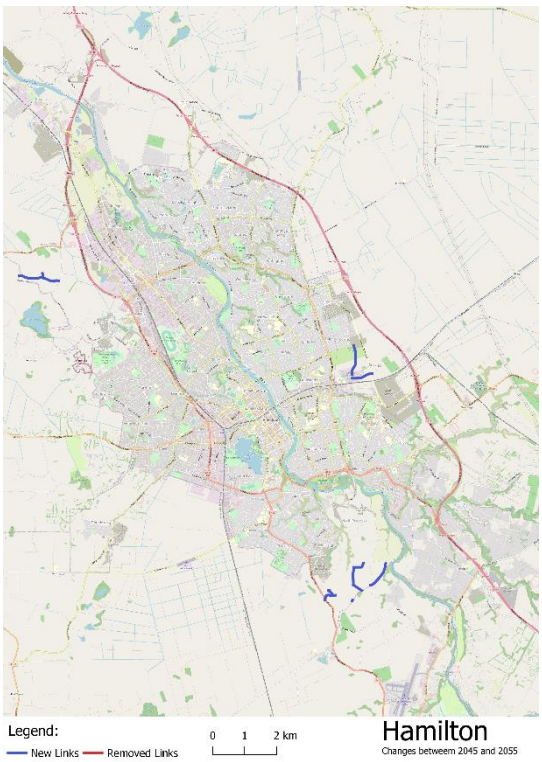


Figure 2-4: Changes in Hamilton added to 2055

A summary of the types of changes incorporated in the WRTM through to 2055 by area is provided in Table 2-1. This information is available by year if required.

Table 2-1 : Total changes over the four years

Type of change	Total							
Territorial Authority	New Roads	Intersection Changes	Speed Reductions	Lane Removal	Lane Addition	New Alignment	Road Closure	Total
Hamilton	117	25	0	0	0	4	5	151
Waikato	5	4	0	0	0	1	3	13
Waipa	51	13	0	3	0	4	0	71
Taupo	1	9	1	1	1	0	1	14
Matamata-Piako	19	3	0	0	0	0	0	22
Total	193	54	1	4	1	9	9	271

This shows that the majority of changes are new roads, many of which will be associated with new developments.

3 Future Year Demographics – Inputs and Processing

Two future demographic projections have been produced, which represent Medium and High growth scenarios.

The demographics required by zone for the WRTM are:

- Persons per household, which requires population
- Households
- Employees per household, which requires employees at the home end (similar to Census work force)
- Employment in total and by industry type
- School places for primary, secondary, and tertiary education

- Cars per household, which requires cars

The modelled area is shown in the figure below, with the Territorial Authority (TA) boundaries outlined in pink.

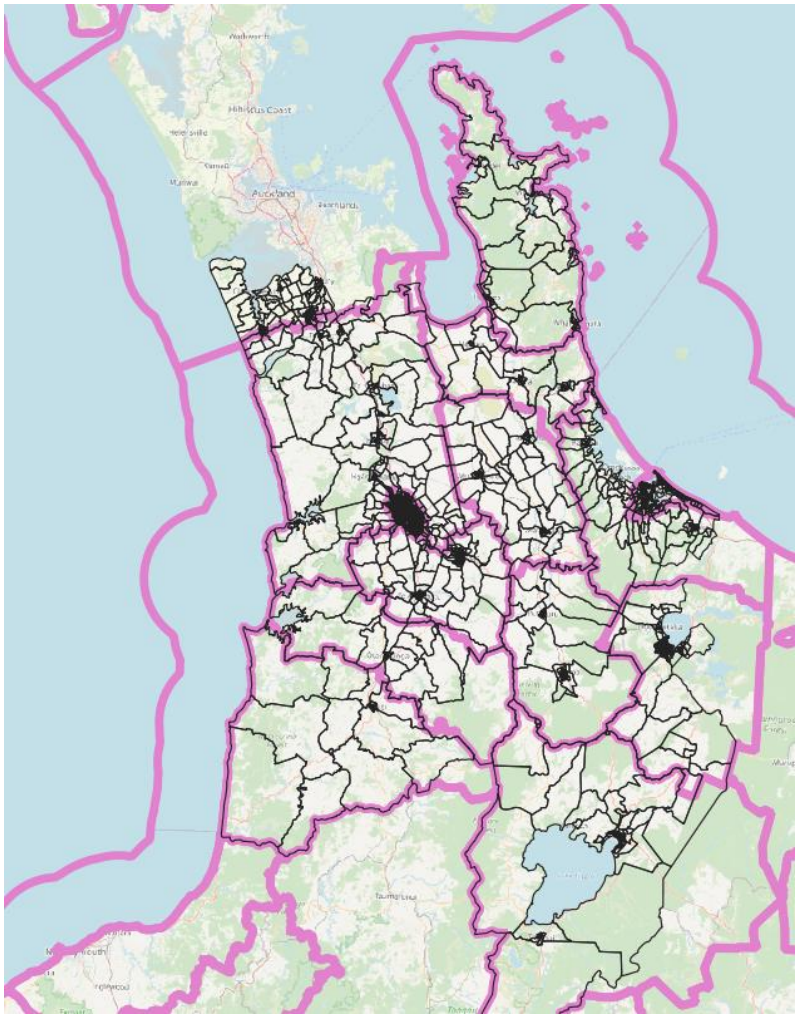


Figure 3-1: WRTM Coverage and TA Boundaries

The data sources and growth scenarios available are listed in the table below.

Table 3-1 : Data Sources and Growth Scenarios

Area	Data Source	Growth Scenario
Auckland	Auckland Forecasting Centre (AFC)	One scenario only provided by AFC (Scenario I Modified, ver 11.6); included in both Medium and High.
Waikato Region, excluding Hamilton and Waipa updates below	WISE, post processed by University of Waikato and Market Economics	Medium and High, WISE
Hamilton City	Hamilton City Council updated Pop and HH	
Waipa	Waipa District Council updated some Pop and HH	
Tauranga	Tauranga City Council (TCC)	One scenario only provided by TCC; included in both Medium and High
Western Bay of Plenty		
Rotorua	Statistics NZ (Rotorua Council projections on a longer timeline)	Medium and High, Statistics NZ

The primary data source for the demographic projections is the WISE (Waikato Integrated Scenario Explorer) land use model. WISE outputs are post-processed by the University of Waikato to produce population, households, and labour force, and by Market Economics to produce employment by type. WISE covers the Waikato Region and so other sources were required for the parts of Tauranga, Western Bay of Plenty, Rotorua, and Auckland within the WRTM.

It is important to note that for Auckland, Tauranga, and Western Bay of Plenty, only one growth scenario was provided. This means that the Medium and High growth scenarios contain the same demographics for these areas.

Processing by area is summarized in Table 3-2. The following technical notes are relevant:

- Technical Note 41, Waipa demographic changes (vs WISE)
- Technical Note 42, Auckland demographic processing
- Technical Note 43, Hamilton demographic changes (vs WISE)
- Technical Note 45, Tauranga and Western Bay of Plenty demographic processing
- Technical Note 46, Future Year Cars

Table 3-2 : Demographic Processing by Area

Area	Auckland	Waikato Region, excluding Hamilton and Waipa	Hamilton City	Waipa	Tauranga	Western Bay of Plenty	Rotorua
Population	Pop (2018 and future years) supplied by MSM zone. Interpolated for WRTM forecast years. MSM zones allocated to WRTM zones using area proportions and 2018 WRTM population proportions (many-to-many relationship). MSM pop allocated to WRTM zone using above relationship for 2018 and WRTM future years. Change in MSM pop between 2018 and 2025 added to 2018 WRTM pop. Same for change in subsequent years (2025->2035, etc)	WISE as supplied by UoW	Revised pop by WRTM zone provided for 2021 base year and WRTM future years. Disconnect between WRTM 2018 and HCC 2021 data. Process applied to take trends in HCC data and add to 2018 WRTM zonal data, maintaining overall totals. Means some difference by zone. Factoring by area applied to improve match between provided and processed data.	Diagrams provided with changes from one area to another. Applied using judgement, and pop/HH WRTM zonal ratios from WISE data.	Pop provided by SA2 for 2018 and future years. Interpolated to produce WRTM future years. SA2's split to WRTM zones using area proportions. Pop by SA2 allocated to WRTM zones using above proportions. Change in this pop between 2018 and 2025 added to 2018 WRTM pop. Same for change in subsequent years (2025->2035, etc)		Stats NZ pop projections by SA2 used. WRTM zones split across SA2 boundaries using area proportions. Some manual adjustment to account for greenfield areas applied using judgement. SA2-based percentage growth applied to 2018 WRTM pop by zone.
Households	Same as pop but using HHs	WISE as supplied by UoW	Same as pop but using HHs		Same as pop but using occupied dwellings change added to 2018 WRTM HHs		Pop growth factor applied to 2018 WRTM households by zone. Same process of spliting zones across SA2 boundaries.
Labour Force	2018 WRTM employee (labour force) to pop ratio (E/P) applied to future year pop. For zones with zero 2018 pop, 2018 overall average E/P ratio applied.	Ratio of WISE labour force to WISE population (both supplied by UoW) calculated for 2018 and future years for each TA. Ratio for each future year adjusted to account for difference WRTM vs WISE in 2018. Adjusted ratio by TA (for each future year) applied to future year pop by zone.			2018 WRTM employee (labour force) to pop ratio (E/P) applied to future year pop. For zones with zero 2018 pop, 2018 overall average E/P ratio applied.		Same as HHs. Applying pop growth to 2018 WRTM labour force
Employment (Total)	Same as pop but using total emp	WISE as supplied by ME			"New" total emp supplied for 2018 and 2048; "Old" total emp supplied for 5 year increments from 2021 to 2048. Both New and Old by TTSM zone. 2048 New/Old tot emp ratio applied to Old emp to create approximate "new" ("factored old"). Interpolated to produce WRTM forecast years.	No emp data provided. Apply growth in population by WRTM zone to 2018 WRTM total emp	Overall pop growth factor (Stats NZ, SA2 pop projections) applied to 2018 WRTM employment by type and total.

Area	Auckland	Waikato Region, excluding Hamilton and Waipa	Hamilton City	Waipa	Tauranga	Western Bay of Plenty	Rotorua
					Split from TTSM zones to WRTM zones using area proportions. Change from new 2018 emp to factored old emp future years added to 2018 WRTM emp by WRTM zone		
Employment (By Type)	2018 WRTM zonal emp by type divided by 2018 total emp to produce proportions by emp type. No zones with zero 2018 tot emp. These proportions applied to future year total emp to produce emp by type.	WISE as supplied by ME			2018 WRTM zonal emp by type divided by 2018 total emp to produce proportions by emp type. 2 zones had zero 2018 total emp; 1 used overall proportions, other used pattern from adjacent zone. These proportions applied to future year total emp to produce emp by type		
School Roll	- growth in children by age group calculated from WISE projections (5-9yrs, 10-14, and 15-19) for Waikato Region - outside of Waikato Region, Stats NZ data used for growth in people by above age groups - linear interpolation to produce other years - new schools identified from MoE data included - growth applied to schools by area (region) - adjustment applied for mismatch in 2018 MoE school enrollment by area vs 2018 population by age						
Tertiary Roll	similar process to schools - growth in eligble population by area applied to tertiary education establishments by area						
Cars	2018 and future year cars for Auckland, Waikato Region, and Bay of Plenty sourced online from MoT. Region-wide and not just area inside WRTM. 2018 and future year pop for Auckland, Waikato Region, and Bay of Plenty sourced oneline from Stats NZ medium projections. Region-wide and not just area inside WRTM. Both of above interpolated for WRTM forecast years. 2018 and future year cars per person calculated for Auckland, Waikato Region, and Bay of Plenty. 2018 disconnect between MoT/Stats NZ and WRTM cars per person. Future year cars per person adjusted to align with WRTM 2018 cars per person. WRTM zonal pop summed to Auckland, Waikato Region, and Bay of Plenty for each forecast year. Adjusted cars per person applied to WRTM pop to produce "target cars" for each forecast year and these 3 areas. 2018 cars per HH calculated for each WRTM zone. For zones with zero HH in 2018, District value of 2018 WRTM cars per HH used. 2018 cars per HH applied to future year HHs to produce first iteration future year cars by WRTM zone. First iteration cars (above) summed to Auckland, Waikato, and Bay of Plenty for each future year. Target cars divided by first iteraion cars (above) to produce adjustment factor for these 3 areas for each future year. Adjustment factor applied to WRTM zonal first iteration cars for each future year so that target cars by 3 areas are produced.						

4 Future Year Demographics – Outputs

Population and employment by area for the High and Medium growth scenarios are discussed below. Appendix C has graphs by area for population, households, persons per household, labour force, cars, and employment places for the High and Medium scenarios.

4.1 Population

The total population for the modelled area is graphed below by year for the Medium and High growth scenarios. Note that the modelled area is larger than the Waikato Region, including parts of Auckland, Tauranga, Western Bay of Plenty, and Rotorua.

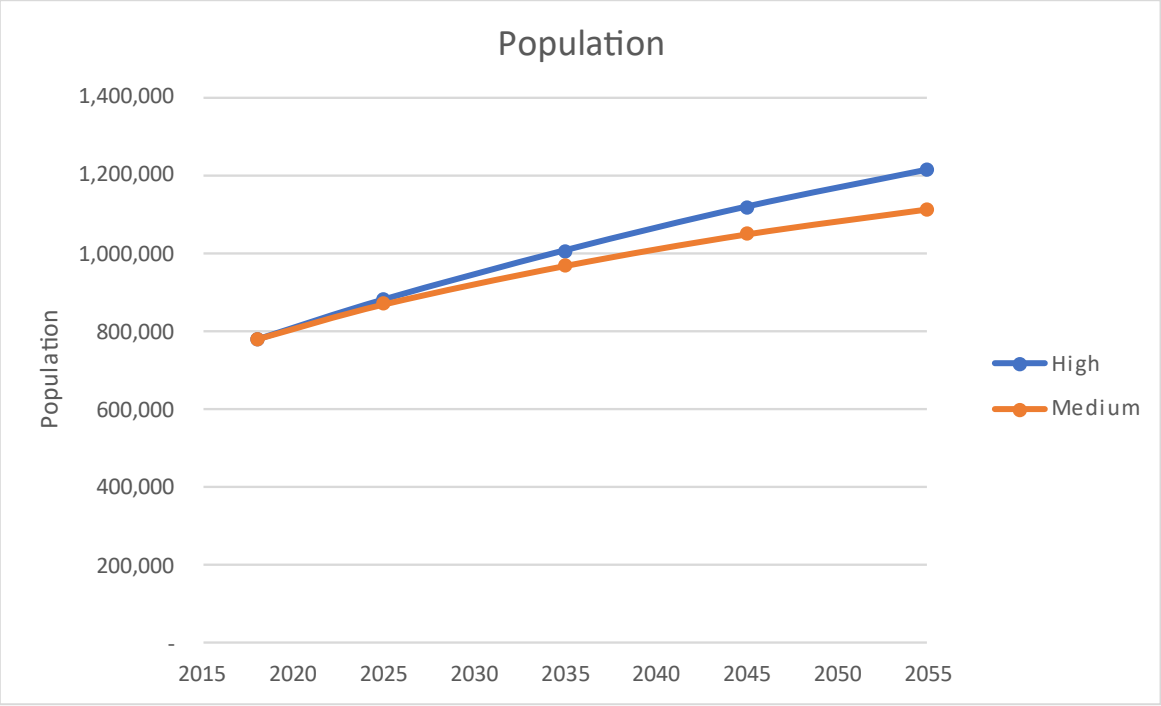


Figure 4-1: Total Population for Modelled Area by Year

For High growth, population is anticipated to increase by 435,000 people from 780,000 in 2018 to just over 1.2 million by 2055. This is a 56% increase from 2018. The Medium growth scenario has 335,000 additional people over the same period, reaching 1.1 million by 2055, a 43% increase. The two growth scenarios anticipate similar populations by 2035, with more disparity from 2045 onwards.

Population by area and year for the High growth scenarios is shown in the following table, including the year-to-year change. The same population data is illustrated in a bar graph in Figure 4-2.

Table 4-1: Population by Area (High)

	Population					Population Change				
TA	2018	2025	2035	2045	2055	2018-25	2025-35	2035-45	2045-55	2018-55
Auckland	52,485	66,642	91,941	111,887	124,173	14,158	25,299	19,946	12,286	71,688
Hamilton City	168,432	194,026	223,684	252,588	276,440	25,594	29,658	28,904	23,852	108,009
Hauraki District	20,024	22,224	23,544	25,457	27,602	2,200	1,320	1,913	2,145	7,578

TA	Population					Population Change				
	2018	2025	2035	2045	2055	2018-25	2025-35	2035-45	2045-55	2018-55
Matamata-Piako District	34,564	36,977	40,191	43,824	47,423	2,413	3,214	3,633	3,599	12,859
Otorohanga District	9,977	10,845	11,879	13,148	14,278	868	1,034	1,270	1,130	4,301
Rotorua District	69,632	77,090	83,662	89,778	95,727	7,458	6,572	6,116	5,949	26,095
South Waikato District	25,068	25,673	26,687	28,714	31,088	605	1,014	2,027	2,374	6,020
Taupo District	38,330	40,817	43,583	46,826	50,118	2,486	2,766	3,243	3,293	11,788
Tauranga City	142,711	160,664	183,595	201,448	217,422	17,953	22,931	17,853	15,973	74,711
Thames-Coromandel District	30,670	32,100	33,399	35,260	37,372	1,430	1,299	1,861	2,112	6,702
Waikato District	78,245	92,217	105,498	118,613	131,932	13,972	13,281	13,116	13,319	53,687
Waipa District	55,298	60,614	67,734	75,044	82,357	5,316	7,119	7,310	7,313	27,059
Waitomo District	9,816	9,826	10,082	10,653	11,472	11	255	571	819	1,656
Western Bay of Plenty District	44,466	52,034	61,664	65,107	65,525	7,569	9,630	3,442	419	21,060
Total	**779,717**	**881,749**	**1,007,142**	**1,118,347**	**1,212,930**	**102,033**	**125,393**	**111,205**	**94,584**	**433,214**

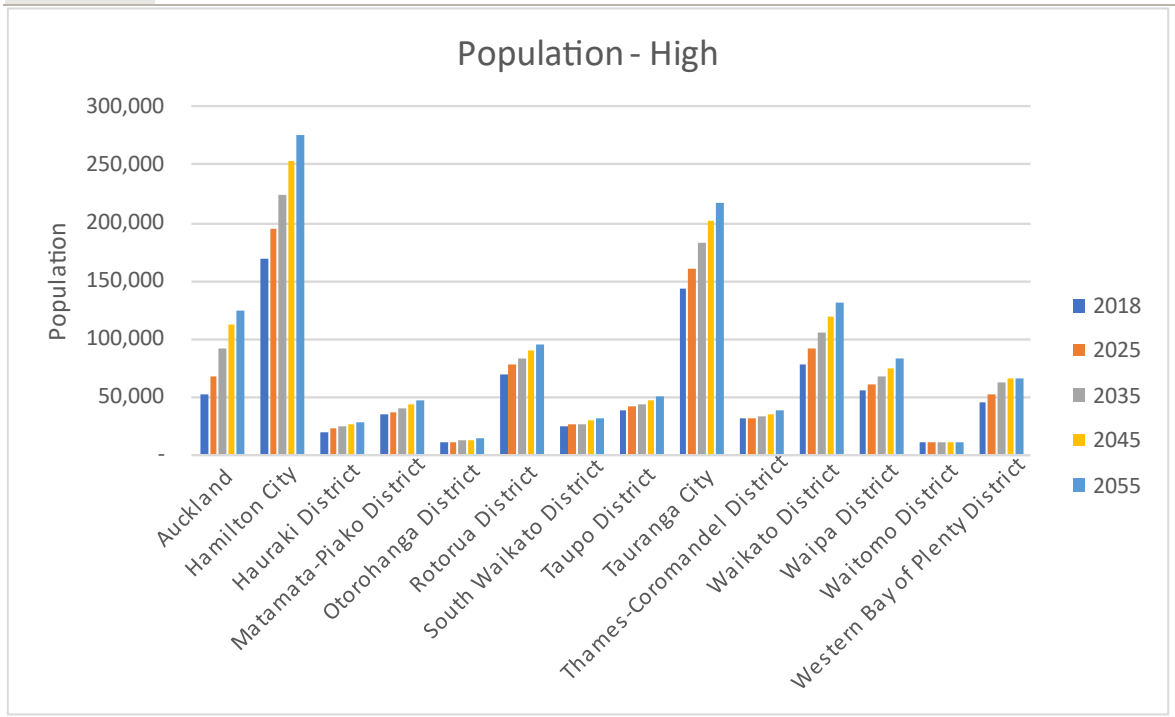


Figure 4-2: Population by Area – High

For the High growth scenario:

- A quarter of the growth between 2018 and 2055 occurs in Hamilton, followed by Tauranga and Auckland with 17% each. These three areas account for 60% of the population growth over this period.
- In contrast, minimal growth is expected in Otorohanga and Waitomo Districts.
- Looking at the percentage change in population from 2018 to 2055 by area, Auckland dominates with a 137% increase and an additional 72,000 people. This is followed by Waikato District with a 69% increase and Hamilton with 64%. Numerically, Hamilton still dominates with 100,000 extra people expected by 2055.

The same data is provided below for the Medium growth scenario.

Table 4-2: Population by Area (Medium)

	Population					Population Change				
TA	2018	2025	2035	2045	2055	2018-25	2025-35	2035-45	2045-55	2018-55
Auckland	52,485	65,618	90,195	109,570	121,517	14,143	25,265	19,919	12,269	71,595
Hamilton City	168,432	191,545	212,866	231,959	248,001	23,113	21,321	19,093	16,043	79,570
Hauraki District	20,024	21,728	22,170	23,115	24,192	1,704	442	944	1,077	4,167
Matamata-Piako District	34,564	36,150	37,796	39,651	41,398	1,586	1,646	1,855	1,748	6,834
Otorohanga District	9,977	10,575	11,168	11,922	12,536	598	593	754	614	2,559
Rotorua District	69,632	74,444	76,932	78,475	79,514	4,812	2,487	1,543	1,039	9,882
South Waikato District	25,068	25,136	25,147	26,047	27,181	69	11	900	1,134	2,113
Taupo District	38,330	39,925	40,990	42,376	43,674	1,595	1,065	1,386	1,298	5,344
Tauranga City	142,711	160,664	183,595	201,448	217,422	17,953	22,931	17,853	15,973	74,711
Thames-Coromandel District	30,670	31,411	31,455	31,973	32,702	741	45	518	729	2,032
Waikato District	78,245	88,641	98,056	106,733	114,882	12,154	9,415	8,677	8,149	38,394
Waipa District	55,298	59,330	63,763	68,036	71,935	4,031	4,433	4,274	3,899	16,637
Waitomo District	9,816	9,618	9,487	9,637	9,954	(197)	(132)	151	317	138
Western Bay of Plenty District	44,466	52,034	61,664	65,107	65,525	7,569	9,630	3,442	419	21,060
Total	**779,717**	**866,820**	**965,284**	**1,046,050**	**1,110,432**	89,871	99,152	81,309	64,705	335,037

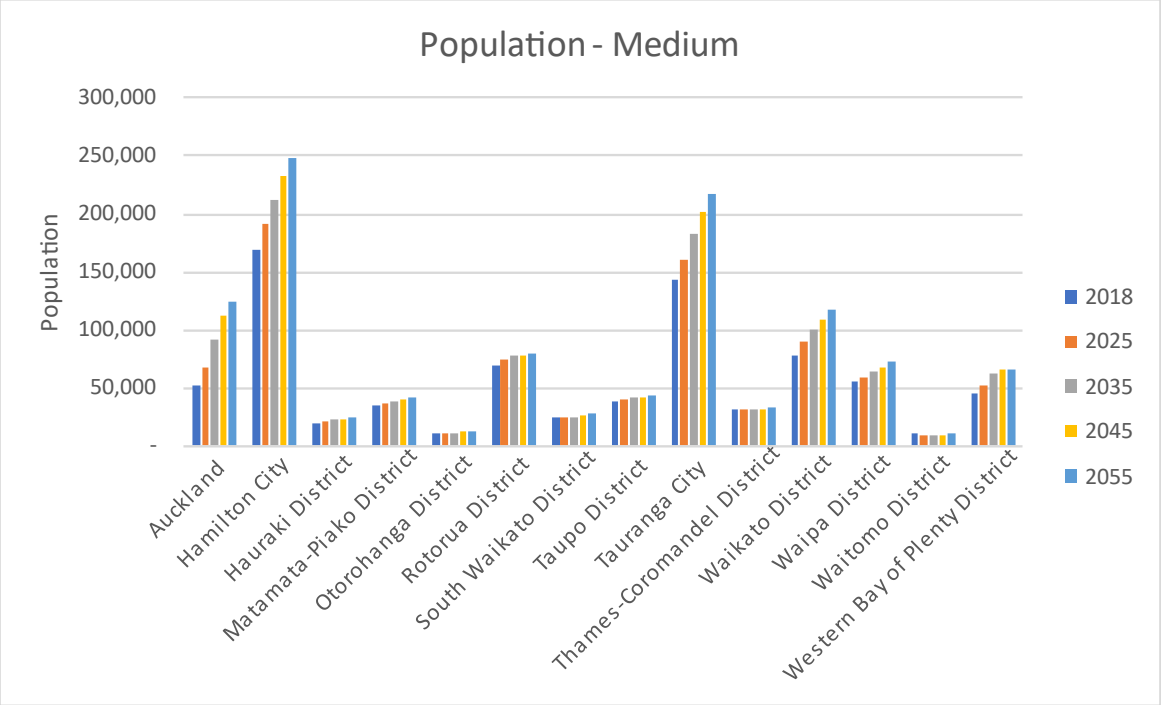


Figure 4-3: Population by Area - Medium

The pattern is different for Medium growth because Tauranga and Auckland demographics are the same as in High, which means their comparative impact changes. Key points for Medium growth are:

- The same as the High scenario, a quarter of the growth between 2018 and 2055 occurs in Hamilton. Tauranga and Auckland play a bigger role with 22% and 21% of the total increase to 2055 respectively. These three areas account for 67% of the population growth over this period.
- In contrast, minimal growth is expected in Otorohanga District (similar trend to the High scenario but less growth), and no growth in Waitomo District. Distinct in the Medium scenario, Hauraki, South Waikato, and Thames-Cromandel Districts all have population increases to 2055 of less than 5,000 additional people.
- Looking at the percentage change in population from 2018 to 2055 by area, Auckland dominates with a 136% increase and an additional 72,000 people. This is followed by Tauranga City with a 52% increase, Waikato District with 49%, then Western Bay of Plenty and Hamilton both with 47% growth between 2018 and 2055. Numerically, while Hamilton has the most expected extra people (80,000) between 2018 and 2055, this is followed closely by Tauranga City (74,000), and Auckland (72,000).

4.2 Employment

The total employment (work end) for the modelled area is graphed below by year for the Medium and High growth scenarios. The definition of employment is the same as Census, which is different to the definition applied to post-process WISE employment data for other uses.

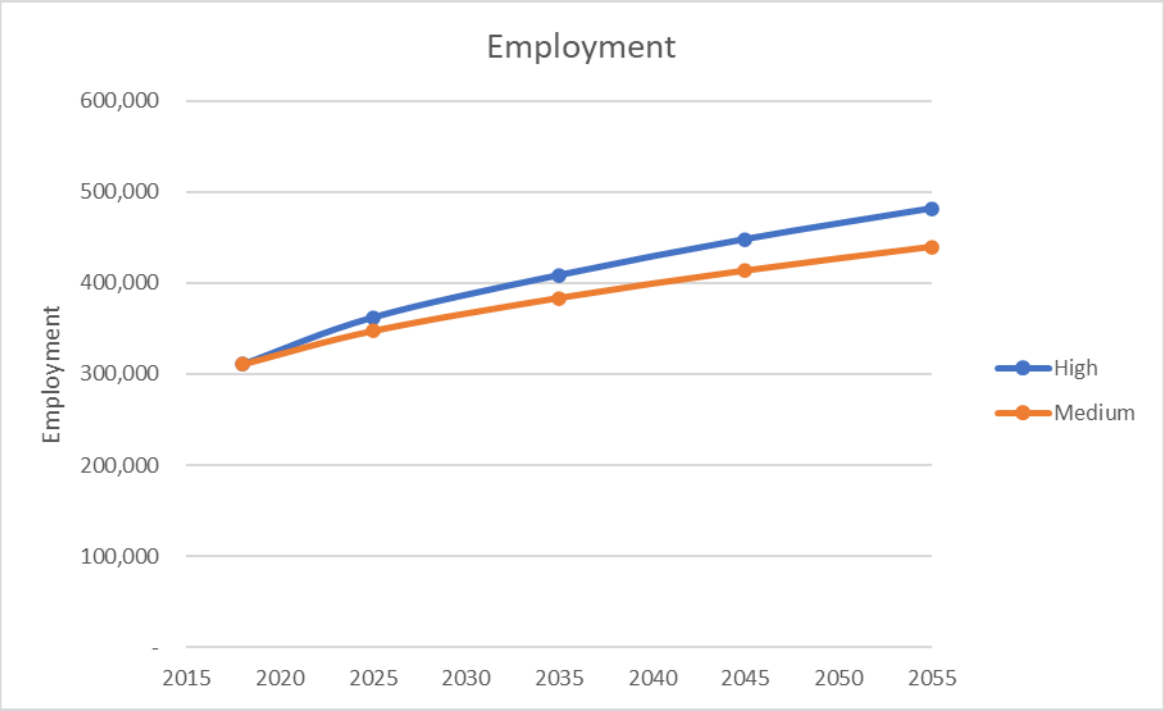


Figure 4-4: Total Employment for Modelled Area by Year

Between 2018 and 2055, the High growth scenario anticipates 170,000 more jobs while Medium has 130,000 more.

While it can be seen that the total number of jobs increases, the increase in the workforce also needs to be considered. The total employment places per employee are shown in the figure below.

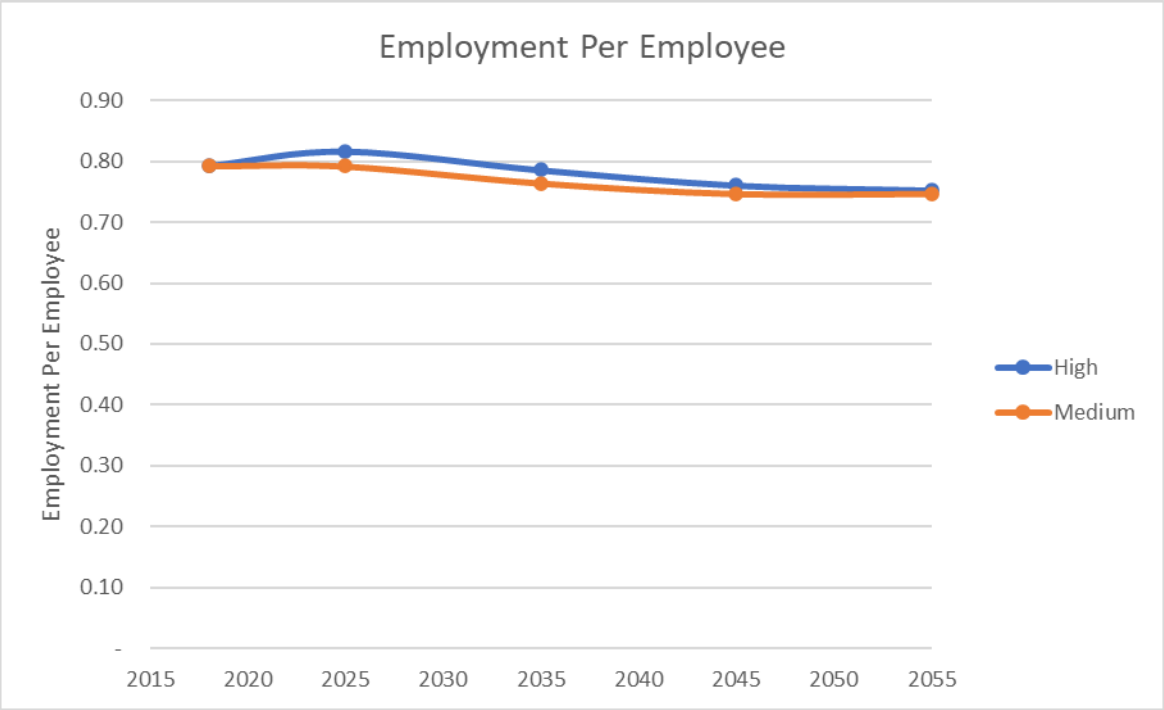


Figure 4-5: Employment per Employee for Modelled Area by Year

From Figure 4-5 it can be seen that there will be less jobs per employee in the future. The WRTM does not explicitly consider the rate of unemployment over time. Employment places are treated relative to each other to allocate trips around the network, so a reduced number of employment places input to the model will not lead to fewer work trips.

Total employment by area and year for the High growth scenarios is shown in the following table, including the year-to-year change. The same population data is illustrated in a bar graph in Figure 4-6.

Table 4-3: Employment by Area (High)

TA	Employment					Employment Change				
	2018	2025	2035	2045	2055	2018-25	2025-35	2035-45	2045-55	2018-55
Auckland	17,355	24,838	29,452	33,229	36,018	7,483	4,614	3,777	2,789	18,663
Hamilton City	79,419	89,943	101,809	111,801	120,398	10,524	11,866	9,992	8,597	40,979
Hauraki District	7,138	7,931	8,647	9,130	9,710	793	716	483	580	2,572
Matamata-Piako District	15,328	17,605	18,869	20,014	20,851	2,277	1,264	1,145	837	5,523
Otorohanga District	3,883	4,799	5,072	5,391	5,564	916	273	319	173	1,681
Rotorua District	25,411	28,279	30,758	32,999	35,203	2,868	2,479	2,241	2,204	9,792
South Waikato District	8,839	9,750	10,898	11,447	11,952	911	1,148	549	505	3,113
Taupo District	16,523	18,840	20,323	21,501	22,444	2,317	1,483	1,178	943	5,921
Tauranga City	61,896	69,097	78,395	86,918	94,759	7,201	9,298	8,523	7,841	32,863
Thames-Coromandel District	11,910	13,480	14,686	16,088	16,934	1,570	1,206	1,402	846	5,024
Waikato District	23,573	28,847	33,054	36,340	39,468	5,274	4,207	3,286	3,128	15,895
Waipa District	22,079	24,971	27,682	30,464	32,435	2,892	2,711	2,782	1,971	10,356
Waitomo District	4,444	4,956	5,429	5,787	6,033	512	473	358	246	1,589
Western Bay of Plenty District	13,214	19,065	23,715	27,031	29,885	5,851	4,650	3,316	2,854	16,671
Total	**311,011**	**362,401**	**408,789**	**448,140**	**481,654**	**51,390**	**46,388**	**39,351**	**33,514**	**170,643**

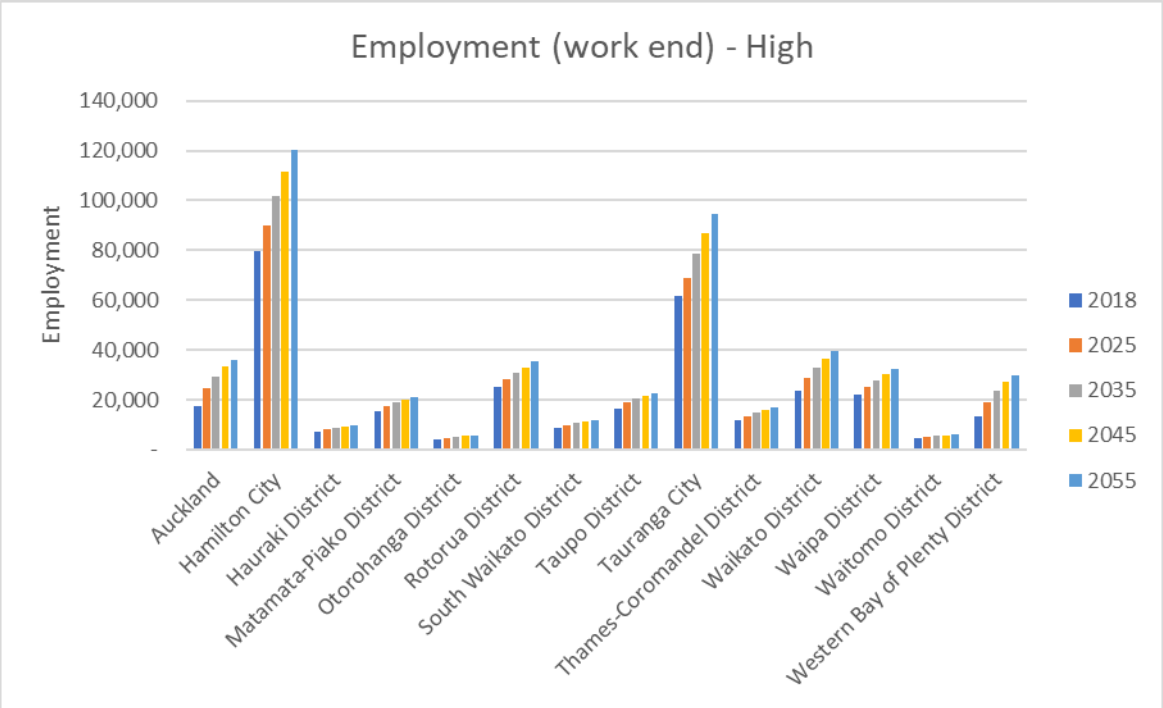


Figure 4-6: Employment by Area – High

For the High growth scenario:

- Quarter of the growth between 2018 and 2055 is anticipated to occur in Hamilton, followed by Tauranga and Auckland and Western Bay of Plenty. These four areas account for 64% of the employment increase between 2018 and 2055.
- In 2055, 25% of the total employment in the modelled area is in Hamilton, marginally less than the 26% for 2018.
- Hamilton and Tauranga combined account for 45% of total employment in both 2018 and 2055.

Total employment by area for the Medium growth scenario is provided in Table 4-4 including the year-to-year change, with employment also shown graphically in Figure 4-7.

Table 4-4: Employment by Area (Medium)

	Employment					Employment Change				
TA	2018	2025	2035	2045	2055	2018-25	2025-35	2035-45	2045-55	2018-55
Auckland	17,355	24,443	28,800	32,334	34,933	7,088	4,357	3,534	2,599	17,578
Hamilton City	79,419	85,489	93,970	101,292	107,142	6,070	8,481	7,322	5,850	27,723
Hauraki District	7,138	7,358	7,733	7,956	8,156	220	375	223	200	1,018
Matamata-Piako District	15,328	16,448	17,346	17,900	18,333	1,120	899	553	433	3,005
Otorohanga District	3,883	4,329	4,524	4,688	4,815	446	195	164	127	932
Rotorua District	25,411	27,337	28,400	29,040	29,457	1,927	1,062	640	417	4,046
South Waikato District	8,839	9,212	9,619	9,893	10,664	373	407	273	771	1,825

TA	Employment					Employment Change				
	2018	2025	2035	2045	2055	2018-25	2025-35	2035-45	2045-55	2018-55
Taupo District	16,523	17,692	18,623	19,291	19,927	1,169	931	668	636	3,404
Tauranga City	61,896	69,017	78,250	86,713	94,487	7,121	9,232	8,464	7,774	32,591
Thames-Coromandel District	11,910	12,579	13,256	13,805	14,211	669	677	549	406	2,301
Waikato District	23,573	26,574	29,304	31,679	33,585	3,001	2,730	2,375	1,906	10,012
Waipa District	22,079	23,337	25,132	26,750	28,364	1,257	1,795	1,618	1,614	6,285
Waitomo District	4,444	4,715	4,961	5,226	5,468	271	246	265	242	1,024
Western Bay of Plenty District	13,214	18,940	23,506	26,769	29,586	5,726	4,566	3,263	2,817	16,372
Total	311,011	347,470	383,425	413,337	439,128	36,459	35,954	29,912	25,791	128,117

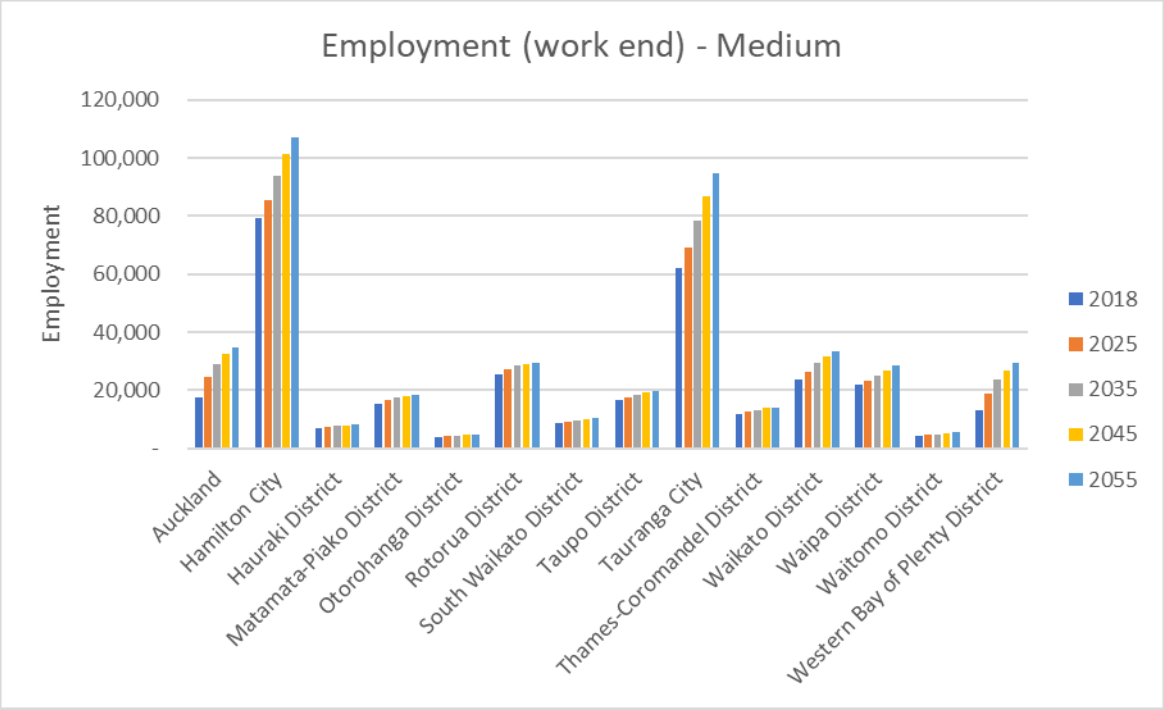


Figure 4-7: Employment by Area – Medium

Again, there is a different pattern in the Medium growth scenario because Auckland and Tauranga demographics are identical to High. Key points for the Medium scenario are:

- While in the High scenario, most of the employment growth occurred in Hamilton, that is not the case for Medium. Tauranga has 25% of the growth in employment, followed by Hamilton with 22%, then Auckland (14%) and Western Bay of Plenty (13%). These four areas account for 74% of the increase in total employment between 2018 and 2055.
- In 2055, 24% of the total employment in the modelled area is in Hamilton, less than the 26% for 2018.
- Numerically, total 2055 employment in Tauranga (94,000) is just less than Hamilton (107,000). These two areas have 46% of the total employment in the modelled area in 2055 (45% in 2018).

5 Change in Auckland External Trips

Internally generated trips for some trips purposes are attracted to the northern external of the WRTM to represent interaction with Auckland. The coefficients in the attraction models for inbound and outbound trips were documented in Section 4.4 of "Technical Note 39 – WRTM 2018 Census Model Validation Update - Model Building Report", and reproduced in Table 5-1 to Table 5-3 below. "Outbound" in this section refers to outbound from the WRTM, i.e. towards Auckland.

Table 5-1: External Coefficients related to Auckland - AM

Trip Purpose	Trip Purpose Code	Inbound External	Outbound External
Home to work	HTW	-	0.579
Home to education	HTEd	-	0.049
Home to business	HTB	-	0.071
Home to shop	HTSh	-	0.052
Home to other	HTO	-	0.045
Non home based	NHB	-	-
Other to home	OTH	0.035	-

Table 5-2: External Coefficients related to Auckland - IP

Trip Purpose	Inbound External	Outbound External
HTW	-	0.400
HTB	-	0.255
HTSh	-	0.424
HTO	-	0.400
NHB	-	-
WTH	0.400	-
BTH	0.255	-
ShTH	0.424	-
OTH	0.400	-

Table 5-3: External Coefficients related to Auckland - PM

Trip Purpose	Inbound External	Outbound External
HTSh	-	-
HTSocRec	-	-
HTO	-	0.310
HTB	-	-
WTH	0.410	-
EdTH	0.089	-
BTH	0.027	-

Trip Purpose	Inbound External	Outbound External
ShTH	0.044	-
OTH	0.089	-

These coefficients are multiplied by an input number of Auckland jobs. In the 2013 validated version of the WRTM ("previous version"), a single number of Auckland jobs was used for both directions of travel, noting this varied by peak period. For the 2018 validated version of the WRTM, different Auckland jobs have been specified for the inbound and outbound directions. While this may appear unusual, it reflects a different coefficient value, and rather than change the coefficients, it was simpler to change the input land use.

The Auckland jobs input to the model are shown in Table 5-4 for each peak period, direction, and year. The 2018 external Auckland jobs are increased for each future year based on the increase in Auckland jobs provided by the MSM.

Table 5-4: Auckland Attracting Land Use

Period	Direction	2018	2025	2035	2045	2055
AM	Inbound	4195	4518	4979	5579	5902
	Outbound	3595	3871	4267	4781	5058
IP	Inbound	5904	6359	7008	7852	8307
	Outbound	5704	6144	6770	7586	8026
PM	Inbound	5035	5422	5976	6697	7084
	Outbound	2835	3053	3365	3771	3988

6 Model Convergence

6.1 New convergence process

The current forecasts have proved to be less stable than previously in terms of reaching a converged situation. So the method of averaging the time and distance matrices between iterations has been changed in the WRTM 2018 3-stage model to improve convergence and reduce run-times.

Previously, the model would take:
- 50 percent of the current total matrix
- 50 percent of the previous total matrix

The new method:
- 25 percent of the current total matrix
- 75 percent of the previous average matrix

The same result would be reached; however, the new method is more efficient in terms of convergence.

6.2 Convergence Parameters

When checking convergence, the process is to check the difference between the current and previous iterations in terms of total vehicle trips, vehicle minutes travelled, and vehicle kilometres travelled. For the vehicle minutes and vehicle kilometres, the difference must be less than the values in Table 6-1 (where IP represents interpeak). For total trips, the previous run must equal the current run, and for vehicle kilometres, the difference must be positive, to illustrate the trips moving in the same direction as the previous run.

Table 6-1: Convergence parameters

Maximum difference allowed between previous run and current										
Year	2018		2025		2035		2045		2055	
	Veh-Min	Veh-Km	Veh-Min	Veh-Km	Veh-Min	Veh-Km	Veh-Min	Veh-Km	Veh-Min	Veh-Km
AM	3100	3100	3400	3400	3900	3800	4300	4200	4800	4600
IP	2800	2800	3100	3100	3600	3500	4000	3900	4300	4300
PM	3800	3600	4200	4300	4900	4600	5600	5200	6400	5700

After each iteration, the vehicles kilometers travelled (Veh-Km) and vehicle minutes travelled (Veh-Min) are compared to the previous iteration. The model continues to iteratively recalculate demand until the differences are less than listed in Table 6-1 for each period and year. The convergence results are listed in Table 6-2, for medium and high land use projections in 2055.

Table 6-2: 2055 convergence results

Difference, Current vs Previous Iteration						
2055	Med			High		
	Trips	Veh-Min	Veh-Km	Trips	Veh-Min	Veh-Km
AM	0	1998	3690	0	1481	146
IP	0	1100	415	0	1608	71
PM	0	4074	2927	0	4093	5603

All other periods and future year converged within the parameters shown in this section. The convergence results are available if required but are not provided here to minimize reporting.

7 Resulting Traffic Flows

This section documents the results, focusing on changes over time in terms of level of service (road and intersection), vehicle-kilometers travelled, and vehicle minutes travelled.

Table 7-1 and Figure 7-1 outline the number of intersections experiencing level of service C to F in the WRTM area for the AM and PM peak periods in the High growth scenario. Intersections with level of service A or B are not reported as they are considered to perform acceptably. Medium growth is also not reported as levels of service are generally better, and so as not to overwhelm the reporting. The interpeak period is excluded as it generally performs better than the peak periods.

Table 7-1: Level of Service, Intersection count, High growth prediction

LOS	2025	2035	2045	2055
AM Peak – Intersection Numbers				
C	486	486	521	524
D	75	74	86	103
E	35	36	45	41
F	57	59	75	92
PM Peak – Intersection Numbers				
C	573	555	589	616

D	57	93	126	141
E	95	57	66	75
F	105	112	140	171

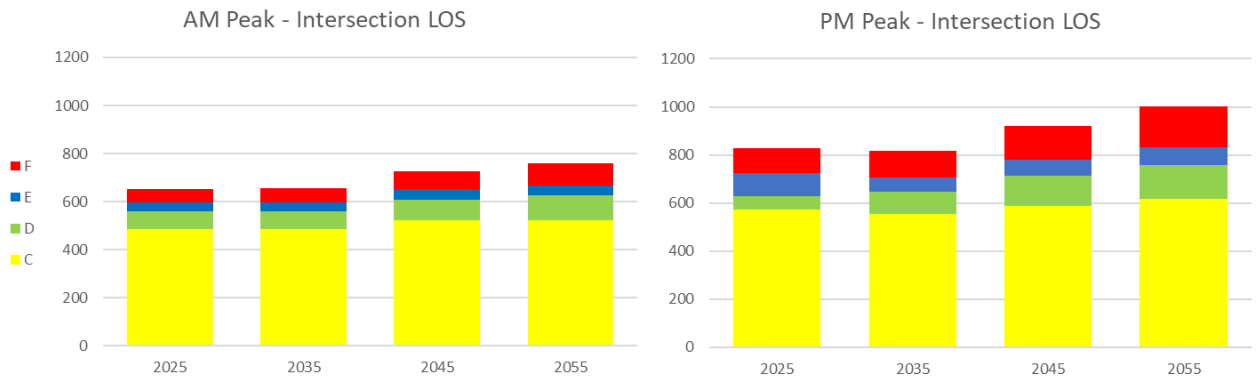


Figure 7-1: Level of Service, Intersection count

For all forecast years, the PM peak has more intersections performing at a worse level of service than the AM peak, and this reflects higher traffic flows in the PM peak. Performance in 2025 and 2035 is similar, with a worsening of conditions in 2045 and then 2055.

Table 7-2 and Figure 7-2 represent the length of road (link) in kilometres experiencing levels of service C to F in all years for the AM and PM peak periods. Again, medium growth, the interpeak period, and roads performing at level of service A or B are excluded to focus the reporting.

Table 7-2: Level of Service, Road Kilometres

LOS	2025	2035	2045	2055
AM Peak – Road Km				
C	203	205	262	295
D	97	100	139	191
E	78	80	99	123
F	23	28	56	70
PM Peak – Road Km				
C	175	172	203	265
D	126	133	156	195
E	68	79	159	226
F	175	172	203	265

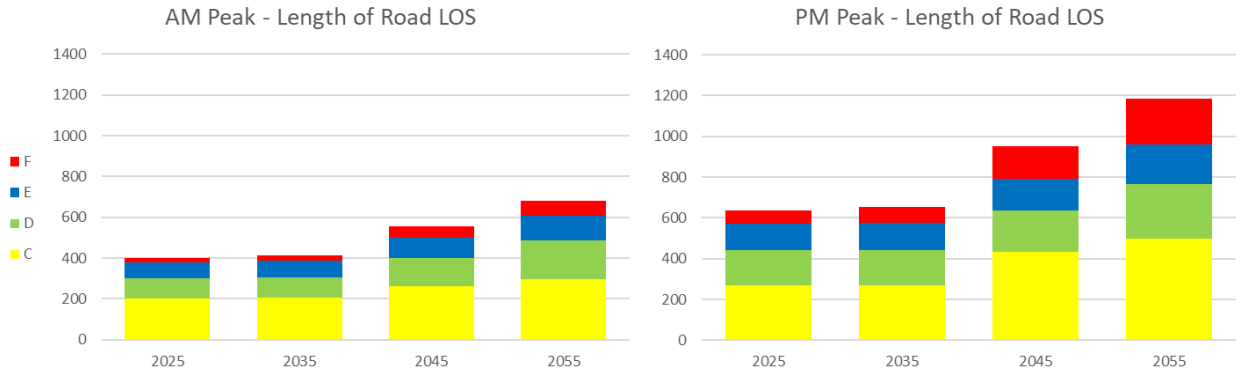


Figure 7-2: Level of Service, Road Kilometres

For roads, the results are similar to intersections. The PM peak shows worse level of service than the AM peak due to higher traffic flows. Performance in 2025 and 2035 is similar, with a step change in operating conditions in 2045 and then 2055.

Figure 7-3Figure 7- to Figure 7-10 below show the road and intersection level of service graphically for the Hamilton area in the AM and PM peak periods for the High growth scenario. The interpeak period and Medium growth scenarios are excluded as they generally perform better, and to focus the reporting. The diagrams centre on Hamilton as plotting the full modelled area results in a loss of detail.

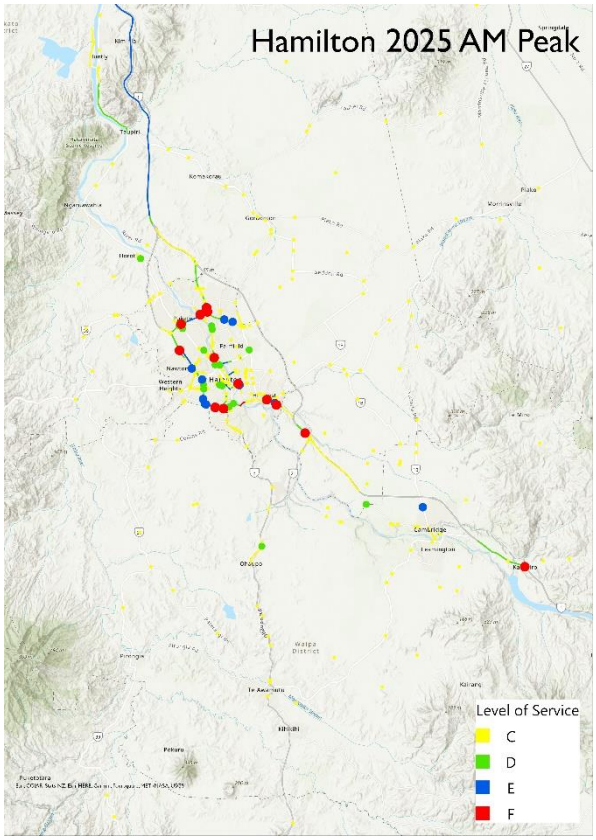


Figure 7-3: LOS, Hamilton Area, 2025 AM

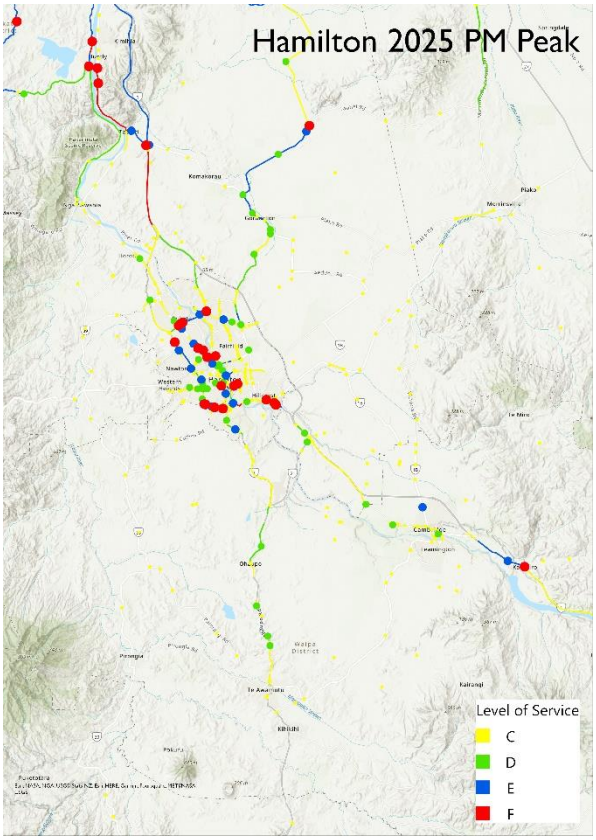


Figure 7-4: LOS, Hamilton Area, 2025 PM

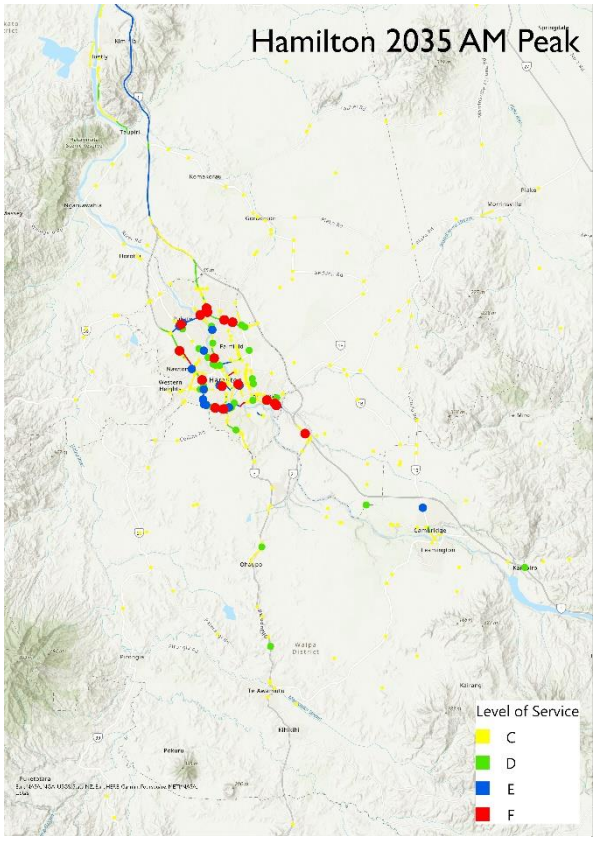


Figure 7-5: LOS, Hamilton Area, 2035 AM

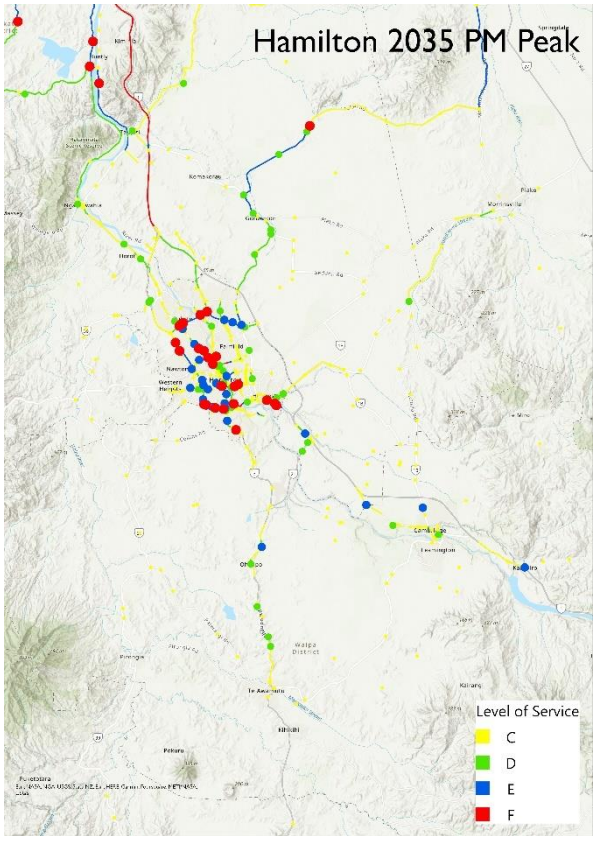


Figure 7-6: LOS, Hamilton Area, 2035 PM

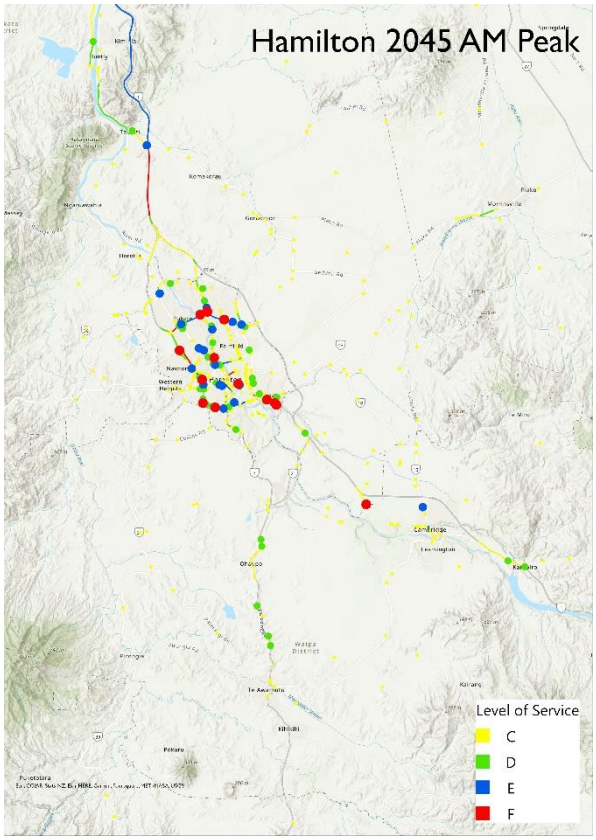


Figure 7-7: LOS, Hamilton Area, 2045 AM

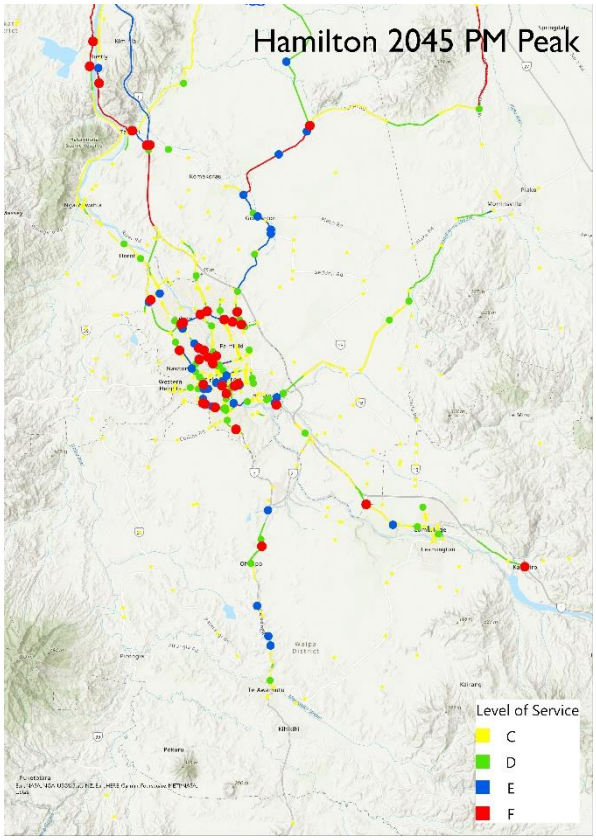


Figure 7-8: LOS, Hamilton Area, 2045 PM

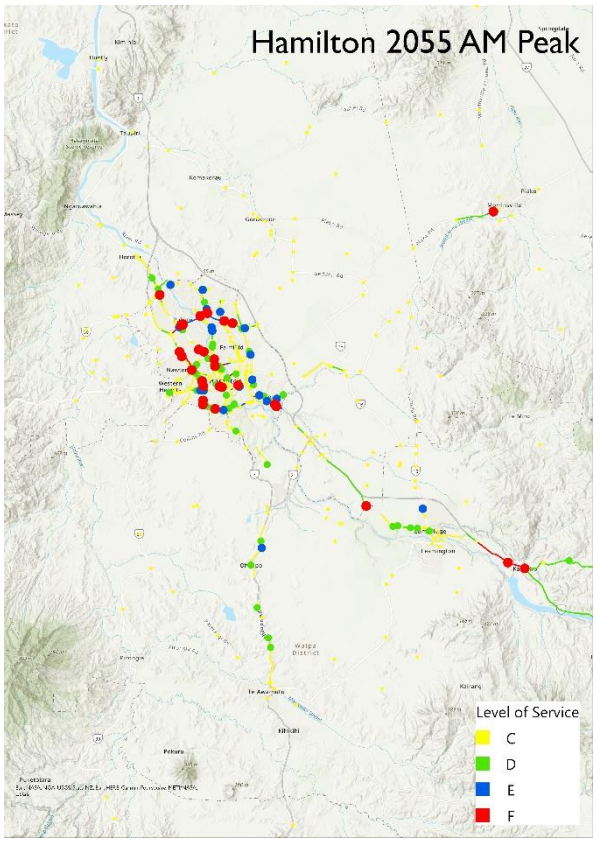


Figure 7-9: LOS, Hamilton Area, 2055 AM

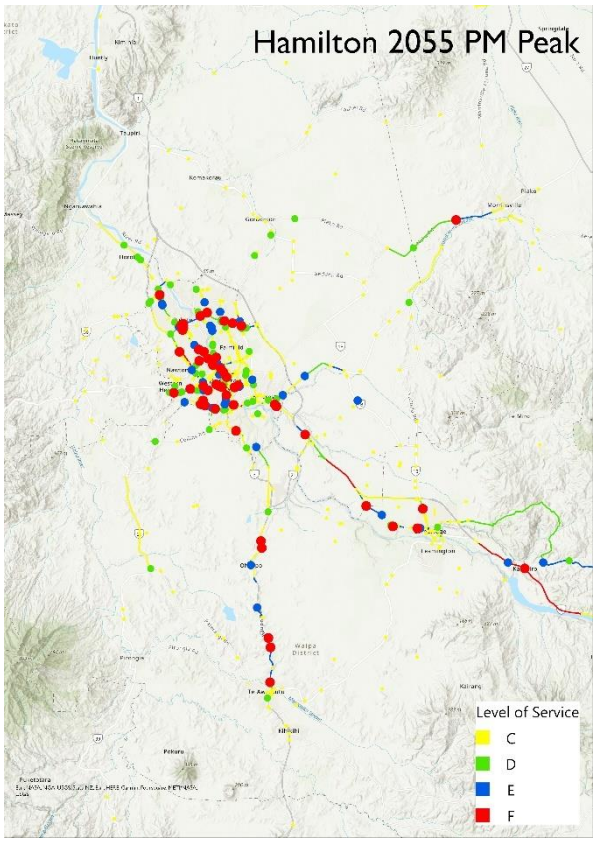


Figure 7-10: LOS, Hamilton Area, 2055 PM

Table 7-3 outlines summary statistics for all three modelled periods, the base year and the four forecast years, for the High growth scenario. This shows vehicle-kilometers travelled (Veh-Km), vehicle-minutes travelled (Veh-Mins), and the mean speed across the model.

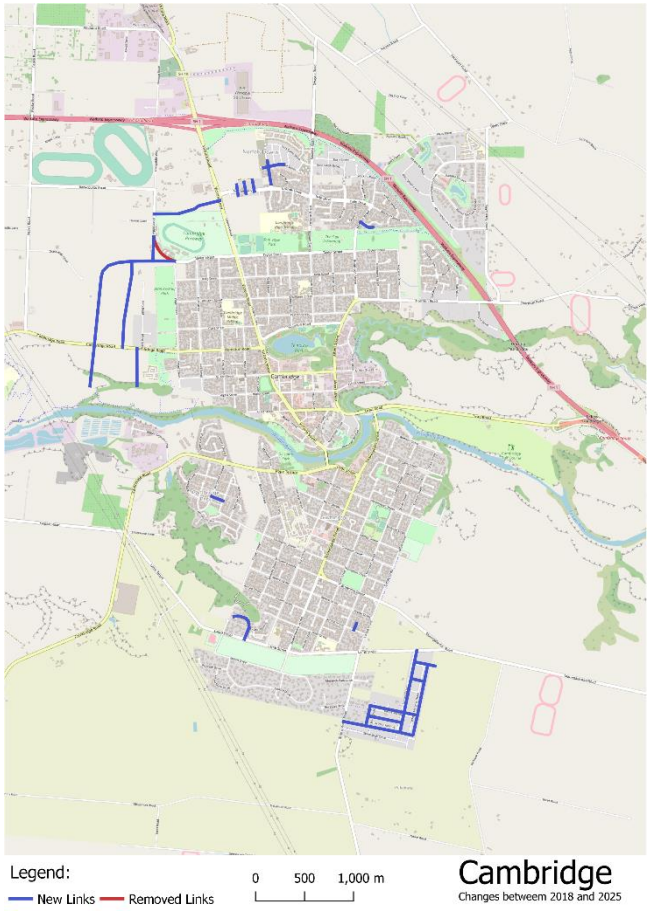
Table 7-3: Network Summary, High Growth Scenario

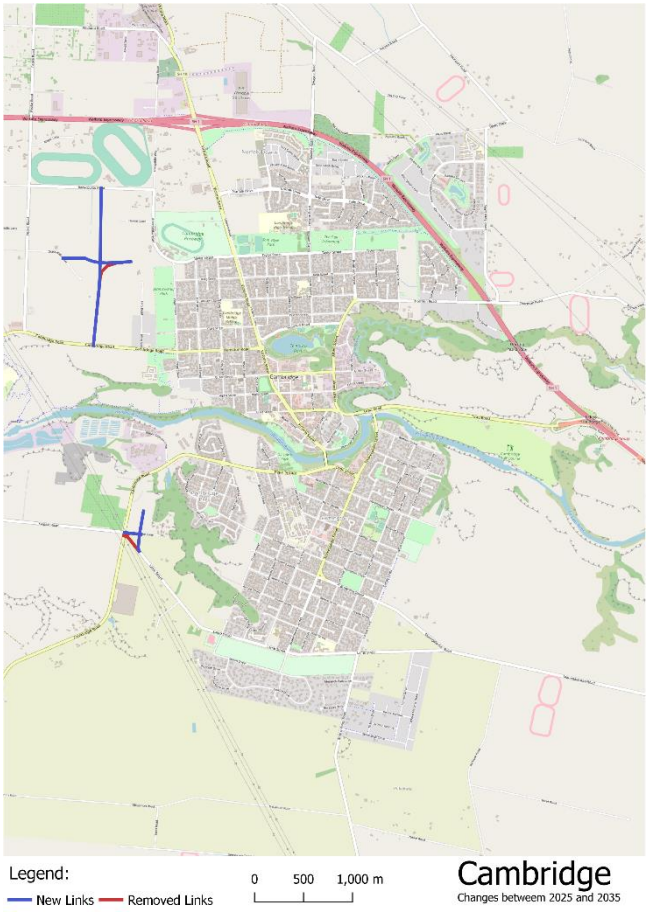
	2018	2025	2035	2045	2055
AM					
Veh-Km	3805212	4934227	5033876	5671209	6098374
Veh-Mins	3615404	4926898	5018187	5802350	6483170
Mean speed (kph)	63.1	60.1	60.2	58.6	56.4
IP					
Veh-Km	3464309	4185860	4347201	4878374	5333680
Veh-Mins	3112799	3859722	3982738	4485910	4931537
Mean speed (kph)	66.8	65.1	65.5	65.2	64.9
PM					
Veh-Km	4666431	6211132	6369199	7357308	8109755
Veh-Mins	4486580	6554765	6679092	8298007	9840912
Mean speed (kph)	62.4	56.9	57.2	53.2	49.4

These results re-enforce the findings from the road and intersection Leve of Service analysis. Generally, performance deteriorates over time. The 2025 and 2035 networks perform similarly, worsening by 2045 and then by 2055. The interpeak has the least congestion, followed by the AM and then PM peak periods, a results of forecast traffic demands.

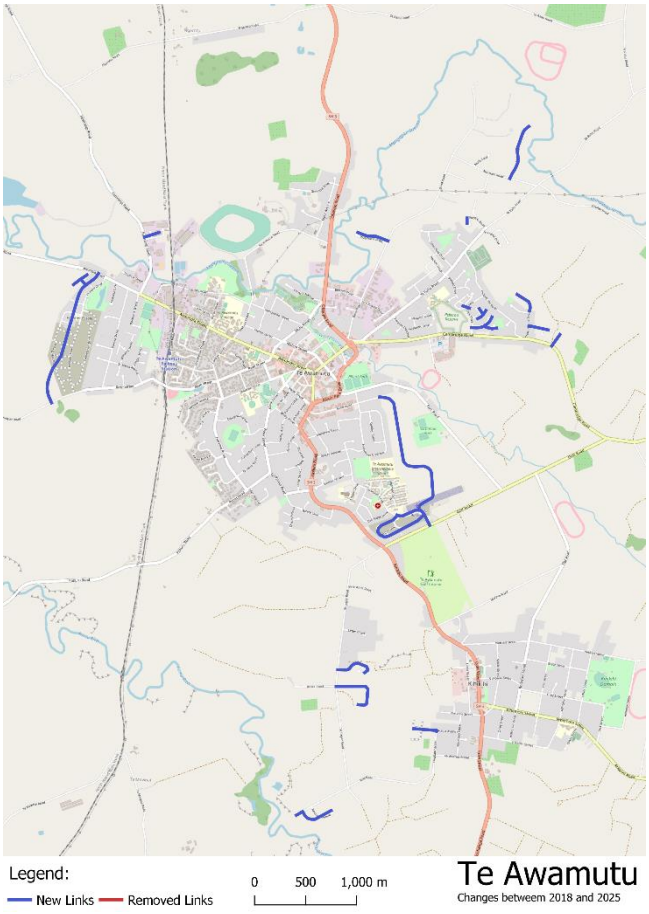
Appendix A – Network Changes over Time

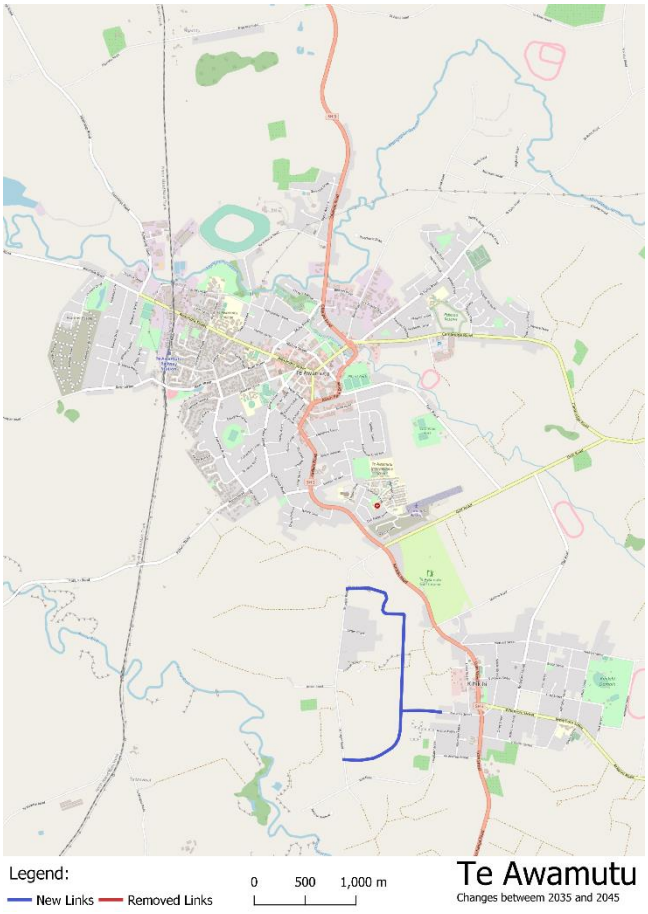
Cambridge



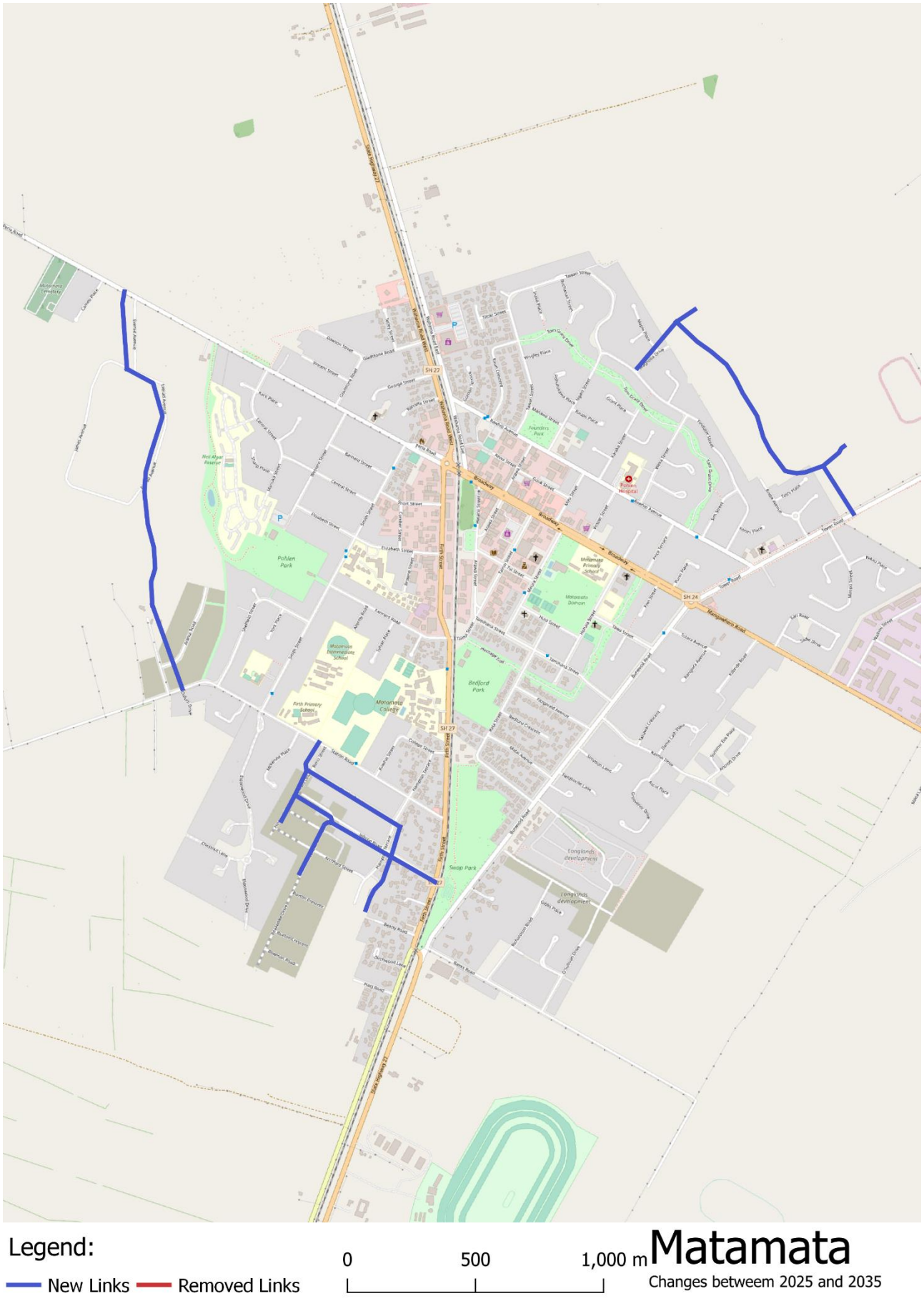


Te Awamutu


Legend:
New Links
Removed Links
0
500
1,000 m
Te Awamutu
Changes betweem 2018 and 2025


Legend:
New Links
Removed Links
0
500
1,000 m
Te Awamutu
Changes betweem 2035 and 2045

Matamata


Legend:
New Links
Removed Links
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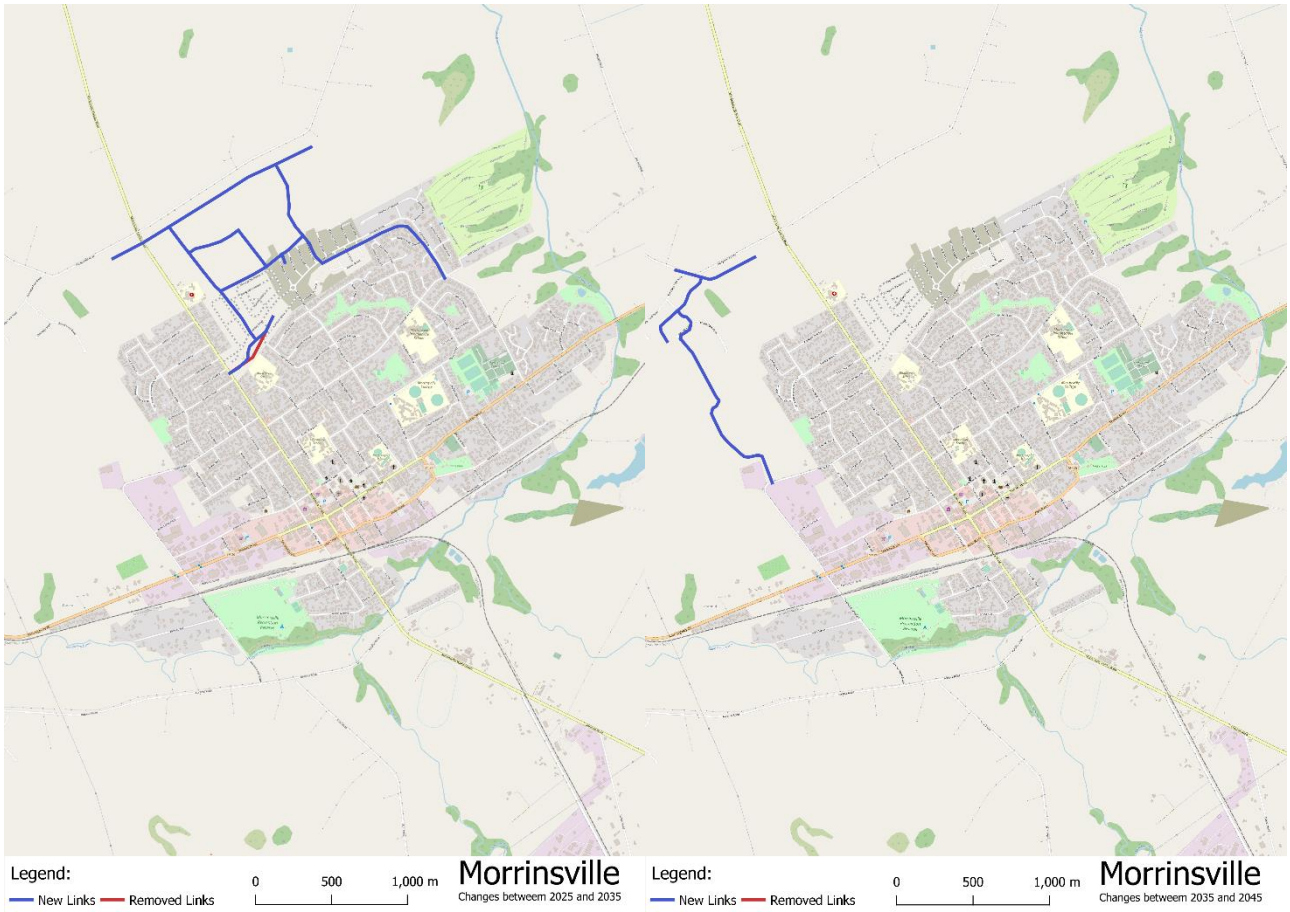
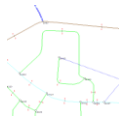
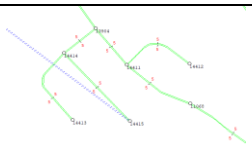
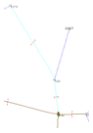
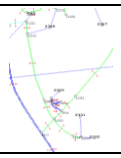
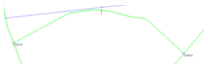
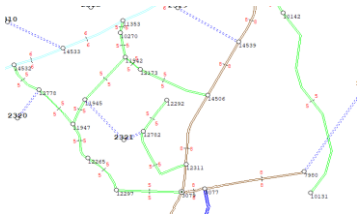
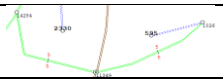
500
1,000 m
Matamata
Changes betweem 2025 and 2035

Morrinsville

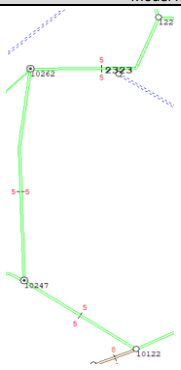
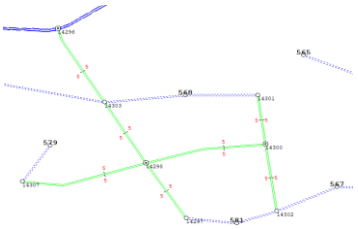
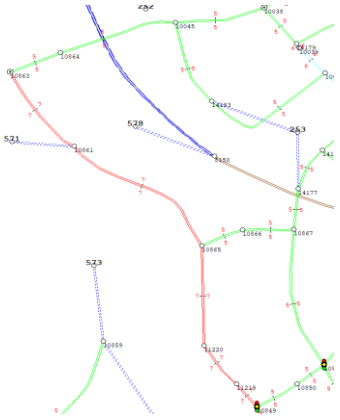
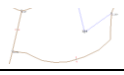


Appendix B – Network Changes by Area

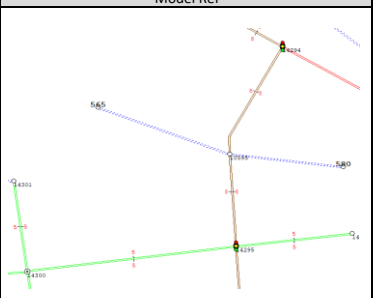
Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
New Development	Flagstaff	New Road	Developer	2025	
		New Road	Developer	2025	
New Development	Flagstaff	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
New Development	Flagstaff	New Road	Developer	2025	
		New Road	Developer	2025	
Realignment	Peacockes	New Signals	Waka Kotahi	2025	
		Road closure	Waka Kotahi	2025	
New Development	Peacockes	New Road	Developer	2025	
		New Road	Developer	2025	
New Development	Peacockes	New Road	Developer	2035	
New Development	Peacockes	New Road	Developer	2035	
New Development	Peacockes	New Road	Developer	2035	
New Development	Peacockes	New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
New Development	Peacockes	New Road	Developer	2045	

Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
New Development	Peacockes	New RB - single lane	Developer	2055	
		New RB - single lane	Developer	2055	
		New Road	Developer	2055	
		New Road	Developer	2055	
		New Road	Developer	2055	
New Development	Peacockes	New RB - single lane	Developer	2055	
		New Road	Developer	2055	
New Development	Rotokauri	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New RB - single lane	Developer	2025	
New Development	Rotokauri	New RB - Dual lane	Developer	2025	
		New Signals	Developer	2025	
		New Signals	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
	Rotokauri	New RB - single lane	Developer	2025	
New Development	Rotokauri	New Road	Developer	2025	

Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
New Development	Rotokauri	New Signals	Developer	2035	
		New Signals	Developer	2035	
		New Road alignment	Developer	2035	
		New Road	Developer	2035	
New Development	Rotokauri	New Road	Developer	2035	
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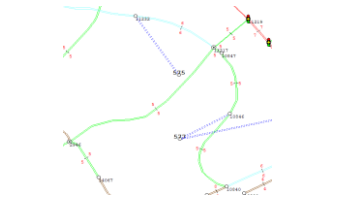
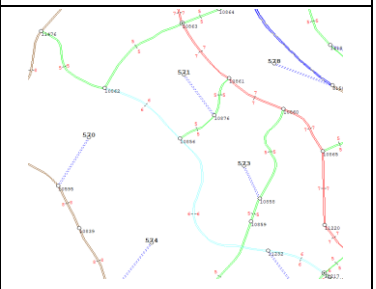
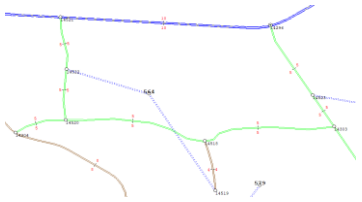
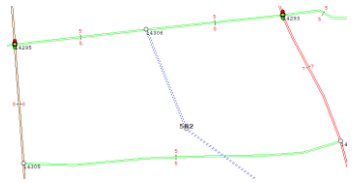
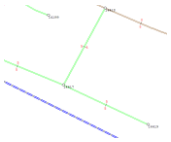
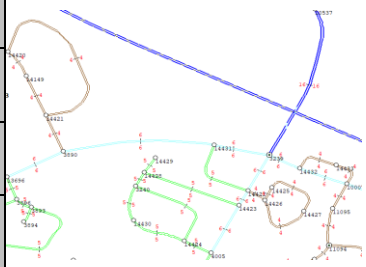
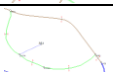
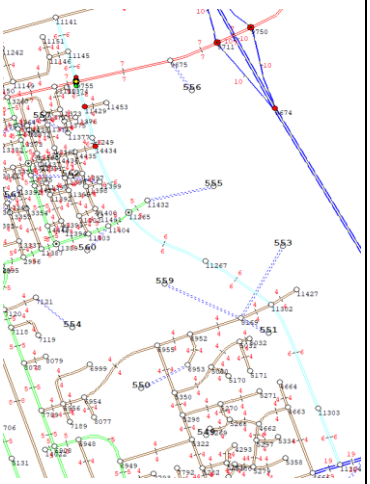
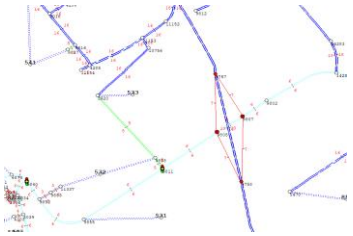
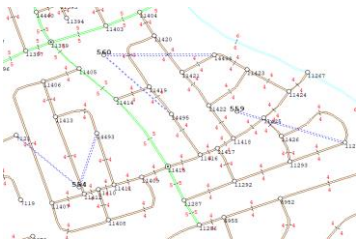
		New Road	Developer	2035	
	Rotokauri	New Road	Developer	2035	
		New Road	Developer	2035	
		New Signals	Developer	2035	
	Rotokauri	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
	Rotokauri	New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
	Rotokauri	New Road	Developer	2045	
		New Road	Developer	2045	
		New Signals	Developer	2045	
	Rotokauri	New Road	Developer	2055	
		New Road	Developer	2055	
		New Road	Developer	2055	

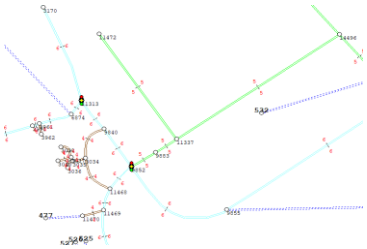
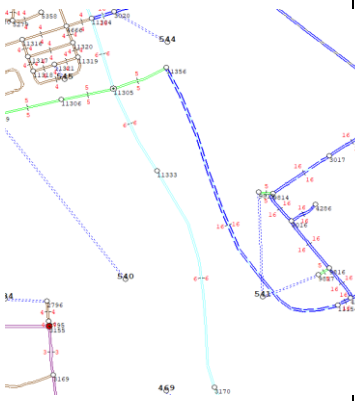
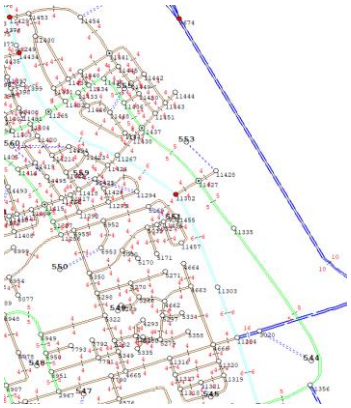
Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
Road expansion	Rototuna	New Road	Developer	2025	
New Development	Rototuna	New Road	Developer	2025	
		New Road	Developer	2025	
Development link road	Rototuna	New Road	Developer	2025	
New residential Development, off current roads	Rototuna	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
Expansion of residential development	Rototuna	New Road	Developer	2035	
Expansion of residential development	Rototuna	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
Expansion of residential development	Rototuna	New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
Expansion of residential development	Rototuna	New Road	Developer	2045	

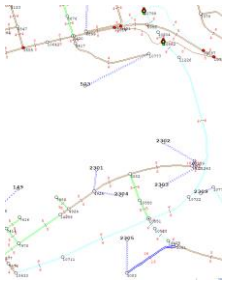
Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
New development, Greenhill	Ruakura	New Road	Developer	2025	
		New Signals	Developer	2025	
		New Road alignment	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
Realignment of intersections, roads. New industrural development	Ruakura	Road closure	Waka Kotahi	2035	
		Road closure	Developer	2035	
		New Signals	Hamilton DC	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
Expansion of residential development, Greenhill	Ruakura	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	

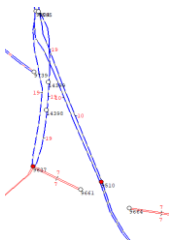
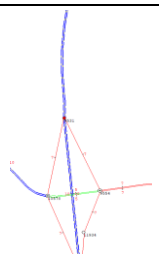
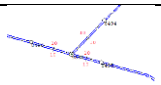
Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
New road alightment, industural development	Ruakura	New Road alignment	Developer	2035	
		New Signals	Developer	2035	
		New Signals	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
Expansion of development, link roads	Ruakura	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
New Link roads, expansion of residential development	Ruakura	New RB - single lane	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	
		New Road	Developer	2045	

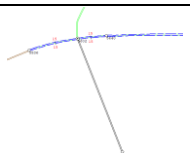
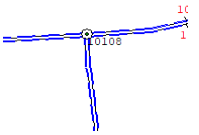
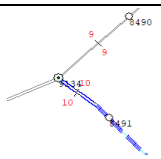
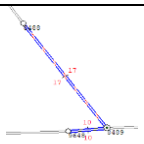
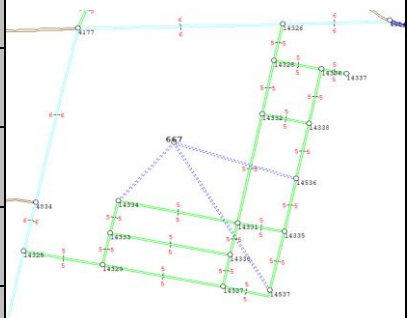
Hamiton

Description	Location	Type of change	Data provided by	Model Year	Model Ref
		New Road	Developer	2045	
New links roads	Ruakura	New Road	Developer	2055	
		New Road	Developer	2055	
Expansion of residential development	Te Rapa	New Road	Developer	2035	
New Development	Te Rapa	New RB - Dual lane	Hamilton DC	2045	
		New Road	Hamilton DC	2045	
		New Road	Hamilton DC	2045	
		New Road	Hamilton DC	2045	
		New Road	Hamilton DC	2045	
Wairere Drive Extension	Hillcrest/ Peacockes	New Signals	Waka Kotahi	2025	
		New Signals	Waka Kotahi	2025	
		New RB - Dual lane	Waka Kotahi	2025	
		New Road	Waka Kotahi	2025	
Southern Links	South Hamilton	New Signals	Waka Kotahi	2045	
		New Road	Waka Kotahi	2045	
		Road closure	Waka Kotahi	2045	
		Road closure	Waka Kotahi	2045	
		New Road alignment	Waka Kotahi	2045	
		New RB - Dual lane	Waka Kotahi	2045	
		New RB - Dual lane	Waka Kotahi	2045	

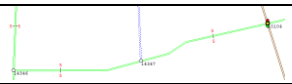
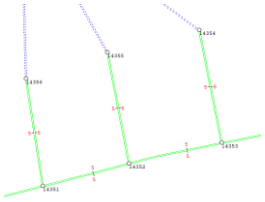
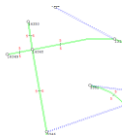
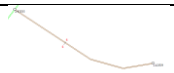
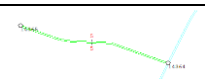
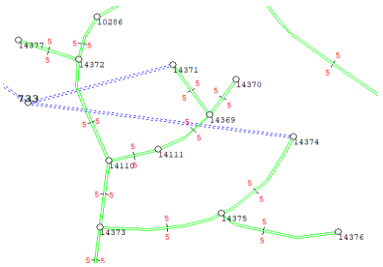
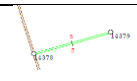
Waikato District

Description	Location	Type of change	Data provided by	Model Year	Model Ref
Waikato Expressway	Huntly End	New Road	Waka Kotahi	2025	
		Road closure	Waka Kotahi	2025	
		New Road alignment	Waka Kotahi	2025	
Waikato Expressway	Tuapiri	New Road	Waka Kotahi	2025	
		New Road	Waka Kotahi	2025	
		New Road	Waka Kotahi	2025	
Change to RB	Intersection SH1/29	New RB - Dual lane	Waka Kotahi	2025	
New RB	SH26/Avenue Road	New RB - single lane	Waka Kotahi	2025	
New overbridge, road diversion	Horotiu	New Road	Waikato DC	2025	
		Road closure	Waikato DC	2025	
New Development	Pokeno	Road closure	Waikato DC	2025	
		New Signals	Waikato DC	2025	
New Development	Ngaruawahia	New RB - single lane	Waikato DC	2025	

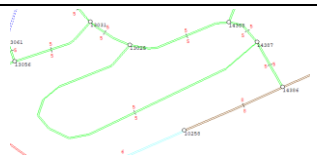
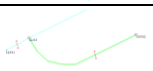
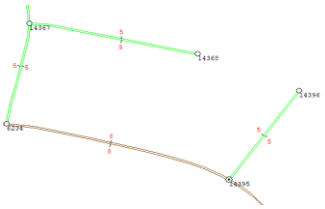
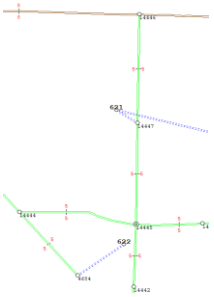
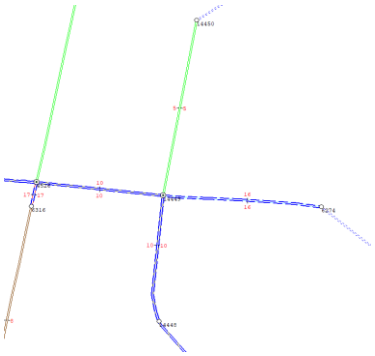
Waipa

Description	Location	Type of change	Data provided by	Model Year	Model Ref
Waikato Expressway	Cambridge	New RB - single lane	Waka Kotahi	2025	
		New Road	Waka Kotahi	2025	
SH23 Whatawhata Road and SH39 Kakaramea Road intersection	Whatawhata	New RB - single lane	Waka Kotahi	2035	
		New Road alignment	Waka Kotahi	2035	
SH3 and SH4 intersection	Te Mapara	Lane removal	Waka Kotahi	2025	
		New RB - single lane	Waka Kotahi	2025	
SH1 and SH5 intersection		Lane removal	Waka Kotahi	2025	
		New RB - single lane	Waka Kotahi	2025	
SH5 and Tarukenga Mare Rd intersection		Lane removal	Waka Kotahi	2025	
		New RB - single lane	Waka Kotahi	2025	
Grey St / Hamilton Rd, left out only N/S	Cambridge	Intersection control change	Waipa DC	2025	
Hall St / Hamilton Rd, intersection changes	Cambridge	New Road	Waipa DC	2025	
McKinnon St missing	Cambridge	New Road	Developer	2025	
Mahy Way added	Cambridge	New Road	Developer	2025	
Chrishy Brown Pl Added	Cambridge	New Road	Developer	2025	
New Development	Leamington	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	

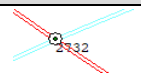
Waipa

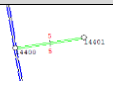
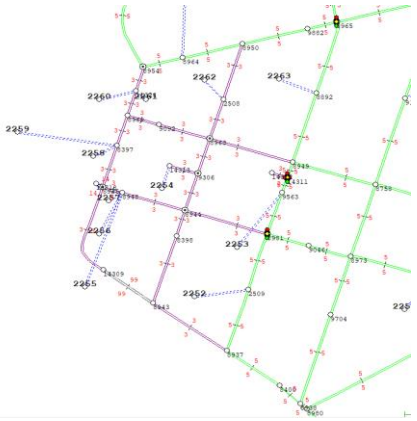
Description	Location	Type of change	Data provided by	Model Year	Model Ref
New Development, Chartwell	Cambridge	New RB - Dual lane	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
Extension of Nortfold Dr	Cambridge	New Road	Developer	2025	
New Development	Cambridge	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
New Development, Cambridge North	Cambridge	New Road	Developer	2025	
		New Road	Developer	2025	
New Development, Cambridge North	Cambridge	New Road	Developer	2025	
Highdens Road	Te Awamuta	New Road	Developer	2025	
Woodlands Ln	Te Awamuta	New Road	Developer	2025	
Riverhurst Dr	Te Awamuta	New Road	Developer	2025	
Thorncombe Road, Wetere Dr	Te Awamuta	New Road	Developer	2025	
		New Road	Developer	2025	
New Development	Te Awamuta	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
Harrison Dr	Te Awamuta	New Road	Developer	2025	

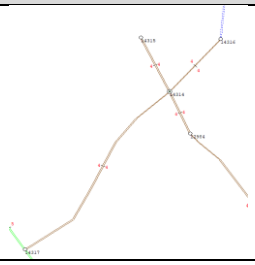
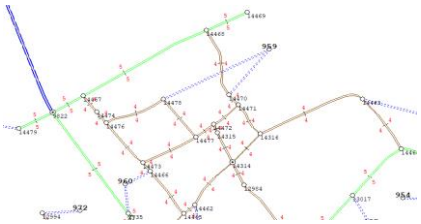
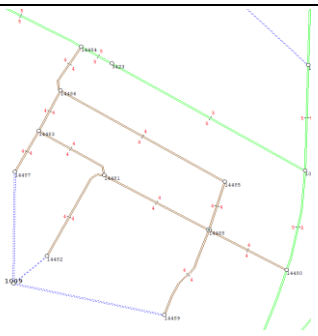
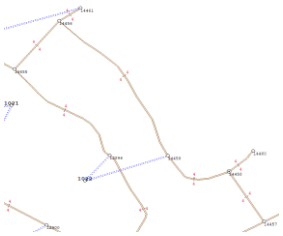
Waipa

Description	Location	Type of change	Data provided by	Model Year	Model Ref
New Development	Te Awamuta	New Road	Developer	2025	
		New Road	Developer	2025	
		New Road	Developer	2025	
Nicholson Dr Devleopment	Te Awamuta	New Road	Developer	2025	
		New Road	Developer	2025	
Linehan rd, Headlands Dr	Te Awamuta	New Road	Developer	2025	
		New Road	Developer	2025	
Awanui Ave	Te Awamuta	New Road	Developer	2025	
Acacia Ave	Te Awamuta	New Road	Developer	2025	
Future Development	Te Awamuta	New Road	Developer	2025	
		New RB - Dual lane	Developer	2025	
		New Road	Developer	2025	
C2 Development	Cambridge	New RB - single lane	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road alignment	Developer	2035	
C4 Development	Cambridge	New RB - single lane	Developer	2035	
		New RB - single lane	Developer	2035	
		New Road alignment	Developer	2035	
		New Road alignment	Developer	2035	
		New Road	Developer	2035	
New Roundabout	Cambridge	New RB - single lane	Waipa DC	2035	

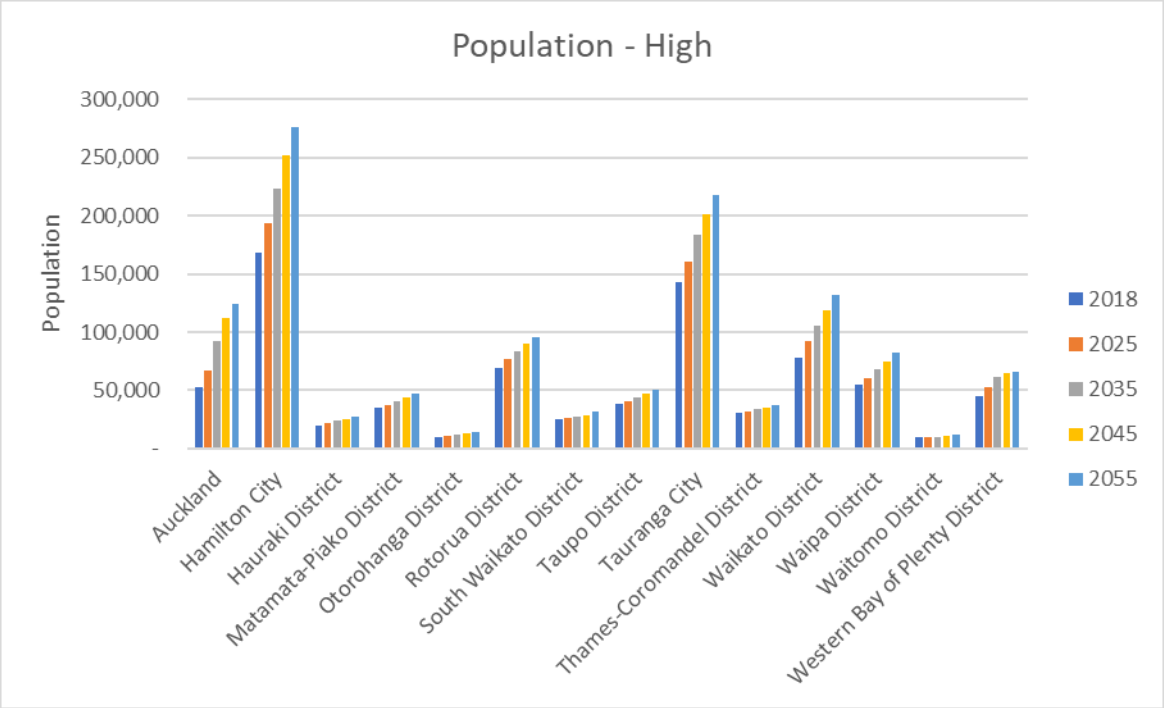
Waipa

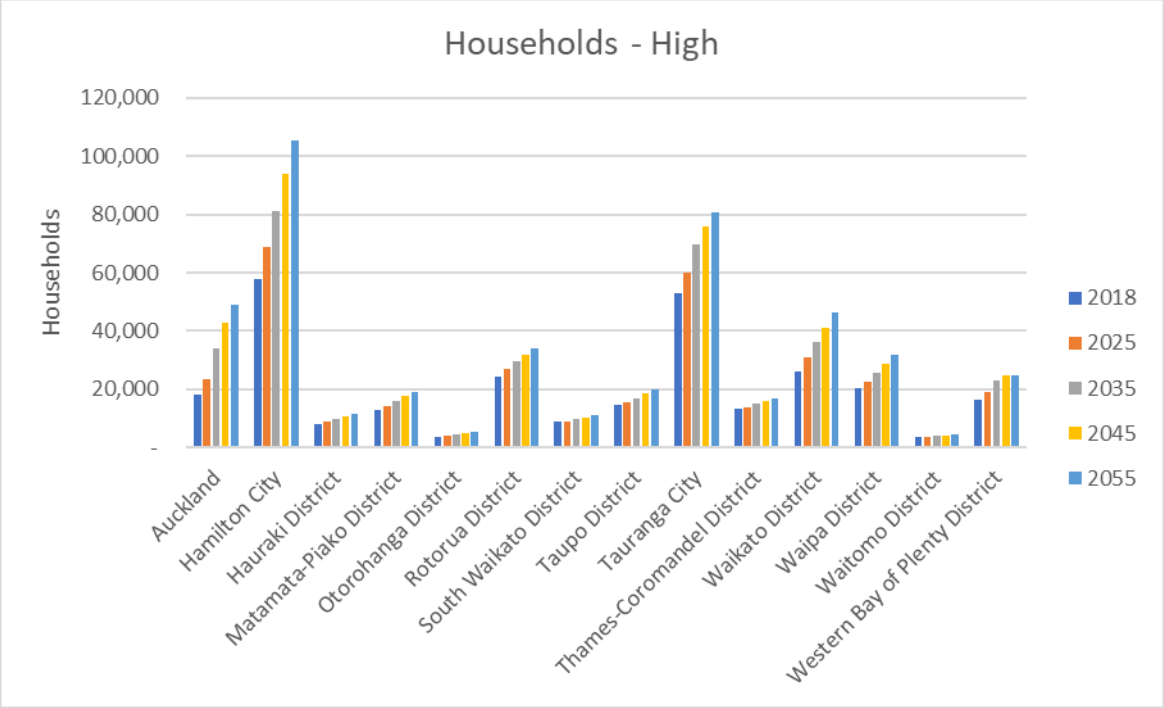
Description	Location	Type of change	Data provided by	Model Year	Model Ref
New Roundabout	Te Awamuta	New RB - single lane	Waipa DC	2035	
Te Aranui Dr Extension	Te Awamuta	New Road	Developer	2035	
Green Spine Development	Te Awamuta	New Road	Developer	2045	
		New Road	Developer	2045	

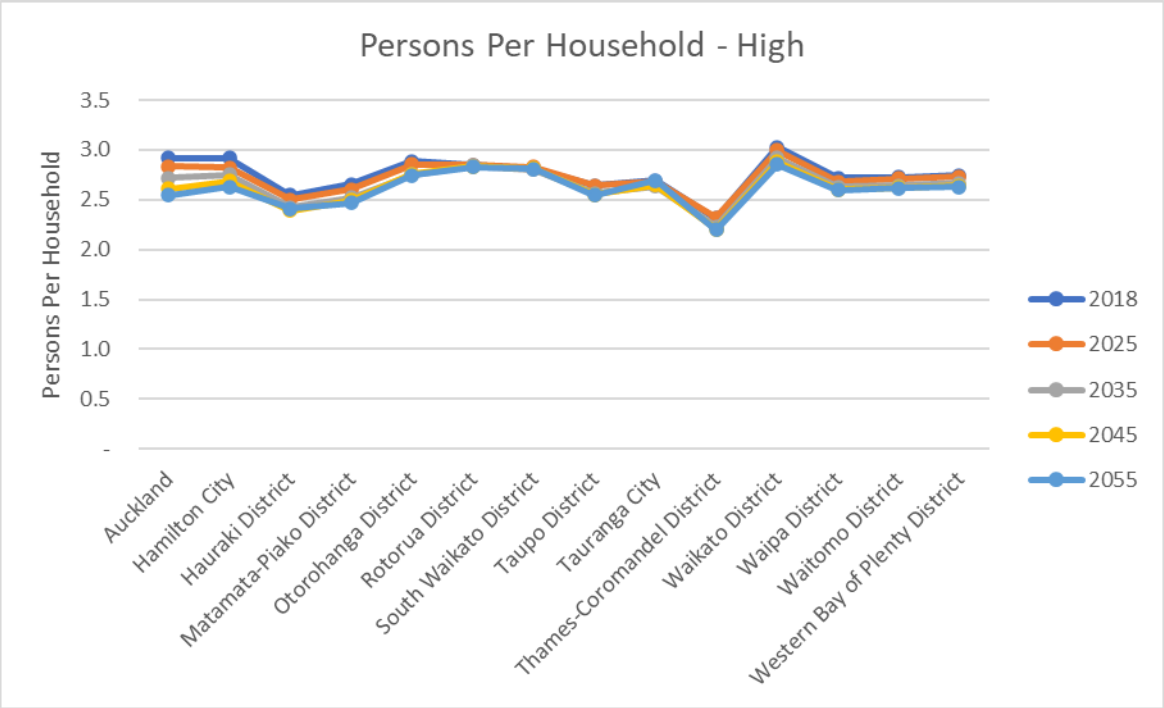
Taupo					
Description	Location	Type of change	Data provided by	Model Year	Model Ref
Missing road	Pukawa	New Road	Waka Kotahi	2025	
Redevelopment of Taupo Town	Taupo	Lane removal	Taupo DC	2025	
		New RB - single lane	Taupo DC	2025	
		New Signals	Taupo DC	2025	
		Intersection control change	Taupo DC	2025	
		New Signals	Taupo DC	2025	
		New Signals	Taupo DC	2025	
		Intersection control change	Taupo DC	2025	
		Speed change	Taupo DC	2025	
		New RB - single lane	Taupo DC	2025	
		New RB - single lane	Taupo DC	2025	
		Road closure	Taupo DC	2025	
Added capacity across Waikato River	Taupo	Additional Lane	Taupo DC	2035	
New Roundabout	Taupo	New RB - single lane	Taupo DC	2035	

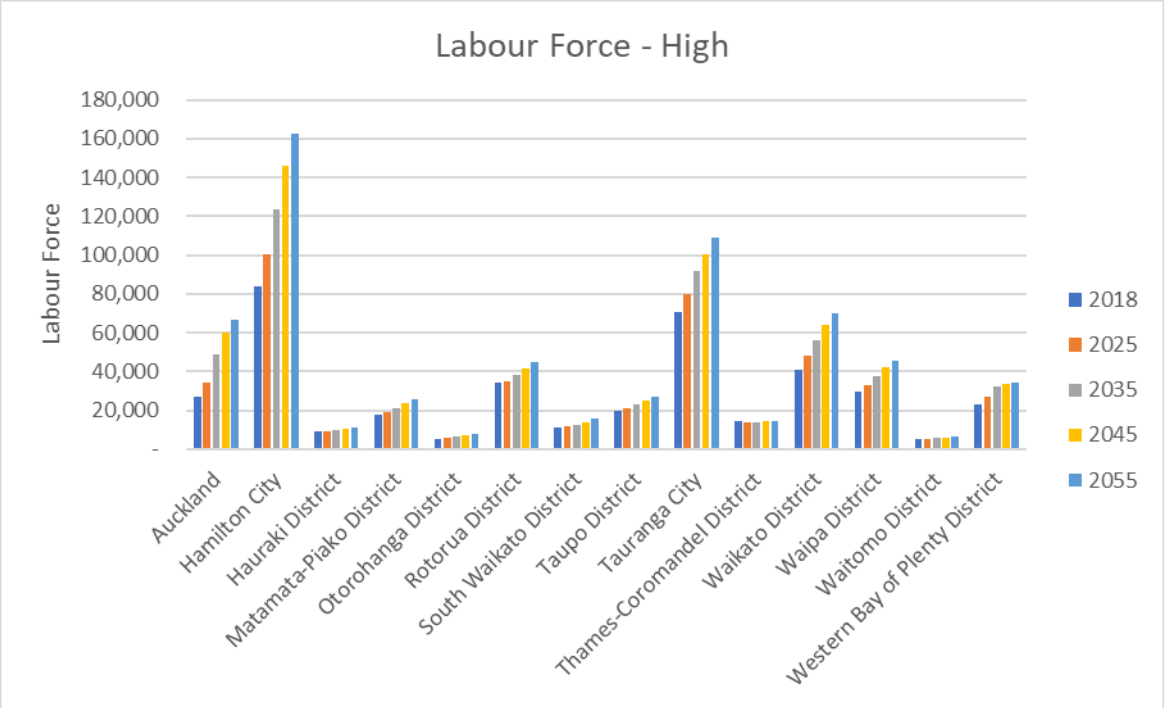
Matamata-Piako					
Description	Location	Type of change	Data provided by	Model Year	Model Ref
Fairway Dr extension	Morrinsville	New Road	Developer	2025	
		New Road	Developer	2025	
		New RB - single lane	Developer	2025	
New Development	Morrinsville	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New RB - single lane	Developer	2035	
		New RB - single lane	Developer	2035	
Everad Ave/Aporo Dr extension	Matamata	New Road	Developer	2035	
New Development	Matamata	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
New Development	Matamata	New Road	Developer	2035	
		New Road	Developer	2035	
		New Road	Developer	2035	
New Development	Morrinsville	New Road	Matamata-Piako DC	2045	
		New Road	Matamata-Piako DC	2045	
		New Road	Matamata-Piako DC	2045	

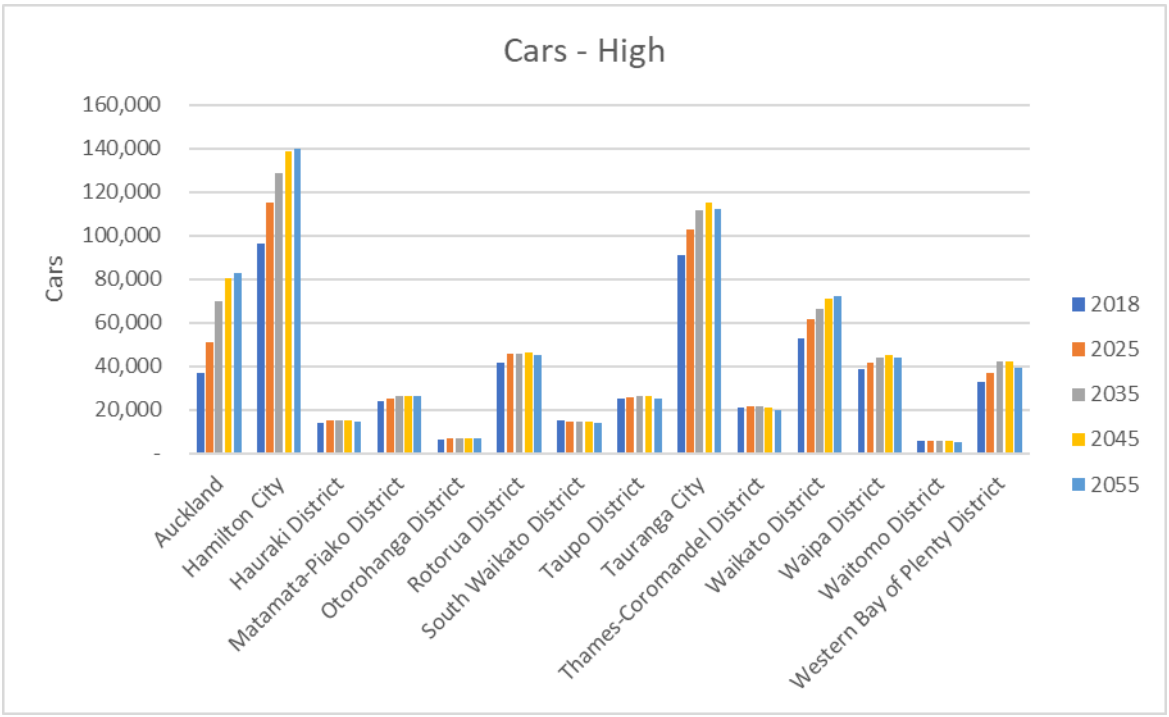
Appendix C - Demographics

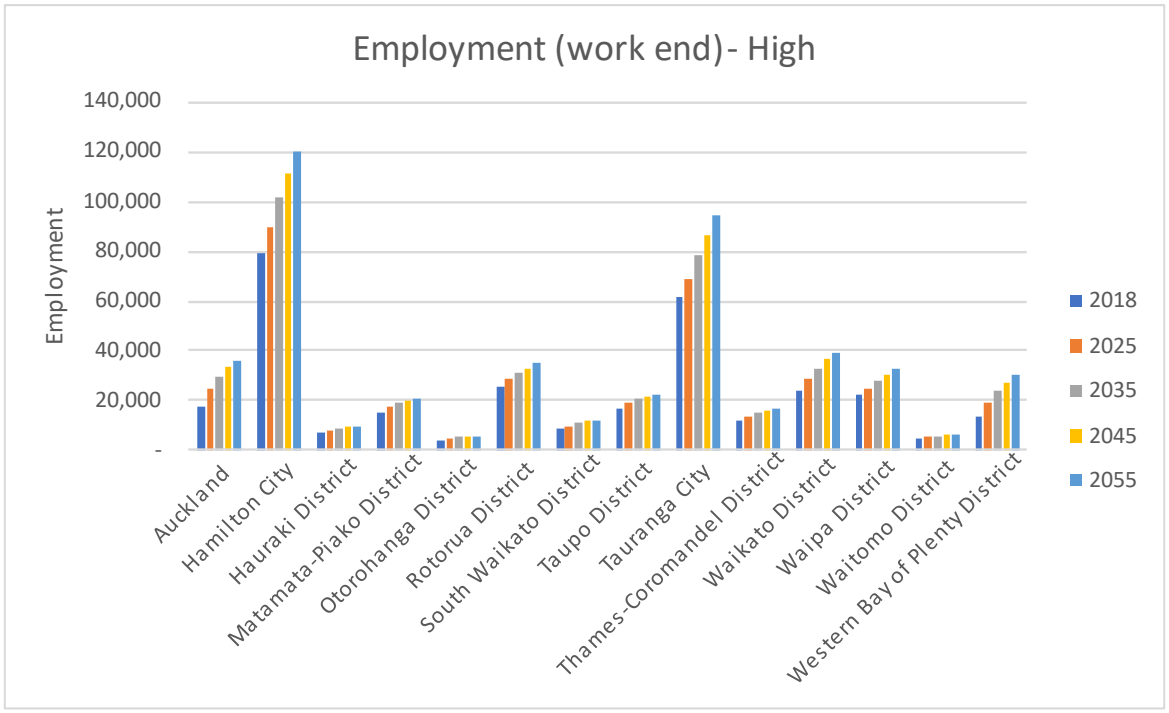


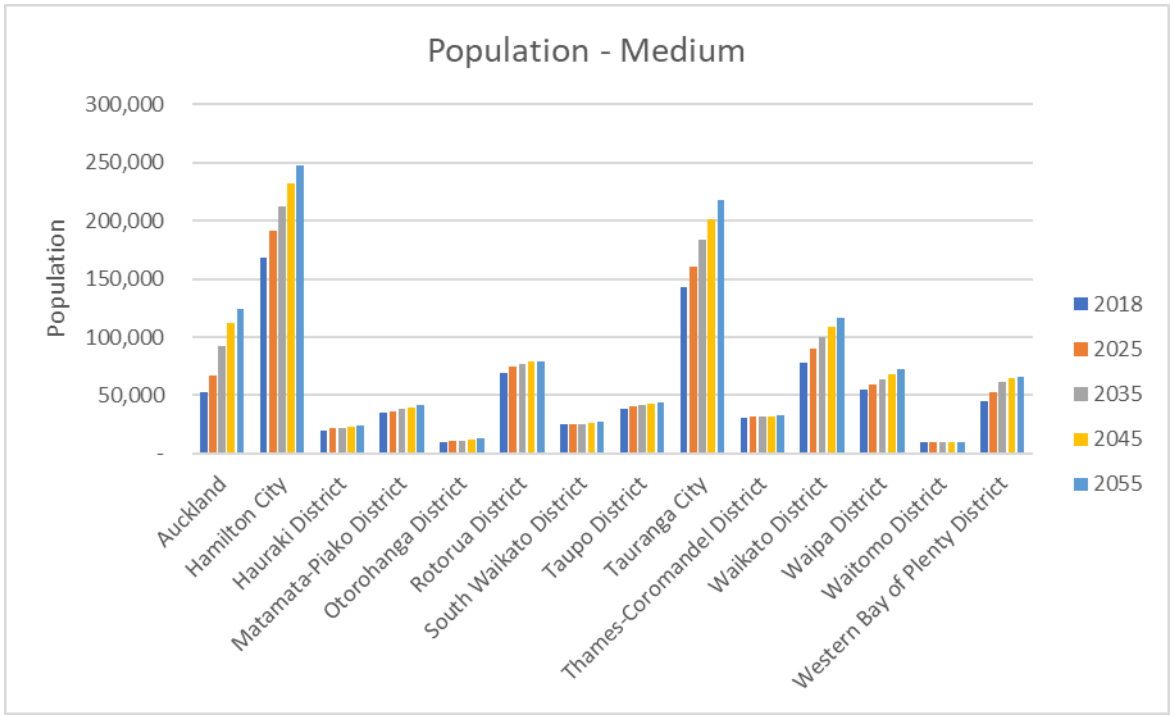


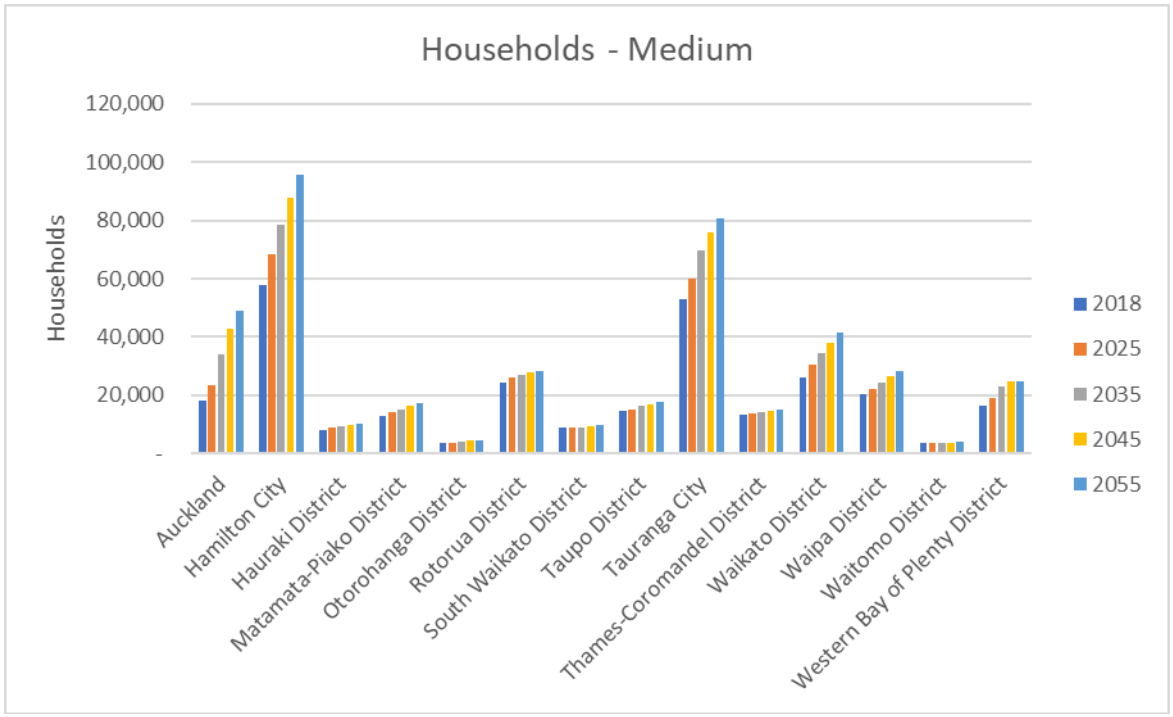

Persons Per Household - High
Persons Per Household
3.5
3.0
2.5
2.0
1.5
1.0
0.5
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055

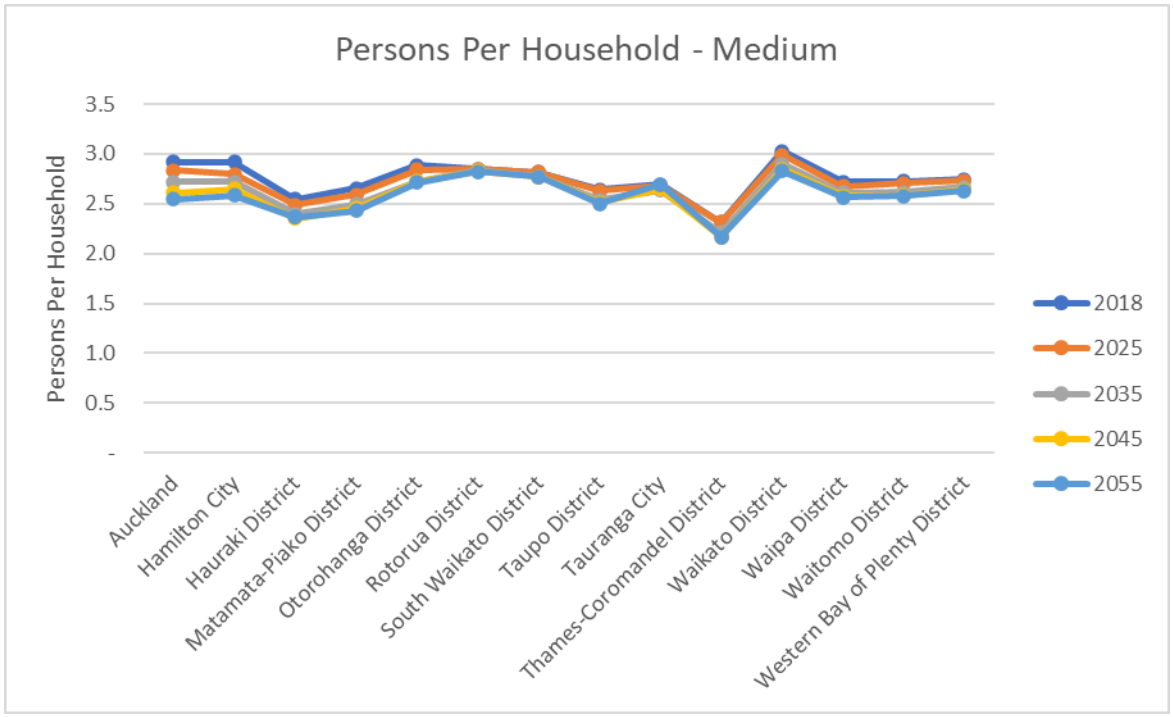

Labour Force - High
Labour Force
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055

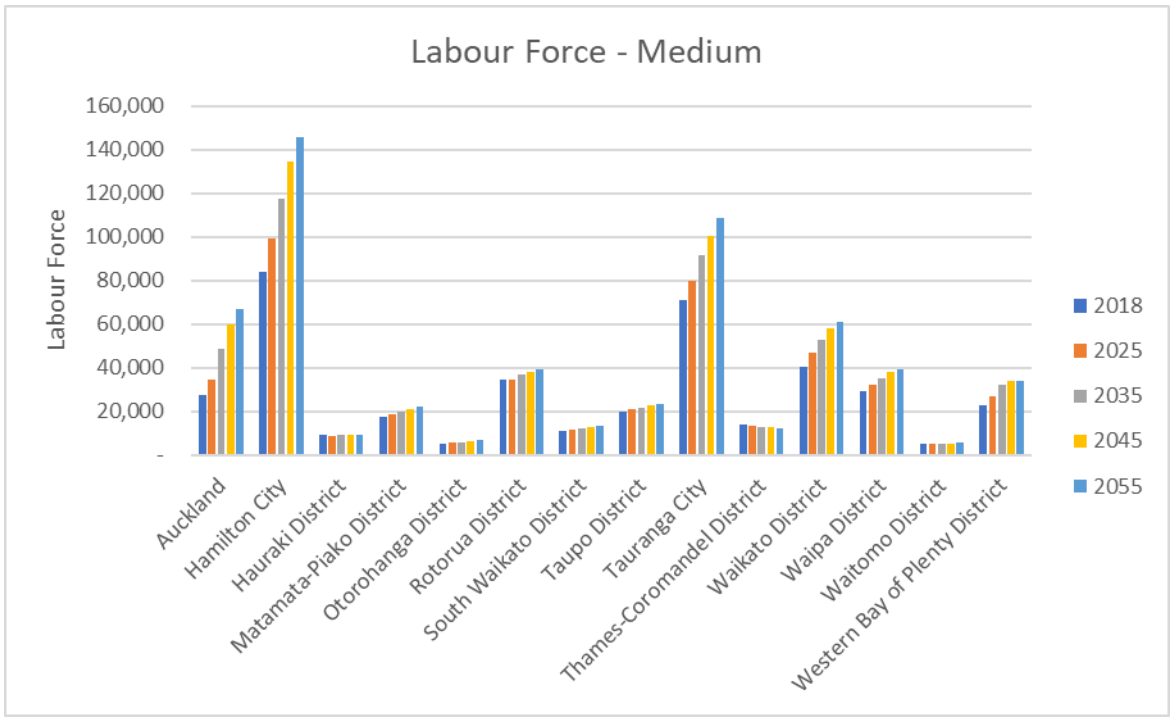

Cars - High
Cars
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055

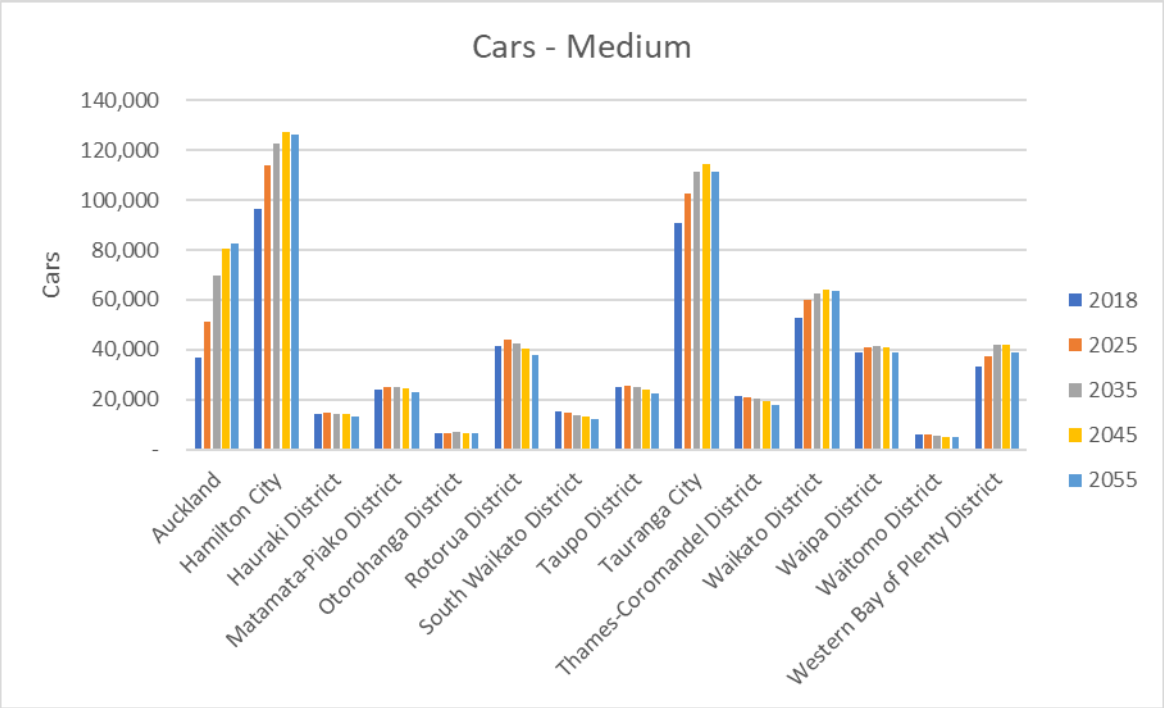

Employment (work end)- High
Employment
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055

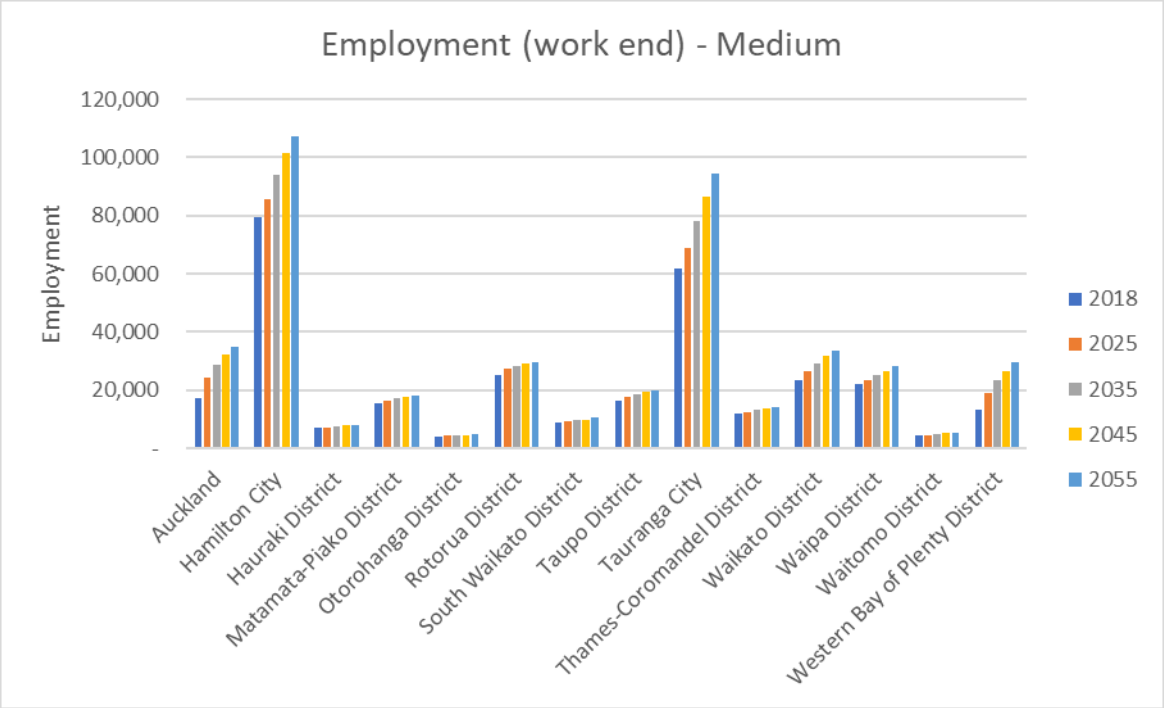

Population - Medium
Population
300,000
250,000
200,000
150,000
100,000
50,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055


Households - Medium
Households
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055


Persons Per Household - Medium
Persons Per Household
3.5
3.0
2.5
2.0
1.5
1.0
0.5
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055


Labour Force - Medium
Labour Force
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055


Cars - Medium
Cars
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055


Employment (work end) - Medium
Employment
120,000
100,000
80,000
60,000
40,000
20,000
-
Auckland
Hamilton City
Hauraki District
Matamata-Piako District
Otorohanga District
Rotorua District
South Waikato District
Taupo District
Tauranga City
Thames-Coromandel District
Waikato District
Waipa District
Waitomo District
Western Bay of Plenty District
2018
2025
2035
2045
2055