WISE model update to version 1.6, reference scenario and Waikato land use projections (TA and SA2 level) 2018 to 2068

Waikato
REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

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Executive summary

This report summarises several workstreams that were undertaken to update the WISE model and then develop the land use projections as part of the 2018 Waikato Projections. The methodology and results for the economic (value add, employment) and social (population, households, labour force) data of the Waikato projections are presented in separate reports (Cheon and McDonald, 2021; Cameron and Cochrane 2021a, b). The workstreams covered in this report are presented in four parts:

Part 1 of this report outline the process and changes made to update the WISE model to version 1.6. This includes the resetting to a 2018 start date and the updating of underlying data sets and assumptions to reflect current policy and land use status and likely influences of key futures (population and economic activity changes). The process undertaken to calibrate and validate the updated model are also described.

Part 2 of this report outlines the Reference Scenario in the new version 1.6 of WISE. This scenario represents the projected future under the 'status quo' of land use policies and plans and the best expert estimates of population change and growth in economic activity. The main outcomes of this Reference Scenario for key indicators are presented.

Part 3 of this report outlines the links between the various modelling processes undertaken to create projection data at the Statistical Area 2 (SA2) level for the Waikato Region, from a baseline in 2018 to 2068 (50 years time horizon). The modelling of land use change is outlined in Part 4 of this report, population dynamics (population, family and household, labour force) modelling is described in Cameron and Cochrane (2021a, b) and economic development (value-added, employment) modelling by Cheon and McDonald (2021).

Part 4 of this report describes how future land use projections for the Waikato were generated from the updated WISE model (Waikato Regional Council, 2021) and how these were then processed to provide a set of land use projections at the Statistical Area 2 (SA2) level for the Waikato Region. Projections are only provided for selected years (2025, 2035, 2045, 2055, and 2065). The land use projections were then used to support the modelling of the population and economic projections (refer to Cheon and McDonald, 2021, and Cameron and Cochrane (2021a, b).

The results for future land use projections indicate areas of plausible land use change. The land use figures provided by SA2 for future time steps are from a single run of the WISE model for three different growth scenarios - the Reference Scenario which is a medium population and economic growth scenario, a high growth projection and a low growth projection.

The changes in land use seen in the projections are in line with expected developments and zoning with increasing residential, commercial and industrial growth particularly around existing urban centres. In some cases, expectations for the extent of residential development across a TA were not able to be supported by the projected population growth for a scenario.

1   Part 1 – WISE Model Update to V1.6

The key steps undertaken to update the WISE model are outlined. This includes resetting the model to a new start date of 2018, and updating land use, zoning, population, and economic data within the model. The process of recalibrating the model and validating it with input from local experts is also described.

1.1   Initial setup of an application with start year 2018

The updated WISE model (version 1.6) now has a starting date of 2018, previously 2013, with a corresponding update of land use, population and economic data to match this start date. Using this new data an updated application (geoproject file) of WISE was created. This included an option to select from four different population projections (Cameron and Cochrane, 2021) and four different economic projections (Cheon and McDonald, 2021). The four alternative population and economic projections included are defined as: medium growth, medium growth without COVID, high growth, low growth. They all include annual values from 2018 to 2068, the end date of the application. The Reference Scenario in WISE uses the medium projection for both population and economic activity. Other updated spatial data included any new district zoning maps and any additional growth strategy areas that had been revised since the previous version (refer sections below).

Except for the updated data mentioned in the previous paragraph, input maps and parameters from the previous application (version 1.5) () were re-used in the new application as a starting point for the calibration.

1.2   Updating Land Use Layer

The previous 2013 land use layer was replaced with the updated 2018 land use layer for the Waikato Region. The new land use map was developed using up-to-date aerial photography for the Waikato Region (WRAPS, 2018), property valuation data for all land parcels in region (extracted June 2018) and rural land use data from the Agribase[1] dataset.

The initial 2018 land use map was provided to staff at the territorial authorities in the Waikato to provide some local knowledge feedback as part of a validation process. Further details of the development and review process for the 2018 land use are described in (Waikato Regional Council, 2021).

1.3   Updating Zoning Layers

The regional and district zoning layers within the model were all reviewed as part of the update. This process involved sourcing the current DP zoning data from councils and then including any new or revised zones into the model setup.

This process also included capturing any specific district growth strategies that identified specific future growth areas. This included:
- Accessing any shapefiles for district growth strategies that were not represented by the District Plan data
- Discussing with council staff where they expected growth in their zoned areas to occur in the short term. They were asked to identify specific areas, based on subdivision consents, where they expected growth to occur in the next 0-5 years and 5-10 years.
- Based on this information 'fine-tuning' of the early residential growth in the WISE model was made to represent this additional development knowledge.

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[1] A rural land use database maintained by Asurequality (https://www.asurequality.com/services/agribase/) – accessed 22/11/2021

- In high growth areas councils were asked to identify potential 'overflow' areas, in addition to current District Plan zones where future growth could be allocated if required. These were then used to address any potential growth constraints, based on current DP zones that might occur towards the end of the projection.

1.4   Other Spatial Layers

The roading spatial layer within WISE, which is used to determine accessibility in the modeling, was updated from the 2013 version using the latest 2018 aerial photos. This resulted in capturing the additional roads that have been created primarily in residential and industrial subdivision areas. This layer was also compared with the data layers used in the Waikato Transport model (WRTM) (as of June 2020) to ensure that planned future roading projects are represented in the WISE modelling when they are expected to be completed.

Also, a new Points of Interest (POI) spatial layer identifying important facilities (schools, hospitals, banks etc) was included into WISE so it could be used with the new Spatial Indicator Tool to assess user-developed spatial indicators (Waikato Regional Council, 2021).

A Statistical Area 2 unit (SA2) boundary map is added as an ancillary map to facilitate the analysis of model results.

1.5   Updating productivities and residential densities

The next step in the update is to ensure that initial economic and demographic numbers align with the respective land use cells on the initial land use map (2018). For the economic sectors and land uses this alignment is tuned using the regional productivity figures per sector, calculated as part of the calibration of the economic modelling. For the population and residential classes this alignment is tuned using the TA population proportion and residential density figures. These starting population figures are based on 2018 census population data and an assessment of dwellings within the residential land use classes identified in the initial land use map (Waikato Regional Council, 2021).

Next, productivity, density and population proportions over time are set. Productivity changes are set based on assumed technological improvements (as part of the calibration of the economic modelling), residential proportions and densities are set based on expected changes in living preferences and policy drivers that aim to influence residential infill and densification processes.

1.6   Calibration

Three main calibration activities can be distinguished: tuning economic productivities, tuning residential densities, and tuning land use model parameters. Each of them is briefly described below.

a)   Economic productivities

The role of the economic productivities in WISE is to provide a link from economic demands to land use demands. For several economic sectors, especially those related to the urban land use classes, an increase in economic demand leads to an increase in land demand. However, when testing the model's behaviour we came across two issues:
1. Temporal variability in the economic demand over short periods isn't likely to have an impact on changes in land demand. As an example, office buildings won't be demolished when there is an economic downturn for a few years, or a crisis as we face with COVID-19.
2. Especially for the forestry sector, and to a lesser extent for the agricultural sectors, a decline in economic demand, e.g. for wood, doesn't lead to a decline in land area, it

just avoids landowners or managers to actually clear the area and sell the wood. They rather leave the land untouched until the economic demand increases again.

To solve the above-mentioned issues productivity values have been adapted in such a way that temporal variability over short periods does not impact on land demands. In some cases, this meant we had to temporally increase productivity, in other cases we had to decrease productivity. Furthermore, productivities for forestry have been adapted (decreased) in such a way that a decline in economic demand does not result in a decline in forestry land.

After adapting the productivity values for the medium projections, we tested the behaviour and results of the low and the high projections and found that the high projections work well with the same productivity values as the medium projections, but the low projections needed to be further adapted to avoid a decline in forested area due to a decline in economic demand for forestry.

b) Residential densities

The role of the residential densities in WISE is to provide a link from the number of people living in each residential class (lifestyle blocks, low density residential, medium-high density residential) to the number of cells of each of the related land use types.

After the initial calculation of the population proportion and the residential densities, as well as their expected changes over time, both the low and medium growth projections directly performed well. However, due to a limited amount of land available, when running the high growth projections not all demands could be allocated in high growth areas (mainly around Future Proof Councils (Hamilton, Waikato and Waipa). We therefore needed to slightly adapt the density figures for lifestyle, low density residential, and medium-high density residential in these TAs in the final years of the simulation, reflecting the assumption that there would be more subdivision and slightly higher density development due to urban pressure in all these residential land uses.

c) Land use model parameters

For the updated calibration of the land use model parameters, we made use of expected development trends regarding the economic activities and land uses that would thrive or suffer as provided by the macro-economic model included in WISE as well as an expert assessment. This expert assessment included three workshops to collate WRC staff input from across the range of organisational functions, and some external input from Market economics and the Climate Change Commission to provide a summary statement about key drivers and plausible future changes for the main land use types. Main assumptions considered were:
- It is unlikely that the economic demands for the dairying sector can be met. Economic productivities cannot increase forever, and policy interventions are likely to impact on the area expansion and the increase in productivities. Overall increase in area is expected to only be in the magnitude of 5000-6000 ha by 2068.
- Demands for sheep, beef and deer farming are declining.
- An increase in the total forested area is expected due to an increasing demand for carbon credits. This could be up to 5-10% of the current forestry area. It is likely that the increase in forestry areas takes place on the marginal lands currently used for sheep, beef and deer farming.
- One-third of retired agricultural land (mainly sheep, beef and deer farming) is expected to convert into exotic vegetation, two-third into indigenous vegetation.
- Horticulture and cropping sectors are expected to increase and existing locations are likely to expand.
- A densification process of the residential areas is expected. As a result, lifestyle blocks may convert to Low density residential and Low density residential can increase in density through subdivision or convert into medium-high density residential.

In addition to the above a new land use class 'vacant urban' was included and parameters needed to be set for this class (refer below).

We used the land use model parameters from the previous version of WISE as a starting point and only tuned those that we felt were no longer reflecting the local dynamics correctly anymore.

This resulted in the following main adaptations:
- To reflect the impact of policies on the dairying sector, we adapted the interaction rules related to dairying to lower the importance of this land use in the competition.
- Interaction rules of horticulture, vegetable cropping, other cropping and other agriculture were adapted to reflect the attraction of the current locations as seeds for expansion.
- A map with high erosion prone areas was included to stimulate a conversion of sheep, beef and deer farming to Indigenous vegetation of locations prone to erosion.
- Residential and other urban classes were given a higher inertia to avoid unrealistic conversions. Conversions from a lower density class to a higher density class were perceived realistic, especially in areas under pressure of high land use demand. Interaction rules were tuned to reflect this.

And the following new setting of 'vacant urban':
- As this class was given the land use type 'vacant', main parameters to set were the interaction rules. These were set in such a way that conversion of 'vacant urban' to urban land types is stimulated and that 'vacant urban' is likely to remain 'vacant urban' until it is occupied with an urban land use.

1.7 Validation

After the updated WISE version 1.6 (WISE V1.6) model had been setup an initial set of land use maps from the baseline in 2018 into the future was created. These were provided to the territorial authorities for time steps of 2020, 2030, 2040, 2050 and 2060 for their validation. This process was to check the plausibility of the modelling and territorial authorities were asked to identify any changes that were not expected given their current zoning and planning documents.

This validation checking process identified a few outcomes that were considered implausible, and the WISE model was adjusted to improve model results.

For a full description of the current technical status of the WISE V1.6 model and specifics of updated components refer to the technical specifications document (Waikato Regional Council, 2021).

2 Part 2 - WISE Reference Scenario

2.1 Looking ahead - Where does our current trajectory take us?

Assuming the current plans and policies in place what does the future hold for the Waikato region based on expert projections of population and economic growth? This future can be explored using the Reference scenario in WISE. The Reference Scenario uses the medium population and medium economic growth projection data as set up in the WISE model.

2.2 Population Story

The regional population is projected to grow by 17% by 2035 (up from 475,601 in 2018 to 554,328 in 2035) and could grow a further 21% by 2065 (669,852 people) under the Reference Scenario.

The behaviour of projected population change for districts varies across the region (Figure 1):
- The current high growth districts of Hamilton City and Waikato District are projected to experience the highest levels of growth in the region, with increases of about 35% by 2045 and 50+% by 2065.
- Waipa District is projected to grow at about the regional average (+ 25% by 2045 and + 38% by 2065). This is closely followed by the Otorohanga District with +18% by 2045 and +31% by 2065.
- Hauraki, Taupo and Thames Coromandel District show consistent ongoing growth by at lower levels (about 2-4% growth/5 years).
- South Waikato and Waitomo Districts are projected to have an initial small decrease in population, with South Waikato then recovering to a 3% increase by 2045 and 13% increase by 2065. Waitomo District is not projected to increase in population until later and then increases by 6% by 2065.
- The projected figures for population change in the Waikato region and by district are summarised in Table 1.
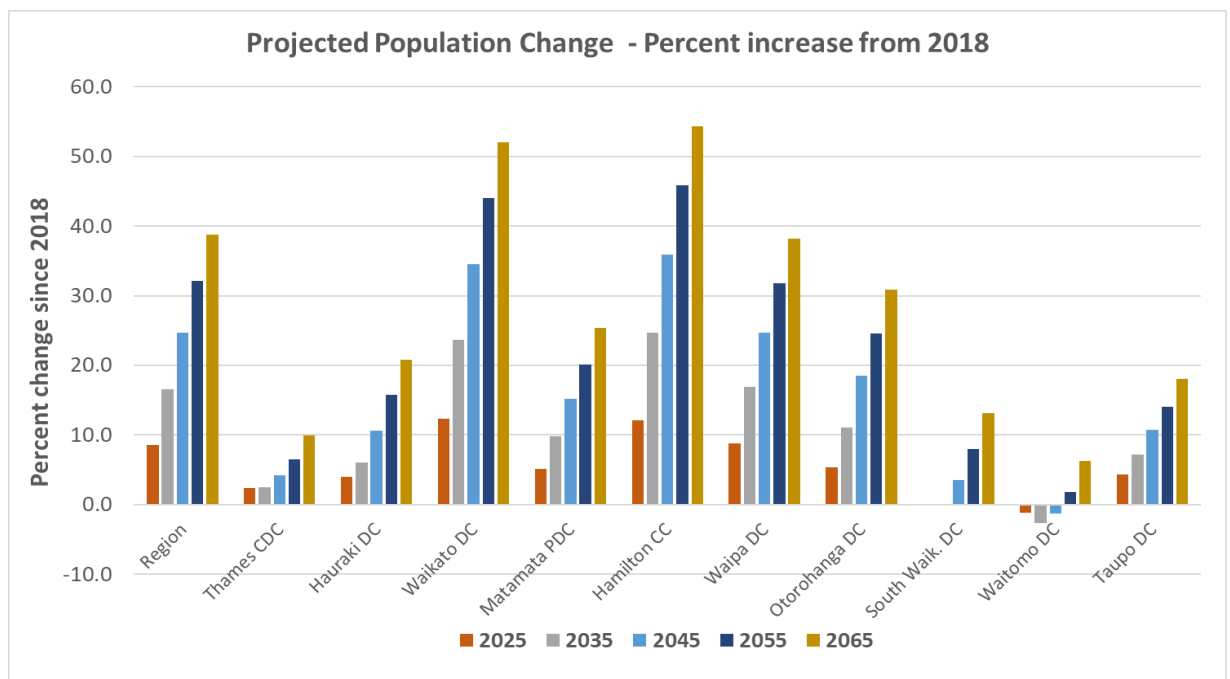
Figure 1: Percentage change in populations from 2018 base

Year	2018	2025	2035	2045	2055	2065
TA						
Thames Coromandel	30700	31411	31455	31973	32702	33755
Hauraki	20600	21412	21840	22778	23852	24873
Waikato	78200	87859	96710	105229	112668	118852
Matamata Piako	35300	37103	38770	40638	42394	44234
Hamilton	168600	188877	210135	229217	245952	260263
Waipa	55000	59844	64303	68584	72487	76023
Otorohanga	10500	11062	11665	12447	13084	13738
South Waikato	24900	24877	24883	25773	26895	28169
Waitomo	9580	9462	9323	9454	9753	10182
Taupo	38400	40062	41136	42515	43799	45330
Rotorua*	3822	3960	4108	4307	4512	4741
Region	475601	515929	554328	592916	628099	660161

*Only part of this district is in the Waikato region.

Table 1: Summary of projected population changes by district and region

2.3   Projected Economic Growth

The story for projected economic growth is driven strongly by associated population growth and household consumption as well as projected increases in economic performance for key sectors. Figure 2 shows the change from 2018 for three key economic outcomes (value add, employment, and household consumption).
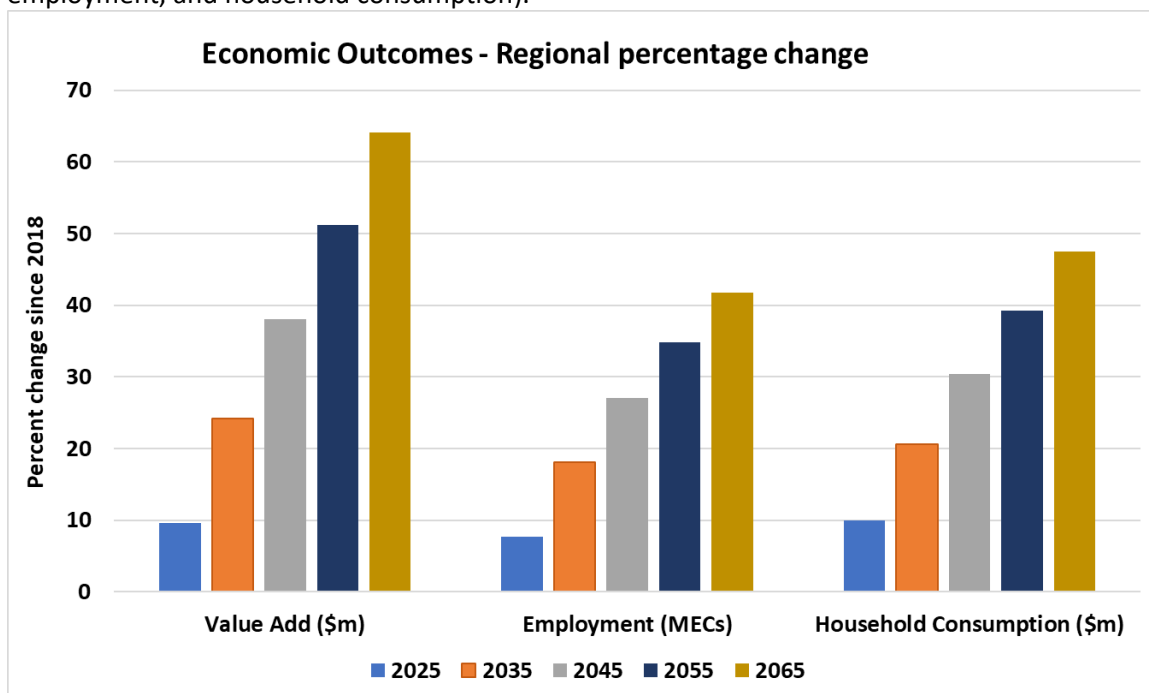
Figure 2: Regional change in key economic outcomes

These results reflect the increased economic activity driven by increased population and assumed improvements in productivity and consumption patterns. Looking specifically at changes in employment across the districts it is clear to see that the high growth areas also show the highest increases in employment from 2018 (Hamilton and Waikato, then Waipa District).
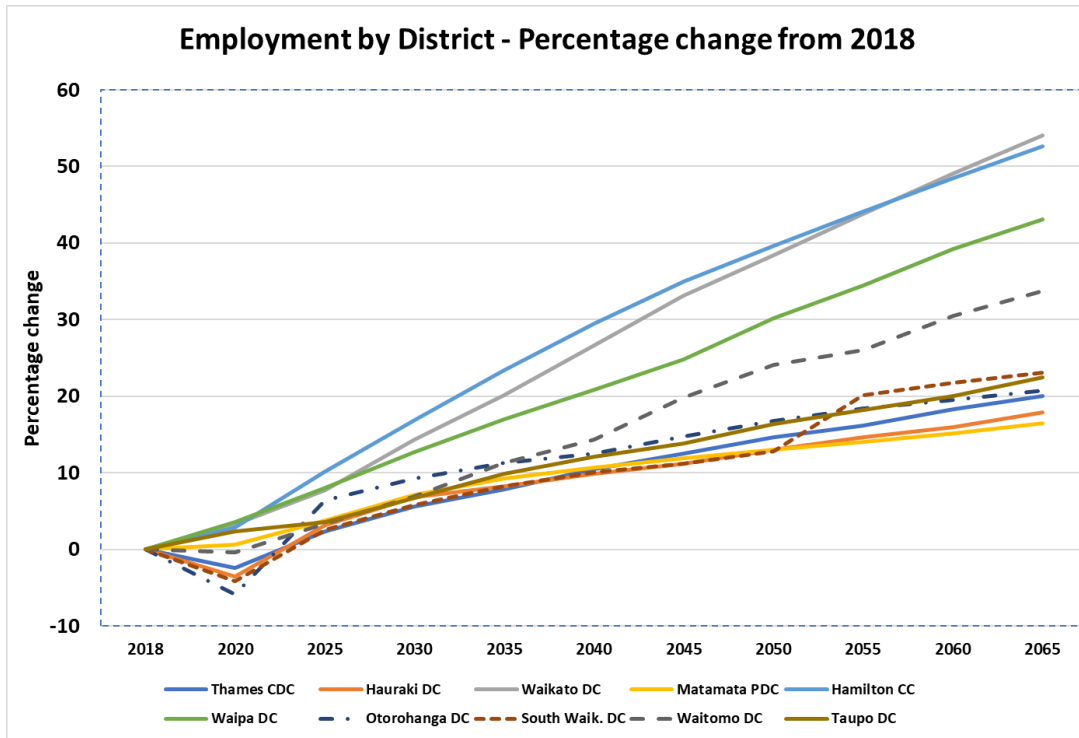
Figure 3: Projected change in employment by district in Reference Scenario

2.4   Outcomes of Drivers on Land Use

The culmination of the projected population and economic growth demands drives many of the main land use changes that could occur across the Region in this "Reference" future. The projected changes are significant for urban, manufacturing and commercial land uses.

Changes in land use zoning and expectations for infill and more intensive urban developments show a marked increase in medium-high density residential land use over time. This occurs primarily within Hamilton City, Waikato and Waipa Districts (Appendix 1). There is a steady increase in the development of low-density residential land use change in the scenario. However, the demand for lifestyle residential is low throughout most of the scenario (the spike in 2065 is likely due to zoning/demand constraints at end of scenario).

The area required for commercial and manufacturing land use increases in accordance with increases in added value and demand from population growth. For rural land uses there is only a minor net increase initially in the scenario in dairying land use area, although some is then lost later primarily around urban areas to residential and industrial land. An increase in forestry is expected as a reflection of increased policy in restrictions for pastoral land use in the Waikato/Waipa River catchment and demand for carbon forestry. This increase came primarily from existing sheep and beef land use.
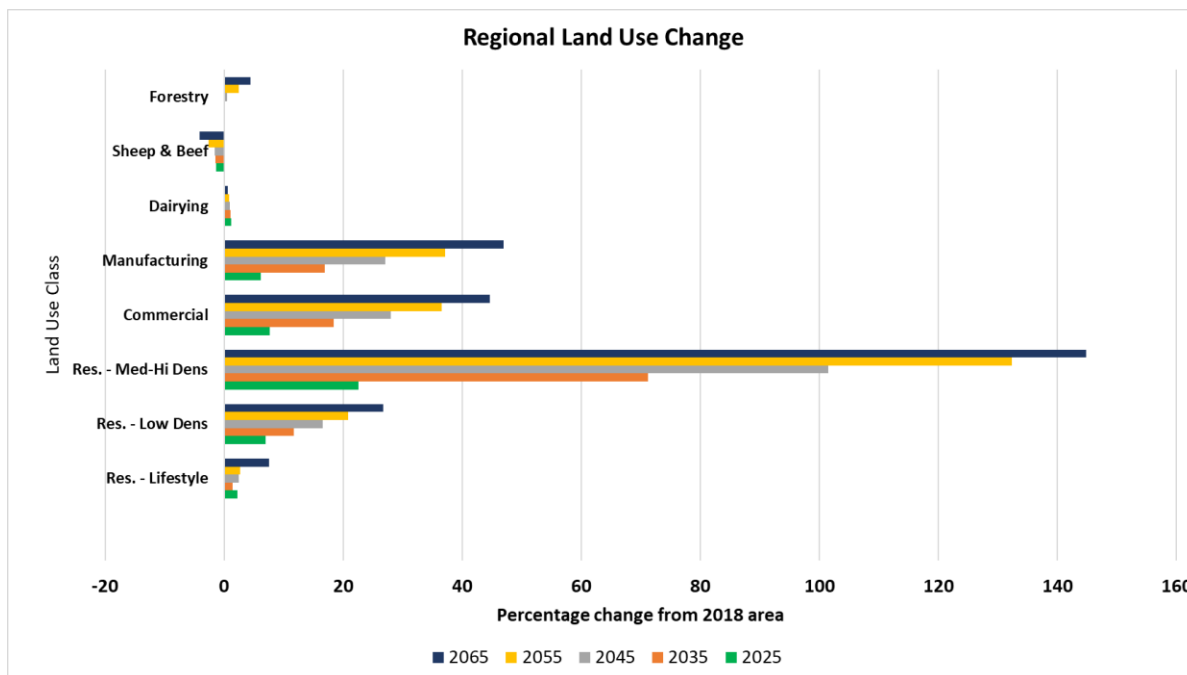
Figure 4: Regional changes in land use compared with 2018

Land type (ha) / Year	2018	2025	2035	2045	2055	2065
Residential - Lifestyle Blocks	39400	40299	39966	40386	40451	42388
Residential - Low Density	13053	13966	14586	15220	15772	16537
Residential – Med-High Density	522	640	894	1052	1213	1278
Commercial	2176	2343	2577	2785	2972	3147
Community Services	2330	2542	2784	2986	3158	3314
Manufacturing	1928	2047	2255	2450	2643	2833
Dairy Farming	681263	689727	688928	687706	686820	685271
Sheep, Beef or Deer Farming	515788	508972	508449	507519	502565	494709
Other Agriculture	12756	12752	12959	12851	12603	12258
Horticulture	3399	3632	3974	4283	4579	4878
Vegetable Cropping	6300	6732	7366	7938	8483	9035
Other Cropping	8395	8393	8529	8457	8294	8067
Forestry	283918	283917	284065	285261	290939	296605

Table 2: Land Use Projection (medium growth) for the Waikato region - 2018 to 2068 (ha's) – for selected land uses

3 Part 3 – Waikato Projections – Overview of Integrated Process

3.1 Introduction

This section describes the integration process used in developing projections of land use, demographics and economics from a baseline in 2018 to 2068 (50 years time horizon). These future projections of land use change, population dynamics (population, family and household, labour force) and economic development (value-added, employment) are important to local government as inputs into district, structure and infrastructure planning.

This section outlines the processes followed to create a common set of population and economic projections data by Statistical Area 2 (SA2) for the Waikato. These outputs are aimed at providing consistency for the inputs used in a range of planning and modelling processes undertaken by Territorial Authorities (TA's), Future Proof, Waikato Regional Transport Model (WRTM) and Waikato Integrated Scenario Explorer (WISE). To generate these outputs, it is necessary to link together outputs from three modelling processes:
1. land use modelling (WISE model, for future projections of land use change)
2. population modelling ('Multi-Regional Demographic' model, regression analysis at SA2 level); and
3. economic modelling (Economic Futures Model (EFM) and additional SA2 modelling).

3.2 Process Overview

The steps and methodology for these three processes are outlined in Step 1 of Figure 5 and the additional modelling to develop the SA2 level projections and the links between the three modelling processes are outlined in Step 2 of Figure 1. The two steps involved are:
Step1: Updating of Core Data Sets
a) New population projections were developed based on 2018 census data.
b) These population projections are used in the 'Multi-Regional Demographic' model to provide an updated data file (territorial authority level population data) for use in economic (Economic Futures Model, EFM) and WISE modelling.
c) A major update of the WISE model has been undertaken to utilise latest data sets (population, land use, zoning), and created a new start date of 2018. As described in Part 1 of this report.
d) A review of data outputs from the revised WISE model was undertaken with territorial authorities to ensure the setup was plausible.
e) Updated sector economic data are provided from EFM into WISE
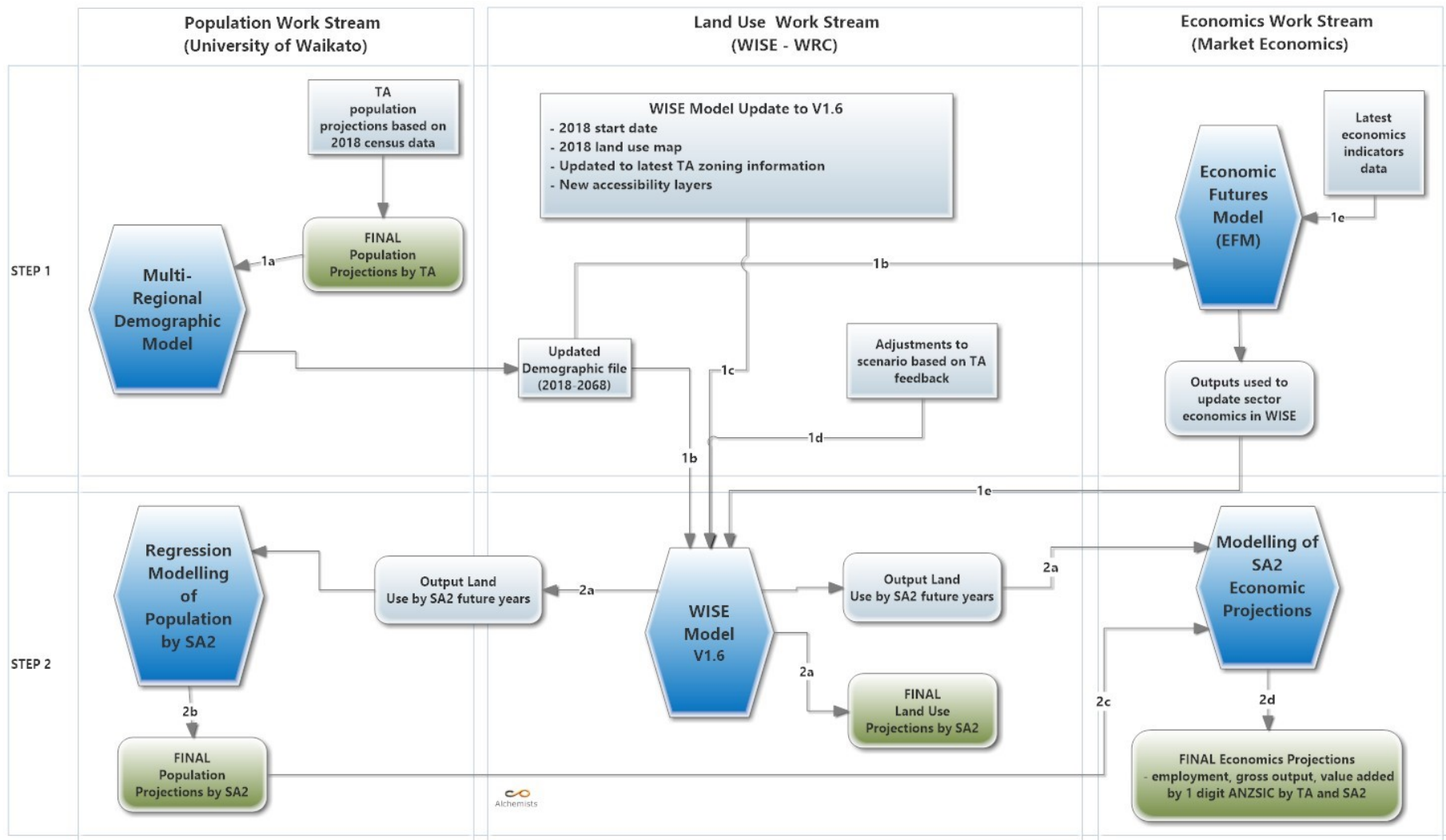
Figure 5: Work stream process for developing updated population and economic output projections for Waikato region

Step 2: Development of SA2 level projections
  a) WISE version 1.6 model is run – land use output data from WISE is processed to a SA2 scale and provided to University of Waikato and Market Economics Ltd to undertake their modelling for population and economic indicators, at SA2 level.
  b) Regression modelling by University of Waikato produces final projection outputs for population by SA2 (Cameron and Cochrane, 2021b).
  c) Final population projections by SA2 are provided to Market Economics to use in their modelling of economic indicators at SA2 level.
  d) Modelling by Market Economics Ltd produces final economic projection outputs by SA2 (Cheon and McDonald, 2021).

4 Part 4 – WISE Modelling and Development of Land Use Projections

4.1 Overview

This project required WISE to produce a robust projection of future land use for the Waikato Region. The projection of future land use is required to support more detailed projection modelling of population and economic outcomes at the SA2 scale.

Figure 6 shows the process that was followed to produce the land use projections. The work firstly required a significant update of the WISE model. This required several data updates including an update of the initial land use layer, zoning and accessibility layers, underlying population database file and economic sector data.

Updating these data sources is important to ensure that the model is 'current' and uses the best available data and knowledge so that the scenario outputs are as robust as possible.

The territorial authority level population projections were updated based upon the release of the 2018 census results (Cameron and Cochrane, 2021). Updated regional economic data was provided by Market Economics Ltd's Economic Futures Model (EFM).

The update of the WISE model to V1.6 was undertaken with the objective of keeping it current and robust for scenario modelling work in the Waikato region. The update included three different growth scenarios (low, medium, high). The validation process with TA staff was undertaken only with outputs from the medium growth scenario which is seen as the Reference Scenario for the Waikato.

For the Waikato Projections project, the WISE model was run to provide land use projection data for the three scenarios (low, medium, high).
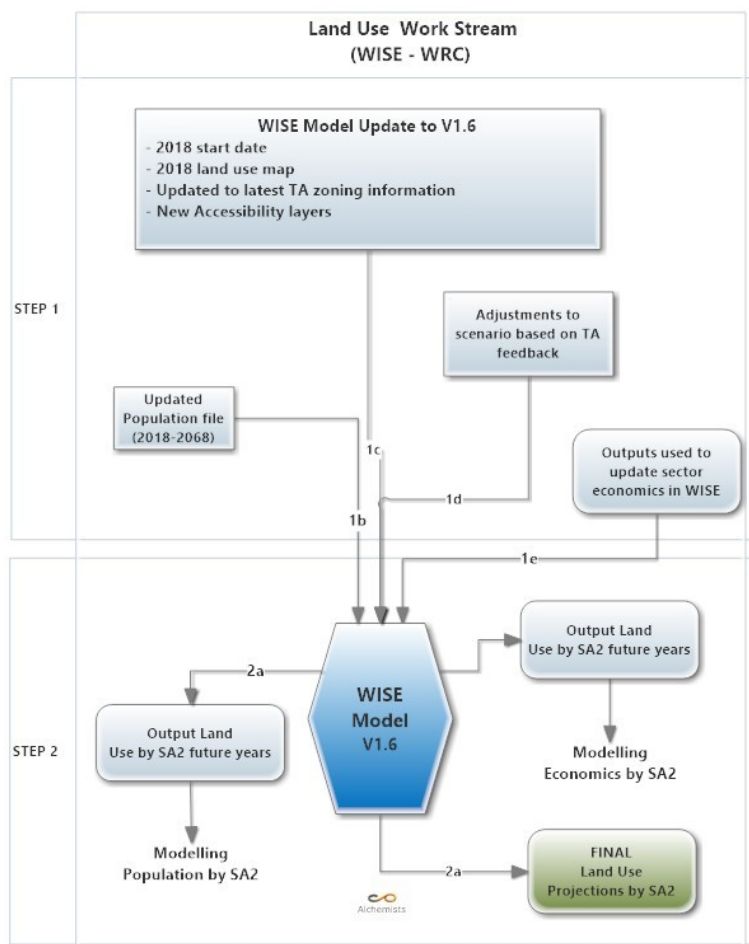
Figure 6: Process for generating up to date projections of land use for SA2 level outcomes modelling

4.2 Results: Land Use Projections by SA2

4.2.1 Process Methodology

After setting up of the WISE V1.6 model and further validation based on territorial authority feedback the resulting 'reference' scenario was run and land use projections for the following years were captured as 'geotiff' files: 2018, 2025, 2035, 2045, 2055, 2065.

For each of these time steps the 'geotiff' file is then analysed in GIS software (Tabulate Area / Cross Tabulate process) against the Statistics New Zealand 2020 Statistical Area 2 (SA2) layer.

This provides a database file for each time step that contains areas of each land use modelled in WISE by SA2's within the Waikato region. This data is then converted to hectares (from square metres) and loaded into a template spreadsheet that provides land use data by TA and SA2 boundaries.

4.2.2 Projection Results

A time step summary of this land use data for each time step, by territorial authority in the region is provided in Appendix 1. This provides a summary of the most relevant 13 land uses (out of a total of 26 land use classes).

The full set of Waikato Projections data, including land use, demographic and economic projections are available via the following link to download the data (Excel) and to interactively explore the projection data: http://www.creatingfutures.org.nz/waikato-projections-demographic-and-economic/2018-projections-outputs/ - accessed 22/11/2021).

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Appendix 1 – Waikato Land Use Projections (medium growth) by TA

HAMILTON CITY COUNCIL	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	688	325	168	93	58	41
Residential - Lifestyle Blocks	692	554	204	152	72	74
Residential - Low Density	4260	4644	4927	5146	5295	5527
Residential - Medium to High Density	243	315	413	429	468	473
Commercial	794	895	1058	1194	1292	1407
Community Services	378	458	529	576	608	627
Horticulture	5	2	1	1	1	1
Vegetable Cropping	0	0	0	0	0	0
Other Cropping	288	140	126	80	8	0
Dairy Farming	1233	1424	1410	1220	1148	831
Sheep, Beef or Deer Farming	347	323	281	238	173	133
Other Agriculture	42	42	41	37	36	32
Forestry	91	90	90	90	93	94
Manufacturing	283	290	316	346	388	427

WAIKATO DISTRICT COUNCIL	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	1203	759	619	412	402	364
Residential - Lifestyle Blocks	15710	15846	15564	15814	15763	16629
Residential - Low Density	1211	1456	1668	1894	2101	2293
Residential - Medium to High Density	28	50	179	280	360	403
Commercial	227	229	249	269	273	274
Community Services	594	612	645	697	756	835
Horticulture	1071	1067	1133	1179	1209	1234
Vegetable Cropping	5430	5775	6255	6697	7132	7551
Other Cropping	2578	2619	2710	2707	2655	2624
Dairy Farming	121447	122288	122066	121606	121243	120506
Sheep, Beef or Deer Farming	155572	154036	153791	153358	153077	152219
Other Agriculture	3693	3696	3741	3737	3714	3674
Forestry	21772	21768	21771	21811	21884	21931
Manufacturing	300	312	374	451	493	561

WAIPA DISTRICT COUNCIL	YEAR					
Land Use Type (ha)	**2018**	**2025**	**2035**	**2045**	**2055**	**2065**
Vacant - Urban land	411	101	64	65	64	36
Residential - Lifestyle Blocks	6253	6676	6625	6530	6341	6651
Residential - Low Density	1318	1444	1528	1597	1656	1737
Residential - Medium to High Density	80	98	124	155	187	196
Commercial	287	302	326	345	365	385
Community Services	289	295	308	328	352	374
Horticulture	1105	1276	1415	1565	1725	1883
Vegetable Cropping	105	125	168	204	227	268
Other Cropping	1605	1641	1656	1641	1625	1596
Dairy Farming	86659	87758	87504	87303	87132	86711
Sheep, Beef or Deer Farming	23375	23077	23068	23042	23053	22881
Other Agriculture	4145	4171	4256	4256	4256	4254
Forestry	1661	1661	1661	1661	1667	1669
Manufacturing	243	256	284	315	384	428

THAMES COROMANDEL DISTRICT	YEAR					
Land Use Type (ha)	**2018**	**2025**	**2035**	**2045**	**2055**	**2065**
Vacant - Urban land	645	545	528	472	389	296
Residential - Lifestyle Blocks	2187	2249	2253	2290	2342	2416
Residential - Low Density	1771	1813	1815	1845	1888	1949
Residential - Medium to High Density	84	86	86	88	90	93
Commercial	155	158	160	163	165	168
Community Services	108	120	139	161	175	187
Horticulture	558	501	506	515	518	523
Vegetable Cropping	0	0	0	0	0	0
Other Cropping	41	34	34	30	27	27
Dairy Farming	13112	13187	13181	13163	13150	13129
Sheep, Beef or Deer Farming	21649	20242	20236	20224	20203	19990
Other Agriculture	89	88	88	86	86	85
Forestry	28492	28491	28490	28490	28524	28548
Manufacturing	95	97	101	104	105	106

HAURAKI DISTRICT COUNCIL	YEAR					
Land Use Type (ha)	**2018**	**2025**	**2035**	**2045**	**2055**	**2065**
Vacant - Urban land	367	242	195	163	140	115
Residential - Lifestyle Blocks	2512	2599	2651	2765	2895	3019

Residential - Low Density	656	675	688	700	716	746
Residential - Medium to High Density	12	12	12	13	14	14
Commercial	109	112	114	116	122	123
Community Services	116	136	142	153	154	156
Horticulture	335	479	608	709	810	919
Vegetable Cropping	8	8	8	8	8	8
Other Cropping	106	110	110	110	110	104
Dairy Farming	59086	59201	59070	58926	58759	58595
Sheep, Beef or Deer Farming	15832	15584	15559	15495	15425	15339
Other Agriculture	270	281	302	302	302	302
Forestry	3531	3531	3531	3533	3538	3544
Manufacturing	55	59	62	65	67	69

MATAMATA PIAKO DISTRICT	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	286	166	83	44	36	32
Residential - Lifestyle Blocks	2715	2795	2886	3008	3120	3255
Residential - Low Density	910	935	938	964	986	1029
Residential - Medium to High Density	21	22	23	24	25	26
Commercial	155	172	178	182	182	184
Community Services	146	162	178	201	221	238
Horticulture	72	74	76	78	79	81
Vegetable Cropping	735	801	911	1003	1088	1180
Other Cropping	1788	1815	1827	1824	1805	1755
Dairy Farming	119720	120835	120714	120548	120444	120454
Sheep, Beef or Deer Farming	13644	13523	13498	13440	13371	13303
Other Agriculture	3837	3799	3851	3848	3794	3589
Forestry	1106	1106	1106	1107	1114	1122
Manufacturing	272	275	290	299	310	325

OTOROHANGA DISTRICT	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	108	38	16	6	4	4
Residential - Lifestyle Blocks	1666	1756	1851	1975	2076	2180
Residential - Low Density	208	212	224	239	251	263
Residential - Medium to High Density	1	4	4	4	4	5
Commercial	39	39	39	39	41	41
Community Services	170	177	182	182	184	184

Horticulture	137	141	143	144	145	145
Vegetable Cropping	9	9	9	9	9	9
Other Cropping	238	239	240	239	238	187
Dairy Farming	65998	66872	66820	66747	66699	66736
Sheep, Beef or Deer Farming	51805	51250	51217	51156	50992	50336
Other Agriculture	56	52	52	52	25	5
Forestry	6292	6290	6290	6301	6449	6618
Manufacturing	9	12	12	13	13	13

SOUTH WAIKATO DISTRICT	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	115	70	58	32	14	3
Residential - Lifestyle Blocks	1409	1408	1408	1458	1521	1593
Residential - Low Density	812	811	811	840	877	919
Residential - Medium to High Density	5	5	5	5	5	6
Commercial	100	117	118	120	148	149
Community Services	119	151	185	195	199	199
Horticulture	30	30	30	30	30	30
Vegetable Cropping	13	14	15	17	19	19
Other Cropping	387	394	399	399	399	397
Dairy Farming	72013	73301	73307	73352	73387	73383
Sheep, Beef or Deer Farming	8215	8215	8212	8164	7947	7567
Other Agriculture	421	420	420	327	220	220
Forestry	68209	68224	68316	68741	69240	69521
Manufacturing	399	399	399	401	402	405

TAUPO DISTRICT COUNCIL	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	814	652	583	584	600	507
Residential - Lifestyle Blocks	4117	4257	4342	4145	3982	4121
Residential - Low Density	1634	1705	1719	1722	1720	1780
Residential - Medium to High Density	47	47	47	53	59	61
Commercial	223	226	229	234	244	251
Community Services	249	258	281	289	296	299
Horticulture	69	45	45	45	45	45
Vegetable Cropping	0	0	0	0	0	0
Other Cropping	844	854	869	869	869	830
Dairy Farming	69593	70470	70474	70504	70563	70653

Sheep, Beef or Deer Farming	57295	56499	56382	56334	53602	50259
Other Agriculture	125	125	130	128	100	43
Forestry	119316	119307	119356	119893	123307	126710
Manufacturing	203	275	334	367	385	391

WAITOMO DISTRICT COUNCIL	YEAR					
Land Use Type (ha)	2018	2025	2035	2045	2055	2065
Vacant - Urban land	165	155	139	114	78	57
Residential - Lifestyle Blocks	1138	1124	1108	1123	1159	1210
Residential - Low Density	252	249	245	249	257	268
Residential - Medium to High Density	1	1	1	1	1	1
Commercial	76	82	95	112	129	154
Community Services	131	143	165	174	183	185
Horticulture	12	12	12	12	12	12
Vegetable Cropping	0	0	0	0	0	0
Other Cropping	174	175	176	176	176	172
Dairy Farming	22658	22768	22770	22769	22766	22764
Sheep, Beef or Deer Farming	153163	151140	151138	151169	150873	150260
Other Agriculture	39	39	39	39	39	39
Forestry	15095	15095	15092	15037	15343	15603
Manufacturing	43	46	56	62	67	77