BEFORE THE HEARINGS PANEL

In the Matter of:	The Resource Management Act 1991
And	Proposed Plan Changes:
	PC38 Strategic Directions
	Taupō District Council
Application By:	

Statement of Evidence
PHILIP CARUANA

Dated: 25 August 2023

Taupō District Plan
CHANGES - BUNDLE ONE

1. Preamble

1) My full name is Philip Caruana, and I am a Senior Policy Advisor in the Policy Team at Taupō District Council (Council).

2) I hold the qualification of Master of Science in Ecological Economics from the University of Edinburgh.

3) I have fifteen years of experience working in the field of economics including in environmental and economic analysis, econometric modelling, and growth and development economics, both in Aotearoa New Zealand and abroad.

4) I led the development of the Taupō District Council's in-house growth model. This model produces population projections broken down by age and gender for each statistical area 2 unit and for the time period 2022-2060. The model also produces projections on demand and supply of housing for the same statistical areas and time period.

5) I confirm that I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023 and that I have complied with it when preparing this report. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2. Purpose

6) The purpose of this statement is to provide the panel with information regarding updated projections on the demand and supply of housing in the Taupō District.

7) The Council's current projections are set out in the Taupō District Growth Management Strategy (TD2050). However, this document is now approaching 6 years old and an update to these figures is required.

3. Discussion

8) Taupō District Council's TD2050 sets out where Council prefers future growth to occur and the nature and scale of that growth. TD2050 was adopted in 2006 and subsequently reviewed in 2018.

9) The population and household projections, and housing capacity estimates used for TD2050 were based on the estimated and projected resident population figures for 2017 and Census 2013 data published by Statistics New Zealand.

10) However, these projections were subsequently found to be consistently lower than what was observed in reality. This led Council to develop an in-house model that produces population and household projections for the Taupō district.

11) As part of the initial work, we tried to understand why Statistics New Zealand was under-projecting population in the Taupō District, and concluded that the likely cause was the use of outdated data (eg Census 2013 figures) or unrealistic assumptions (eg net migration assumed to be fixed at a low level throughout the timeseries).

3.1 Model development

12) In 2020, we started the development of an in-house growth model that used more recent census data on key parameters of population growth and specific assumptions eg projected net migration being influenced by the Covid pandemic. These key parameters relate to fertility, mortality and net migration.

13) A range of scenarios were produced to account for the inherent uncertainty in any model that projects into the future. This range is bounded by low and high scenarios reflecting the confidence levels in the key parameters.

14) The demographic software Spectrum has been used to model and interpolate these parameters and to produce population projections for each statistical area unit. This software was developed by the Futures Institute with the support of USAID, the Bill and Melinda Gates Foundation, the United States Fund for UNICED, UNAIDS, the World Health Organization (WHO), and UNICEF. It is used worldwide to project outcomes for demography, family planning, epidemics and healthcare, among others.

15) To identify the future housing need in Taupō, the population projections produced by Spectrum were translated into residential household units (households) by accounting for the number of holiday homes and average household size.

16) Since cohorts with similar ethnic, demographic and economic backgrounds tend to reside in the same area, there are noticeable differences in the observed household size between statistical area units. Census 2018 data shows that the average household size in the Taupō district is 2.4 but is as low as 2.2 in Wharewaka and as high as 2.9 in Wairakei-Broadlands. A large average household size implies that fewer dwellings are needed to accommodate the same number of people compared to an area where the average household size is small.

17) Household projections proxy the expected demand for houses in the Taupō district, and these figures guide policymakers to zone appropriate areas for residential housing development purposes and to plan for the required infrastructural services.

18) Housing capacity is determined by comparing the projected households with projected housing supply i.e. the projected number of new dwellings expected to be built in the district.

19) Housing supply is modelled using comprehensive information extracted from resource consent applications on future housing developments received by Taupō District Council. A separate sub-model is used to estimate the projected number of infill developments using multi-criteria analysis.

3.2 Results

20) The population projections produced by Council's model show steady growth rates in the majority of statistical area units of the district reflecting the observed growth between 2010-2020. In this decade, Taupō's population grew by 20% or at an average of 1.7% per year. This growth rate translates to around 280 new households moving to Taupō every year.

21)   None of our scenarios project a slowdown or decline in population in the Taupō district. Unlike our projections, Statistics New Zealand's projections show that Taupō's population is expected to slowdown and eventually decline under the low to medium scenarios. The two sets of population projections are shown in Figure 1.

Figure 1: Population projections – Taupō District Council (TDC) and Statistics New Zealand (SNZ)
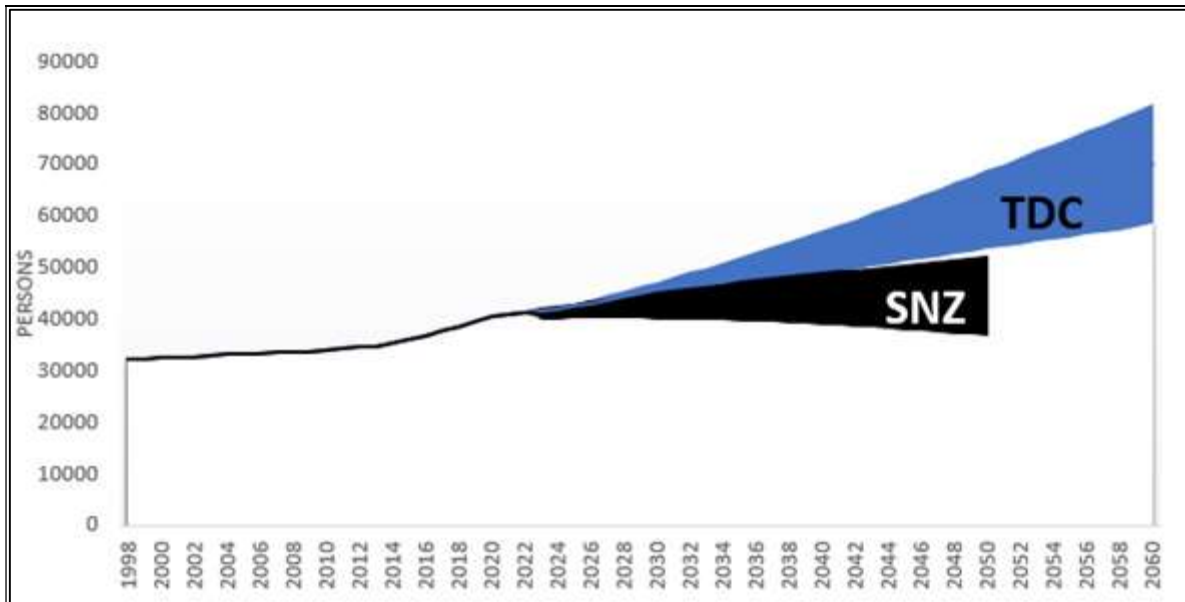
22)   The model's household projections, which proxy the demand for houses in the Taupō district, project an increase of around 67% by 2060 compared to the base year of 20,000 households in 2021, as shown in Table 1.

Table 1: Projected new households compared to base year (2021)

	2025	2030	2040	2050	2060
Taupō Township	310	1,300	3,590	6,380	9,320
Tūrangi	80	150	280	430	570
Marotiri	50	100	200	290	360
Mapara	50	210	580	1,040	1,540
Northern Rural	70	160	330	460	520
Lake Taupō Bays	20	130	360	680	1,050
Eastern Rural	0	0	10	10	20
Total	580	2,050	5,350	9,290	13,380

23)   The above housing demand projections are compared with projections of housing supply to estimate the housing capacity in the Taupō District over the next four decades. Table 2 below shows the additional new dwellings expected to be built in the District.

Table 2: Projected new dwellings compared to base year (2021)

	2025	2030	2040	2050	2060
Taupō Township	720	1350	2890	4370	5590
Tūrangi	30	170	380	480	580
Marotiri	0	0	0	0	0
Mapara	120	230	490	690	690
Northern Rural	0	0	0	0	0
Lake Taupō Bays	50	140	250	300	300
Eastern Rural	0	0	0	0	0
Total	920	1,890	4,010	5,840	7,160

24) Comparing the projected housing demand with housing supply indicate that there is enough District-wide housing capacity for around 20 years +/- 5 years. However, to have adequate capacity at each point in time requires that the timing of new developments meets the demand at that point in time. In reality, there will always be a level of disequilibrium between demand and supply such as in-between business cycles.

25) Housing capacity is also location-dependant. The known greenfield developments are largely concentrated in the Taupō township and Mapara (Kinloch) areas, and very limited developments, mostly infills, are currently earmarked in Marotiri (Mangakino) and in the Northern and Eastern Rural Communities.

3.3 Model Uncertainty

26) Growth projections represent a range of plausible futures based on the best available information and expert advice. Any model that attempts to project into the future will inevitably prove to be inaccurate. Growth projections depend on several drivers that are subject to some level of uncertainty.

27) Having a range of plausible projections and an understanding of the risk associated with them allows Council to take appropriate measures to mitigate this risk. We will be reviewing these projections on an annual basis or when key data, such as new census figures, is made available.

4. Conclusion

28) I consider that the growth model produces robust population and household projections for the Taupō District, and resulting estimates on housing capacity. It is based on the latest data on key parameters and updated assumptions.

29) The model is consistent with conventional statistical techniques used to project population. In our case, the growth model uses the cohort-component approach which accounts for changing fertility rates, mortality patterns, and migration trends.

30) The growth model is consistent with techniques used to account for inherent uncertainties associated with each key parameter. This was supported by a sensitivity analysis that tested the model's output in response to measured variations in key assumptions.

31) The model has been independently peer reviewed by Schiff Consultancy Limited.

Philip Caruana
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25 August 2023