



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

**Short Proposal for 2018-Base  
Waikato Population Projections**

Michael P. Cameron <sup>a,b</sup>

<sup>a</sup> School of Accounting, Finance and Economics, University of Waikato

<sup>b</sup> National Institute of Demographic and Economic Analysis, University of Waikato

**Prepared for Waikato Regional Council**

March 2018

This proposal outlines the methods, data, and indicative costs (final costs to be determined, and depend on selected options) associated with producing 2018-base demographic projections for the Waikato Region (and all Territorial Authorities that are partly or wholly within the region).

These projections adopt an overall similar approach to previous demographic projections at the territorial-authority level (Cameron and Cochrane, 2014a; 2015b; 2016b). However, in response to subsequent peer review (Wilson, 2015) two substantial changes have been made:

1. The adoption of a gravity-based model of internal migration that enables the estimation and projection of directional migration flows between all pairs of territorial authorities; and
2. Smoothed schedules of age-gender specific migration shares.

However, the adoption of the first of these two changes entails flow-on impacts in terms of the end-user-informed projections method. In previous population projections, we were able to incorporate feedback from end-users in terms of expectations of future migration flows. In Cameron and Cochrane (2014a; 2015b; 2016b), this involved a Bayesian method that altered net migration rates. This will not be possible with the gravity-based model of internal migration. International migration flows (the most uncertain of the components of population change) may be alterable, but the desirability of making these changes is yet to be determined. Second, the ability to generate high, medium, and low projections may be limited to changes in international migration, fertility, and mortality, with no ability to directly alter internal migration flows (though these will indirectly change as a result of changes to fertility, mortality, and international migration assumptions).

Projections at the SA2 (or other small area) level will be derived using a substantially similar method to Cameron and Cochrane (2014b; 2015a; 2016a).

## **Item A: Generation of new 2018-base demographic projections at territorial authority level**

### *Tasks*

Generating new 2018-base medium TA-level population, household, and labour force projections using a custom gravity-based internal migration model, projections of international migration flows (emigration and immigration), and Statistics New Zealand medium-variant assumptions for fertility and mortality. The projection horizon will be 2068.

### *Methodology*

Similar to Cameron and Cochrane (2014a; 2015b; 2016b), with differences noted above.

### *Deliverables*

- (A1) New WOW base file for use in the WISE model;
- (A2) Full report on population, household, and labour force projections (similar to Cameron and Cochrane, 2014a; 2015b; 2016b); and
- (A3) population, household and labour force projections by Territorial Authority in Excel format for 2018, 2025, 2035, 2045, 2055, and 2065.

Deliverable dates (subject to agreement):

(A1) – July 2019

(A2, A3) – December 2019

### *Cost (indicative)*

\$72,000+GST (of which \$12,000+GST relates to deliverable A2 if agreed in advance; if not, only a short memo on methodology will be available to support the projections)

### *Additional Costs (indicative)*

\$12,000+GST to add high and low variant projections

## **Item B: Additional update of household projections methodology**

### *Rationale*

The previous projections (Cameron and Cochrane, 2014a; 2015b; 2016b) used the standard Statistics New Zealand methodology for deriving household projections, using Living Arrangement Type Rates (LATRs). This approach is simple, but is not the state-of-the-art in household projections methodology. Wilson (2013) proposed a sequential propensity method for deriving family and household projections from population projections. However, the sequential projection method has not been applied in New Zealand to date (although Statistics New Zealand is contemplating a change to this methodology). Updating to this new method will result in more accurate and defensible household projections based on a given set of population projections, but will require additional time and resourcing to achieve.

### *Tasks*

Generating new 2018-base medium TA-level family and household projections using a sequential household projection methodology approach.

### *Methodology*

Following Wilson (2013).

### *Deliverables*

- Replace household projections in Deliverables for (A), above.

Deliverable date (subject to agreement): As per (A), above.

### *Cost (indicative)*

\$24,000+GST

## **Item C: Generation of new 2018-base demographic projections at SA2 (or other) level**

### *Tasks*

Generating new 2018-base medium SA2-level (or alternative level) population, household, and labour force projections using the same method as previously (Cameron and Cochrane, 2014b; 2015a; 2016a), and based on demographic projections at the TA-level and land use modelling from the WISE model. The projection horizon will be 2068.

### *Methodology*

Identical to Cameron and Cochrane (2014b; 2015a; 2016a). This method has been peer reviewed, and published as Cameron and Cochrane (2017).

### *Deliverables*

- (C1) Report describing the projection methodology, and the resulting SA2-level demographic projections; and
- (C2) Revised CAU demographic projections in Excel format, for 2018, 2025, 2035, 2045, 2055, and 2065.

Deliverable date (subject to agreement): February 2020

### *Cost (indicative)*

\$12,000+GST

### *Additional Costs (indicative)*

\$8,000+GST to add high and low variant projections

## References

Cameron, M.P., and Cochrane, W. (2014a). *Population, Household, and Labour Force Projections for the Waikato Region, 2013-2051*, research report commissioned by Waikato Regional Council, Hamilton: University of Waikato.

Cameron, M.P., and Cochrane, W. (2014b). *Small-area Population, Household, and Labour Force Projections for the Waikato Region to 2051*, research report commissioned by Waikato Regional Council, Hamilton: University of Waikato.

Cameron, M.P., and Cochrane, W. (2015a). *Area Unit Population, Household, and Labour Force Projections for the Waikato Region, 2013-2061*, research report commissioned by Waikato Regional Council, Hamilton: University of Waikato.

Cameron, M.P., and Cochrane, W. (2015b). *Population, Household, and Labour Force Projections for the Waikato Region, 2013-2063 (2015 Update)*, research report commissioned by Waikato Regional Council, Hamilton: University of Waikato.

Cameron, M.P., and Cochrane, W. (2016a). 2016 Update of Area Unit Population, Household, and Labour Force Projections for the Waikato Region, 2013-2061, research report commissioned by Future Proof, Hamilton: University of Waikato.

Cameron, M.P., and Cochrane, W. (2016b). 2016 Update of Population, Family and Household, and Labour Force Projections for the Waikato Region, 2013-2063, research report commissioned by Future Proof, Hamilton: University of Waikato.

Cameron, M.P., and Cochrane, W. (2017). Using land-use modelling to statistically downscale population projections to small areas, *Australasian Journal of Regional Studies*, 23(2), 195-216.

Wilson, T. (2013). The sequential propensity household projection model, *Demographic Research*, 28, 681-712.

Wilson, T. (2015). *Review of demographic projections for the Territorial Authorities of Waikato Regional Council*, peer review report commissioned by Waikato Regional Council, New Farm, Queensland: Advanced Demographic Modelling.