# List of Improvements to WISE and outputs of Population and Land Use Projections

Draft for further feedback from TA’s – Dec 2016 – Version 2

## Modelling of ‘Planning Units’

The projection modelling of households/dwelling, rateable units, absentee ratepayers, and non-residential floor space are somewhat inter-related so are grouped under a discussion here around modelling of “planning units”.

### Including a households/ dwelling model into WISE

*People involved: Tony F – WISE, Michael Spurr – HCC, Myk Cameron – UoW*, RIKS

There is a demand from TA’s, particularly FP, for household / dwelling numbers from WISE rather than just population. The approach to this would depend on what type of household data TA’s required – Total households or broken down to different household types. Also links to at what spatial breakdown is required by TA’s – providing TA level households probably easy vs at Ward, Urban boundary, or CAU

At a TA level this could be undertaken using a ‘conversion’ model that take population changes and converts this to household and dwellings based on StatsNZ generation rates – living arrangements by age/sex cohorts (Myk – additional comments? ).

The spatial allocation of households at a sub-TA level (Wards or CAUs) would be more difficult and require more complex modelling – like what has been done for CAU level projections ( Myk – additional comments? – what would be options for doing this at sub-TA level? – could your households model be included into WISE ?).

Is it an option to change modelling to be done based on households rather than population density by land use type? (Seek feedback from RIK’s, UoW)

Also any changes to improve modelling ability to represent future infill in urban areas could impact on this need – either by creating more land use types or requiring a more complex household’s model *(see also 2. below).*

Questions to explore:

* How are (have been) the Household data used?
* What is the level of household details that TA’s would want from model? – Specific household types or just based on average household size?
* Could processes for undertaking recent household projections be used in WISE to allow for automated predictions of households at different spatial groupings?
* Has the modelling of Households rather than population density been done using RIKs Geonamica model in other countries? – emailing RIKs to check on this.

### Improve ability to differentiate/accommodate for infill and greenfield development in WISE

*People involved: Tony – WISE, Michael – HCC, RIKs*

There is a demand to improve ability to model urban infill in more detail to represent what can occur in large urban areas. Options include either by incorporate a land capacity layer (linking to a households model?) or additional residential land use types into WISE. This is primarily an issue in large existing urban areas (Hamilton City, Cambridge).

To date this has been represented by accounting for infill through changing the LD residential land use density upwards in future. This lifts the density across the TA for the LD residential land use class. This does not provide the spatial delineation required when modelling household numbers at a sub-TA level.

Previously suitability layers have been used to direct growth of MH Density residential into existing L Density residential areas to represent this type of infill– but this does not account for infill within L Density residential areas that does not lift the population density into the MH Density LU Class – i.e existing property subdivision which accounts for a significant portion of growth in HCC.

One option is to introduce additional residential land use classes that delineates areas for this type of infill and would allow for the population densities to vary from non-infill areas. Adding new land use classes to WISE is a significant task requiring a new starting land use layer, additional model coding and recalibration of models.

Another option might be to account for this in any household modelling approach (not sure this is even possible? – depends on the outcomes from point 1. above)

Questions to explore:

* How important is this (only FP councils)?
* Are there other options to represent this type of infill? How is this dealt with now/in the past?
* What are the costs/benefits of adding more residential land use classes to WISE and when could this be potentially achieved? (seek feedback from RIKs)
* Could any approach to households modelling assist with this?

### Accounting for absentee ratepayers

*People involved: Raised by Scott (TCDC), Tony F - WISE*

Some TA’s particularly those with coastal properties (TCDC, WDC, perhaps Otorohanga, Waitomo) have significant numbers of absentee ratepayers in some communities.

Need to have a standard definition of “absentee ratepayers”. Currently they are estimated by TCDC by comparing rates billing address with property address (show 55% absentee). But is there a more ‘robust’ method for defining?

Also absentee levels can vary spatially across a district (East vs West in Coromandel) this can mean that the TA averages used for population densities for residential land use classes would not always represent future growth well when assessed at sub TA levels (Wards or CAUs) – i.e potential to underestimate future population growth in low absentee ratepayer areas (Thames) and over-estimate in high absentee areas (Matarangi).

Questions to explore:

* What other options are available to quantify absentee ratepayers (and levels of occupancy?)
* Would using an additional residential land use class in WISE improve modelling in TAs with high levels of absentee ratepayers?

### Ability to generate No’s of ‘Rating units’

*People involved: Raised as need by – Charan (HDC) /Niall (MPDC), Tony F – WISE, Input – M.E.?, others?*

There is a demand from TAs to be able to project future changes in “Rating Units”. Could we use WISE modelling to help generate future estimates of number of Rating Units.

Need a formal description of ‘Rating Units”

Rating base information

*A long-term plan must state, for each year covered by the plan, the projected number of rating units within the district or region of the local authority at the end of the preceding financial year.*

It’s thus mandatory that rating unit projections are included in the LTP’s. It would be helpful to have projections broken down by rating unit category (residential, commercial, industrial etc.).

The Act says “Rating unit” means a rating unit for the purposes of the Rating Valuations Act 1998. Section 5B and 5C of the Rating Valuations Act 1998 essentially define rating units as pieces of land that hold a certificate of title or equivalent (e.g. gazette notice).

Rating Valuations Rules 2008 (Operative from 31 March 2009) states:

*For land for which there is a certificate of title, the land comprised in the certificate of title constitutes a rating unit.*

*For land owned by the Crown for which a single instrument exists, the land described in the instrument constitutes a rating unit.*

Need to agree on a formal description for a ‘Rating Unit’ (which might vary between residential, rural, commercial and manufacturing) and then establish how/if this could be projected based on the output information from WISE:

* Population / population density
* Area of land use (resid. / commercial)
* Households ( if produced by a Households model)
* Commercial/Manufacturing ‘output changes’ or non-resid. Floor space modelling

Questions to explore:

* How are rateable units currently estimated by different TA’s?
* What are different types of rateable unit required to be projected?
* Is there a link/cross over between household modelling and ‘rateable units’?
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### Non-residential areas: PROJECTION OF floor space

*People involved: Michael Spurr - HCC/M.E.*

Is it possible to use WISE model outputs and/or other data to project future demand for floor space in non-residential areas. Market Economic is going to be doing some floor space projections for HCC. This might provide some useful insight into possible process. (Seek Feedback from ME)

The calculation of non-residential floor space is likely to be linked to any process to calculate rateable units.

Questions to explore:

* Could the M.E. methodology being used for HCC be captured into WISE?
* How would this data be used?
* What other information might be required to project, that’s not in WISE?
* What are the links with calculating rateable units?

## Other WISE Modelling Improvements

### Provide full District modelling for TA’s not completely in Waikato Region

Some TA’s are not fully captured by current WISE modelling (Taupo, Waitomo, and Rotorua Districts).

There is potential to extend WISE boundaries outside Regional boundary where only part of district is within region to provide total district projection results (Taupo, Waitomo, maybe Rotorua). This would require changes to Land use Layer, Population Model and Economic model, then recalibration of the WISE model.

This change could be undertaken as part of the next WISE version upgrade (to WISE 1.5) in 2017/18 and at the same time any changes in residential land use types etc under point 2 above.

Questions to explore:

* What are the cost/benefits of making this change?
* Who would be paying?

*People involved: Beat H– WRC, Tony F– WISE, Myk C– UoW, Garry Mc - M.E.*

### Improved migration modelling

*People involved: Beat – WRC, Myk – UoW/NIDEA*

Generally, migration is the principal influencing factor of the three determinants of population projections (birth rate, death rate, migration rates). NIDEA uses the net migration rate method for projecting future migration, while Stats NZ uses the absolute net migration number approach. With absolute net migration numbers, net migration becomes less important as a population driver as the size of the population increases. Arguably, this makes net migration rates the preferred method compared to the absolute net migration numbers< e.g. the NIDEA projections prepared for FutureProof in 2007 (2006-base projection) outperform the corresponding SNZ projections.

The peer review for the NIDEA population modelling undertaken in 2015 has proposed to develop and use directional migration modelling for future projection work. NIDEA has already started to develop new methodologies with particular application to New Zealand:

* Jacques Poot and Michael Cameron currently have been funded by the Ministry of Business, Innovation and Employment (MBIE) to develop a multi-regional population model that incorporates directional migration based on a gravity modelling framework.
* Michael Cameron has been funded by the Royal Society of New Zealand Marsden Fund to extend the methodology to the Territorial Authority level.

NIDEA intends to use these improved models in future population projection work beyond the 2018 Census.

### Update WISE economic model for TA level

*People involved: Beat – WRC, Garry – M.E*

Improve economic model in WISE so it is spatial and operates at a TA level and aggregates to Region. This would allow for better representation of productivity differences across region.

This has been identified as a potential enhancement with benefits but the feasibility needs to clarified by M.E.

Need to ensure that this doesn’t create TA ‘silos’ and that growth in commercial/manufacturing area are plausible and not TA restrained.

Questions to explore:

* What improvements to current projection outputs? What is the added value?
* How difficult is this to implement?
* Will it require a full recalibration?
* ?

## Projection outputs – Modelling Alternate spacial Groupings

### Processing projection outputs at other spatial areas (e.g. urban zones, Wards)

*People involved: Tony F– WISE, Myk UoW for Population projections, raised by Charan (HDC) /Niall (MPDC)*

There is a demand to both improve the ease (speed and cost) with which projection scenario outputs (Land use, population, household) can be generated and that these can be process in a variety of spatial groupings (CAU’s, Urban growth areas, Wards, river catchments, Freshwater Management Units (FMUs)).

Can create land use outputs by any spatial delineations using the same process as used for CAU projections. There is scope to improve efficiency/ automation of this process using more python/MySQL scripting.

Question is how easy is it for UoW to spatially reallocate population to different set of ‘areas’ – can this be automated more to reduce turnaround time for scenarios? (Myk – Comments?)

Questions to explore:

* What are opportunities for more automated processing?
* Can these be included into WISE or remain as post- WISE modelling?
* What are options/ limitations to achieving this?

## Reporting formats and Data presentation

### Reporting and Display of data: pivot tables, interactive webmaps and visualization tools

*People involved: Beat - WRC*

Projections results can be presented in many ways, the aim is to define and meet output information needs for TA’s.

Some TA’s have raised a desire to have more reporting (improve quality and content), specific to their TA’s so that outputs are more easily used by them. This would also provide consistency of data presentation, interpretation and reporting throughout the region.

However, more data analysis, presentation and (TA specific) reporting would increase the cost.

The Rationale Reports done for HDC, MPDC, TCDC provide a good example of data presentation, and excel spreadsheets provided make good use of Pivot Table to make assessment of data. Other methods of data presentation / accessibility could be explored for future work. WRC is current migrating to ArcGIS. This could provide prospects for exploring its web service and interactive infographic capabilities in the second half of this financial year. Interactive web-based delivery on-line visualisation of data and

Questions to explore:

* How much data analysis, interpretation and reporting is required?
* Is web-based interactive data exploration and visualisation desired (in addition to hardcopy/excel)?
* ?

## Other Improvementc / Issues Identified

### Consider data and monitoring requirements for NPS-UDC – *FP councils*.

*People involved:* Michelle White – FP, Greg Morton, Derek P – WRC

Need to identify baseline data and ongoing monitoring and reporting needs for the NPS-UDC.

There are working groups being established to advance this topic (FP, WRC)

Questions to explore:

* What data is key?
* How is it created?
* What schema/data structure will it have?
* Who creates, hosts and manages it?
* When should it be reviewed and/or updated?

### Multi-owned Maori land

*Raised by Jenni V – WDC*

WDC are creating this layer for informing their planning. The issue was raised about what are the implications/ opportunities to use this type of information in WISE to project residential development (e.g. different household sizes).

Would need to apply some classification to such a layer as not all multiple owned Maori land would be subject to residential development.

Currently some zoning does exist to account for residential areas developing on multiple owned Maori land – i.e. Pa Zoning in WDC District Plan.

Questions to explore:

* Are there different classes of multiple owned Maori land that need to be considered in WISE modelling?
* Could these be represented by a specific zoning layer?

### Duplication of economics data - Infometrics and Market Economics Ltd/WISE?

*Beat – WRC*

A number of agencies and consultancies provide economic summary statistics, e.g. Infometrics Ltd provides updated statistics in a user-friendly web-based format: <http://ecoprofile.infometrics.co.nz/waikato%20region>).

Both Infometrics and Market Economics Ltd (ME) use SNZ as the basis for further analysis (regionalisation) and reporting, and results might differ due to various methods of data analysis used.

Infometrics and ME outputs are complementary: Infometrics produces current/historical data/trends, while ME produces projections into the future. Infometrics have a broader range of indicators/data, but are not producing results at CAU level as ME does.

Questions to explore:

* Is there any duplication between Infometrics data and Market Economics projections?
* Are councils interested in both data outputs?
* If so, what are the costs? (WRC pays $9,360 pa – regional data only);
* Who else subscribes to Infometrics (HCC, Hauraki, TCDC, Waikato?); Could we get a better deal?