

WISE SCENARIO MODELLING

EXPLORING IMPLICATIONS OF WAIKATO MEANS BUSINESS (WMB) GROWTH GOALS ON REGIONAL OUTCOMES

Assessment of Land Use Outcomes from WMB Goals July 2018

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BACKGROUND

The aim of this project is to understand some of the possible implications of the growth goals in the Waikato Means Business Economic Development Strategy (EDS). This is done by assessing the economic growth requirements, by key sectors, to achieve the goals and then applying this growth scenario using the WISE model to assess changes in projected land use compared with the Waikato “Reference” scenario¹.

The Waikato Means Business (EDS) has four main growth goals: (i) grow value added by 2.8% per annum; (ii) grow value added of key sectors by at least 3% per annum; (iii) grow productivity by at least 1% per annum; and (iv) grow value of international exports by at least 1.5% per annum.

The economic analysis of the WMB growth goals was undertaken by Market Economics Ltd of Auckland (McDonald and Kim 2018).

The outputs of the economic modelling undertaken by Market Economics were then incorporated into a scenario in the WISE model. This including an adjustment, in WISE, to projected population growth so that the required labour force was available to support increased economic activity in the WMB scenario. This report presents a summary of the process used to set up the WMB scenario and an analysis of the land use outcomes compared with the current ‘Reference’ growth scenario for Waikato.

SCENARIO SET-UP

The WISE Reference scenario was used as a Waikato ‘baseline’ to compare land use implications of the WMB goals scenario. The WISE Reference scenario was used as the starting point for developing the WMB scenarios. Based on the economic analysis of ‘optimal’ sector growth requirements to meet the WMB goals as outlined in McDonald and Kim (2018) the following changes were made to the *Reference scenario* to create the *WMB growth scenario* in WISE:

1. Population growth has been set to ensure a similar labour force participation rate as the Reference scenario (i.e. increasing from 67 to 81% by 2064 for a 15-67 year old working age population). The two easiest levers in WISE which allow this to be achieved are: (1) Multi-

¹ The WISE Reference scenario is set up to represent the modelled projections of population and economic growth for the Region and the current policies and plans that influence growth and land use development (<http://www.creatingfutures.org.nz/reference-scenario/>).

Factor Productivity (MFP). However this could not be used in this case as the MFP is set according to WMB aspirational goals i.e. at 1% p.a., and (2) increasing the net migration for each TA. The second lever was used for the WMB scenario. It was adjusted to provide a uniform 10% p.a. increase from 2013 through 2064 as was recommended (McDonald and Kim, 2018). This is easy implement and produced the required working age population (i.e. ensured that the labour participation rate remained similar to the baseline).

2. The economic model has been recalibrated to allow for the additional household consumption resulting from the increased population. The remaining other final demands (interregional trade, international trade, gross fixed capital formation and changes in inventories) are also changed to ensure that total final demand remains the same as what was estimated through his GAMS quadratic programming optimisation model used in McDonald and Kim (2018) (i.e. there is no change in total final demand, rather a redistribution between final demands, with household consumption increasing and the remaining other final demands decreasing).
3. The model has been set up as per the WMB goals so should only really be run through to 2031. It is possible to run it out to 2064, but running it out this far would ‘test’ the plausibility of modelling outcomes. Therefore in this report projections of future land use change are only results out to early 2030’s.

IMPLICATIONS FOR POPULATION

The rate of net migration into all of the Territorial Authorities (TAs) was increase (by 10% above Reference scenario migration levels) as outlined in the scenario set up above. This represents the population increase required to meet the employment demand if the WMB goals were achieved.

The resulting outcome from this adjustment on future population projections regionally is shown in Figure 1.

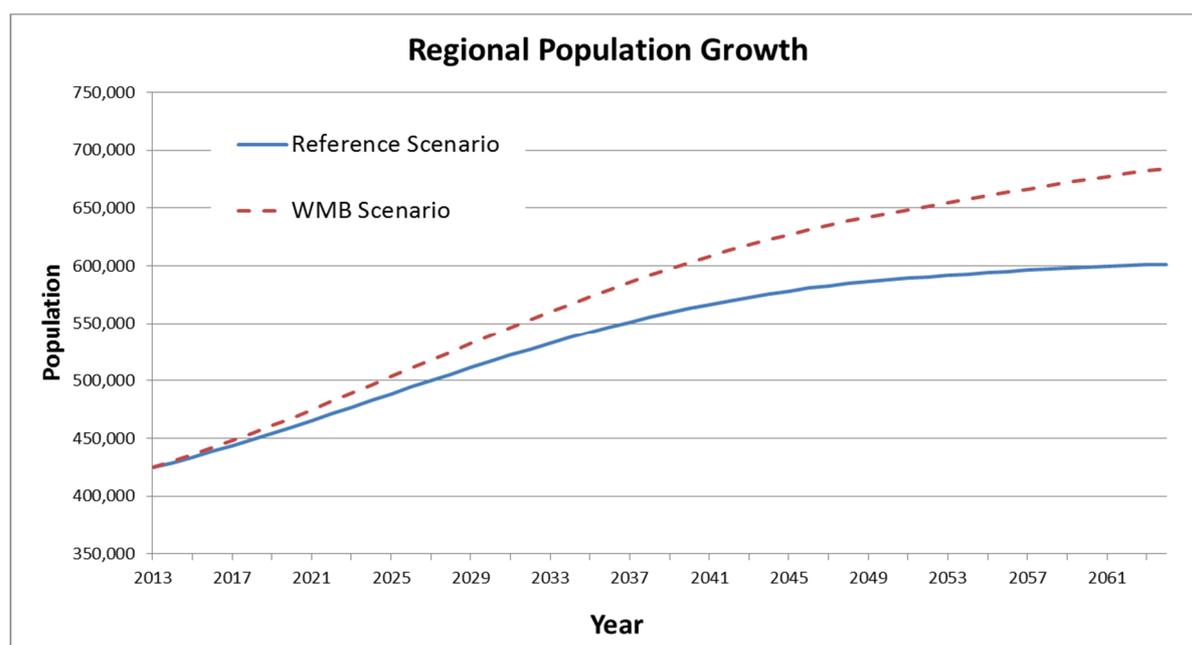


Figure 1: Projected regional population growth for Reference and WBM scenarios

The resulting population increase under the WMB scenario is about 5% by 2031 and 14% by 2064 compared with the Reference scenario (which is based on Medium population growth projection for the Waikato)(Table 1).

Year	2013	2025	2031	2045	2064
Reference Population (Medium projection)	424,740	488,621	522,033	578,349	601,326
WMB Goals population	424,740	503,375	546,252	627,054	684,270
Percentage increase of WMB from Reference level		3.0	4.6	8.4	13.8
Waikato Projections - High projection level	424,740	507,808	553,498	642,097	710,041

Table 1: Population outcomes from different scenarios.

The 10% increase in net migration into all TAs would represent a significant increase over historical trends (on which the Reference scenario settings are based). The likelihood and requirements for this change could be debated. However, it is noted that the increase in regional population that results from this additional net migration is still slightly lower than the High Population projection level developed through the Waikato projections project that was based on the 2013 Census outcomes (Table 1).

LAND USE CHANGE FROM WMB GOALS

The land use outcomes from the WMB scenario were compared with the outcomes from the Reference scenario. The differences in areas of land use changes are presented below and key spatial changes are provided in maps in Appendix 1 (Figure A1-A9).

Business Related Land Uses

For the main business related land uses (Commercial, Manufacturing, Community Services²) by area there would be an additional 6-7% by 2021 and 18-21% by 2031 (Figure 2) of land needed for these uses compared with the allocations in the Reference scenario (Table 2).

The differences spatially by 2031 are indicative of not enough land being available in right locations for many of these land uses (See Figures A1-6 in Appendix). In these Figures areas shown in 'Blue' are the additional areas allocated for that land use under the WMB scenario, areas of 'Green' occur under both scenarios and areas of 'Red' occur under the Reference scenario but not the WMB scenario.

By 2031 some additional commercial is starting to occur around the boundary of Hamilton City (Figure A1). This is indicative that all available (zoned) land has been utilised within the City (Note: Currently WISE is not able to model increased use of existing commercial land to account for growth – i.e. redevelopment to multi-storey commercial). Also the increase demand for Community Services in the WMB scenario means some potential Commercial areas are taken up by earlier Community

² The Community Services land use is made up of activities such as Government administration, education, health services, libraries and museums.

Services (Red Cells in Figure A1). This increased demand for commercial land in the WMB scenario and reduction of 'prime'/accessibly commercial areas as project towards 2031, means the model starts to allocate demand into less suitable (and likely – i.e. away from large urban areas) locations. By 2031 there are small clusters of commercial appearing around smaller settlements which are not projected to growth significantly (Taupiri, Huntly, Onewhero). This pattern is a good example of the power of scenario analysis and planning as it highlights that current planning for commercial growth may be inadequate and then raises the question of: Where best to direct additional commercial growth within TA's and Regionally?

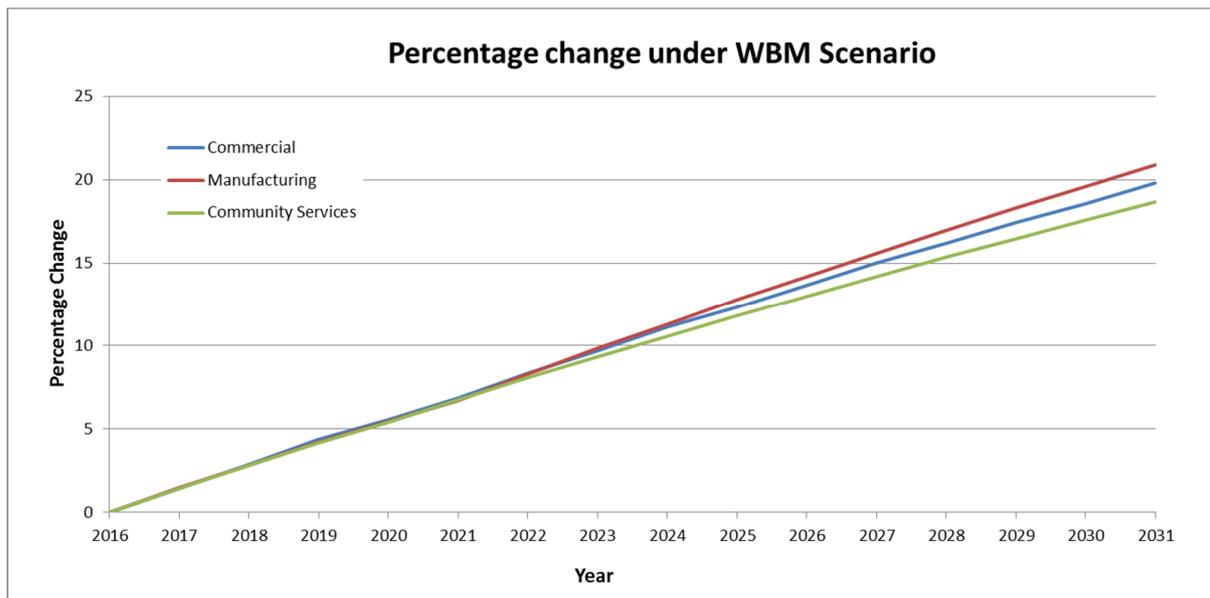


Figure 2: Percentage of additional business related land required in WMB scenario compared with Reference.

		2016	2021	2026	2031
Commercial (ha)	<i>Reference</i>	810	873	930	984
	<i>WMB</i>	810	933	1057	1179
Manufacturing (ha)	<i>Reference</i>	2666	2906	3091	3265
	<i>WMB</i>	2666	3101	3529	3947
Community Services (ha)	<i>Reference</i>	1942	2069	2198	2322
	<i>WMB</i>	1942	2209	2484	2755

Table 2: Area changes in business related land uses between WMB and Reference scenario

Manufacturing land use would also experience a significant increase in demand under the WMB scenario. Spatially this increase in demand occurs in the zoned areas around many of the existing industrial areas (Horotui, Rotokauri, Ruakura, Hamilton Airport, Hautapu, Pokeno)(Figure A3-4 in Appendix 1). By 2031 significant additional areas of Manufacturing land use have developed under the WMB scenario and small pockets of this use are also occurring away from urban centres. This

raises the same question as for Commercial land use with respect to where best to direct additional demand if it occurs.

Demand for Community Services land use is similar to other business related land uses and spatially there is additional growth within and around most urban settlements (Figure A5 & A6 in Appendix 1). Differences in locations of this land use occurs between the scenarios (Red and Blue in Figures A5 & A6) as a result of different rates of competition between land uses which have similar zoning status for an area (i.e. commercial and community services).

Residential Land Uses

The 5% increase in population from the Reference scenario by 2031 under the WMB scenario provides a demand for additional residential land uses. This leads to about a 4-5% increase in projected land use areas by 2031 (Figure 3) which equates to an additional 1990 ha of Lifestyle, 690 ha of Low Density Residential, and 22 ha of medium-High Density Residential land use (Table 3).

The spatial implications are that most of this additional growth for low density residential occurs mainly in Hamilton City (Temple view, Rotokauri, Huntington) and Pokeno, with smaller areas of additional growth around other settlement (Cambridge, Morrinsville, Te Kauwhata) (Figure A7 & A8 in Appendix 1).

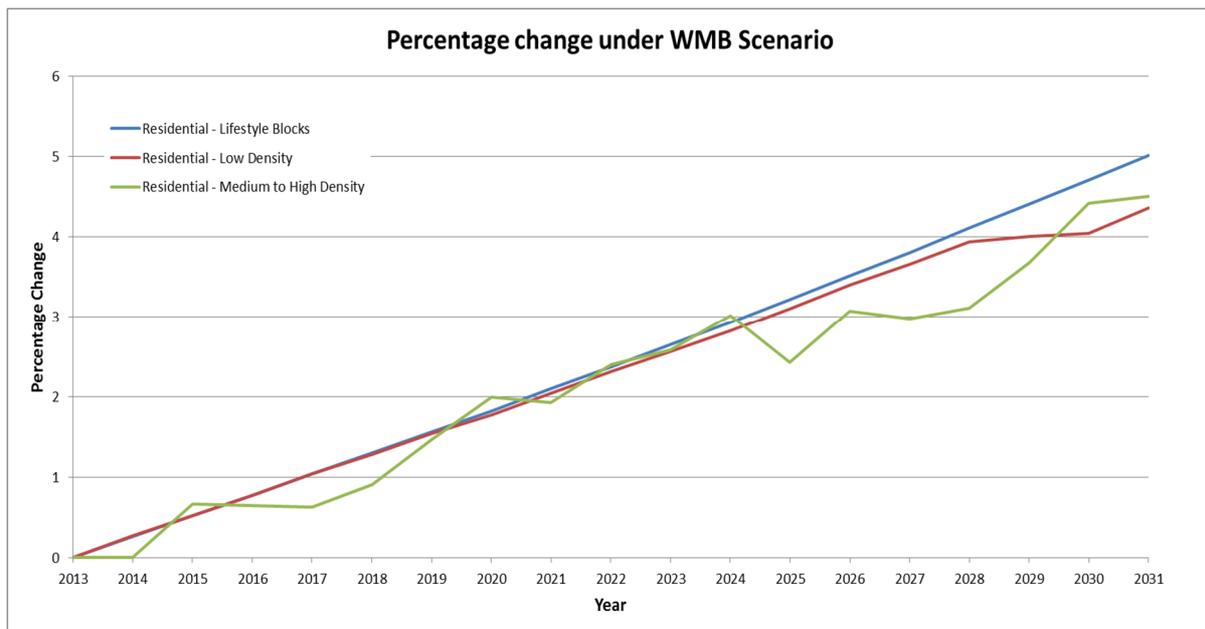


Figure 3: Percentage of additional residential land required in WMB scenario compared with Reference.

The implication for lifestyle block residential land is minimal in most growth areas. In the Waikato District current zoning allow for further lifestyle development across many parts of the district so the additional growth is accommodated at that expense of other rural land uses (Dairying, Sheep and Beef) (Figure A9 in Appendix 1). However, in the Waipa District there are currently not a lot of areas zoned for Lifestyle growth and therefore additional demand is placed into less suitable (i.e. zoned discretionary or non-complying zones) areas in the district.

		2016	2021	2026	2031
Residential - Lifestyle Blocks (ha)	<i>Reference</i>	35439	37020	38463	39737
	<i>WMB</i>	35713	37796	39813	41731
Residential - Low Density (ha)	<i>Reference</i>	12787	13764	14756	15736
	<i>WMB</i>	12886	14045	15257	16422
Residential - Medium to High Density (ha)	<i>Reference</i>	310	363	424	488
	<i>WMB</i>	312	370	437	510

Table 3: Area changes in residential land uses between WMB and Reference scenario

The increase for medium-high density residential is a relatively small area (~22 ha) and most of this occurs within Hamilton City. Spatially the allocation of this increase is also influenced by 'competition' from other land uses with similar zoning 'status' for an area.

The population increase modelled in the WMB scenario does 'push' the extent of land zoned for residential development outcomes post-2030, as the extent of zoned land in some areas is insufficient to accommodate the additional growth.

Under the Reference scenario there was already some shortfall in capacity late in the scenario particularly for low density residential particularly in Hamilton City (by 2053 – all zone low density residential is infilled). Under the WMB scenario residential zones infill quicker and there is a shortfall in Waipa in early 2030's and by about 2045 there is no zoned LD residential land remaining in Hamilton City.

Also under the WMB scenario and current zoning the Waikato District would run out of Low Density residential zoned land by about 2037.

The main outcomes for comparing these two scenarios for residential land is that current zoned land would be utilised more quickly if growth (economic and population) was higher than currently projected in the 'medium' growth scenario in WISE. There are some significant spatial variations in residential growth if demand is higher as areas fill more quickly and differently based on current settings for making new zones available. Further scenarios could be used to explore these patterns of development and to assess how best to avoid 'choke points' in zoning or where more intervention may be required for desired development sequence.

Rural Land Uses

The main implications for rural land uses are based mainly around the loss of dairying, sheep and beef, and other agricultural land uses to urban development. Although they represent small percentage changes of the regional land use (Figure 4) they represent significant changes in addition to the Reference scenario (additional 2150 ha of dairying and 1670 ha of sheep and beef converted to urban land uses under WBM scenario)

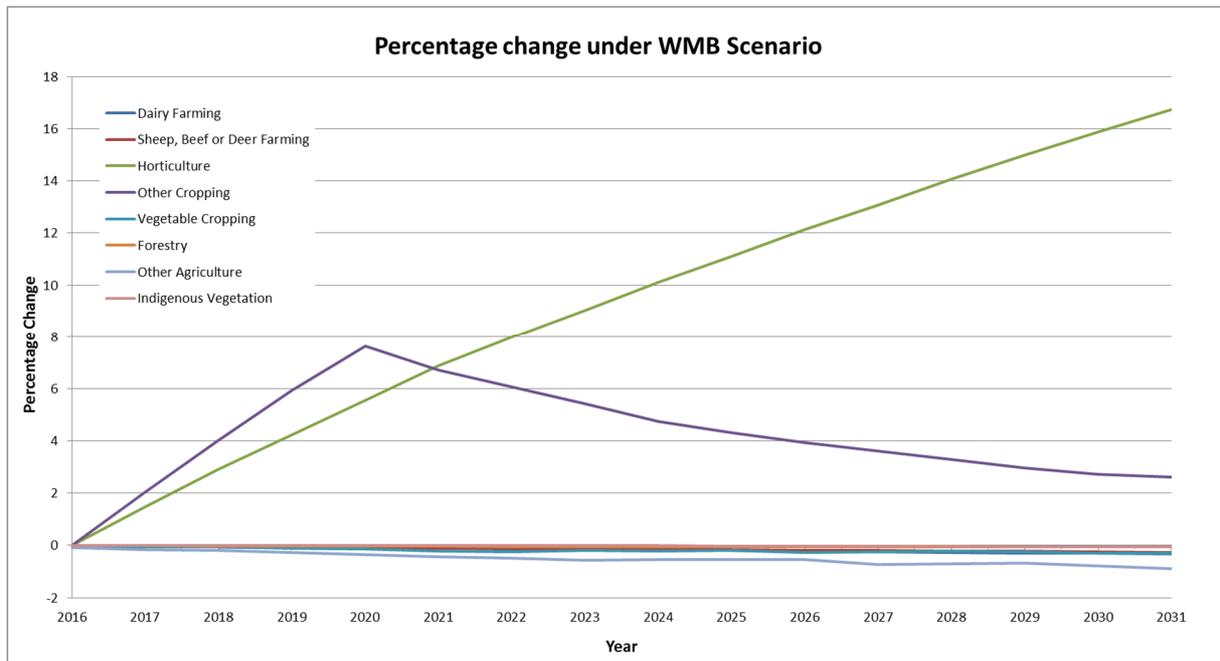


Figure 4: Percentage change in rural land uses required in WMB scenario compared with Reference.

Horticulture shows a significant percentage increase under the WMB scenario as one of the rural sectors that has growth potential increasing from 2750 ha under Reference scenario to 3200 ha under the WMB scenario.

DISCUSSION

The aspirational goal of Waikato Means Business Economic Development Strategy would mean a significant increase in economic activity and also additional population growth to support the increased demand for employment. Economic optimisation modelling was undertaken by Market Economics (McDonald and Kim, 2018) to establish the optimal changes in sector related economic outcomes required out to 2031 to achieve the WMB goals. The plausibility of achieving these goals are not discussed here, but they are seen to provide additional 'stretch' over and above expected 'status quo' growth.

The predicted increase in economic activity and population based on achieving these goals were then used in WISE to assess the changes in extents and spatial location of land uses at a regional scale. Most of the change occurs in the existing areas of growth in and around the Hamilton basin and northern Waikato District areas.

In applying the WISE scenarios and assessing these changes the following observations are made:

- Growth required to achieve the WBM goals would be a significant increase in economic and population growth over and above that projected from current and historic data (represented by Reference scenario).
- The scenario comparison highlights that there are a series of flow on implications in achieving such goals. For example increased employment opportunities drives an increase in

population, this increases demand for residential land use. Therefore, planned residential areas would fill more quickly making the current planning horizons and assumptions less suitable. This raises the need to consider longer more flexible planning horizons and methods if increasing growth in future is seen as more likely.

- Similar flow on implications occurs for business related land uses as a result of increased economic activity. An outcome of faster growth is that most suitable land is infilled more quickly and longer term growth then begins to occur further away from main urban areas.
- Increased growth rates also create different outcomes as a result of land use competition. Land uses fill in different orders (i.e. Low Density Residential expands into some zoned areas before its needed for Medium-High Density residential – resulting in a different pattern/location of these land uses). Similar outcomes are seen in some areas between Commercial and Manufacturing land uses. This is a consequence of the District Plan zoning setup which potentially allows different land uses in the same area although with different restrictions applied (i.e. discretionary, non-complying).
- This assessment is an initial analysis of the plausible outcomes of achieving increase economic outcomes in the Region. The observed pressure points and land use competition could be used to develop further scenarios to better understand how they might be mitigated/ managed under a ‘high’ growth future.
- These results represent possible outcomes of one ‘high’ growth scenario. The true benefit of scenario planning and using decision support tools like WISE is in modelling multiple scenarios that represent different policy questions to engage stakeholders and communities to develop more robust and enduring policy outcomes.

REFERENCES

Garry McDonald and John Kim (2018): Waikato Means Business: Waikato Economic Development Strategy Implications Scoping Study. Report prepared for Waikato Regional Council (DOC#12787130) by Market Economics Ltd (180306 Waikato Means Business Report.DOCX).

APPENDIX 1 – KEY SPATIAL CHANGES UNDER WMB SCENARIO

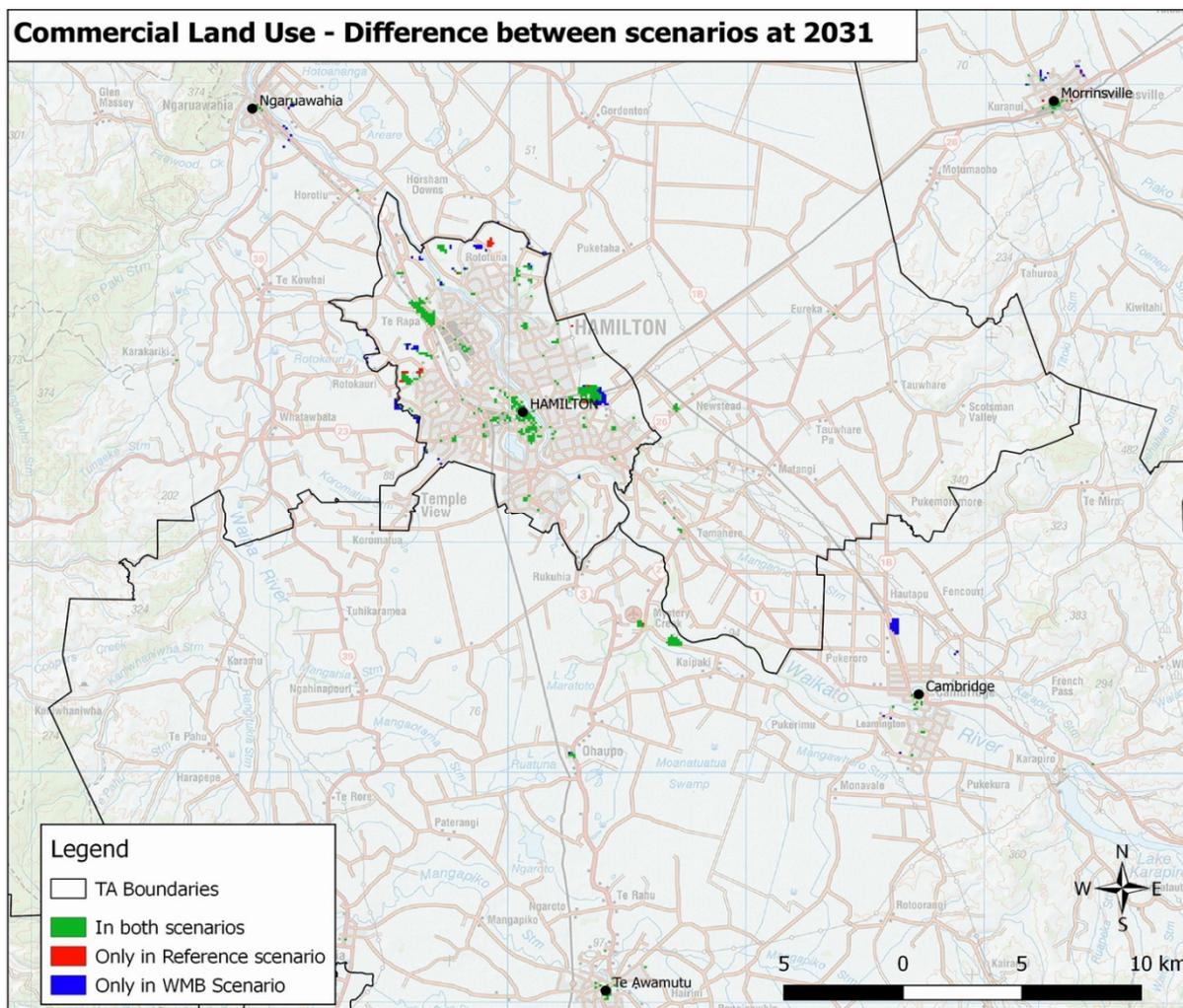


Figure A1: Differences in projected land use outcomes between scenarios – Commercial (Hamilton area)

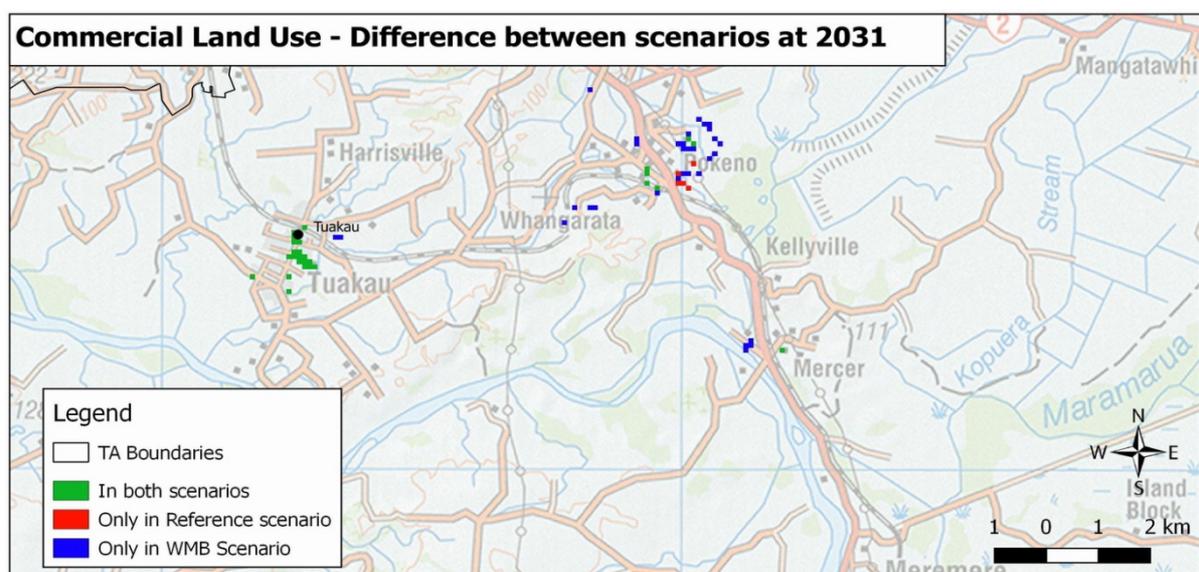


Figure A2: Differences in projected land use outcomes between scenarios – Commercial (North Waikato)

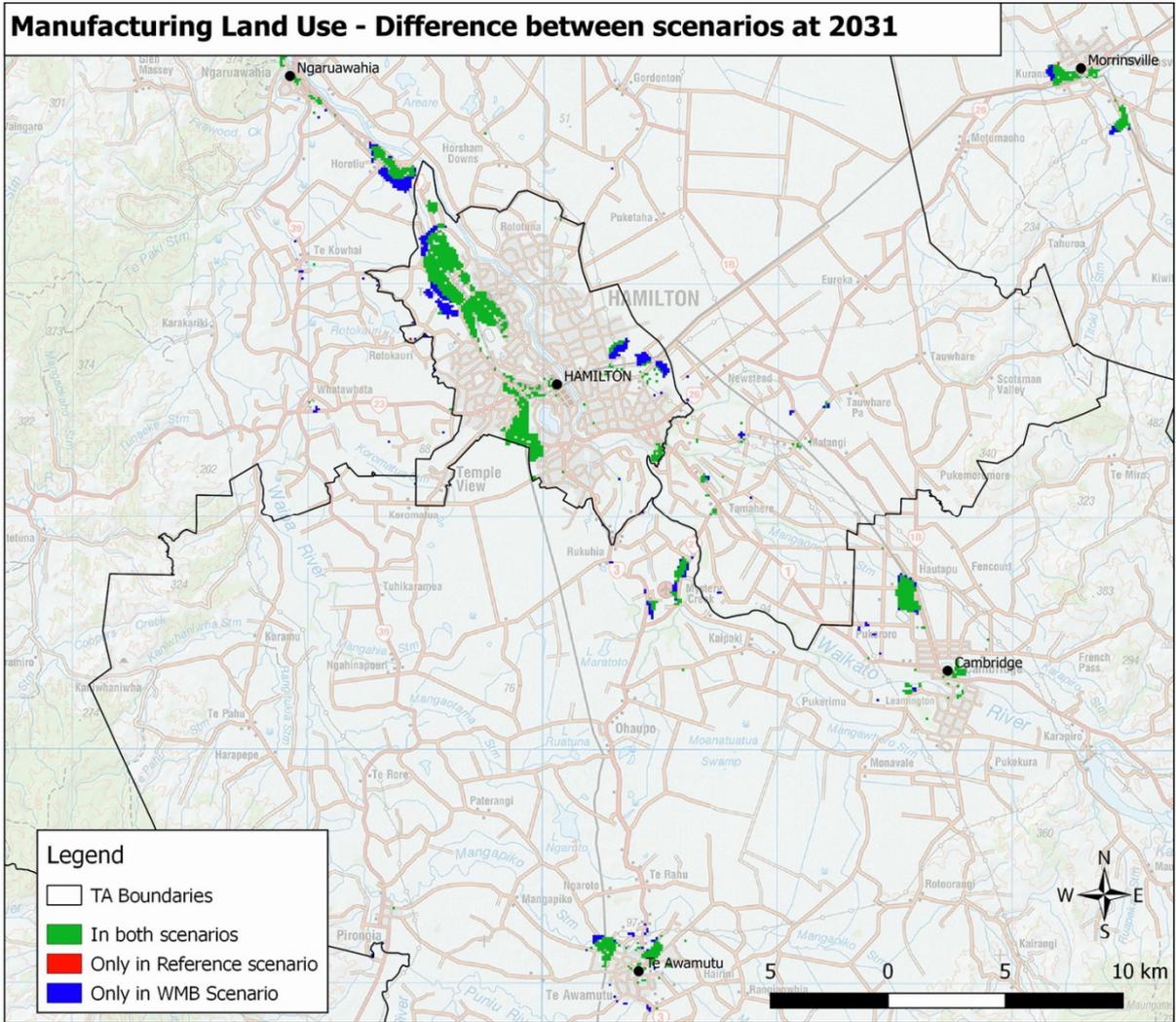


Figure A3: Differences in projected land use outcomes between scenarios – Manufacturing (Hamilton area)

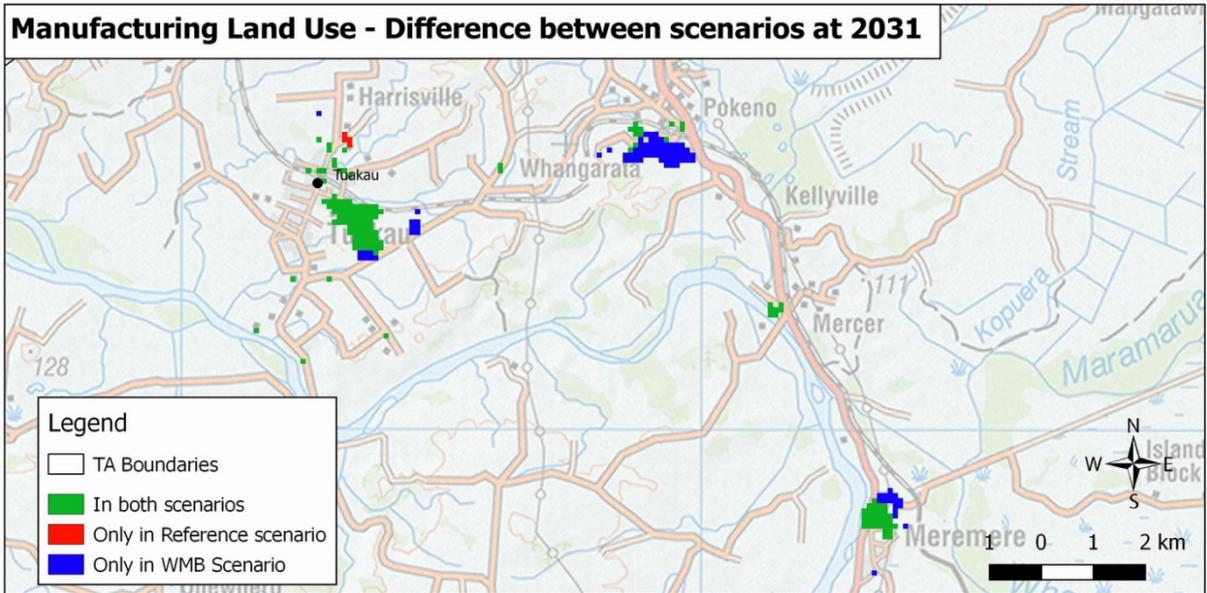


Figure A4: Differences in projected land use outcomes between scenarios – Manufacturing (North Waikato)

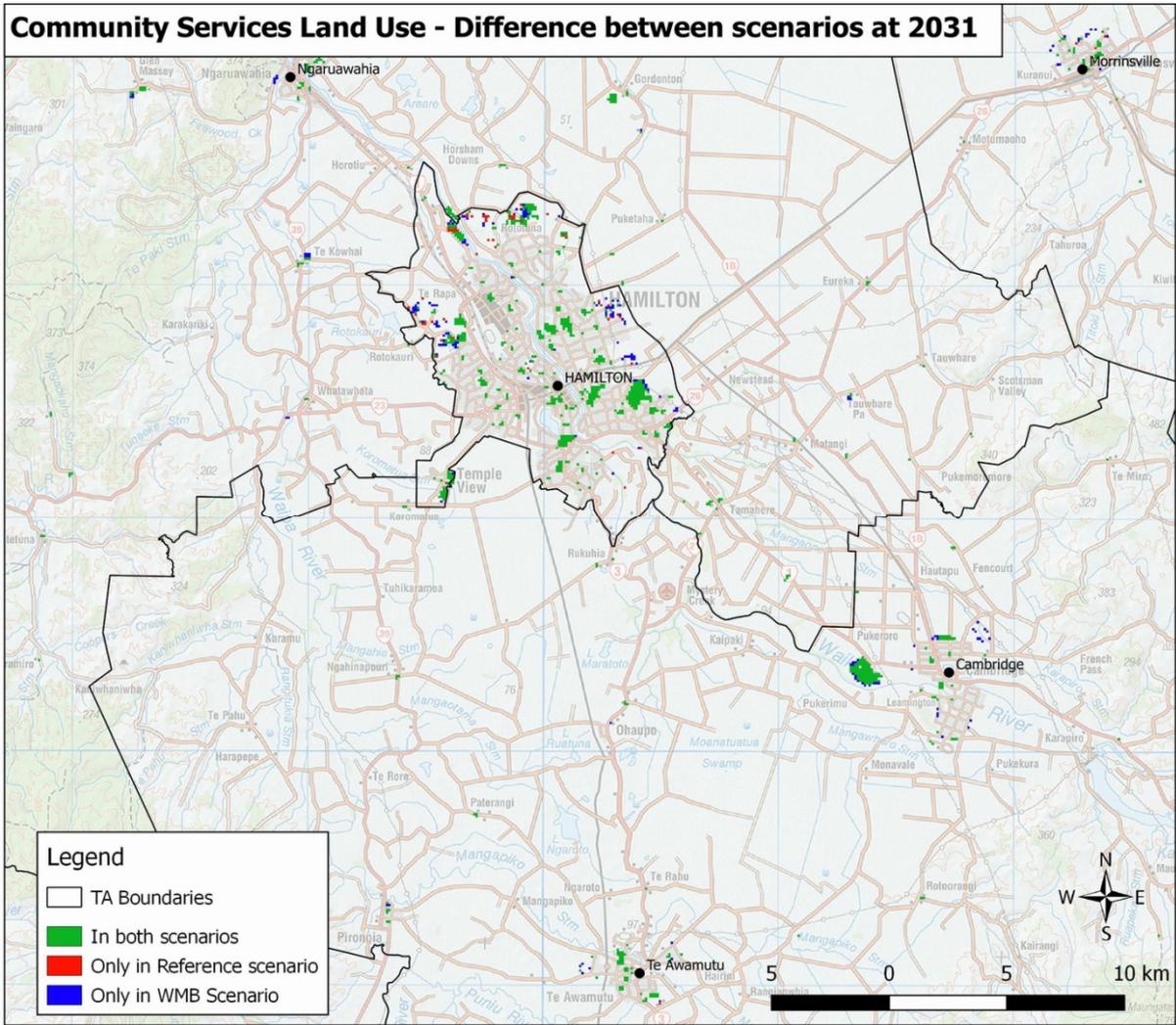


Figure A5: Differences in projected land use outcomes between scenarios – Community Services (Hamilton)

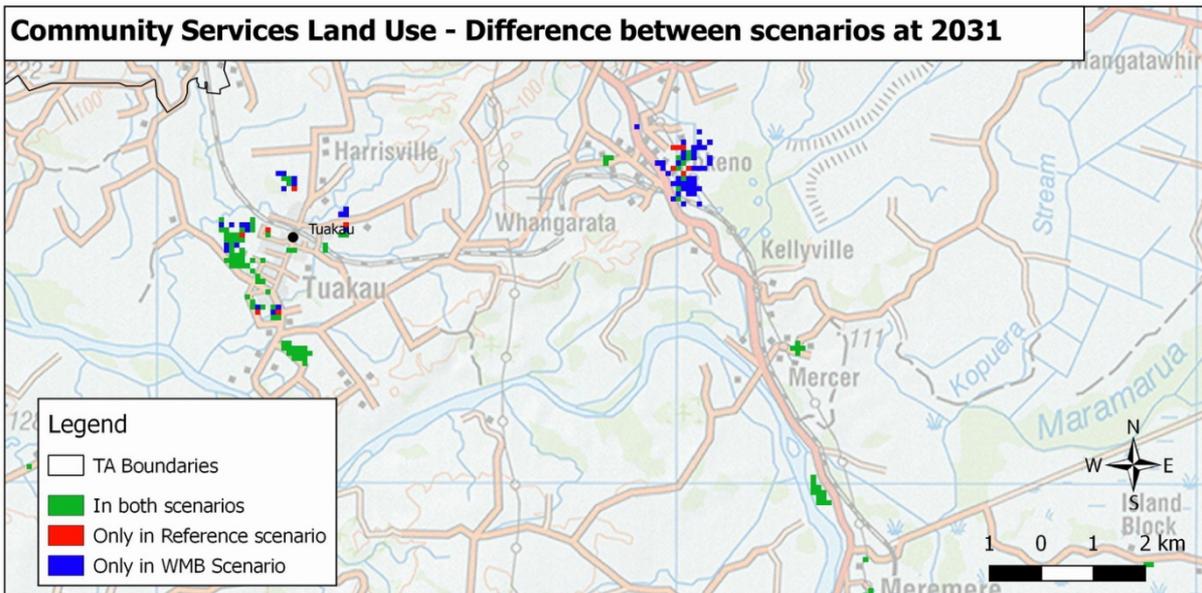


Figure A6: Differences in projected land use outcomes between scenarios – Community Services (N Waikato)

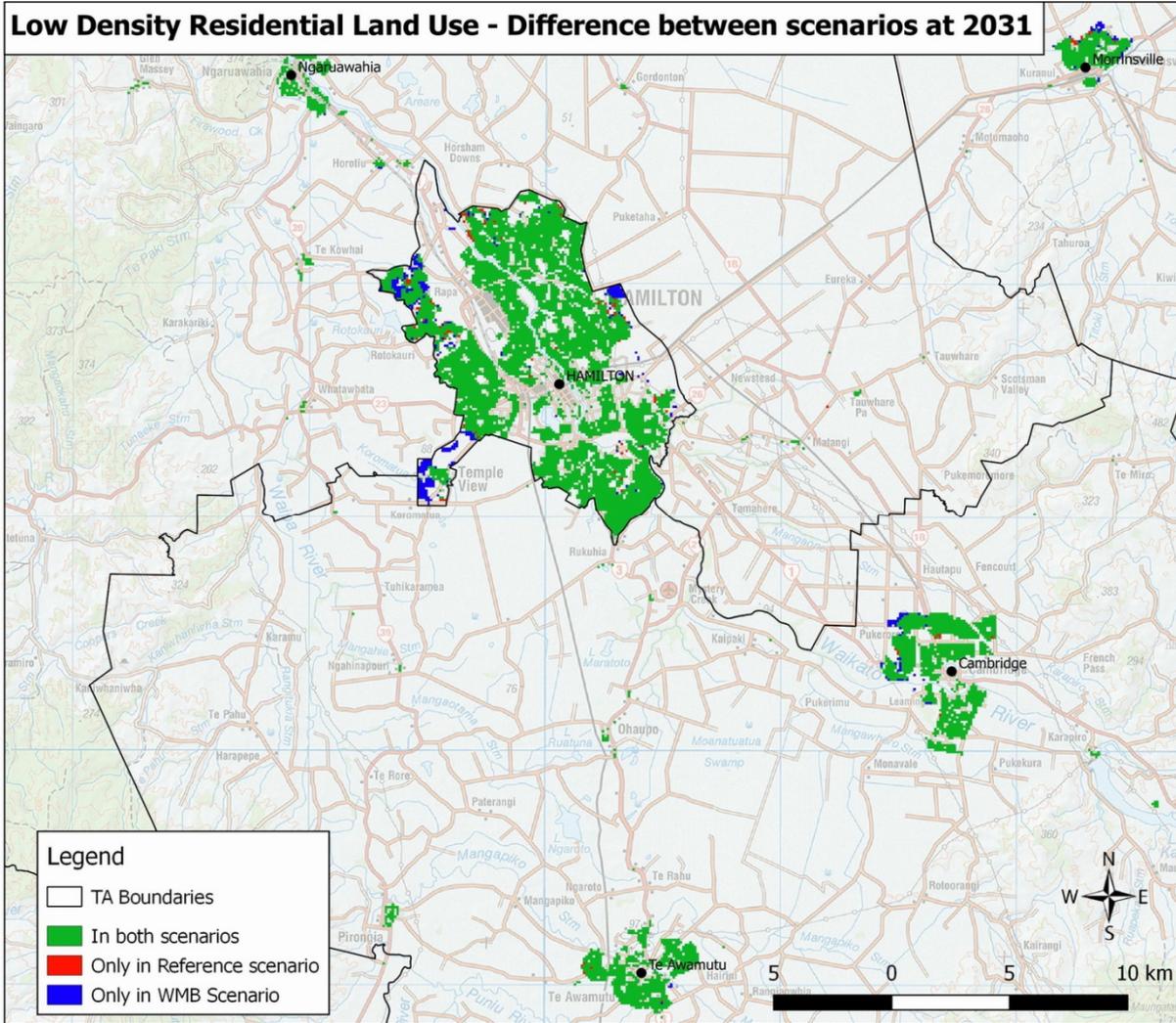


Figure A7: Differences in projected land use outcomes between scenarios – LD Residential (Hamilton area)

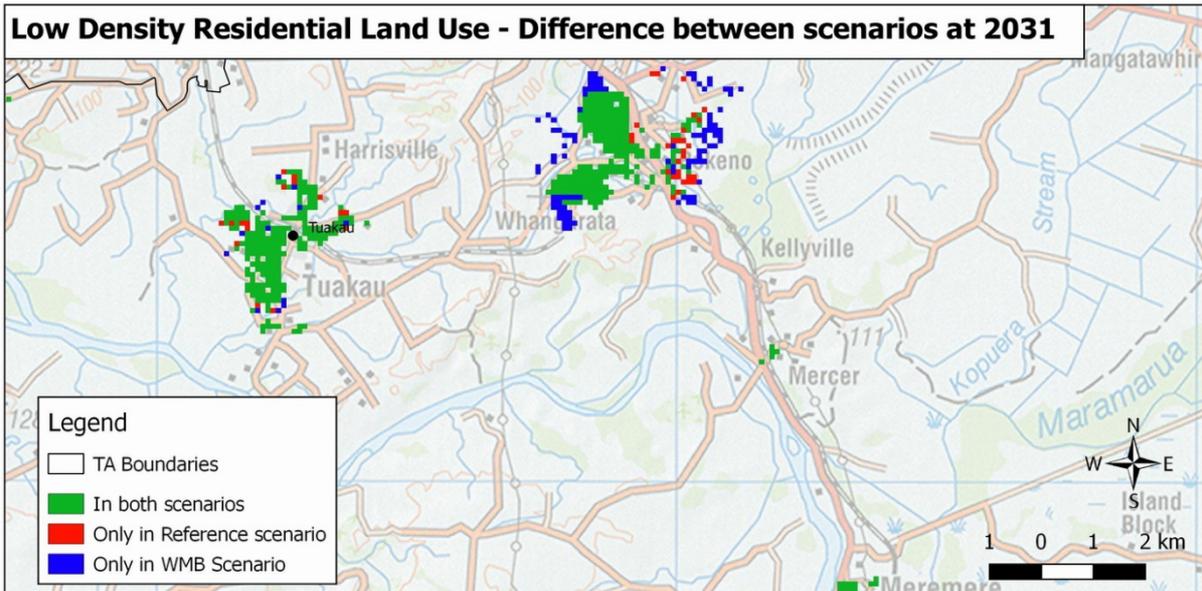


Figure A8: Differences in projected land use outcomes between scenarios – LD Residential (North Waikato)

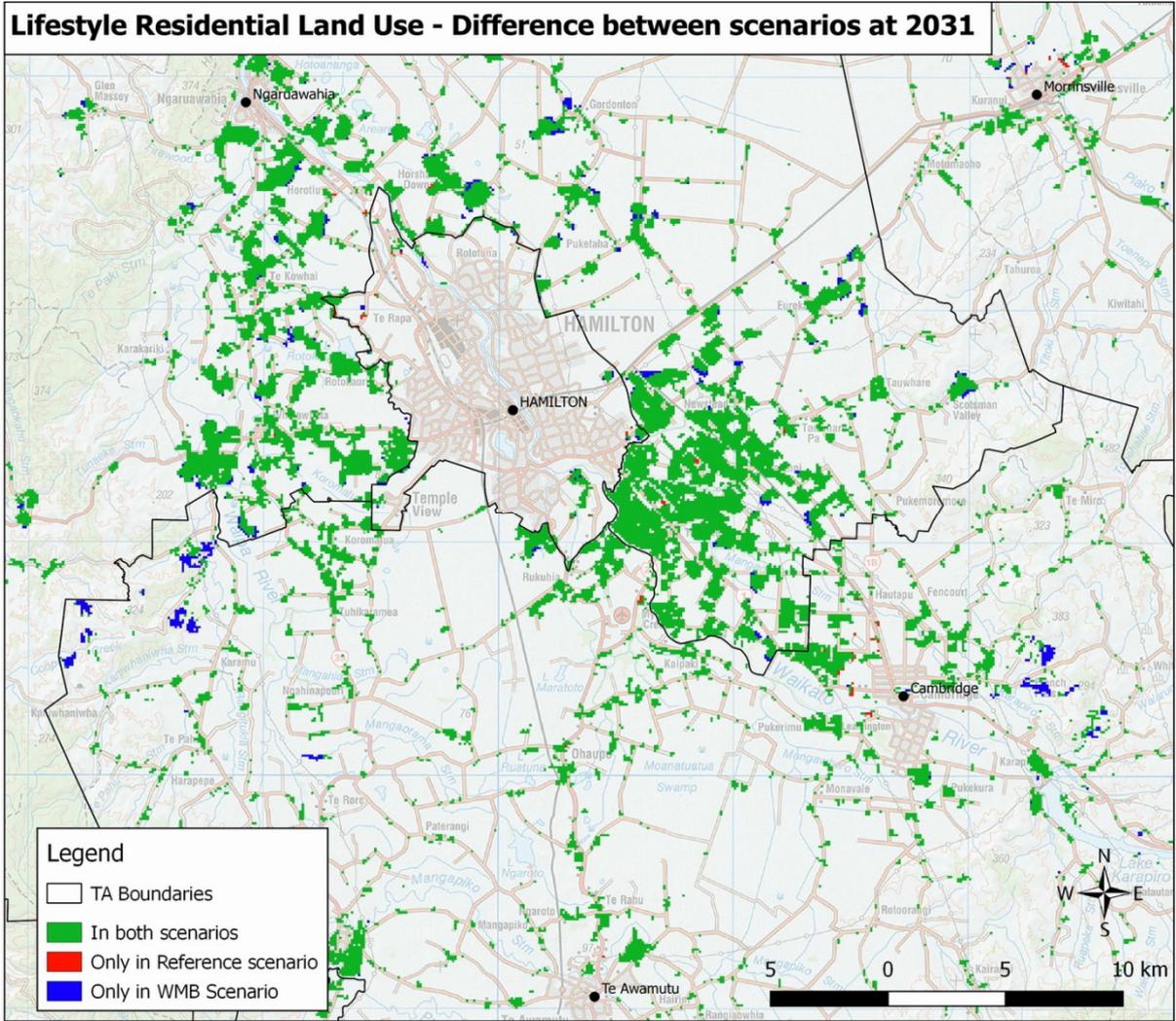


Figure A9: Differences in projected land use outcomes between scenarios – Lifestyle (Hamilton area)