ALTERNATIVE FUTURES FOR MELBOURNE'S PERI-URBAN REGION

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Alternative futures for Melbourne's peri-urban region is a collaborative research project by researchers from RMIT University's School of Global, Urban and Social Studies, Spatial Vision and La Trobe University's School of Humanities.

Cover image: Bill Fish

Foreword

This study is the final project in a nine year RMIT university study of peri-urban regions in the *Change and Continuity in Peri-urban Australia* series. The first reports investigated trends and issues in peri-urban regions in Australia and worldwide, analysed related concepts and their application to issues, and produced detailed reports into case studies of the Melbourne and Brisbane peri-urban areas. Two subsequent reports investigated sectoral trends in Melbourne's eight outer-peri urban municipalities and modelled scenarios defining possible futures for that region.

This report is the result of a joint project between RMIT University, Spatial Vision, Latrobe University and the University of Melbourne. The project involved the production of five reports, seven conference papers and participation in Australia's first major conference on peri-urban regions. Staff involved in the project were:

Professor Michael Buxton, School of Global Urban and Social Studies, RMIT University
Dr Kath Phelan, Research Fellow, School of Global Urban and Social Studies, RMIT University
Dr Lucy Groenhart, Senior Lecturer, School of Global Urban and Social Studies, RMIT University (later Swinburne University)
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Melissa Kennedy, Faculty of Humanities and Social Science, Latrobe University
Andrew Butt, Senior Lecturer, Faculty of Humanities and Social Sciences, Latrobe University
Bill Fish, Spatial Vision
Stephen Farrell, Spatial Vision

Reports from the project are:

Bill Fish, Kath Phelan, Michael Buxton, Stephen Farrell (2014) *Peri-urban Futures: Scenarios for Sustainable Regional Development*, RMIT University, Spatial Vision.
Albert Llausas, Ruth Belin, Michael Buxton (2013) *Natural resource management in Peri-urban Victoria: assessing the residents' views*, RMIT University, University of Melbourne.
Albert Llausas, Ruth Belin, Michael Buxton (2014) *Framing land use change in rural areas of peri-urban Victoria: drivers, impacts and responses* RMIT University, University of Melbourne.
Lucy Groenhart, Michael Buxton, Bill Fish (2013) *Housing Futures for Regional Settlements*, RMIT University.

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Executive summary

1.1 Study context and purpose

The potential of regional areas of Victoria to absorb a portion of the population growth of metropolitan Melbourne has never been fully evaluated. Australia is one of the world's most urbanised countries with a tradition since Federation of concentrating most urban growth in capital cities. These cities now hold two thirds of the Australian population. A widespread belief that urban land on city fringes is unlimited has underpinned the wasteful use of land for urban expansion and the concentration of population in big cities. Some Australian states have promoted regional development in various ways, including Victoria, through post-war decentralisation policies. The Whitlam government in the 1970s attempted to promote regional development in nominated regional centres, but this attempt was stillborn by a combination of conservative state governments and local councils and by vested interests in the development industry. The Victorian Hamer government adopted the State's most ambitious regional planning program but this was to protect vital environmental assets close to Melbourne and limit population growth in identified areas, not to accommodate a portion of Melbourne's increased population. Only since the middle 1990s has a reversal of decades of inner city population loss seriously challenged the belief in unlimited outer urban expansion. Yet the potential for a networked city approach linking metropolitan and regional centres has been largely ignored and in Victoria never adopted in practice.

Recently, a tentative interest in a regional approach to urban growth has emerged in government documents. The Labor government in 2008-09 began a process of developing strategic plans for regions including predicted population growth and development. The most recent Melbourne metropolitan plan, *Plan Melbourne*, identifies regional towns or centres with the potential for being linked to Melbourne's growth, and contains some policies for peri-urban areas (DTPLI 2014). This plan generally seeks to investigate the accommodation of predicted regional population growth assuming current trends, not to intervene to redirect substantial metropolitan growth. It seeks to cater for this regional growth primarily through the long standing practice of rezoning land on the fringes of regional centres for low density housing (DTPLI 2014). Some infrastructure development also has occurred to improve metropolitan-regional connections, particularly the provision of faster rail services between regional centres and Melbourne .

This report presents for the first time an evaluation of the potential of one regional area on the fringes of Melbourne to accommodate dwelling growth under a range of scenarios. The case study area examined includes the municipalities of Moorabool, Macedon Ranges, Ballarat, Hepburn, Mount Alexander, Central Goldfields and Greater Bendigo, with a total population of 308,556 people (ABS 2013). The area studied is bounded to the south by Melbourne's urban-rural edge, to the west by the transport corridor to the city of Ballarat and the north by the transport corridor to the city of Bendigo. Ballarat with a population of 85,935, and Bendigo of 82,794 are the two largest regional settlements (ABS 2013). The report estimates current and potential land supply and their capacity to meet dwelling demand for both rural and urban areas to 2041. For rural areas, it compares dwelling yields under three scenarios, transfers rural dwelling land supply to townships and explores the transfer

of rural dwelling demand. For urban areas, it explores how dwelling demand in townships can be met through alternative development scenarios. The report assumes a continuation of trend growth but its approach could be used to accommodate increased dwelling demand transferred from Melbourne.

Central to the approach followed here, therefore, is the integration of an analysis of both rural and urban land supply and demand, and the actual and potential relationships between rural and urban areas. The report proposes a number of interventionist policy scenarios to reduce projected rural dwelling growth and transfer it to townships and regional centres. Rural land supply for Statistical Local Areas (SLAs) is compared to estimated dwelling demand and the timing of expected development. Timing is estimated according to development pressure exerted, calculated using an index based on infrastructure and services, demographic trends, environmental influences and locational factors.

The report also investigates the land supply in a number of regional centres under a number of scenarios and the ways that new spatial policies in regional centres might accommodate future growth and achieve substantial increases in population. The report does not evaluate different growth scenarios but assumes that growth will continue according to past trends.

Through these scenarios, the report demonstrates the potential for state government and local councils to alter the prevailing patterns of township and rural growth. The reliance on low density urban growth on township fringes is locating large numbers of people in areas poorly served by public transport, often far from town centres. This practice increases infrastructure and household running costs, removes agricultural land from production and is leading to a range of detrimental environmental impacts.

Extensive rural land fragmentation has occurred through past subdivision leading to the creation of tens of thousands of small rural lots. The capacity for future subdivision of rural land will lead to the creation of many more lots. This has resulted in a large oversupply of rural land but the gradual construction of dwellings on these lots is removing land from agricultural production, causing water quality problems, reducing biodiversity, degrading landscapes and placing thousands of people in harm's way in some of the world's most fire prone regions. Doing nothing is not an option for rural land in this and similar regions because inaction will lead to serious problems, including loss of life and property from fire in future years.

1.2 Methodology

Three rural scenarios test the extent to which rural land supply can meet projected rural dwelling demand. The first is a Business-as-usual scenario under which supply is determined by the number of existing and potential new lots under existing planning schemes. The second, the Rural preservation scenario, discourages rural development by requiring high minimum lot sizes for the construction of one dwelling of 40 hectares in the Farming and Rural Conservation zones, and 16 hectares in the Rural Living zone. Conversely, this scenario encourages township development in three future urban zones on township fringes by reducing the minimum lot sizes for dwellings to 0.04 hectares in the Urban Growth and Comprehensive Development zones while not applying any minimum lot size in the Township zone. The third, the

Tenement control scenario, requires the area of multiple lots in the same ownership to total 25 ha or 40 ha for the construction of one dwelling.

Some of the alternative rural scenarios examined in this report have been used at various stages in the past in Victoria. The requirement of a minimum lot size for the construction of a dwelling has been proposed or used at various times, for example, in the draft new rural zones in 2004, or to reduce the capacity for dwelling construction on small rural lots in potable water catchments. The use of tenement controls was an established technique to reduce the potential for dwelling construction on multiple lots held in single ownership by requiring a minimum lot size for a dwelling. Such provisions in planning zones were removed by the introduction of the standardised measures of the Victoria Planning Provisions in 1996 (DOI 1996). This report provides detailed analysis into the supply of small rural lots, the impact of scenarios on this supply, and ways to transfer rural dwelling demand to rural townships. This is the first time such detailed analysis has been undertaken in Victoria.

The second two scenarios considerably reduce the development capacity of rural land. The rural capacity foregone is transferred to urban settlements using development pressure criteria initially within SLAs according to a count of lots and service availability in a settlement hierarchy. Lots are allocated predominately to well-serviced major settlements. This approach assumes that supply influences demand, that is, that a supply of small rural lots will influence consumer expectations about development, attracting demand. Alternatively, the study assumes that providing attractive lots of various sizes in well located towns with high amenity and heritage value will influence expectations differently.

Planning zones in 2013 were used to define rural areas. The Farming, Rural Conservation and Rural Living zones are the three rural zones in Victorian planning schemes (DTPLI 2014c). The Rural preservation and Tenement control scenarios group these rural zones with three other zones designated for future urban development on township fringes but with the appearance of rural landscapes. These zones are Urban Growth, Comprehensive Development, and Township zones. The development potential of the rural zones therefore is reduced by the number of lots unable to be developed while that of the future urban zones is increased beyond current planning scheme rules. All scenarios exclude lots under 500 square metres. The capacity for environmental constraints to reduce rural land capacity is also calculated.

A number of scenarios are also modelled for redistributing town growth within township boundaries according to a number of township density scenarios. Existing township land supply is estimated for townships in the region under a trend growth scenario. Land supply is evaluated under scenarios for Ballarat, Bendigo, Ballan and Castlemaine and related to trend demand to 2041. Three urban development scenarios of Business As Usual, Infill and Fringe density were applied to the State government's Urban Development Program (UDP) estimates of land supply in the three UDP categories of minor infill, major infill and broadhectare land to gain various estimates of lot yields under different scenarios over time. For each of these three options, estimates of alternative dwelling supply were gained for categories of minor infill, major infill or broadhectare land assuming different proportions of apartments,

townhouses, compact detached and detached housing under each option. Business-as-usual, assumes that development will consist primarily of detached housing on large lots on the fringe of townships, with a small proportion of apartments and townhouses on Minor Infill sites and some townhouses on Major Infill sites. The majority of dwellings will be detached, with broadhectare sites developed at 15 dwellings per ha. Option 2, Urban Density, focuses development on Minor and Major Infill sites, with a higher proportion of apartments and townhouses than Scenario 1. Option 3, Fringe Density, has the same small proportion of apartments and townhouses as Option 1, but the majority of detached dwellings are developed on compact sites, delivering 20 dwellings per ha.

Development scenarios are then modelled for the City of Greater Bendigo as a case study to 2041. This part of the study did not limit land supply to available land identified by the State government or local council but explored additional scenarios to supplement land supply. These scenarios were: Business-as-usual development on broadhectare land at current densities; broadhectare development at 25 dwellings per hectare; dual occupancy development on existing lots; activity centre medium density infill on residential land within 400 metres of land zoned business; residential infill land; non-residential land redevelopment; Bendigo CBD redevelopment. None of these scenarios overlapped. They identify overall development potential from a complete list of options which do not overlap. Urban planning zones at June 2013 were used in the assessment of supply.

The final scenario involves shifting projected dwelling demand from large regional centres to smaller townships, with Kyneton used as a case study. It transfers regional centre growth to district towns with a rail service in a hierarchy by size in area not lot numbers. An average net residential density required to meet development transferred to towns from Ballarat and Bendigo was calculated. Rural lots unable to be developed under scenarios reducing rural development are also transferred to nominated towns.

1.3 Findings

1.3.1 Business-as-usual scenario

Dwelling growth in the urban and rural SLAs of the study area is projected to grow by 75,661 dwellings to 201,137, or 58.43 per cent, to 2041. On current trends, 15,010 more dwellings will be built in rural areas, most, or 2,684 dwellings, in Macedon Ranges (S) Bal. Townships are expected to grow by 60,651 dwellings from 2011 to 162,427, mainly in Bendigo, Ballarat and Bacchus Marsh. Conversely, two fifths of demand in Macedon Ranges is for rural dwellings.

A large oversupply of lots exists in rural areas. Under Business-as-usual projections, demand is unlikely to ever lead to this supply being used for housing. A total of 79,075 lots existed in the six zones studied (three rural and three township) while 31,316 contained dwellings. Total development capacity of 87,195 lots in the six zones is comprised of 47,759 existing vacant lots and a potential 39,436 through subdivision under current planning schemes, including the three township zones currently in rural use, while projected rural dwelling demand is only 15,010. The vast majority of existing lots, 71,990, are situated in the three rural zones. Large numbers of these lots are situated away from population centres where demand for new

dwellings is low because of slow population growth. For example, in Mt. Alexander Bal 13,492 lots exist of which 9,428 are vacant, but with a demand to 2041 of only 1,495 lots.

Yet almost all subdivision capacity of 39,436 lots potentially exist in the three township zones under existing planning rules. The Urban Growth and Comprehensive Development zones on the fringes of one SLA alone, Ballarat Inner North, accounted for 21,231 potential lots. In contrast, only 1,310 new lots, or about six per cent of the total subdivision capacity, can be created in the three rural zones under existing planning rules in this SLA. Yet in certain locations, rural development could substantially alter landscapes, for example through the projected construction of 5,851 rural dwellings in the Shire of Macedon Ranges. Only in three SLAs on the fringes of Bendigo and in Macedon Ranges does the demand for rural dwellings slightly exceed rural capacity.

The Farming Zone contained by far the greatest number of existing rural lots, 47,732 on 710,686 hectares, and therefore the greatest potential development capacity. Many small lots zoned Rural Living also exist, with the highest concentration in Gr.Bendigo (C) Pt B with 3,147 lots. Macedon Ranges (S) Bal has the largest number of lots zoned Rural Conservation with 3,468 lots on 28,990 hectares. Most lots are small, with almost 75 per cent ten hectares or less on 93,994 hectares, however over 3,500 lots over 40 hectares exist on a significant land area of 286,280 hectares or about 45 per cent of the rural land area. These large lots represent much of the study area's future, maintaining options for future agriculture and containing much of the remnant biological diversity.

Development pressure for rural lots will be exerted closest to Melbourne, and in well serviced settlements, including towns with rail infrastructure. Macedon Ranges, parts of Moorabool particularly around Bacchus Marsh and the fringes of Bendigo will experience the greatest development pressure in time periods staged to 2041.

1.3.2 Rural preservation Scenario

Application of the Rural preservation scenario reduces the number of developable lots in the Farm, Rural Conservation and Rural Living zones from 49,449 in the Business-as-usual scenario to 10,657 lots. Development capacity, including lots and subdivision potential, is affected even more strongly. This falls in the three rural zones from 48,261 to 5,911 dwellings. The greatest quantitative reduction occurs in the Farming zone where dwelling yield falls from 34,112 in the Business-as-usual scenario to 4,841 in the Rural preservation scenario, an 86 per cent reduction. This represents a fall from almost 40 per cent of total capacity under Business-as-usual to four per cent under Rural preservation scenario. Higher percentage reductions occur in the Rural Conservation zone by 90.3 per cent to only 459 dwellings, and 93.4 per cent in the Rural Living zone by 93.4 per cent or 611 dwellings.

Conversely, application of the Rural preservation scenario to the three urban zones on township fringes increases their yield considerably from 38,934 to 106,083 dwellings. Yield in the Township zone increases from 6,950 dwellings at a density of 2.4 dwellings per hectare to 52,406 dwellings at 18 dwellings per hectare, and the Urban Growth and Comprehensive Development zones by another 21,693 dwellings. The effect of this combined fall in the capacity of rural zones and an increase in

capacity of urban zones on the rural edge of townships is an overall increase in development capacity from 87,195 under Business-as-usual to 111,994 under Rural preservation scenario. The greatest reductions in rural yield occur in Macedon Ranges (S) Bal and Ballarat (C) – Inner North where large numbers of small lots in the Rural Living zone become ineligible for development.

Under the Rural preservation scenario, application of a higher minimum lot size will transfer demand for 11,082 dwellings from rural to urban areas increasing dwelling growth from 60,651 under the Business-as-usual scenario to 71,733. Growth was transferred according to the existing size of townships in two ways, firstly from rural areas to townships within SLAs, and secondly within LGAs. Under the second method, most growth will occur in Ballarat, Bendigo and Bacchus Marsh. Total dwelling capacity in all 6 zones provides a large oversupply of 108,066 lots because of the large number of new lots in the three urban zones. Under the Rural preservation scenario, the use of a regulatory control would shift development pressure to far fewer settlements, and significantly reduce the capacity for rural development compared to the Business-as-usual scenario. The use of pressure criteria such as services and infrastructure would concentrate development in regional centres, district towns and townships on rail lines.

1.3.3 Tenement Ccontrol Scenarios

There are 79,075 total lots in the six zones examined in the study region including 32,896 singly owned lots qualifying for the construction of a dwelling under this scenario. Tenement controls were then applied to the 46,179 multiple lots or 58 per cent of the total held in single ownership on the 10,196 properties comprising combinations of lots. Applying tenement controls reduces significantly the development potential of the multiple lots, under a 25 hectare control to 14,597, and a 40 hectare control to 7,395 dwellings. The greatest impact would apply to the Farming zone where 70 per cent of lots are held in common ownership although all rural zones and the Township zone would also be affected significantly.

Transfer of foregone rural development under the 25 hectare tenement control would comprise a small proportion of new urban dwelling demand of 4,247 compared to the Business-as-usual demand of 60,651 urban dwellings to 2041.

1.3.4 Risk assessment

The development of lots under the Business-as-usual scenario was assessed for risk from flood and fire, impacts on biodiversity and water resources and continued agricultural production.

A large number of lots are situated in areas of high bushfire risk, assessed by the Wildfire Management Overlay (WMO) (assessed prior to the updated Bushfire Management Overlay). Macedon Ranges (S) Bal SLA was assessed as the highest risk in the study region with almost 1,200 rural lots in high risk areas, reduced to almost zero under the Rural preservation Scenario. Mt Alexander (S) Bal had the second highest assessed risk with almost 750 rural lots reduced to about 50 under Rural preservation scenario. Other high risk areas occur on the fringes of Bendigo, Hepburn, Moorabool and Macedon Ranges (S)-Romsey.

Restricting development of the 1,167 lots affected by the WMO in Macedon Shire, for

example, would reduce the current rural land supply of 2,143 to 976 lots. This would advance the date when demand would exceed supply from 2036 to 2025. The foregone lots could be accommodated in existing settlements of Gisborne, Macedon, Riddells Creek and Woodend under other scenarios. Using the Rural preservation scenario to reduce risk for other factors would reduce development in catchments from about 1,650 to about 50 lots, significant vegetation from 1,500 to about 80 lots and almost eliminated development of lots the Farm zone and in intensive agricultural areas.

1.3.5 Urban scenarios

Findings for urban settlements follow two approaches. The first analyses land supply and density scenarios against projected demand for dwellings in Ballarat, Bendigo, Castlemaine and Ballan in the study region (*Regional Housing Futures)*; the second examines a range of density scenarios for residential development within Bendigo to meet the same projected demand.

Large amounts of land remain within the existing urban areas of the major regional centres studied. Substantial supplies of land either subdivided or designated for future urban development are available also on the fringes of townships. However, both township and fringe urban land is being developed rapidly because of the use of the dominant model of low density detached housing. Increasing average densities by building a range of housing types would substantially increase the supply of housing in townships, and its diversity and affordability. Further fringe growth becomes unnecessary under the scenarios examined in this study.

For example, under *Regional Housing Futures'* option 1, BAU, a total of 22,201 dwellings can be accommodated on the current Urban Development Program (UDP) land supply in Bendigo. The majority of these are 'BAU' detached dwellings on larger lots, with just over 18,117 delivered under this scenario; 2,599 compact detached dwellings are located on Minor and Major Infill sites only, along with 1,485 apartments and townhouses. Option 2 Urban Density has the largest total dwelling yield for Bendigo, with a total of 31,164 dwellings accommodated on the current UDP land supply. Just over half of this total is compact detached dwellings on smaller lots, with around 16,295 delivered; 4,720 BAU detached dwellings are included in this option; 10,149 apartments and townhouses would be accommodated on Minor and Major Infill sites. Option 3 Fringe Density has a yield of 28,344 dwellings on the current UDP land supply. The majority of these are compact detached dwellings on smaller lots, with 20,003 delivered under this option; 4,113 BAU detached dwellings are included. Minor and Major Infill sites could accommodate 4,228 apartments and townhouses. Demand for housing in Bendigo is satisfied by supply under each of the three development scenarios with between 22,000 and 31,000 sites generated using all the development options studied.

The second approach analysed seven scenarios for the City of Bendigo. By 2041, 19,672 more detached dwellings will be required in Bendigo under the *Regional Housing Futures* estimates in a total Business-as-usual new housing supply of 21,691. Under the *Business as usual broadhectare development* scenario, 770 hectares are suitable for greenfield development. Development at the current 12 lots per hectare would provide 9,240 lots, exhausting the supply of greenfield land by 2026. Development overlays further reduce this yield to 7,465 lots. Under the *higher*

density broadhectare scenario, increasing density to 25 lots per hectare would yield 19,250 dwellings on the same land supply reducing the shortfall of detached houses by 2041 to 400.

The transfer of demand for a large number of rural lots under the Rural preservation and Tenement control scenarios to fringe area development would significantly reduce demand for broadhectare land over time. For example, 2,456 dwellings could be built within Bendigo rather than in rural areas under the Rural preservation scenario and 872 under the Tenement control scenario.

Under the *Dual occupancy infill scenario*, one additional dwelling could be constructed on 6,536 lots containing one dwelling and two lots on 220 vacant lots between 700-1,000 square metres on 555 hectares. This results in a total of 6,976 new dwellings at a density of 13 dwellings per hectare, excluding lots available within other scenarios. This could satisfy Bendigo's demand for detached housing till 2021, or coupled with the higher density broadhectare scenario of 19,250 would meet detached housing demand to 2041. Alternatively, the dual occupancy supply of 6,976 dwellings could meet a target of 30 per cent of all new detached dwellings by 2041.

Under the *Activity centre infill* scenario, 11,270 dwellings on 4,154 lots covering 322 hectares could be constructed in activity centres at 35 dwellings per hectare. Projected demand for townhouses to 2041 is only 509. There is substantial potential for medium density development in activity centres to substitute for detached housing in the Business-as-usual model. Given that the supply of dwellings can influence demand, this type of supply of townhouses could potentially shift demand away from detached houses on the urban fringe. This scenario provides ample capacity to meet transferred rural demand.

Under the *Residential infill scenario*, 1,129 residential lots between 1,129 square metres and eight hectares in size totaling 344 hectares would yield an additional 12,040 dwellings at a density of 35 dwellings per hectare. Again, this scenario could be combined with others to produce a large quality of diverse housing types. The *Other infill scenario* examines the capacity of non-residential lots over 0.1 hectare in size. At a density of 35 dwellings per hectare, 209 identified lots covering 275 hectares would yield 9,625 dwellings.

The *Central Bendigo* redevelopment scenario examines potential individual sites in the Bendigo CBD excluding sites affected by a heritage planning overlay, specifying a minimum site size of 150 square metres and limiting development to three and five storeys, consistent with council's *CBD strategy* (Planisphere et al 2005). This scenario produces about 2,000 dwellings on 140 lots on 14 hectares at a density of 140 dwellings per hectares. It could provide a mixture of townhouses and apartments, meeting an emerging demand.

Under these seven scenarios, a substantial oversupply of land is available to meet all future housing needs in Bendigo. By 2041, Bendigo may need to have an additional 21,218 dwellings and this would increase to 26,148 under the Rural preservation scenario and to 23,571 under Tenement control, with 93 per cent as detached houses, two per cent as townhouses and five per cent as apartments. The

six development options (including the 25 lot per hectare greenfield option) provide 61,161 dwellings. The higher density dwelling supply almost wholly meets the anticipated Business-as-usual demand for detached housing to 2041 from existing residential zoned land. There is no need to rezone any further fringe area land for residential development. Adding the potential 6,976 dwellings from dual occupancy detached housing provides a substantial oversupply of this type of housing. Council could pursue a combination of these two scenarios to substantially reduce the need for fringe area development on zoned land.

The potential 34,935 lots available for townhouse and apartment dwelling types offers the potential to achieve a substantial shift in dwelling demand from detached housing on the fringe to townhouses and apartments within the established urban area. The supply of these housing types substantially exceeds the demand for detached housing to 2041. Council could pursue the objective of diverse, affordable housing with a mix of attached and detached housing types, providing a land supply to 2060 and beyond without any further expansion of existing residentially zoned greenfield land.

Chapter One: Melbourne's peri-urban region and study aims

1.1 Introduction

Melbourne's peripheral ('peri') urban region contains a wide range of important natural resources. The protection of these resources is essential to maintaining Melbourne's resilience and enabling the city to adapt during the coming century of fundamental change. Yet these resources are under unprecedented pressure from international, national and local economic, social and environmental factors. Land use planning is a powerful independent factor affecting the capacity for the survival of agriculture and other rural activities, the maintenance of natural resources and the development of high amenity environments and towns. The two most important land use factors are the large number of existing rural lots which, if developed, will change the character and functioning of the entire region; and the potential for future subdivision of larger properties into smaller lots. A range of other factors, such as land uses and developments, are also affected by a land use planning system. This study, however, concentrates on the potential impacts of dwelling construction on the thousands of existing rural lots, and the potential for the creation of additional lots through subdivision. These fragmented rural landscapes are a 'time-bomb' whose effects are just being experienced. Their existence means that doing nothing is not an option.

Township and rural amenity exert reciprocal impacts which reinforce important trends and benefits. High amenity can be defined by the valued appearance and effective functioning of localities. Landscape and township heritage and broader amenity attract a wide range of people migrating to peri-urban regions. Valued landscapes interact with high quality infrastructure, services and social environments to attract professional and business services, investment and innovative agricultural and other enterprises. But unless protected, these amenity values can be degraded or even destroyed by their success in attracting additional population.

Cities which protect their hinterlands are likely to be the most economically prosperous this century. The maintenance of physical attractiveness and natural resources will prove to be essential to continued economic innovation, and make significant contributions to wealth, health, personal identity and social harmony in both city and region. The level of successful interaction of these factors will define a liveable and functioning community. Yet governments routinely separate economic, social and environment sectors and fail to use tools such as a land use planning system to achieve integration. Governments also separate rural areas from towns, and urban hinterlands from metropolitan areas. Such spatial separation leads to sectoral policies which are as fragmented as the pattern of land ownership.

True regional planning integrates sectors and spatial areas through cross-sectoral policy and planning. Under this approach, city, rural areas and regional towns are seen as parts of an interdependent system with natural resources, urban settlements, rural land uses and natural systems connected in various ways to ensure the efficient functioning and perhaps even the survival of the overall structure. Efficient agriculture maintained on high quality soils, water resources, remnant habitat and a range of other rural uses are linked under such an efficient

system to the activity of towns and a nearby metropolis by high quality public transport and other infrastructure. Such regional planning, though common in Europe and many other parts of the world, is almost unknown in Australia.

This report aims to help redress this lack of interest in regional planning and in the integration of metropolitan, rural and township land uses. The report integrates an analysis of both rural land supply and demand. It calculates land supply for rural areas and townships and estimates potential rural land supply and its capacity to meet demand for dwellings to 2041 under three scenarios. These scenarios are: business-as-usual; the use of a minimum lot size for dwelling approval; and the use of tenement controls. The latter two are used to limit dwelling growth on rural land. The project investigates transferring demand for rural lots to townships. It is therefore a supply-led approach, assuming that the existence of lot types, such as rural-residential lots, will create a demand for dwellings on those lots, and that varying types of land supply, such as in townships, will alter consumer preferences.

The report proposes a wide range of alternative development scenarios for towns in order to increase township population and accommodate the transferred demand for rural lots. These scenarios are primarily forms of dwelling intensification developed as alternatives to the dominant model of business-as-usual detached dwellings on large lots located on townships fringes. The study explores alternative models of township growth, in particular concentrating growth into the major towns or distributing it among a range of differently sized towns. The study develops criteria to identify the areas where greatest pressure for growth is likely to eventuate.

The study aimed to:
- Build key data resources to create an accurate picture of current conditions and trends in land use, development, demographic changes (and ultimately, resource use and environmental factors) in the case study area; and use this data to assist the development of a sustainable growth strategy for the case study area
- Investigate methods for limiting future development in rural areas through controls on small rural lot development and on rural land subdivision
- Investigate means for transferring development from rural to township areas
- Develop settlement options for regional centres, medium and smaller townships, and criteria to guide and direct development to preferred locations, and types and amounts of development to achieve preferred regional settlement.

The project team also aims to make available the study results in a wide range of formats, including reports, conference papers, articles, and through extensive liaison with government, local government, communities, and key interest groups. Findings provide the basis for further discussion of policy options for regional development, especially for the protection of rural landscapes and the intensification of townships.

This report provides a summary literature review on regionalism, scenario development and peri-urban areas, a demographic analysis of the region, and an analysis of existing state and local planning policy. It summarises the methodology and findings of the 2014 technical report, *Peri-urban Futures: Scenarios for Sustainable Regional Development.*

1.2 The case study region

Melbourne's peri-urban region consists of a non-urban belt of land and associated townships around the city extending to about 160 kilometres from the Melbourne central business district. The case study area examined includes seven peri-urban municipalities extending north-westerly from Melbourne (see Figure 1). The area is bounded to the south by Melbourne's urban-rural edge, to the west by the transport corridor to the city of Ballarat and the north by the transport corridor to the city of Bendigo. Ballarat with a population of 95,582, and Bendigo of 86,078 are the two largest regional settlements. The seven municipalities are Moorabool, Macedon Ranges, Ballarat, Hepburn, Mount Alexander, Central Goldfields and Greater Bendigo, with a total population of 308,558. The study area also includes a number of medium sized towns, such as Bacchus Marsh, and small towns. It contains many historic features and is predominantly rural in appearance with 23 per cent of the land area zoned for public use, with the remaining rural land zoned for rural production, rural conservation or rural living uses. The region is notable for its landscape quality, biological diversity, rural production and tourism.

Figure 1 Case study region
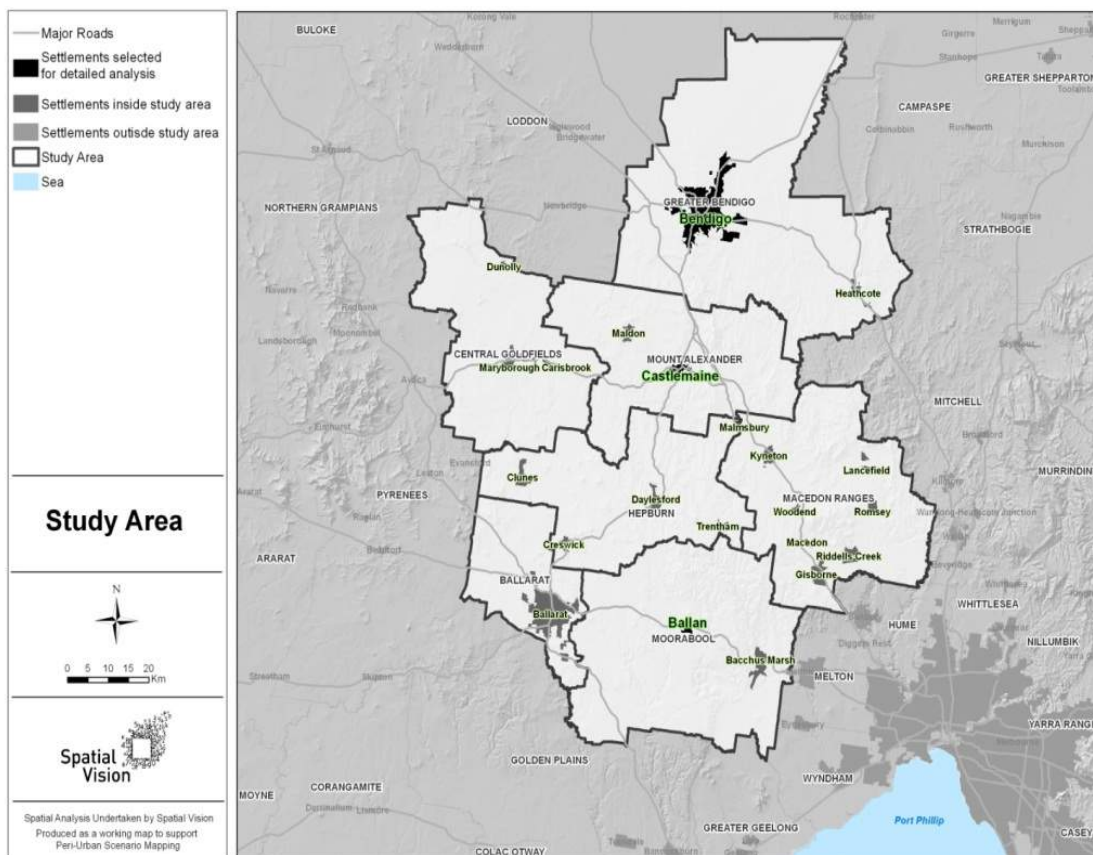
The region's location and transport connections to Melbourne provide it with the classic features of peri-urban regions. Melbourne attracts large numbers of people from the case study region to work and for recreation, with up to 40 per cent of workers in the municipalities closest to Melbourne commuting to the city, although this proportion falls significantly with distance. The region's proximity to Melbourne attracts significant numbers of visitors. Between 2001-2011, the region's population increased by 1.3 per cent, with urban settlements increasing by 17 per cent and rural

areas by only 1 per cent. Dwelling numbers rose by 20 per cent, with 7,000 new dwellings constructed in Ballarat and Bendigo, mainly detached houses on the edge of townships, while rural area dwellings increased by 10 per cent. Ballarat and Bendigo exert influences on their own peri-urban areas with, for example, 20 per cent of Ballarat's 2006-2011 growth from people moving from rural areas and up to 50 per cent from surrounding towns.

1.3 State policy

The 1971 metropolitan strategic plan developed by the former Melbourne Metropolitan Board of Works is the only plan historically resembling a regional plan for Melbourne. This plan attempted to integrate the planning of the metropolitan area with the city's hinterland, developing strategic policy and planning implementation measures over the entire metropolitan area, green wedges and a broader green belt. The area affected was revised from 1,800 to 5,029 square kilometers. The non-urban zones, including nine green wedges, covered 2400 square kilometres or about half the MMBW planning area. At the same time, regional planning authorities were established to develop cross-sectoral planning for the environmentally significant inner peri-urban areas of the Dandenong Ranges, Upper Yarra Valley and the Mornington Peninsula. The 2002 plan, *Melbourne 2030*, implemented new regulatory rural planning zones for the Melbourne green belt and developed a strong policy approach aimed at protecting hinterland resources. In 2006, the government also implemented four new rural zones for the rest of Victoria, including the broader Melbourne peri-urban region. These zones were Farming Zone, Rural Activity Zone, Rural Conservation Zone and Rural Living Zone. These zones introduced greater regulation through more prohibited uses or uses requiring permits, and were a recognition by the government of the inadequacy of the permissive rural zones introduced by the Kennett government. Non-agricultural commercial activities were directed away from the Farming zone to the Rural Activity zone. In the Rural Conservation zone, agricultural uses required a permit and intensive animal industries and most non-agricultural commercial uses were prohibited. Each zone retained the right to apply for a permit for one house for each existing lot and every zone except for the Rural Conservation Zone allowed the right to apply for approval for additional houses for each lot, subject to requirements. The Farming Zone and Rural Activity Zone allowed the excision of an existing dwelling. These rights for the construction of additional dwellings have led to the continuing proliferation of dispersed dwellings in peri-urban areas.

The State government also altered planning policy to control the proliferation of rural-residential subdivision in rural areas, introducing Ministerial Direction No.6 on Rural Residential Development in 1992, and in 1996 inserting provisions for rural-residential, rural living and the retention of productive agricultural land in the state Planning Policy Framework (SPPF). Further amendments to Ministerial Direction No.6 in 1997 and 2006, required an application for rural-residential development to be consistent with a range of requirements including the need to locate any such development close to existing towns and urban centres, not to encroach on productive agricultural land or adversely affect environmental resources.

Ministerial Direction No.6 was revoked in May 2012. In 2013, the State government also made significant alternations to the rural zones by removing a wide range of regulatory controls and allowing extensive non-farming related commercial uses to

be introduced into most zones. The requirement for a mandatory section 173 agreement to restrict future subdivision after an initial subdivision was approved was deleted from all zones. The Rural Living zone reduced the minimum lot size for subdivision and construction of a dwelling from 8 to 2 hectares. A wide range of prohibited uses was removed and made discretionary in the Rural Conservation and Farming zones including some accommodation, retail and other commercial uses. In the Farming and Rural Conservation zones, significant conditions restricting group accommodation, residential hotel and restaurant were removed and the requirement that group accommodation, residential hotel and restaurant could only be approved in conjunction with agricultural uses was also deleted. All these changes significantly weaken the rural zones by increasing the capacity for dwelling construction on separate lots and allowing a wide range of commercial uses to be approved on land reserved for agricultural and traditional rural uses.

The 2014 metropolitan plan, *Plan Melbourne*, includes statements aimed at protecting peri-urban agricultural land and reviewing regional city growth opportunities. *Plan Melbourne* proposes to investigate an agricultural food overlay to protect high value agricultural land, and to identify, protect and manage strategically significant agricultural land. However, such strategic statements about protecting the values of peri-urban land have been pre-empted by the 2013 planning system changes which make rural zones more permissive. Similarly, an undertaking to introduce a permanent metropolitan urban boundary has been made redundant by successive governments rezoning sufficient rural land on Melbourne's fringes to provide a 30 year supply of residential land at some of the world's lowest densities.

Plan Melbourne also undertakes to develop peri-urban town plans in order to increase the supply of land for housing and attract population growth. It identifies towns such as Ballan, Bacchus Marsh, Kilmore, Broadford, Warragul-Drouin and Wonthaggi. It also supports increased business and residential densities in regional cities, the identification of renewal and infill opportunities in regional cities and centres, the development of significant employment precincts in regional cities, and the provision of additional infrastructure. Implementation provisions in the plan, however, are insufficient.

This study intends to make a major contribution to demonstrating how such regional growth initiatives can be implemented. In particular, the study demonstrates techniques for regional growth through township intensification linked to the protection of rural land from commercial and intensified residential and rural-residential development.

Chapter Two: Literature review

2.1 Regional planning in Australia

Successful regional planning integrated horizontally across sectors and vertically across levels of government is rare in Australia. Some attempts at integrated regional planning have been made with varying degrees of success. The most notable was by the Whitlam federal government between 1972-75 through the creation of the Department of Urban and Regional Development (DURD). DURD's key policy initiatives included the creation of formal planning regions; increased policy co-ordination between Commonwealth, State and local governments; direct financial assistance to local governments; a regional population distribution plan; and major spending on a number of selected regional growth centres such as Albury-Wodonga (Tonts and Haslam-McKenzie, 2005).These initiatives were abandoned with the defeat of the Labor Government in 1975. The Labor Government in 2007 adopted common regional boundaries and established Regional Development Australia (RDA) but with little effect on policy or practice. The work of the Murray Darling Basin Authority is the most important attempt at integrated land use and natural resource planning.

The Western Australian government has developed strategic plans for most of the state's spatially defined regions (WA Government, 2012). The government is directing large financial payments to regions for improved infrastructure. The New South Wales government introduced some regional planning measures over time in dispersed settlements away from Sydney to plan for environmental improvement and economic performance. The Queensland population is even more dispersed and the government continues to promote regional population growth through a number of policies. The most notable large scale regional planning program in Australia has been the South East Queensland (SEQ) planning process. The SEQ2001 plan proposed primarily a scenario of trend growth (Queensland, 1994). The SEQ2005 and more significantly the 2009-2031 plans seek to identify a preferred settlement pattern and encourage more compact development, increasing the proportion of infill to 44 per cent of new housing and concentrating growth in the Western corridor away from the coast (Mackenroth, 2005; Hinchliffe, 2009). In Melbourne, the *Melbourne 2030* strategic plan also sought to redirect up to 40 per cent of trend growth away from outer urban growth corridors into the established city in an alternative settlement pattern (DOI, 2002) but was abandoned in 2008 in a reversion to trend growth when the urban growth boundary was expanded by 43,000 hectares (DPCD, 2008). The Victorian government's new metropolitan plan, *Plan Melbourne*, explores the possibility of increased population in Melbourne's peri urban settlements (DTPLI, 2014a). The government has developed Regional Growth Plans for its five rural regions and is seeking alignment with the Commonwealth RDA committees. However, these tend to be directed towards accommodating trend growth.

The most successful example of integrated regional planning in Victoria was for environmentally significant peri-urban regions of Melbourne between 1974 and 1991. In 1971, the State government introduced statutory policy to protect two peri-urban regions, Westernport Bay-Mornington Peninsula, and the Upper Yarra Valley-Dandenong Ranges (UYVDRA). Acts of parliament established regional planning

authorities for these two regions, integrated vertically across state and local authorities, and horizontally across a range of sectors. This legislation required the authorities to implement state policy through the development of regional strategy plans and their implementation. Regional plans integrated policy across a range of natural resource, social and economic sectors.

These policies and ultimately the strategy plans were interventionist, seeking alternative futures to path dependent trajectories associated with trend analyses. They included a range of requirements to regulate subdivision and development of land and contain development within defined urban boundaries in order to protect rural land uses, including agricultural practice, landscapes and environmental features. The UYVDRA policies and plan, for example, required the regional authority to "retain and improve where possible, the amenity of the…[region]…for present and future residents, the farming community and other users and the conservation of its natural resources" (UYVDRA, 1980, p. ii). The regional authority identified land fragmentation and development as the main threat to achieving this objective. It severely limited future subdivision and dwelling development on the 62 per cent of 17,272 rural lots and the 42 per cent of 43,334 urban lots without dwellings (Loder and Bayly, 1980). This removal of development expectations controlled land speculation, protected environmental qualities and increased the capacity for agriculture to persist by maintaining comparative rates of return and the potential to innovate. This kind of regional planning is rare in Australia.

2.2 Peri-urban areas

A peri-urban area can be defined in relation to a nearby metropolitan area on its inner boundary (Burnley and Murphy, 1995), a rural area on its outer boundary (Bunce and Walker, 1992), or as a distinct settlement pattern as the land in between, neither urban nor rural but an interface, a transitional zone (Audirac, 1999, Nelson and Dueker, 1990). Peri-urban regions may be conceptualised as those areas on the urban periphery into which cities expand (Burnley and Murphy, 1995) or functional regions which cities influence (Houston, 2005, Buxton et al, 2011). Boundaries may be fluid, yet the area is not necessarily in a temporary state on a pathway to urbanisation.

The Melbourne peri-urban region can be defined structurally by its physical structure and form, or functionally, or by a combination of spatial and functional factors (Buxton et al, 2006). Structural characteristics include lower population and building densities compared to urban regions, the heterogeneous nature of land uses and rapid rates of change; while a functional analysis of social and economic processes is both interactionist and system based. The resilience of peri-urban systems therefore is determined by both the system components and how they interact, that is by multiple physical and social states. Thus, the relationships between elements determine the system's function and its capacity to respond to change.

Australia's peri-urban areas have a complex mix of production and consumption, with land use and value trends different to those in broadscale productive agricultural regions (Low Choy, 2012, Butt, 2012). Even though examples of local landscape conversion and industry loss exist, net production levels and values are not in demonstrable decline in broader peri-urban regions, and in fact farm numbers are often increasing, although typically among small-scale businesses (Houston, 2005,

Buxton et al, 2009).

2.3 Regions

Regions have undergone various stages of conceptualisation. At the most general level, they are adjoining areas or places which share common characteristics (Beer et al, 2003, Agnew et. al. 1996). These common elements may range from formal to functional attributes (Beer et al., 2003, Väyrynen, 2003). Regions have been defined according to their social characteristics (Gilbert, 1988), physical landscapes (Hamin and Marcucci, 2008), bio-regions (Holloway, 1981), or as a locus of economic growth (Storper, 1995 and Scott, 2001). Paasi (1991) describes the region as a socio-spatial unit that is characterised by institutionalised practices that are embedded in the history of the region. Regions are therefore socially produced and reproduced through communication and symbols.

Differentiating between structural and functional definitions can lead to different understandings. A formal region is constituted by the grouping together of smaller geographic units according to identified similarities in contrast to functional ties such as transport patterns and capital flows which connect a hierarchy of settlements internally and to external urban areas, and which relate sectoral activities such as agriculture and manufacturing to each other. Increasingly, the view has been accepted that regions can only be understood through an analysis of their operation internally and externally. A 'networked' relational conception of the region (Castells, 2000, Jones, 2009) recognises regional scale as 'functional space' for the deployment of a range of connected activities such as economic and political processes.

In turn, such a concentration on functional connections has implications for urban centres. The concept of the 'city region' can reorient urban areas towards their hinterlands and the complex relationships between metropolitan and regional urban and rural areas. The term 'city-region' has grown to encompass a breadth of alternative descriptors including: urban regions, metropolitan areas, sub-regions, polycentric regions and functional urban areas (Healy 2009, p. 833). This orientation can supplement or replace a concentration on global city connections and a traditional monocentric and hierarchical centre-periphery model of the city region with 'aspatial conceptualisations' and 'polynucleated urban landscapes' (Batt,y 2001 cited in Green, 2007).

2.4 Scenario methodology

The approach to regional planning adopted here is part of a growing body of research that uses scenarios as a method to examine the impacts of current trends and practices on the future. A scenario can be defined as a story involving an internally consistent and plausible explanation of how events unfold over time (Swart et al, 2004). Scenarios generally are not regarded as predictions but as statements of possible future states. Porter (1983), Schwartz (1991), Ringland (2002) and Shoemaker (1995) agree that scenarios are not simply random imaginings but are part of a consistent methical tool kit for thinking strategically about the future. In the Borjeson et al (2006) typology of scenarios, three main categories of the future are identified: possible, probable and/or preferable futures.

Scenarios can be normative subjective narratives which explore plausible futures, or

quantified explorations. Various scenario typologies have been proposed. Linear approaches explore a continuation of trends to varying extents, while systems approaches investigate the multiple and complex interactions of elements. Such elements can be physical and social. The concept of risk is central to complex system analyses.

Scenarios can be forward looking or involve backcasting. In backcasting, scenarios "define a normative state in the future…then diagnose how to achieve that state over time" (Jones, 2010: 5). Glenn and Gordon (1997) propose two types of scenarios, exploratory and normative. Exploratory scenarios follow a foresighting approach, projecting trends based on the question "What do you think the future will be?", while a backcasting approach is based on the normative question "What kind of future would you like to see". Backcasting is an imaginative exercise. It requires "working backwards from a particular desired end point to the present in order to determine the feasibility of that future and what policy measures would be required to reach that point" (Robinson, 1990 p.823). Nordlund (2008), Beer (2006) and Jones (2010) also discuss this approach.

The comparative approach followed here uses both a forecasting approach, projecting current trends forward, and a backcasting approach in proposing how to achieve an alternative future state. The study also uses a modified scenario approach by adopting a game workshop method that tests assumptions about regional futures, visualises outcomes associated with different futures and evaluates different policy and practical outcomes.

This paper estimates current and potential land supply, and its adequacy to meet dwelling demand for both rural and urban areas to 2041. The approach followed presumes that land supply influences demand, specifically, that the existence of small rural lots will result in their use for dwellings but that alternative housing types and lots within townships will in turn influence demand in different ways. Three rural scenarios test the extent to which rural land supply can meet projected rural dwelling demand. The first is a business-as-usual scenario which shows the patterns of development and infers impacts on landscapes from a continuation of trend development. Under this scenario, land supply is determined by the number of existing and potential new lots under existing planning schemes. Business-as-usual projections of dwelling increase were derived from the Victorian government's 'Victoria in Future' (VIF) projections (DPCD, 2012a). These were spatially distributed throughout Statistical Local Areas (SLAs) in the case study region on both rural and urban land.

Every individual rural land parcel was plotted for SLAs. Projected future growth was then applied to individual rural and urban land lots to build a picture of housing growth at a highly localised level beyond that of the more general VIF trends. The concept of an attractiveness index was developed to distribute VIF projections to individual rural land lots for a one square kilometre grid surfaces. This index used criteria such as infrastructure, environmental, settlement and demographic factors as indicators of preferences for location and timing of development, and so to identify the most probable rural settlement pattern within each SLA. Business-as-usual land supply was determined by the number and size of existing individual rural land lots without dwellings; potential for future subdivision; the impact of constraints such as

biodiversity, water resources, primary production and flood potential on land use; and land use planning provisions. Demand was distributed by applying the attractiveness index to supply, demonstrating how soon demand would be met in the rural parts of the region's SLAs.

The second two scenarios assume an alternative future to be achieved by 2040 and propose measures to achieve this end. The alternative future is defined as a continuation of 2014 existing physical conditions, particularly landscapes, environmental attributes and natural resources, and the continued capacity for agricultural production in a region linked through efficient and accessible transport options. Two scenarios are proposed to achieve this future. Scenario 3, the Rural Preservation scenario, requires high minimum rural lot sizes for the construction of one dwelling of 40 hectares in the Farming and Rural Conservation zones, and 16 hectares in the Rural Living zone. It also reduces the minimum lot sizes for dwellings in three future urban zones of rural appearance on the edges of towns to 0.04 hectares in the Urban Growth and Comprehensive Development zones, with no minimum size applied in the Township zone. Scenario 3, the Tenement Control scenario, requires the area of multiple rural lots in the same ownership to total 25 ha or 40 ha for the construction of one dwelling

The application of the second two scenarios substantially reduces the potential for dwelling construction in the three rural zones by reducing rural development on existing land lots and restricting rural land subdivision. However, the scenarios increase the development potential in the three urban edge zones through a number of techniques. Firstly, forgone rural demand is transferred from rural to township zones. Secondly, under scenario 2, the three future urban zones on the edges of townships can be subdivided to small lots substantially increasing their yield. Thirdly, under scenario 3 the BAU yield applies together with transferred rural demand.

Finally, six township development scenarios are examined to investigate the capacity of existing urban zoned land in townships to accommodate projected future dwelling and population growth.

2.5 Melbourne's peri-urban region

Melbourne's peri-urban region consists of two non-urban belts of land round the city and their associated townships extending to about 150 kilometres from the Melbourne central business district. The first, or inner belt, is the Melbourne green belt extending from the metropolitan urban growth boundary to the outer rural boundary of the 17 municipalities which form the Melbourne green belt. The second, or outer belt, includes eight municipalities in a broader arc extending from the western to the eastern coast line.

The inner Melbourne green belt is the second highest producer of agricultural products in Victoria with a gross production in 2001 of $890 million from 4,010 farms, although the true value may be closer to double this figure (Gardner, 2002, Langworthy and Hackett, 2000 cited in Parbery, Wilkinson and Karunaratne, 2008). The agricultural output per hectare of this area is the highest in Victoria, at least three times greater than any other region in the state and four times the state average (PPWCMA, 2004). Five municipalities in Melbourne's outer peri-urban belt contributed over 5 per cent, or $390 million, of Victoria's $7.5 billion farm business

turnover in 2006, an increase from the region's share of 4.1 per cent in 1997. These municipalities contain almost 2,500 farm businesses, or 7.6 per cent of the total farm businesses in the state. The number of small farm businesses in these municipalities has remained stable since 1997 while declining across the state (Buxton, et. al, 2009).

The eight outer peri-urban municipalities cover 13,020 square kilometres and include a range of landscapes from mountain forests, woodlands and lowland forests, cleared farming land, and coastal areas. The population in 2013 was about 165,000 on 5.9 per cent of the land area of Victoria. Two regional settlements just beyond this outer zone dominate this region, Bendigo with a population of 82,794 and Ballarat with a population of 85,935 people (ABS, 2013). The city of Geelong on Port Phillip Bay to the south also can be regarded as part of Melbourne's peri-urban region. The seven municipalities forming the case study area of this project include two from the outer peri-urban region, Moorabool and Macedon Ranges, and five beyond this outer region, Ballarat, Hepburn, Mount Alexander, Central Goldfields and Greater Bendigo.

The township settlement pattern also includes towns with populations of 500-9,000 people and a small number of larger towns of up to 15,000 people. Many of the towns retain significant heritage character dating from the gold rushes of the nineteenth century. Townships are separated by non-urban areas consisting of important environmental areas of public land, productive landscapes, and rural landscapes with scattered housing. The region is growing at a rate of 1.7 per cent annually (Buxton et.al, 2009).

The relationships between agriculture, a range of other system elements such as water, and land tenure illustrate the region's importance for the nearby Melbourne metropolitan area. Australian peri-urban agriculture is highly significant. Houston (2005) estimates that Australia's peri-urban regions comprise less than 3 per cent of the land used for agriculture but are responsible for almost 25 per cent of the gross value of agricultural production in the five mainland states, an underestimate because Australian Bureau of Statistics data measures broadscale agricultural production only.

Land tenure is the key factor in a complex network of interacting variables and reciprocal relationships. The findings in the case study and related discussion will show that development impacts would be severe and extensive, detrimentally affecting agriculture, biodiversity and water resources, and lead to high costs in the provision and maintenance of social and physical infrastructure.

2.6 Drivers of change

2.6.1 Population movement

The inward movement of new populations and consequent growth and housing development is a key feature of peri-urbanisation. The pull factors attracting migrants to peri-urban areas are recognised generally as proximity to a metropolitan area combined with rural attributes such as amenity, lifestyle and affordability (Moss, 2006; Gosnell & Abrams, 2011; Buxton et al, 2009; Costello, 2009). The new population sources, scale and spatial patterns highlight the differentiated process of peri-urbanisation. Population growth comes from a nearby metropolis and from more

distant rural areas experiencing longer-term decline (Fisher 2003).

Two main types of migratory movements exist: peri-metropolitanisation where households relocate beyond the fringe of the metropolis, and counter-urbanisation with movement to smaller towns and regional centres (Burnley and Murphy, 1995). While both may be at odds with broader trends of urbanisation, the former may also be a process of suburbanisation, while the latter reflects movements down the urban hierarchy. These are related to diseconomies of scale, metropolitan and peri-urban housing costs and lifestyle attributes of smaller communities among other factors (Champion, 1988, Lewis, 2000, Vias, 2012, Costello, 2009). The complexities of peri-urban areas are social, as well as spatial, and involve a variety of identities and processes (Rauws and de Roo, 2011, p. 269). Concepts such as exurbanisation, rural gentrification, counter-urbanisation, retirement migration and welfare-led migration and are useful ways to describe the different processes driving these population movements and social change.

Exurbanisation is a 'process of in-migration of affluent people into rural settings' (Zasada et al, 2004, p. 60), but typically explains extension to a suburban pattern of growth (Spetkorsky, 1950). A profile of exurban settlers suggests that these are 'city people who purposively wish to reside in a rural landscape and exert high patterns of commuting for work and leisure' (Taylor, 2011, p.324). Those from capital cities maintain ties to nearby city-based services and public utilities (Phillips, 2004; Rauws and de Roo, 2011).

Rural gentrification may be a by-product of the exurbanisation process, although it also applies to those areas further from the city (Nelson et al, 2010, Phillips, 2004). Social changes involving gentrification are generally part of a global phenomenon (Cadieux and Hurley, 2011, McCarthy, 2008). Commodification of peri-urban areas is catalytic to gentrification with new residents' consumptionist values contributing to a more stratified society than previously existed (Argent, 2002). Gentrification is most visible in places with greater differences in socio-economic status (Clark, 2005).

At the local level gentrification processes also 'involve a multiple set of changes that are highly individualised, not just reflecting class and income but often more subtle notions of taste, discernment and social reproduction through selected and varied forms of housing and lifestyle' (Butt, 2011, p. 70). The influx of urbanites to these areas has contributed to the propensity for conflicts around changing identity of the community, consumption of the countryside, privatisation of resources, housing affordability, environmental conservation (Ghose, 2004, p. 529) and social segregation (McCarthy, 2008). Gentrification in rural areas has been the subject of extensive research (Cloke et al, 1995, Lewis, 1999), but less is understood about its effects at the peri-urban scale.

More urban-focussed perspectives suggest a broader trend of **counter-urbanisation** (or anti-urbanisation), often described as the tree change phenomenon. These are strongly linked to amenity landscapes surrounding large urban centres, and also in more remote areas. (Burnley and Murphy, 2004; Halfacree, 2010; Ragusa, 2011) Rural migration in Australia since the 1970s is also connected to the emerging pre- and post-retirement mobility preferences and expectations in coastal areas and hillscapes (Murphy, 1979, Murphy and Zehner,

1988). For example, older (retirement) age groups dominate the age groups in a case study of the NSW Central Highlands (Drozdzewski et al, 2011).

Welfare-led migration, especially to outer peri-urban regions and beyond is influenced by housing and other costs (Hugo and Bell, 1998; Burnley and Murphy, 2004). Processes such as the deindustrialisation of small and medium-sized towns in regional Australia, the reduced economic and population connections between towns and their agricultural hinterland, and centralisation of employment and services, have resulted in many economically underperforming and vulnerable rural towns and regions (Stimson et al, 2001). These processes also affect towns and peri-urban areas experiencing inward movement of new populations. Recent analysis from the Netherlands suggests that lower housing costs provide a key driver of inward movement in less desirable rural areas (Bijker and Haartsen, 2012).

These diverse conceptions of counter-urbanisation and peri-urbanisation provide sometimes discrete and sometimes overlapping examples of change as a socio-spatial process. Age, income, rurality and displacement are among the signifiers of change. Change in peri-urban areas is not just confined to population growth (Murphy and Burnley, 1996).

Commuting and the employment dependency between peri-urban regions and larger cities are important influences on community life and peri-urban relationships. Links to those cities and the associated advantages of higher incomes and labour market diversity are evident, although varied evidence exists for the income and other benefits of commuting. Longer distance commuters can overcome typical urban-rural wage disparities (Hazans, 2004). But systematic losses in well-being may also occur as a result of the negative trade-off from time spent commuting between rural or peri-urban and metropolitan places (Stutzer and Frey, 2008).

2.6.2 Landscape and land use

Changing land uses and their landscape impacts are key physical processes in peri-urbanisation. Agricultural activity is continuously transforming and together with non-farm housing development and perceptions of landscape amenity, these are crucial features and critical concerns in peri-urban areas.

Agricultural change as a physical and socio-economic process is strongly associated with peri-urbanisation. Economic and landscape transition in Australian agriculture relates to structural changes in specific industries: this includes increasing farm scale, displacement, and movement of industry types. But most evident in peri-urban areas is landscape change related to social preferences and settlement systems rather than structural industry change.

Typically farm businesses in Australia and elsewhere have increased in scale to maintain viability in the face of declining terms of trade (ABARE, 2007). Comparatively high levels of productivity growth in the agricultural sector in Australia over several decades have been both a cause and consequence of local and global industry restructure and new policy environments, particularly emerging international trade practices and local industry support (Mullen, 2010). Overall, the broad process of restructure in Australian agriculture has resulted in farm numbers decreasing by approximately 10,000 in the decade to 2009 Australia-wide (ABS 2010).

The consequences of restructure and consequent vulnerability have also been uneven between industries and regions. This has also had implications for farms of different sizes. Large-scale operations vary in farm viability, vulnerability within and between industries, and in their responses to the challenges of scale and declining returns. This has challenged the broad concept of family farming enterprises (Alexander and Kokic, 2005; Pritchard et al., 2007). At the same time, small-scale farms have grown and production has been concentrated in a number of key industries.

In Australia, the complexity of change in peri-urban farming is broadly described through at least four processes and explanations of economic and landscape change: *agricultural loss, dilution, transition* and *transference* (Buxton et al., 2007). These explain how enterprises and industries experience various processes of change, some through pressure from alternative land uses, and some resulting from the particular interplay between industry change and the features of land markets in peri-urban regions.

Reviews of peri-urban areas in Australia also suggest that these regions display trajectories of change that diverge from the experiences of more typical agricultural regions (Houston, 2005, Budge et al., 2012, Buxton et al., 2008). In peri-urban regions, farm numbers have been stable or increasing, although the financial scale of these businesses is, on average, smaller (Barr, 2003, Butt, 2013, Budge et al., 2012). A shared phenomenon is the lack of children interested in continuing to run family farms. Elderly parents feel under pressure to sell their land, the proceeds of which function as a form of retirement income or superannuation (Millar, 2010). Those who wish to continue to farm must compete with land developers and speculators to increase their land holdings. They also may have to pay higher rates, and their properties may be subject to trespass and vandalism with the shift to a more urban environment (Bryant, Russwurm and McLellan, 1982). Often peri-urban areas have many small properties which are popular and affordable for in-migrants who may farm part time or intensively, or not at all (Barr 2003). It is important to note that farmers' motivations to sell their land are not homogeneous (Bryant, Russwurm and McLellan, 1982).

Conversion of farming areas to non-farm uses is often regarded as undesirable due to the loss of a land resource, the dilution of farming systems, and consequent urban inefficiencies created by sprawled housing (Alterman, 1997). Under this approach, regulation to prevent land fragmentation is an indispensable tool to control property speculation and maintain effective rates of return on agricultural production against the allure of profits from anti-competitive land development. Contrary perspectives, such as in the economics literature, suggest that as farming retreats, new urban employment opportunities emerge and local markets expand for farm produce (Bryant, Russwurm and McLellan, 1982). These perspectives argue that alternative land uses are desirable, or inevitable, regardless of planning preferences (Bryant, Russwurm and McLellan, 1982, Wills, 1992, Bowie, 1993, Barr, 2003). Advocates of market oriented policy criticise the legitimacy of polices aimed at supporting non-productive activities within multi-functional landscapes, such as environmental works, as providing trade and markets distortions (Potter and Burney, 2002).

The complex and multiple roles and expectations of peri-urban landscapes and land resources are related to the changing nature of agricultural land uses in peri-urban areas. In these areas, the resource expectations of the city for water, recreation space and food production, and the natural values of biodiversity and habitat, are under conflicting pressures from agricultural and non-farm development. This is particularly evident where landscape and habitat values and amenity values for residents and visitors are intrinsically linked to the leisure and production economy, and land markets. In Britain, governments have recognised the importance of protecting scenic and cultural landscape values where agriculture is in decline (Auster, 1993). This revaluing of amenity or landscape quality is part of an emerging peri-urban culture of consumption which brings both physical and socio-economic change (Moss, 2006, McCarthy, 2008, Gosnells and Abrams, 2009; Mansvelt, 2005, Torres and Momsen, 2011).

2.6.3 Amenity

Amenity value arises from attributes which make a place aesthetically attractive and from facilities that are well-suited to visitors and residents (Argent, Smailes and Griffin, 2007). Amenity enhances a location as a place of residence, however the amenities which residents perceive as desirable may not necessarily appeal to tourists (McGranahan, 1999). In Australia, amenity rich areas have 'a complex mix of amenity (residential, recreational and tourism), part-time, pluriactive[4], specialised, niche or factory-farming uses' (Holmes, 2008, p. 217). Therefore, the multiple functions of these areas pose considerable challenges in balancing the competing interests of its residents, visitors and the larger population dependent on its resources.

The role of amenity in rural development is increasingly recognised as a significant factor in the shift from rural production to a mix of production, consumption (of amenity) and protection (of the natural environment) (Holmes 2006, Mather et al. 2006). Its role is linked to diversification processes and contributes to a rural comparative advantage of place (Argent et al., 2010, p. 25; Galston and Baehler, 1995). Amenity has also become a driver for population settlement through consumption values such as 'ambience' and charm rather than traditional production values (Argent et al., 2010, p. 27). Regions which have a mix of amenity landscape, heritage architecture, and access to metropolitan centres also attract city dwellers who desire the countryside ideal (Tonts and Greive, 2002). Towns whose economies were previously dependent on agriculture may also benefit from demand for second homes but only in areas sufficiently attractive due to features such as landscape quality, architectural character and heritage value (Auster, 1993).

Amenity is also valued because of its link to the natural environment. Natural amenity is connected to the physical rather than the social or economic environment, and along with accessibility and land prices, is a key driver in shaping processes of rural growth (McGranahan, 1999; Argent et. Al., 2010 p. 31). Natural amenities such as forests, lakes and mountains are powerful lures to migrants (Argent et al., 2010). Nature can provide many positive welfare benefits to residents, including numerous opportunities for recreation, leisure and health and well-being such as exercise, visual amenity, mental or psychological well-being, source of inspiration, wildlife

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[4] Part time farming

viewing, and ecological education opportunities (Gibbons et al., 2011). There is clear evidence of the relationship between amenity and a sense of well-being and good health amongst inhabitants (Eyles and Williams, 2008). The more intangible contributions of place to identity can provide many personal and community benefits. As Ashworth explains it, "there is the explicit idea that history endows places with a distinctive identity. It transforms spaces into places through its inherent quality of uniqueness" (ib id: 187).

However, placing a value premium on aesthetic amenity and nature can have significant impacts on how exurban landscapes change. Prioritising nature and amenity may be in conflict with traditional production such as agriculture (Gibbons et al., 2011 p. 269). Urban incursions can also have significant ecological impacts: amenity land owners may only live part time on their properties and know little about or give scant attention to problems such as invasive weeds (Gibbons et al., 2011 p. 17, Klepeis, 2009).

Regard for rural amenity landscapes can transcend traditional perceptions of productive value (Barr, Wilkinson, and Karunaratne, 2005). In Victoria, many farms in such areas generally have lower on-farm income but higher off-farm income drawn from a diversified local economy. The rate of farming population decline in these areas is less than in pastoral or 'agricultural heartland' areas (Barr et al., 2005). Low amenity areas such as the Mallee contrast with the high amenity areas in Melbourne's peri-urban regions (Barr et al., 2005), assessed against an amenity premium valuation through calculating the ratio of land value to value of production per hectare, High amenity rural areas are also attracting the sought after 'creative class' (Argent et al., 2013, McGranahan and Wojan,, 2007). The economic value of amenity can be measured through tourism, cultural industries and cultural production, and the value of heritage as an element which attracts innovative investment and professional and business services to high amenity locations. At the same time, in-migrants' demand for housing brings more urban development which challenges the rural character which attracted those households to these areas (Bryant, Russwurm and McLellan, 1982).

Exurbanites tend to prefer to favour preserving built heritage as part of broader conservation and sustainability values. Along with natural attributes, built and cultural assets such as attractive streetscapes or unique customs or traditions are pivotal to creating the conditions for a 'commodified landscape to unfold' (Mitchell and Coghill, 2000, p. 88). In Europe and more locally in Victoria, the amenity and quality of built form of rural villages, former farm structures and country towns are critical drivers of exurbanisation and counter-urbanisation (Stockdale, 2010, Lacour and Puissant, 2009, Costello, 2009). Protecting built environment heritage may have a positive effect on residential property values (Nankervis, 1988, Armitage and Irons, 2013). Heritage value may also infer higher social status to the occupants of such buildings, with anecdotal evidence of "monied city-siders" buying commercial heritage buildings in small country towns to run antique shops (Nankervis, 1988, Russell, 1997). Built form and heritage character are also signs of authenticity and are distinct from contemporary urbanisation although rural amenity assessment models need more development (Argent et al., 2007, p. 231).

Landscape amenity is assessed and valued according to a number of different

factors. These factors may include economic use and non-use values from objective and analytical studies, together with more subjective concepts, such as community and/or visual values. Calculating the economic value of amenity is problematic as it is a 'non-market service' (Howard, 2008, p. 298). A range of proxies are used such as measuring use values, market returns and visitor and migration preferences.

Total Economic Value (TEV) mathematical and analytical assessments can measure the economic use and non-use values associated with any given landscape, producing a 'monetarisation of these use and non-use values [which in turn] enable, in theory, the integration of environmental commodities into cost benefit analysis of planning choices' (Plottu and Plottu, 2012, p. 797). Valuation techniques such as hedonic pricing methods and choice modelling reveal the non-productive value of amenity landscapes and are used widely in empirical research. Examples include valuing urban and urban fringe vegetation, and valuing agricultural areas under pressure in broader peri-urban regions (Poudyal et al., 2009; Mallawaarachchi et al., 2006). The bifurcation of land values in Victoria between small and larger rural holdings suggest the formation of a non-farm rural land market in peri-urban regions and beyond (Barr and McKenzie, 2007). Hedonic pricing can assess the value of cultural heritage: a study in the Netherlands found that historical characteristics of buildings and their surroundings account for almost 15 per cent of property values (Ruijgrok, 2006).

Ultimately, however, 'amenity' is a concept based on values and on assessments of quality. The value placed on attributes such as landscapes may not be assessable in quantifiable terms and, to many people, may override other measured benefits and disadvantages.

2.7 Planning peri-urban regions

Effective land use planning is a necessary though often not a sufficient tool for the maintenance of landscapes and other environmental features, productive activities, employment and agricultural land markets. However, without the use of stronger spatial planning techniques to prevent further land fragmentation, it is unlikely that other measures will maintain peri-urban landscapes.

The Victorian planning system uses subdivision control as its main tool to manage rural landscapes and land use. Local governments include specific minimum subdivision area requirements in schedules[5] to rural planning zones which in the project study region include Farming, Rural Conservation and Rural Living zones. Each of those zones enable agricultural land uses, with the Farming Zone also seeking to "encourage the retention of productive agricultural land" (DOI, 1996). The zones' policy goals and their specific schedules attempt to address existing spatial patterns. Many owners of small lots, and land uses other than agriculture are evident in rural landscapes. Schedules requiring larger lot minima than currently exist aim to prevent further fragmentation and reflect an implicit preferred future residential density. However owners and purchasers place pressure on the planning system's implementation of these controls given past subdivision precedents (Buxton et al., 2007).

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[5] Tables with specific locations and subdivision lot areas.

Local planning schemes can also specify minimum parcel areas for the construction of a new dwelling or require a planning permit application for a new house. In the past, councils have tended to allow dwellings on rural lots of any size. This project considers both the potential additional residential yield from subdivision and homes built on currently vacant lots. The total represents the development potential of the study region's rural areas.

Urban planning zones apply to land within the urban boundaries of major regional centres and many medium sized and smaller towns. Substantial land supplies are available also on the fringes of townships. Both township and fringe urban land is being developed rapidly using the dominant model of low density detached housing. Consumer preferences and planning regulation both influence the types of housing built at the urban edges and within the established areas of these urban settlements, and change in both offer an opportunity for different future approaches. Evidence from the US suggests that a greater gap is developing between demand for particular housing types and market supply (Nelson, 2013). Innovative supply strategies can also demonstrate to both consumers and government that latent demand exists for dwellings other than detached homes.

Political neo-liberalism results in government reluctance towards taking on additional debt to finance new infrastructure. This trend suggests that existing urban areas which are well serviced will be more able to accommodate population growth and more residential development. Directing growth to urban settlements will both reduce development impacts on peri-urban landscapes and can reinforce the important role of those places as concentrations of community resilience in the context of increased risk from natural hazards. This also suits a neo-liberal ideology of minimal government involvement and higher expectations of community self-reliance.

2.7.1 The role of urban centres within regions

Settlements in many countries have experienced an increasing shift from traditional hierarchical patterns of central place to dispersed multi-centred nodes. At a city-region scale, Davoudi argues however that regional conceptualisation has been underpinned by an urban-centric and economically driven approach (2008).

At a practical level, scholars such as Batten (1995) and Meijers (2007) demonstrate how settlement planning has focussed on linking "discrete" urban centres into the city network in an attempt to address growth and sprawl through developing linkages between places that are ideally not simply commuter relationships. Turok (2009, p. 849) argues that understanding the complexities of contemporary regionalism is pivotal to comprehending the evolving character of peri-urban regions and implications for policy formulation and regional development.

2.7.1.1 Demand side: consumer preferences

Detached dwellings dominate both existing and new housing stocks, limiting the opportunities for new households to choose from a diversity of housing types. This is particularly the case in regional areas which tend to lack the growing variety of townhouses and apartments evident within established suburbs of larger metropolitan areas such as Melbourne.

Housing markets respond inadequately to demographic change and make

assumptions about the appropriate size of houses for particular households. Average dwelling size is increasing while household numbers are falling. The increase in small households is due to an ageing population, delayed marriage, couples not having children and individuals remaining single: planners assume that these households will need smaller homes than those which currently exist. Little evidence exists that these households are moving in great numbers to new apartment buildings: rather, they purchase them for investment and then rent them out to younger households (Birrell et al., 2013).

Commonwealth programs also actively support ageing in place and taxes such as stamp duty act as effective deterrents against older households selling their homes (Birrell et al., 2013). The baby boomers may be a large cohort in the population but their homes will not flood the housing market until their numbers start to fall in 20 to 30 years. Significant population growth is projected prior to then: where will newly formed households live and in what types of homes?

Recent research demonstrates that households prioritise number of bedrooms and location before dwelling type (Weidman and Kelly, 2011; Judd, 2010). This further supports arguments for greater dwelling type diversity, including in non-metropolitan locations. Regional cities and towns sometimes suffer from a lack of sufficient planning expertise and developers increasingly produce house and land packages on their fringes: both are producing less rather than more diverse new housing stock (Beer et al., 2011). In Ireland, policies exist to control this type of development and direct it into existing settlements: but at the same time, pressure remains for detached houses on rural lots because of an inadequate supply of alternatives within towns. These households seek space and views, and easy access to work and shops (Bullock, 2011).

Why then do housing markets not supply dwellings in locations for which demand apparently exists? The housing industry is conservative, preferring to build products for demonstrated rather than latent demand. Consumers often are cautious about housing purchases as they anticipate eventually selling their home and wish to optimise its investment potential (MPE, 1987). Regional and rural areas experience further constraints: small scale land developers and builders often are unable to quickly respond to shifts in demand because of their size and lack of skilled staff; they are highly dependent on local investment; and significant market differences are associated with the size of places and their location (Beer et al., 2011).

If the market is resistant and slow to change, who should then intervene to attempt to achieve a better match between unmet consumer preferences and housing supply? Beer et al (2011) show that, in a rural and regional context, survey respondents suggested the need for a stronger role for government through ensuring more land supply, and encouraging different housing types and densities. Demand clearly exists for affordable homes in peri-urban areas, particularly from families who still want a detached home (Birrell et al, 2013). Improved planning and services, and greater housing diversity in regional towns could reduce pressure on peri-urban landscapes (Nilsson, 2013). The British experience also suggests that policies and regulations need to be specifically designed for particular locations rather than taking a broad, national approach to housing supply attempting to meet consumer demand (Dunse, 2013).

Modelling shows that more than sufficient land supply exists for projected population and dwelling growth in peri-urban areas. Increasing average densities through building a range of housing types would substantially increase the supply of housing in townships and more than adequately meet projected demand. The next section looks in more detail at the range of options which government can use to regulate housing supply.

2.7.1.2 Supply side: how planning controls and manages supply

The populations of peri-urban areas are growing and their demographic composition is changing; their economies are shifting from production to consumption-based; and their natural environments are adversely affected by urbanisation and shifts in farming practices. These factors affect rural and urban parts of peri-urban regions but in different ways.[6]

Local and state governments share responsibility for developing strategic plans which identify possible future change and propose flexible strategies for managing that change. Land use planning has assumed a neat, linear and rational path to produce ideal outcomes. The reality is far more complex. Peri-urban areas are fragmented spatially, institutionally and socially. They are also places of conflict due to competing land interests and incompatible uses, the spread of contentious urban development, impacts on natural resources and the different values and perspectives of residents. Each of these is a challenge to strategic and regulatory planning.

This study specifically focuses on the regulatory aspect of planning which attempts to prevent or control the physical results of land subdivision and development. Resistance to regulations has led to reduced regulatory control. Often zoning prohibits few uses, is permissive rather than prescriptive and reactive rather than proactive. An unintended consequence of these types of regulation can be a scarcity of land and associated increased property prices. In Britain, the observed result of landscape protection is that 'rural communities are whiter, more middle class, more affluent and contain more retired people than at any time in the past' (Satsangi 2010, p.28).

Positive aspects of zoning exist. By preventing undesirable uses, limiting subdivision and leaving open future possible uses, this tool draws on the Precautionary Principle and the principle of intergenerational equity. Exclusive farm zones can protect agricultural land from development Large lot requirements for subdivision help maintain lots of an adequate size for viable farms and environmental protection. Zones can also require owners to amalgamate multiple small lots when constructing new dwellings or can prevent building on small lots. In these ways, zoning can maintain future options that help adapt communities to change. This project tests these approaches.

Zones in the rural parts of Melbourne's peri-urban areas include minimum lot sizes for subdivision but often existing lots are smaller than those minima, especially close to nearby metropolitan areas. Small minimum area requirements can contribute to

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[6] The following material draws heavily on Buxton et al (2006).

price inflation as many small lots tend to increase the per hectare value of land and make urban development and speculation more likely. Farm zones which allow more than one dwelling on a parcel through excision (where an additional dwelling is allowed, typically for family members or farm workers[7]) contribute to the further spatial fragmentation of the larger region, and create land parcel sizes less suited to agriculture. Land owners may also introduce incompatible but allowable land uses on smaller lots which place additional demands on inadequate local infrastructure and services. Generally urban or rural-residential development precludes other future uses.

The 1977 Melbourne metropolitan farm study recommended a minimum subdivision area of 40 to 80 hectares for farm zones as an appropriate disincentive for residential land subdividers (MMBW, 1977). The State of NSW introduced a 40 hectare minimum during the same decade to also protect agricultural land. Other factors affect viability, including capital invested in the farm and prices received for agricultural produce. A central challenge in protecting farm land is preventing small lot subdivision and dispersed residential development which fragments landscapes. The impacts of land fragmentation can be further reduced if the right to construct a dwelling on a subdivided lot is removed. Clearly defining the appropriate use of agricultural land is crucial (Auster, 1993).

Amalgamating small agricultural land holdings (MMBW, 1977) is another strategy modelled in this project and little studied in Australia. Until the introduction of the new format Victoria Planning Provisions in the 1990s, state and local government bodies could choose to restrict the construction of additional dwellings on multiple individual lots held in the same ownership by requiring that those lots total a minimum area before approval was given for the construction of one house (Buxton et.al., 2008). Another technique is the requirement for a minimum lot size for the purpose of dwelling construction.

Strategies other than zoning which specifically aim to protect agricultural land include:
- Rate relief as an incentive to retain large farms (MMBW, 1977)
- Transfer of development rights (common in the United States but rare in Australia), and particularly for heritage properties and subdivision rights (Auster, 1993)
- Trading water rights in irrigated areas (Auster, 1993)
- Higher rural residential infrastructure connection and ongoing service fees, although determining their application and amount are difficult (Auster, 1993)
- Protections for communally owned property, although Australians are not very supportive of group titles (Auster, 1993)

Strategies to limit dispersed rural development should be integrated with policies for urban settlements within regions. Some European countries take a strong regulatory approach to protecting rural areas and preventing the urbanisation of fringe and peri-urban areas, but they often lack complementary urban strategies to increase residential densities (Tosics, 2013). The British government has linked limits on rural development to more growth in nominated towns, ensuring that more land is

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[7] These provisions are very hard to enforce (Auster 1993).

available to accommodate growth. The British have adopted the sequential test for development, where planning favours growth in the largest places first (Satsangi, 2010). This is the same approach taken in one section of modelling for this project, where demand which is transferred from rural to urban areas goes to the largest places first.

Zoning is a regulatory approach which government can also apply to limit urban development. In Victoria currently local governments can encourage growth in Township Zones in smaller settlements and Urban Growth Zones on the edges of larger regional centres within peri-urban regions. But some councils continue to allow very low density residential development through the Rural Residential Zone, the Low Density Residential Zone, and even the Farm Zone and Rural Conservation Zone specifying small lot area requirements for subdivision and the construction of a dwelling. The spatial distribution of these zones influences the location and type of residential development.

Little policy guidance is provided on urban density. Residential density controls are available in standard zones through minimum lot sizes included in zone schedules. The metropolitan strategy, *Melbourne 2030* (Policy 2.2, 2002), suggested an average density of 15 dwellings per hectare for Melbourne's growth corridors and the *Plan Melbourne* suggests increasing this to 18 dwellings per hectare (DOI, 2002; DTPLI, 2014a). This reflects current planning and government attitudes which support development facilitation in particular locations rather than constraining or placing demands on new development such as minimum (urban) or maximum (rural) densities.

This study argues for more explicit local government regulation of residential densities. As a comparison, in 2000, the U.K. government required local councils to provide an overall density target of 30 to 50 new dwellings per hectare for outer urban development. Three years later, the 'national indicative minimum density' was 30 dwellings per hectare and most recently, the national government has removed any requirement. It now expects local policies to address this issue (United Kingdom. DETR/TSO, 2000, DCLG, 2006, 2010). British density assumptions are higher than this project proposes. Rather than accept that zoning is an outdated mechanism that should be replaced by performance-based approaches, this project proposes stronger rules for zones (Millar, 2010). Zones cannot address all peri-urban planning challenges but they can provide greater physical control over rural landscapes and settlements.

2.7.1.3 Supply led demand

This study proposes that restricting rural land supply through regulatory measures such as zoning, and making available additional land supplies and diverse housing types in high amenity rural townships can contribute to changing consumer demand for new homes in rural and regional areas. Greater dwelling yields in urban settlements than possible under current planning regulations are the principal means of providing for the transfer of demand from rural areas to townships.

Recent urban settlement dwelling yield analysis in response to projected population growth typically models past development yields into the future (Spatial Economics, 2013). This modelling provides an approximate date for the exhaustion of land

supplies and the need to further rezone non-urban land for residential uses. Most analysis avoids applying density assumptions (The Treadstone Company, 2009; Planisphere, 2008) and often closely examines local contexts and conditions when assessing possible yields. Rarely do these studies report on densities achieved through the analysis: a background report on Hobart, for example, is unusual in its observation that the city will continue to have a relatively low average residential density of ten dwellings per hectare (GHD, 2010). Local government and consultant reports rarely demonstrate alternative, innovative approaches to residential development. Planning practitioners usually are concerned with the practicalities of land supply and are hesitant to mention densities because of the potential political and community responses.

Strategic policies can change patterns of dwelling supply which can in turn influence consumer demand. In a local example, Knox City Council credit their housing policies and strong implementation tools with shifting new residential development from dispersed locations to activity centres. While they also acknowledge the role of the property market, they argue that the 2005 *Housing Statement*, planning policies and urban design frameworks for specific places, use of residential zones and their Design and Development and Significant Landscape Overlays have all contributed to this outcome (Vickridge & Anderson, 2013).

Essential Economics' work on Victoria's ten Regional Cities supports this project's hypothesis that regional Victoria has sufficient residential land supply to accommodate projected population growth. This analysis assumes an average development yield of ten dwellings per gross hectare which would be sufficient to meet demand to 2021. The report notes that land would need to be rezoned and infrastructure built from 2031, with the cost of servicing as potentially prohibitive. It does not propose any alternative approaches to using the identified land supply, such as with residential development with higher average densities (Essential Economics, 2012).

2.7.1.4 Cost of infrastructure

Concentrating development in existing urban settlements reduces the costs of servicing residential populations and leads to lower servicing costs by utility companies (Satsangi, 2010). Infill development can be less costly than dispersed development if infrastructure is available and has spare capacity. Councils may view greenfield development as initially less costly to service due to the shifting of capital costs to the private sector through development contribution plans, but in the longer term councils incur ongoing costs from operating and maintaining infrastructure and services for all settlement types. While these costs may be high in denser neighbourhoods, those infrastructure systems and services are also serving a large number of people in a comparatively smaller area (SGS, 2012).Infrastructure capital and operating costs to small dispersed rural lots are high.

2.7.1.5 Resilience

Walker et. al, (2004, p. 4) defined resilience as "the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks". Peri-urban areas can be examined for their own resilience in the face of change, and for their contribution to the long term resilience of nearby metropolitan areas. Urbanisation changes peri-

urban areas fundamentally to another state. All outer metropolitan growth and new city formation occurs on peri-urban land. Where the landscapes are dynamic, and change continues, elements within existing peri-urban systems will no longer be able to absorb system shocks, and threshold levels of tolerance will be exceeded. Peri-urban systems are complex, dynamic systems and their resilience should be understood in terms of dynamic interactions between socio-economic and biophysical processes operate over multiple scales (Alberti and Marzluff, 2004).

The concept of resilience is increasingly being applied to urban settlements. Examples include: the study of terrorism and emergency response, from both historical and contemporary perspectives (Coaffee, Wood & Rogers, 2008), and disaster preparedness and recovery (Klein, Nicholls and Thomalla, 2003). Likewise, the use of the term has started to gain momentum in literature related to the study of peak oil and climate change (Newman, Beatley and Boyer, 2009). This includes how cities can undergo 'transitions' in order to become more resilient by embracing more sustainable forms of urban development (Newton and Bai, 2008), and how these same cities can continue to survive in a carbon constrained economy of the future (Norman, 2010).

The concept appears in many contexts, including: leadership as a precursor to the building of community resilience and sustainability (Jans, 2011); stoicism as a form of resilience, and how it can hinder rural residents' ability to ask for help in difficult times (Warburton and Winterton, 2011); identifying the diverse, variable and innovative characteristics of a 'resilient world' (McManus, et al., 2011, p. 149; citing Walker and Salt, 2006); the development of socio-ecological 'dis-junctures' within agricultural production, 'leading to a loss of [ecological] resilience' (Farmer-Bowers, 2011, p. 159); capitalising on the 'available pool of [labour] skills' inherent to country towns in order to 'increase' resilience (Kilpatrick, Vitartas, Homisan and Johns, 2011, p. 227); questioning the ability of health care services in 'developing/leading community resilience' (Farmer, Nimegeer and Prior, 2011, p. 313); 'the potential of the arts … in building resilience to change' (Anwar-McHenry, 2011, p. 330; citing Kong, 1995); and finally, Martin and Budge (2011, p. 351) reiterate the earlier call made by McManus et al. (2011), that 'the sustainability or resilience of a country town and its community':

> is not about the social verses the economic, but involves maintaining a range of aspects of community of place, including a viable local economy, the quality of the local environment and a strong sense of belonging among residents … [because] a sense of belonging is critical, resilience is more possible … when people identify with and feel a sense that their local community is vibrant.

The concept of rural resilience features large in international literature, too, and likewise is concerned with a diverse range of topics. Select examples include: localisation of food production in the UK (Franklin, Newton and McEntee, 2011); health maintenance of women in Canada (McAllister, 2004); observing life pathways of women living in trailer (caravan) parks in the USA (Notter, MacTavish and Shamah, 2008), and disease management in Bangladesh (Edgeworth, 2011).

The concept of resilience is often applied to rural settlements. Recently in Australia, for example, one multi-university study involved the interviewing of 115 farmers from across two rural regions of NSW and found 'the importance of the local economy and

jobs, the quality of the local environment and a strong sense of belonging [all contributed toward] a strong sense of local community and [the] potential for resilience' (McManus, et al., 2012, p. 20).

At the level of Australia's state and territory governments, it would appear the concept of resilience is being adopted within a similar, hazard reduction context. For example, the Victorian Government's Department of Premier and Cabinet (DPC, 2011, p. 41) sees 'strengthening community resilience in order to manage the changing risk and hazard environment' as a way of preparing for and responding to emergencies and disasters. The capacity of individuals and communities to manage events such as bushfire is cited as evidence of community resilience, and social linkages are critical differentiators.

Finally, at the local government level, and particularly in the Planning Schemes of the five municipalities that feature in this study – Macedon Ranges, Mount Alexander, Greater Bendigo, Moorabool and Ballarat – it would also appear that the concept is likewise being applied in the now familiar manner of risk aversion. For example, Clause 13.5 of the five previously mentioned Planning Schemes[8] and under the heading *Strategic and settlement planning strategies*, states: 'Ensure that strategic and settlement planning assists with strengthening community resilience to bushfire'. Nowhere else within each of the five planning schemes is the concept referred to outside of this application.

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[8] Each of which is available at: http://planningschemes.dpcd.vic.gov.au/

Chapter Three: Demographics

3.1 Introduction

Much of the literature on Australia's rural and regional areas focuses on population decline. However this project takes a different position: using the Victorian state government's population projections, it assumes that the study region will experience population growth. The size of that growth varies across the statistical local areas but they are all projected to grow. This is due at least in part to sections of the study region being more peri-urban in character than strictly rural or regional, where these areas are under the economic and social influence of a nearby urban area such as Melbourne, Ballarat and Bendigo.

The *Victoria in Future* (VIF) population projections suggest that even the more rural Statistical Local Areas (SLAs) in the study region are likely to experience population growth (DPCD 2012b). This growth is significantly less than is projected for metropolitan areas and regional settlements. The projections do not provide any suggestion as to whether the growth is in the urban settlements within those rural SLAs or across rural areas. This project addresses this by splitting the household projections based on dwelling counts in the rural and urban areas, and then applies the same proportional split to future projected households (see Chapter 5 Methodology).

This growth context may be specific to current social, economic and policy conditions. Australia currently has very high net migration, and fertility is higher than in the OECD average (OECD 2011). While population growth is faster in Australia's largest urban centres, growth is also happening outside them. How long this will continue is very hard to predict although the most recent ABS population projections suggest that growth will continue to be focused within metropolitan areas (ABS 2013[9]). This project accepts the VIF projections for the next thirty years and makes specific regulatory changes in an alternative scenario to try to change the distribution of that projected growth. It does not comment on federal immigration policies, incentives to try to encourage changes in fertility rates, or rural and regional economic development strategies in relation to faster, slower or no population growth.

This chapter analyses recent demographic trends in the study region using the *Towns in Time* 2001 to 2011 database as the primary source as it provides time series census data on both Victorian towns and rural areas (DTPLI 2013c). Its geographical boundaries slightly differ to the project's urban and rural definitions so the analysis is limited to identifying trends rather than specific numerical results at particular points in time. The analysis is presented using a settlement hierarchy with a focus on the two regional centres, district towns and towns, as well as the rural balance outside those urban areas (Planisphere 2009). *Towns in Time* does not include data for all of the study region's villages and hamlets (DTPLI 2013c). Their populations are also very small so census data is not reliable as the ABS uses

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[9] In 2012 Melbourne was home to 75 per cent of Victorians. The ABS projects that this will increase to 83 per cent by 2061 under their Series B projections, with a similar trend for all other capitals except Darwin.

randomised data to protect privacy in such places. Some of the following analysis also uses 2011 census data for variables not included in the *Towns in Time* database or for larger geographic areas such as local governments[10].

The study region's rural areas continue to lose young adults which make the ageing and less mobile population more evident. Rural household sizes are larger than in urban settlements but they are falling often at a faster rate than in towns. Increasing numbers of vacant dwellings at census time suggest that second or holiday homes are a growing component of the rural housing market and this complicates projecting future demand for rural dwellings.

Regional urban areas have larger populations and are adding people and houses faster than their surrounding rural areas. They are ageing with a large cohort between 55 and 64 years old but they also gain new younger residents. The majority of urban residents live in detached homes but those aged between 18 and 24 have higher rates of renting in dwellings other than separate houses than other groups. This group is also highly mobile and does not necessarily stay in smaller towns into its late 20s and early 30s but moves to Melbourne and larger regional centres including Ballarat. Given its dwelling propensity, mobility and contribution to new household formation, this age group may be particularly relevant to this project's proposed higher density residential development in the study region's towns.

Melbourne's peri-urban area has larger household sizes which reflect its popularity as places for families. Towns such as Gisborne and Bacchus Marsh have a higher proportion of young people than other district towns and the rural areas but are also ageing. While the majority of people work locally, up to 40 per cent of residents of the peri-urban area commute to Melbourne's north-west and inner city. Given the ongoing improvements to Victoria's regional rail network, current and future residents of this peri-urban area may be another important group in this project who may be more inclined to live in towns with good rail connections to Melbourne.

The study region also shares demographic and housing trends with metropolitan areas such as Melbourne: household sizes are falling, and as a result dwelling growth is occurring at a faster rate than population growth (although this is greater in the study region than in Melbourne); the population has a large and influential cohort of baby boomers who are now in their mid-40s to 60s; and, most people work close to home and drive to their jobs.

3.2 Population change

This project's study region population grew by 13 per cent between 2001 and 2011, from 268,218 to 308,556 people but its rural areas only increased in population by one per cent (ABS 2011; ABS 2013). During the same period, urban settlements in the region grew by almost 17 per cent. The difference in both the overall urban and rural populations and their change over this time period are both apparent in Figure 2

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[10] *Towns in Time* is the data source here and differs slightly to the ABS census time series data. ABS geographies are produced for statistical purposes while the *Towns in Time* data uses the ABS source data to report on urban and rural areas. For the purposes of this population analysis, *Towns in Time* is more useful because of this project's focus on the rural landscape and urban settlements. In the remainder of the report, ABS dwelling counts and *Victoria in Future* dwelling projection data are used (see Chapter 5 Methodology). (DTPLI 2013c; ABS 2012; DPCD 2012b)

which shows change in the study region's municipal areas. Population growth in the rural parts of Macedon Ranges and Mount Alexander and fluctuations over the period in Central Goldfields and Greater Bendigo offset the population falls in rural Ballarat, Hepburn and Moorabool. Only Central Goldfields has lost some of its urban population between 2001 and 2011 and Hepburn's has fluctuated but grown overall.

Figure 2 Population change by LGA, 2001 to 2011

Population chan

Legend:
- 2001 Rural population
- 2006 Rural population
- 2011 Rural population
- 2001 Urban population
- 2006 Urban population
- 2011 Urban population
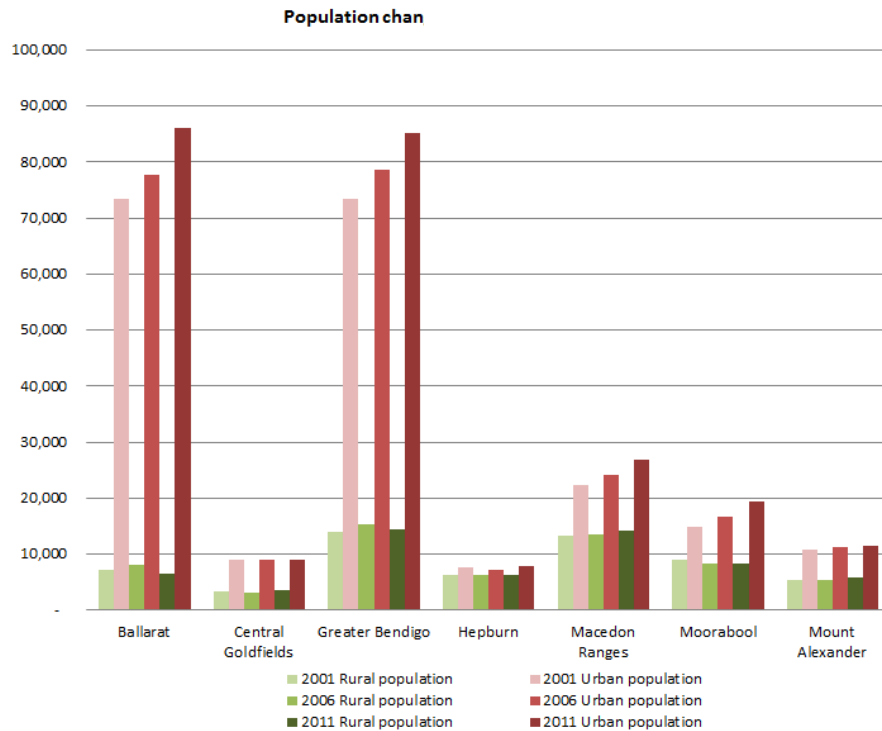
Source: DTPLI 2013c

Figure 3 further highlights the concentration of growth in urban settlements, and particularly in the regional centres of Bendigo and Ballarat. While population decline tends to increase with distance from those metropolitan areas (Hugo 2011), this region shows a slightly different pattern due to the influence of the two regional centres. Population growth in both the urban and rural parts the Shire of Macedon Ranges is related at least in part to its proximity to Melbourne, as is Bacchus Marsh's growing population.

Figure 3 Population change in study region towns and rural balance of LGAs, 2001 to 2011
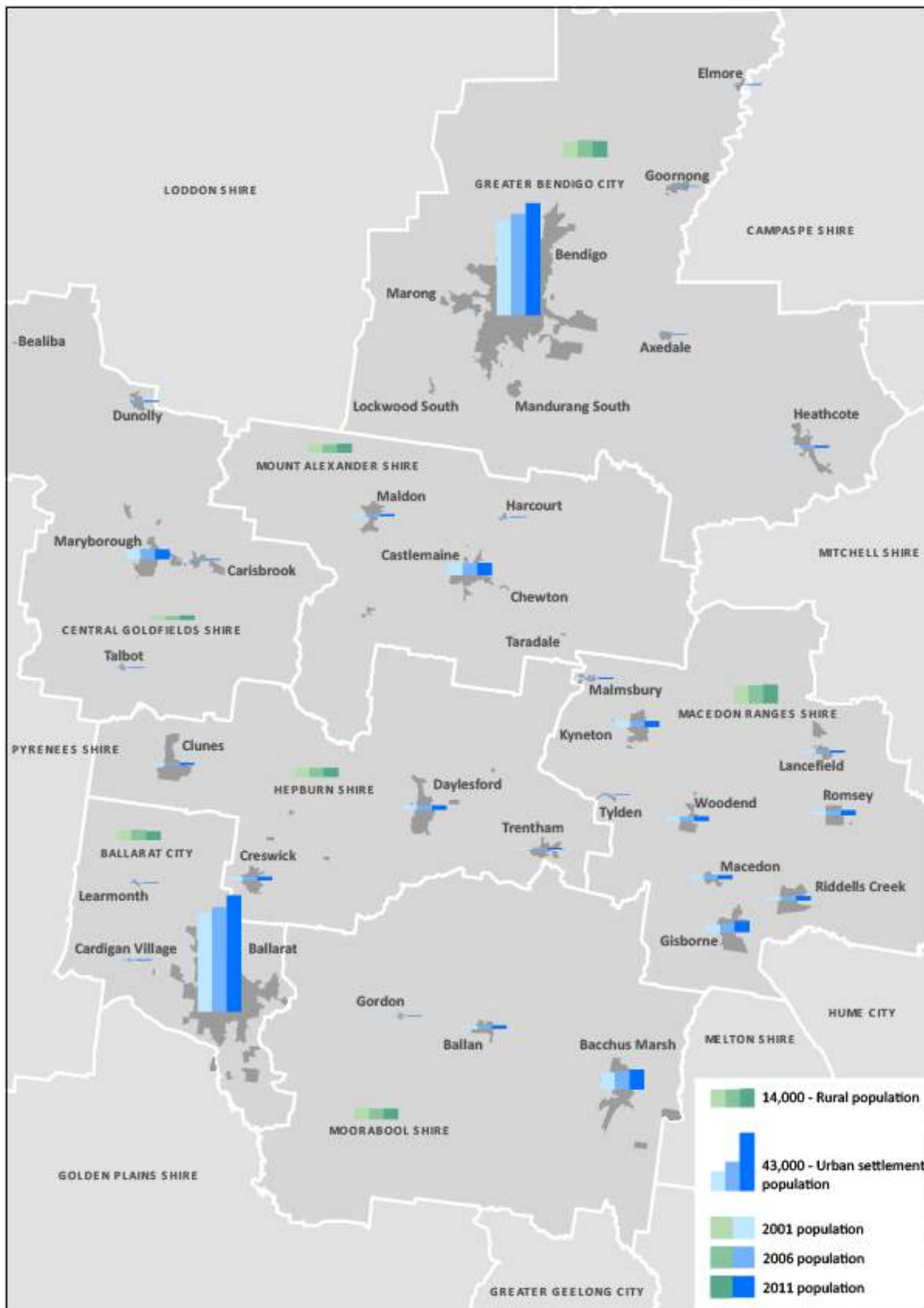
Source: DTPLI 2013c

Figure 3 also shows the spatial distribution of the three of local government areas which lost population in their rural areas between 2001 and 2011. Moorabool and Ballarat's rural population fell by over 600 people over this time period while Hepburn had a net loss of almost 100 people. The first two council areas have fast growing

urban settlements within their boundaries but Hepburn Shire generally has much less growth. The trend towards falling populations in these three rural areas suggests that demand for housing may also be falling in these places. This is relevant for this project in its analysis of demand for rural dwellings.

Even though the rural part of the Shire of Moorabool is losing population, its largest town, Bacchus Marsh, is growing. This town is part of Melbourne's peri-urban area and is growing in a manner consistent with such places. Similarly while the rural population of Ballarat's municipal area has declined, the regional centre of Ballarat has grown strongly over the last decade. Due to changes in ABS geographies, only a general estimate can be used to suggest that around 20 per cent of Ballarat's 2006 to 2011 growth came from people moving into the city from surrounding rural areas. About a third of that group were between 18 and 29 years old.

The movement of young people out of rural areas contributes to slower population growth in those areas and has occurred for decades. Rapid changes in technology after World War II accelerated the decline in the number of agricultural jobs (Rolley 1993), and the lack of alternative employment and post-secondary education opportunities have further contributed to this trend, particularly for young women. Young men are also less interested in taking over family farms than in the past (Hugo 2011). Between 2001 and 2011, the rural parts of the study region experienced a two percent decline in the group aged between 18 and 24 years while all urban settlements gained people in that age cohort. Population growth in the rural areas occurs in people aged over 45 and the proportional increases in the 60 plus group are higher than for urban settlements and the region as a whole (although the numerical change is small, particularly for those over 75 years). Note that these are most likely a similarly large cohort of people in their 40s identified in the 2007 report, *Change and continuity in peri-urban Australia*, who have simply aged into their 50s.

The size of these older age groups suggests present and future challenges for service accessibility and delivery to an ageing population living outside established urban areas. Figure 4 illustrates the percentage increases and decreases in each age group for the study region, urban settlements and the remaining areas which are rural.

Figure 4 Percentage change in age groups, 2001 to 2011
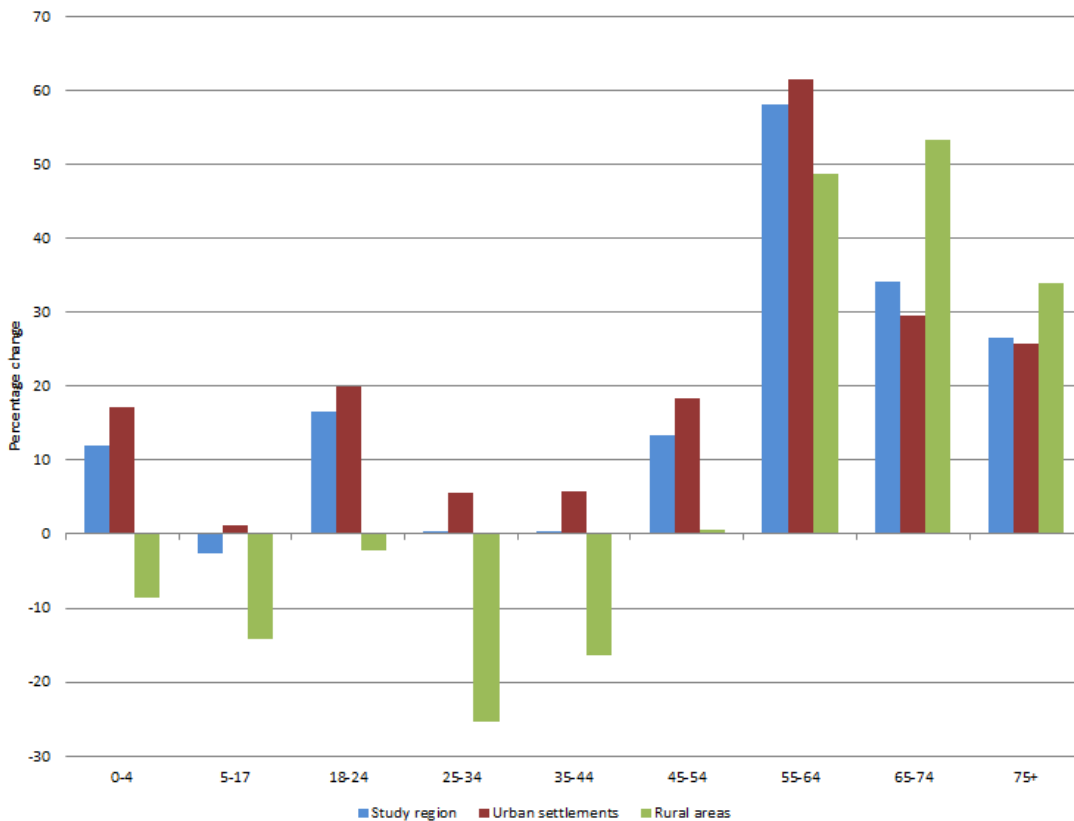
Source: DTPLI 2013c

The study region's towns had the largest growth in 55 to 64 year olds between 2001 and 2011 but all age groups increased in size. The following chart shows the numerical change in the different age groups for the study region's district towns: Bacchus Marsh's increase in this age group is notably larger than the other towns. This same pattern is evident in Ballarat and Bendigo, and in the rural parts of the study region, as illustrated in Figure 5. However internal migration data suggests that many of the 55 to 64 year olds were already living in these places: the 2011 census shows that around 70 per cent of this age group was already living in towns such as Ballarat, Bendigo, Bacchus Marsh and Romsey in 2006[11] (ABS 2011). This group represents the first half of the baby boom generation[12] and is therefore larger in total number than age groups in the whole population. This is relevant for this project: this age group will have a disproportionate influence on housing trends, whether it chooses to age in place, move from rural areas to towns or into smaller dwellings.

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[11] Note that the 2011 census data sourced here uses Urban Centre Locality boundaries which are larger than the Towns in Time defined town areas. This data would also include some of the areas defined as rural balance in Towns in Time and so may overstate the proportions of this age group living in towns. The Towns in Time database does not include data on specific age cohorts and their internal migration.
[12] People born between 1946 and 1965 (ABS 1999).

Figure 5 Population change in age groups in district towns, 2001 to 2011

A notable difference exists here in comparison with the 2007 peri-urban report: the 2001 to 2011 data suggests that young families are no longer moving into the region in such large numbers compared to 1981 to 2001. Rather the parents in those families are staying in regional Victoria while their children may have moved to Melbourne or to larger regional centres. One exception is Bacchus Marsh which gains families from the Shire of Melton, City of Wyndham and City of Brimbank: in Figure 5, Bacchus Marsh peaks at 5 to 17 years and parents may be those aged 35 to 54 years. This illustrates a typical peri-urban population growth pattern (Hugo 2011). The other exceptions are Ballarat and Bendigo: Figure 6 shows that children and people of parenting age have increased by at least 500 individuals between 2006 and 2011 in both regional centres.

Figure 6 Population change in age groups in rural areas, Ballarat and Bendigo, 2001 to 2011
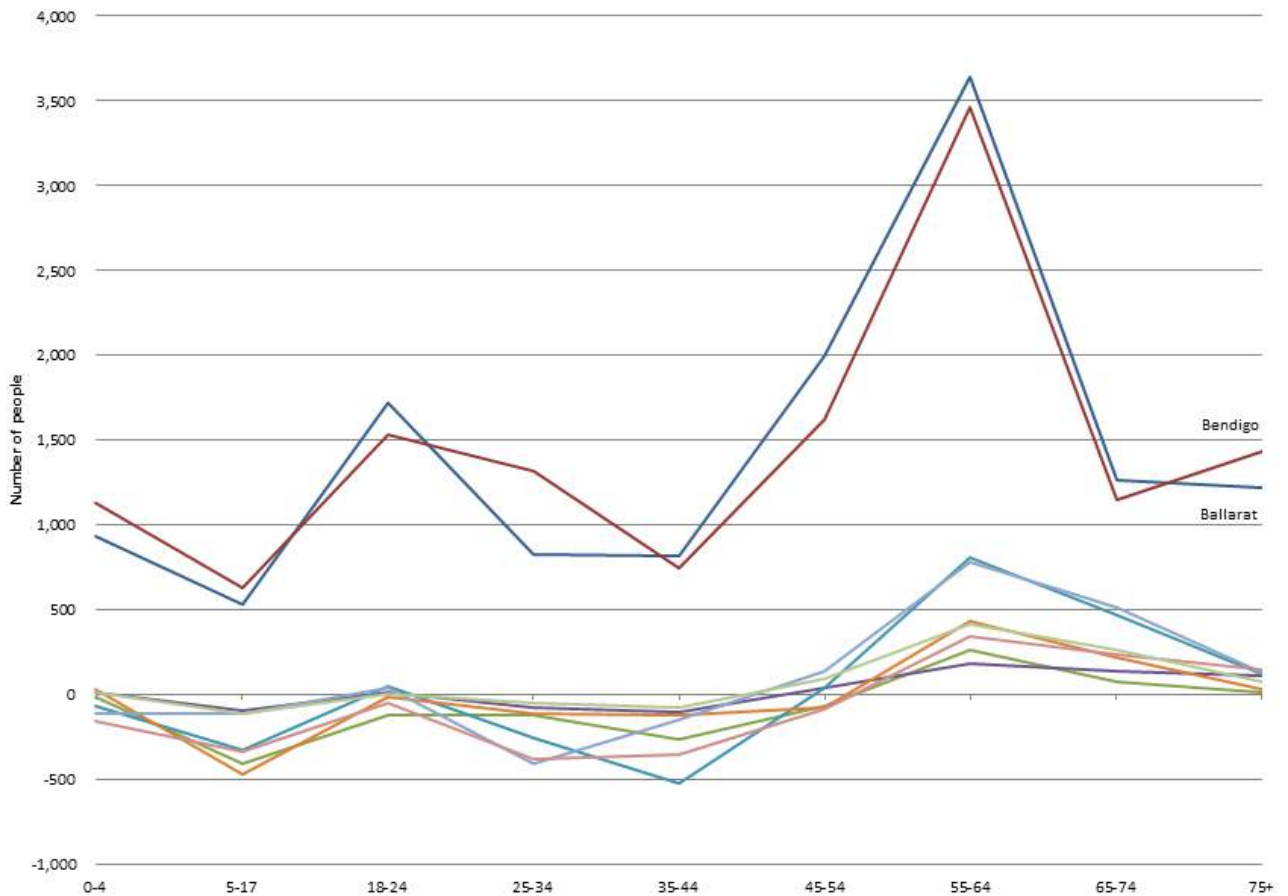
Source: DTPLI 2013c

While age groups which represent families have grown, the number of 18 to 24 year olds has also risen in most urban settlements. Ballarat and Bendigo had the largest increases (see Figure 6) and around 30 per cent of that age group was resident in those towns in 2006. This group has mainly moved from surrounding shires: around 200 came from the adjacent Shire of Golden Plains and Greater Geelong, and almost 200 of Greater Campaspe's young adults had moved to Bendigo by 2011 (ABS 2011). Education is one attraction: around 40 per cent of this age group is studying full or part time in these two regional centres which each has a range of educational institutions (ABS 2011). Employment opportunities also typically draw young adults to larger urban centres. Note that the proportion of this age group with children and living in the study region's urban settlements is close to that for Melbourne at approximately 43 per cent (ABS 2011).

This group is a more mobile population than the 55 to 64 year olds, except for those who may still be living at home with their parents in towns such as Macedon and Carisbrook. Eighty three per cent of 18 to 24 year olds living in Macedon in 2011 were also living there in 2006 (ABS 2011). While this age group is smaller in size than the 55 to 64 year olds across the study region, it also has the potential to greatly influence local housing markets.

Once this group ages into the 25 to 34 year old cohort, its growth slows, stops or even declines regardless of location as Figure 5 and Figure 6 show. Where do they move to? The only census data which can give an indication of this group's movement is through place of residence for two census dates. In 2006, around 27,500 people aged in their twenties lived in the seven case study local government areas. This grew to just over 33,000 in 2011 but around 30 per cent had moved out of their 2006 regional council area to another part of Victoria (and less than ten per cent left the state). Around 15 per cent of the movers lived in Melbourne by 2011 and another 14 per cent had moved to another part of regional Victoria, mainly to Ballarat and Geelong (ABS 2011).

The larger trends on internal migration suggest that urban settlement populations are generally more mobile than populations of the rural areas. Less than half of Ballarat and Bendigo's 2011 population also lived in those cities in 2006, and between 50 and 60 percent of the people who moved to Ballarat and Bendigo by 2011 came from the project region's district towns. Given that only around ten per cent of the urban and rural populations were born overseas, international migration has only minimal influence (DTPLI 2013c; Hugo 2011). Towns and rural areas tend to have more stable populations, with around 60 per cent of their populations living in those places in both 2006 and 2011 (DTPLI 2013c). This mobility will result in more volatility in housing markets in urban settlements, and possibly will contribute to demand for change in dwelling stocks.

3.3 Household change

Pressure for dwelling diversity may also come from shifts occurring in household sizes in the project's towns. They share the broader Australian metropolitan trend towards smaller households with almost all urban settlements gaining one and two person households (Rolley 1993). Table 1, Figure 7 and Figure 8 show that larger households are increasing in number in places closest to Melbourne such as Bacchus Marsh, Gisborne and Riddells Creek as well as in Ballarat and Bendigo (Table 1). This movement to Melbourne's peri-urban area and regional centres is also representative of trends observed across Australia (Hugo 2011).

Table 1 Regional centres' change in number of households by size, 2001 to 2011

	One	Two	Three	Four or more	Total
Ballarat	2,084	2,488	661	638	5,871
Bendigo	1,779	2,226	708	753	5,467

Source: DTPLI 2013c

Figure 7 Change in number of households by size in district towns, 2001 to 2011
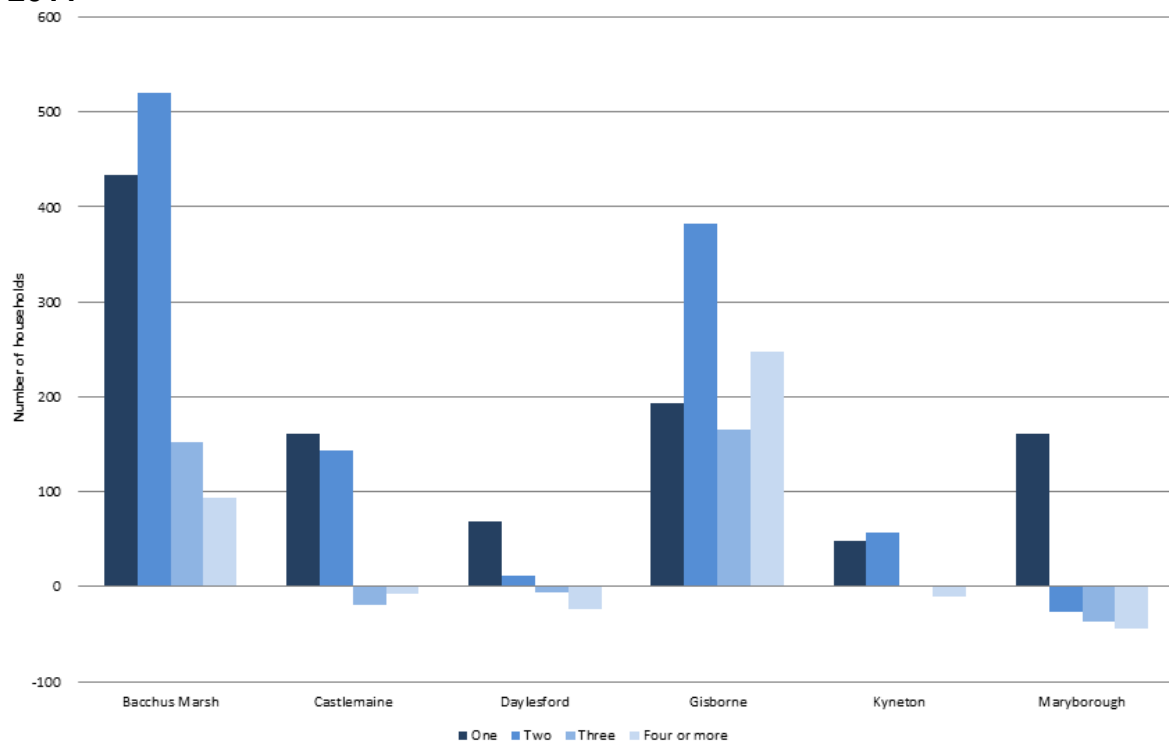
Figure 8 Change in number of household s by size in towns, 2001 to 2011
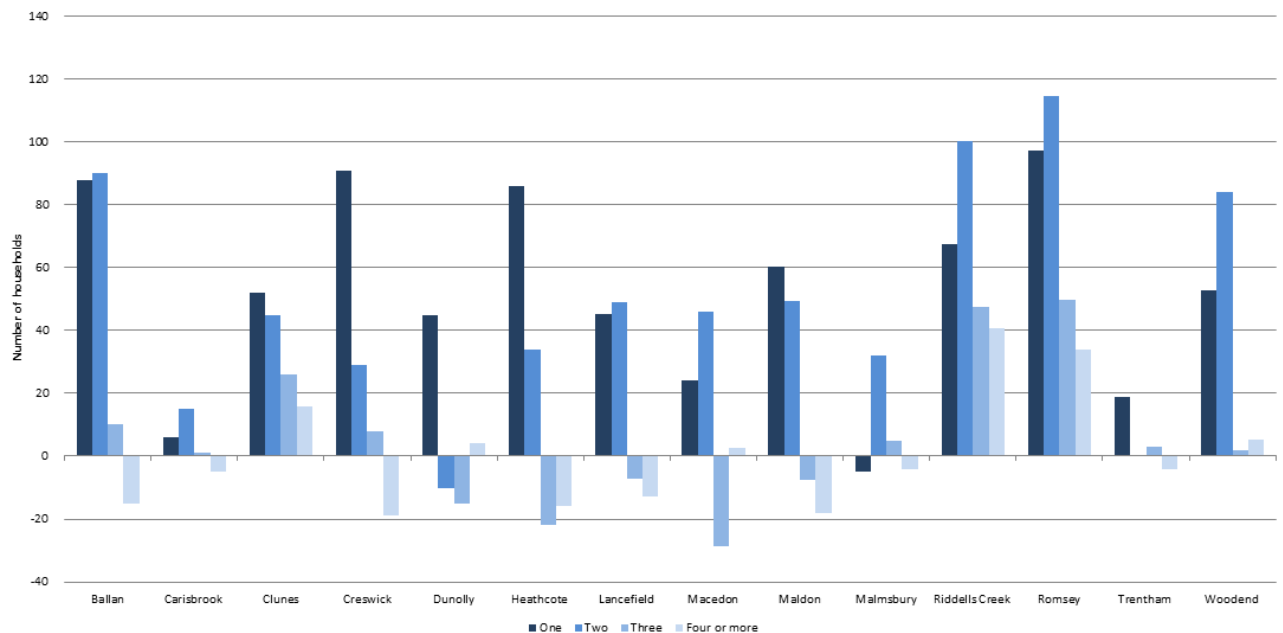
The study region's rural areas share these household size changes and are also consistent with broader non-metropolitan trends (Flood 2010). As Figure 9 demonstrates, larger households are falling in number outside urban settlements as well. Macedon Ranges is an exception although it only gained around 60 three and four person households in its rural areas over the ten years between 2001 and 2011.

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Figure 9 Change in number of household s by size in rural areas, 2001 to 2011
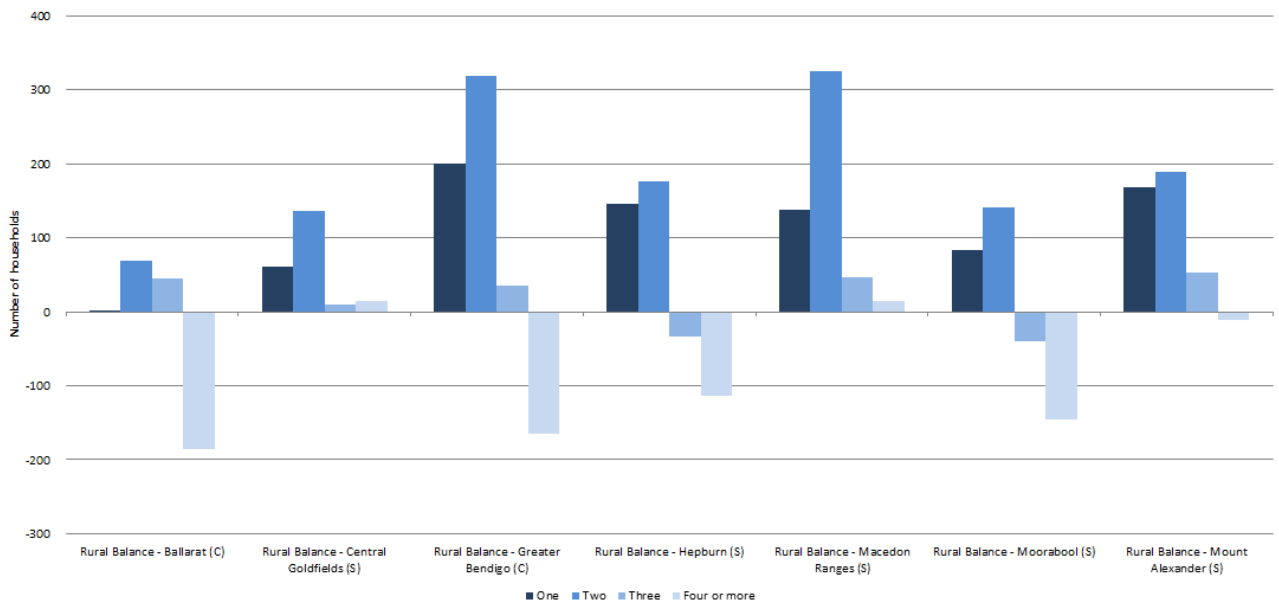
Rural areas have a higher proportion of four or more person households than urban settlements although this has fallen from 33 to 27 per cent from 2001 to 2011. During the same period Ballarat and Bendigo's large households declined from 23 to 21 per cent of all households while 22 percent of district towns' and towns' households had four or more people in 2011. The household size differences between urban and rural areas are decreasing.

The two age groups identified above as influencing future housing demand trends have an important difference in their household characteristics: the 18 to 24 year olds are often forming new households while the 55 to 64 year olds are doing so at a much slower rate. The new younger households' housing preferences may have a greater impact on future housing trends than the older households for whom a range of financial obstacles and support programs act as a disincentive to move, especially to the higher density residential development proposed by this project (Judd et al 2010). Increased residential densities in well serviced locations may be attractive to these young adults.

Any connection between the increasing number of small households and demand for smaller dwellings is challenged by qualitative and quantitative evidence: most households prefer to live in a two to three bedroom dwelling that is well located (Weidmann et al, 2011) and census data shows that the majority of Australian households live in detached dwellings (Wulff et al, 2002). Past housing propensity patterns are unlikely to change unless new housing supply dramatically changes: this project proposes that more diversity and density can influence demand (households' housing preferences). Given that small households are changing most in number, they are a logical focus for this proposed approach.

3.4 Dwelling change

Dwelling numbers in the study region's urban settlements rose by 20 per cent between 2011 and 2001, while rural areas experienced about half that growth.

Melbourne's dwelling growth was approximately the same as the urban settlements while dwelling growth in regional Victoria increased by about 16 per cent (DTPLI 2013c; id 2011a). Slower rural dwelling growth (compared to urban settlement growth) is clearly connected to slower rural population growth, and these trends may contribute to falling demand for new houses outside the study region's urban settlements.

Ballarat and Bendigo each added 7,000 new dwellings to their existing stock between 2001 and 2011 while Melbourne's peri-urban influence is evident in the 1,000 plus dwellings built in Bacchus Marsh and Gisborne over the same period ((Victoria. DTPLI 2013c). Figure 10 shows the increase in dwellings in the study region's district towns, with those outside of Melbourne's peri-urban area experiencing slower increases.

Figure 10 Number of dwellings in district towns, 2001 to 2011
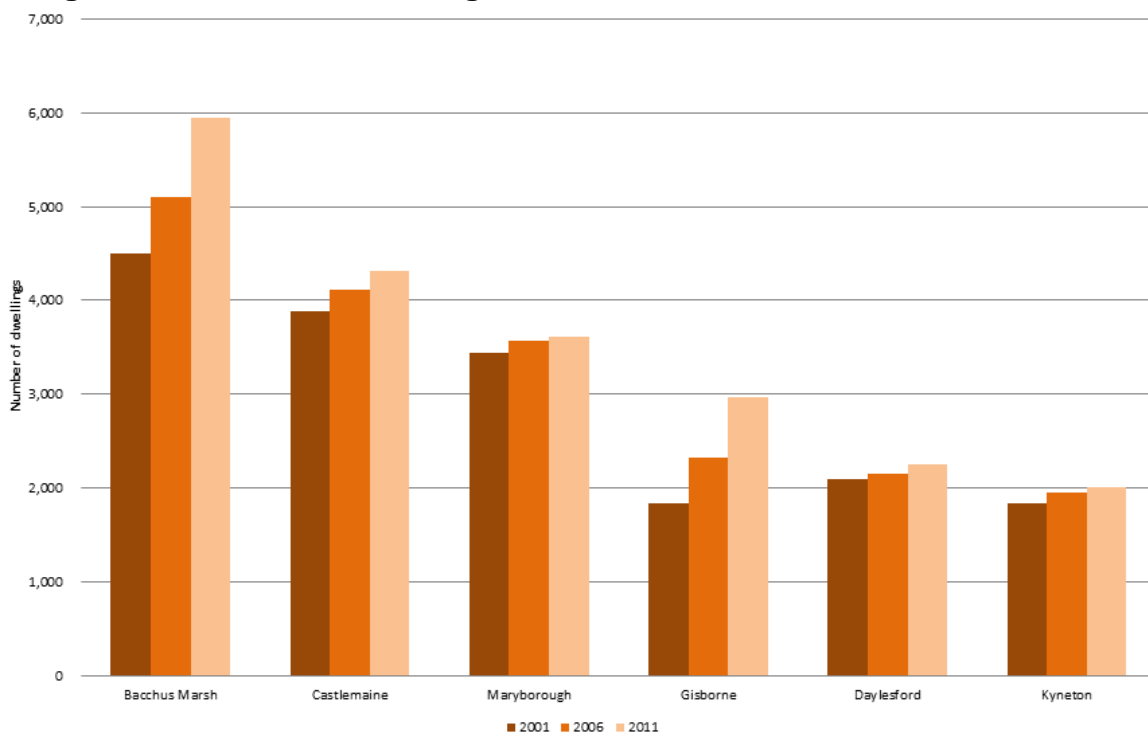
Source: DTPLI 2013c

Most of the rural areas in the study region shared the urban settlements' trend of increasing dwelling numbers. As illustrated in Figure 11, the rural parts of Macedon Ranges, Hepburn, Mount Alexander and Central Goldfields gained up to 20 per cent more houses over the decade. Trends in Greater Bendigo, Moorabool and Ballarat suggest fluctuating demand for new houses in the rural parts of those council areas. These areas may have an existing dwelling oversupply which could be second homes.

Figure 11 Number of dwellings in rural areas, 2001 to 2011
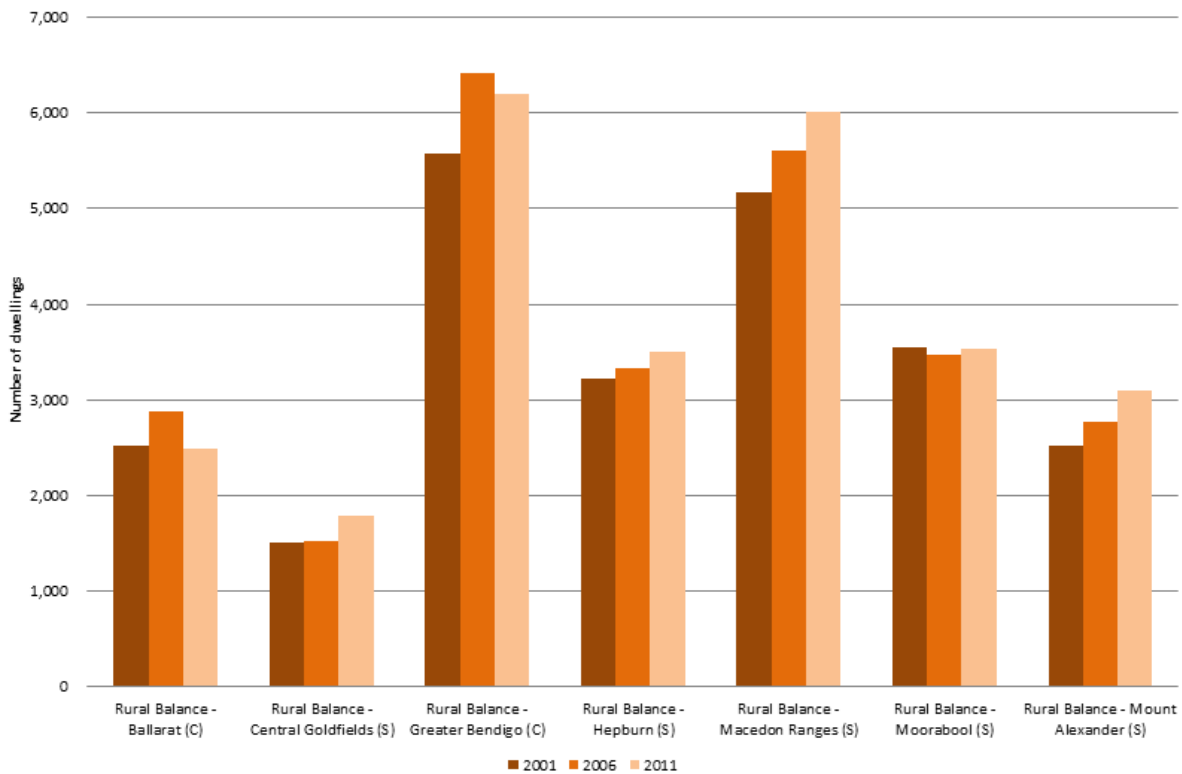
Second homes are part of the unoccupied dwellings count in the census but the ABS currently collects no further information on them. The cities of Ballarat and Bendigo had between seven and eight per cent of their dwellings counted as unoccupied on census night in 2001, 2006 and 2011 which is similar to Melbourne's nine per cent in 2011. Figure 12 illustrates the proportions of all dwellings which were vacant in district towns in each of the three censuses. Daylesford is clearly different to the other district towns, and Maldon and Trentham (in Mount Alexander Shire) are both moving towards 25 per cent of their dwellings being vacant during the census count. Between 20 and 25 per cent of the dwelling stock of the rural areas of Hepburn and Mount Alexander Shires were also vacant on the 2011 census night. Given these results, many houses in these places are likely to be second homes but the actual number is unknown. Demand for second homes in these areas may continue into the future, particularly if the trends of increased affluence, private consumption and demand for more living space continue (Bourne et al 2003).

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[13] Small losses in Ballarat and Moorabool may be attributable to census data collection and processing errors rather than representing actual dwelling loss.

Figure 12 Proportion of all dwellings in district towns vacant on census night, 2001 to 2011
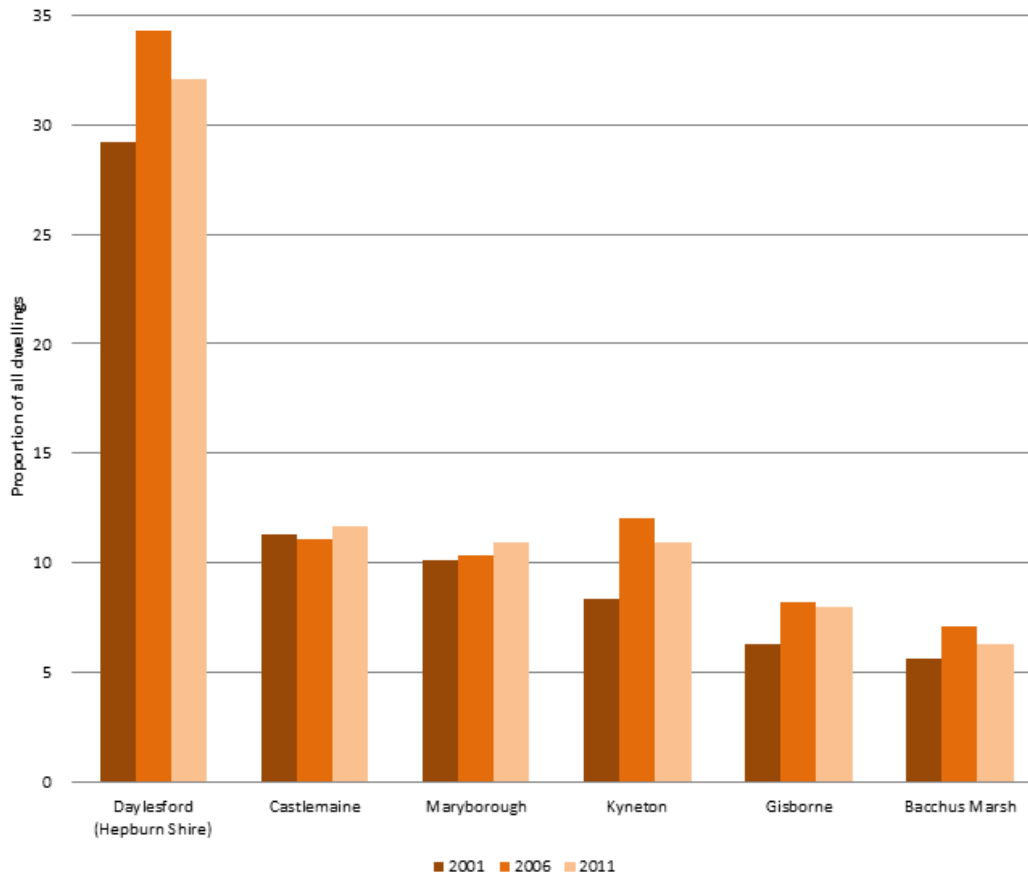
Source: DTPLI 2013c

In 2011, detached houses represented over 80 per cent of dwellings in the study region's urban settlements. Ballarat had the highest proportion of dwellings other than separate houses at 15 per cent while 12 per cent of Bendigo's housing stock was flats and units (ABS 2011[14]). Figure 13 illustrates the district towns' proportions of these two dwelling types: Maryborough and Kyneton's ratios are closer to the regional centres with more one and two storey semi-detached houses, flats and units than in the other towns. The smaller towns typically have less than ten per cent of those dwelling types while the study region's rural areas are assumed to only have separate dwellings.

Two interpretations of this data are pertinent to this project: urban settlements which currently have slightly higher proportions of homes other than detached houses have an established precedent for such dwellings and may be receptive to more; and, places with the highest proportions of separate houses may need more dwelling diversity if dwelling preferences change in the future. It is also important to note that new homes currently represent around only two per cent of the total dwelling stock in any year (ABS 2012). The existing dwelling stock must then also influence dwelling preferences.

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[14] Note that the 2011 census data sourced here uses Urban Centre Locality boundaries which are larger than the Towns in Time defined town areas. This data would also include some of the areas defined as rural balance in Towns in Time and so may overstate the proportions of dwelling types, and particularly separate houses.

Figure 13 Proportion of dwelling types in district towns, 2011
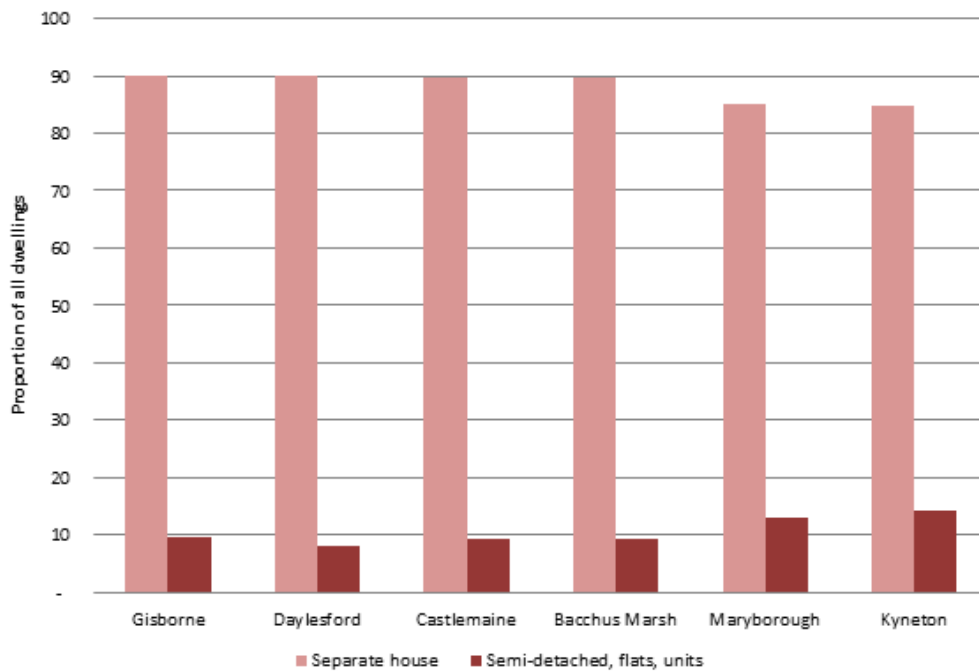
Source: ABS 2011

The young adults identified above as new and mobile households were also a group more likely to live in dwellings other than separate houses in 2011 in Ballarat and Bendigo. Over 15 per cent of people in their twenties lived in semi-detached houses, flats or units in Ballarat, and almost two thirds of these particular dwellings were rental properties in 2011. Bendigo's young adults were less likely to live at these slightly higher densities which may be related to less of this stock than detached houses. The young residents in separate houses typically have a mortgage rather than rent these properties. At the same time, the elderly are also more likely than other age groups to live in units and flats which they own outright, with 19 per cent of people aged 80 to 84 years in Ballarat doing so and around 12 per cent in Bendigo (ABS 2011). While these proportions are small in comparison to those for separate houses, these results from the 2011 census again demonstrate that particular age cohorts could be the focus of efforts to shift to higher density living.

The majority of separate houses in the study region's towns have three or more bedrooms while the higher density dwelling types tend to be smaller[15] (ABS 2011). Past research has identified both existing household patterns and preferences for three bedrooms (Weidmann et al 2011; Judd et al 2010; Wulff et al 2002). This presents a challenge for this project: to adequately address existing market preferences, new higher density dwellings in towns may need to have three bedrooms. Examples of dwelling types including bedroom numbers are included in Chapter 5 to demonstrate existing projects which achieve that size.

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[15] The 2011 census data includes a count of bedrooms however this generally requires that a household has filled out a census form. If the dwelling is unoccupied on and around census night, such a count is unlikely. For example, in 2011 Ballarat had 3,106 unoccupied dwellings and a bedroom count was not stated or not applicable for 4,823 dwellings.

3.5   Employment spatial patterns

Most relevant to this project are the patterns of residents' movement between home and work. Previous reports have provided information on occupation, income and social equity. These are relevant to the choices households make about the types of homes in which they live. However this project focuses on the spatial distribution of homes across the study region and travel to work is a readily available data source which can show a type of movement. The industry of occupation is useful in showing the types of jobs in the study region, including agriculture. This analysis is limited by the lack of time series data so it only discusses travel as captured by the 2011 census.

As is evident in the previous material, the study region has different characteristics within it. The areas closest to Melbourne function as typical peri-urban places, Ballarat and Bendigo have particular trends and demographic profiles, and the region's smaller towns and agricultural areas also differ. This section focuses briefly on the peri-urban and the two regional centres as they have the largest populations with the most work-related movement. Commuting to Melbourne occurs from its peri-urban area but reduces dramatically beyond Ballan and the hills of the Macedon Ranges (part of the Great Dividing Range).

The Shires of Macedon Ranges and Moorabool are closest to Melbourne and their eastern parts have peri-urban aspects to travel. The eastern parts of those local government areas have higher proportions of work trips to Melbourne: 40 per cent of residents in the Bacchus Marsh SLA commute to Melbourne as do approximately a third from the eastern part of Macedon Ranges. Residents are travelling most to the north west of Melbourne's metropolitan area and a smaller group work in the inner city. They work in a variety of industries within Melbourne, with about ten per cent of their total in each of the following: manufacturing, construction, retail, transport and health care. Almost 15 per cent work in professional services[16] (ABS 2011).

Around 83 per cent of these work trips to Melbourne are in cars, a very similar proportion to Melbourne's population which drives to work. The improved train service may have contributed to higher rates of rail journeys to Melbourne jobs from Kyneton (21 per cent – of a total 264 trips to Melbourne) and Bacchus Marsh (13 per cent of 1,350 trips) compared to the overall nine percent of train trips to work within Melbourne (ABS 2011).

Outside this area, most people work locally with the proportions commuting to Melbourne falling with distance from the city. Only ten per cent of people living in Kyneton work in Melbourne and around one per cent of people living in the City of Ballarat commute to the metropolitan area. The vast majority of Ballarat residents work in a wide range of industries within the large boundaries of the regional centre. Employed people from the Moorabool West SLA also travel in to Ballarat and this area appears to define the western edge of Melbourne commuting. Bendigo shows even greater employment self-containment although some people do commute to

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[16] This includes information media and telecommunications; financial and insurance services; rental, hiring and real estate services; professional, scientific and technical services; and administrative services.

Castlemaine for work, predominantly in manufacturing[17]. Heathcote is an employment centre for residents of the rural north of the City of Greater Bendigo with retail, health care and accommodation and food services as the largest industries of employment (ABS 2011).

In the rural areas of the study region, agriculture still employs the most people although the actual numbers are relatively small. For example, around 300 people work in agriculture in the rural area around Castlemaine, representing around 23 per cent of the almost 1,400 employed people within that particular SA2 boundary[18]. The majority of agricultural jobs are held by local residents in these areas, with the Maryborough region's residents holding 85 per cent of those positions. In 2011, everyone working in agriculture in the study region drove to work in cars, trucks or on motorbikes. (ABS 2011)

Given projected population growth, further demands will be placed on road and public transport infrastructure from people travelling to work in Melbourne, local towns, regional centres and farms. If past patterns continue, most people will work relatively close to where they live but demand for quick and efficient transport connections to outer Melbourne may grow. Employment patterns are influenced by many factors beyond the scope of planning but jobs have an important impact on where people live and how they travel to work. Given the pronounced shifts to contract, part time and casual employment, people will need flexibility and mobility to access employment opportunities which may be difficult to achieve without car-based transport in regional areas (ABS 2009).

3.6 Conclusion

This demographic analysis gives insights to past trends which give an approximate indication of the future. However that future will also be influenced by a wide range of factors which may shift or dramatically change demographic patterns. One of those factors could be public policy and related regulation as proposed in this project: through introducing specific land development rules, this project aims to shift the spatial distribution of the study region's population.

The region has is not demographically homogenous but has clear differences between types of places. These include:

- Two larger regional centres with trends similar to Melbourne's with falling household sizes, an ageing population, new home construction at a faster rate than population growth, and a large group of young adults who then move away in their late 20s;
- One group of smaller towns which are similar to the regional centres and another group with stronger amenity factors (and poor public transport) which may be attracting second home buyers;
- A northwest corner which is experiencing slower rates of population and dwelling change than elsewhere in the region;
- Areas closer to Melbourne's with larger households, higher commuting rates

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[17] Most likely at the KR Castlemaine food processing plant.
[18] The ABS introduced new geographies in the 2011 census and the SA2 replaces SLAs which are used extensively through this report (ABS no date).

to Melbourne than elsewhere, and new homes being added in both towns and rural areas; and,

- Rural areas which are ageing faster than other parts of the region but which may have a growing non-permanent resident population owning second homes.

This project aims to reduce rural housing development and land subdivision and increase the densities at which these take place within the study region's urban settlements. Current trends which support this approach include:

- The higher propensity of young households in regional centres to rent dwellings other than separate houses, which suggests that a market exists for slightly higher density rental properties in Ballarat and Bendigo;
- Higher rates of the elderly living in units, townhouses and flats in the regional centres, with one storey dwellings acting as suitable and well-located substitutes to retirement villages;
- Slow rural population growth with demand for new dwellings coming from second home owners rather than a permanent population, which requires full services and infrastructure;
- A growing peri-urban population which has access to improved train services from study region towns to Melbourne, which may add to the attraction of living in those places; and,
- An increasing number of smaller households across the region which may represent a market for well-located, higher density dwellings.

A number of demographic trends present challenges to this project's goals. The following questions highlight these and also demonstrate that uncertainty about the future needs to be considered. Once again, a supply-led approach to influencing demand could possibly address each of these issues.

- Will young adults in their early twenties continue to move into regional centres, and maintain (or grow) demand for higher density dwellings? What happens to those dwellings when those people leave in their late twenties?
- Will baby boomers in towns age in place or will they consider downsizing?
- Will baby boomers move out of rural areas and into towns? Will they be willing to live in units or townhouses? Will those dwellings need to have three bedrooms?
- Will the popularity of Melbourne's peri-urban area continue to support drive demand for new dwellings outside towns?
- Will the region's population generally shift from an overwhelming preference for separate houses?

Demographics does not have to be destiny but current trends will be slow to shift without specific interventions or sudden, unanticipated events. The next section of this report provides information on the existing policy contexts in the study region, which reflect current state and local government approaches to both demographic and development trends.

Chapter Four: Policy context

4.1 State Planning Policy Framework

Regional planning in Victoria is occurring in a relative state policy vacuum. The policies that do exist are vague and provide little direction or motivation to municipal councils for effective regional planning. Given the importance of regional Victoria and ongoing population growth in many regions, this lack of state direction is surprising. Its main impact is incremental ad-hoc development based on a deregulated or neo-liberal model of development facilitation instead of integrated cross-sectoral strategic planning.

The current State Government is amending the State Planning Policy Framework (SPPF) clauses that specifically address regional areas (DOI 1996). Particularly notable is the SPPF's reference to the policy guideline, *Ready for Tomorrow – a Blueprint for Regional and Rural Victoria* which the previous Labor State Government published (RDV 2010). This was not a policy document but a series of initiatives and actions that included a regional infrastructure development fund, funding for infrastructure for small towns and support for local councils to plan for growth and development. It is no longer available and no replacement has been identified.

The SPPF includes typically broad and aspirational statements about planning regional settlements and managing their development.[19] (DOI 1996) It states that facilities and services should be planned regionally to support population growth, but has no detail on who should do so, who should pay for the planning or actually provide facilities and services. It also notes that regional land use plans should ensure that adequate land is provided for residential, commercial and industrial uses; it has no definition of "regional" or "adequate", or alternative policies to the traditional separation of township uses.

Even though the SPPF talks about needing to consider local as well as regional contexts when planning the future of settlements, it has little regard for local contexts in its own text. Victoria has very few large regional centres (with Ballarat and Bendigo located within this project's study region) but the policy simply states that growth should be directed into those places. It gives no guidance as to how to actually achieve this result.

Rather, the SPPF limits itself to general statements about the importance of identifying transport, communication and economic links between all settlements in regional plans. It then separately states that the rural landscape and natural resources should be preserved and protected: it treats the urban and the non-urban separately, not exploring the possibility of relationships between these parts of regional Victoria.

The current State Government has continued the previous Government's approach to more detailed regional planning through the Regional Growth Plan projects. This began in 2008 with regional strategic plans and regions are finalizing plans (DTPLI 2014d). The plans relevant to this project are discussed in more detail in the next section but are effectively statements on economic growth with some reference to land use planning. Their names are no accident: the State Government wants regional Victoria to grow but the plans again only provide very general directions. Local councils will have to devise the detail of how to actually achieve and manage growth drawing from these more general plans.

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[19] See Clause 11.05 Regional Development. Subclause 11.05-1 Regional settlement networks.

4.2 Regional Strategic and Regional Growth Plans

Regional growth plans are plans for more economic and population growth in regional Victoria. However they provide little detail or specific guidance on how to achieve and manage growth. Local councils are expected to deliver growth and coordinate with other councils in their region. The plans include few, if any, innovative ideas about either attracting or dealing with regional growth.

In 2013, the state government released draft growth plans for the Central Highlands and Loddon Mallee South government regions which are relevant to this project (DPCD 2013a; DPCD 2013b). Both include local government areas outside this project's spatial scope and the following addresses the project's local government areas (identified with * in Table 2 Regional policy settings below; local government areas by region are illustrated in Figure 14). The Steering Committees accepted public comments during 2013 and plan to update the drafts, seek endorsement from the relevant local councils and then submit the final documents to the Minister for Planning for consideration.

Figure 14 Local governments in Central Highlands and Loddon Mallee South regions in project study region

The *Draft Loddon Mallee South (LMS) Regional Growth Plan* describes itself as a plan for growth and change which uses land use as its strategic framework. Its vision includes but does not define words such as "liveability", "accessibility", "vibrant", "innovative", "sustainable" and "connected"(DPCD 2013b).

The *Central Highlands (CH) Draft Regional Growth Plan* states that it is a regional approach to land use planning and is a specific planning response to the *Central Highlands Regional Strategic Plan* (DPCD 2013a; Trevor Budge et al 2010). The region's vision remains as described in the *Strategic Plan*, aiming for a productive, sustainable and liveable future. The plan notes its role in managing growth and change but is less explicit about the centrality of economic development than the *LMS Plan*. The plan includes a specific list for *Land use policies, strategies and actions* in each subsection of the plan. The *LMS Plan* has no equivalent (DPCD 2013a; DPCD 2013b).

The *LMS Plan* focuses on economic development: the first section looks closely at the regional economy, arguing that population and employment planning must happen at the same time. The *CH Plan* makes the same case. But issues facing people living in the region do not appear until much later in both plans (DPCD 2013a; DPCD 2013b).

The plans note that the current population distribution across the regions is a useful indication of future population settlement patterns. But the *LMS Plan* expresses the hope that all places will grow and recommends looking into building new infrastructure. Investigation and funding of construction is deferred to a subsequent implementation plan. The plan does identify road transport as a priority for both passenger and freight to support regional economic growth. Public transport is regarded as a minor issue (DPCD 2013a; DPCD 2013b).

The *CH Plan* is less aspirational about population growth and accepts that most will occur in Ballarat and Bacchus Marsh, the first with its momentum as the biggest inland regional centre in Victoria and the second due to the influence of Melbourne. These places also need efficient road infrastructure but the plan also does acknowledge the need for public transport (DPCD 2013a).

Little detail is provided on how disadvantage might be addressed or whether the *LMS Plan* can really contribute to improved education, health and wellbeing outcomes. An equivalent section does not appear in the *CH Plan* although it does have a short section on social infrastructure and another on housing affordability (DPCD 2013a; DPCD 2013b).

Both plans recognise the tension between economic and environmental issues, but only recommend considering or minimising negative impacts on natural assets. The *LMS Plan* generally describes these assets' ability to contribute to or constrain economic development. This is less explicit in the *CH Plan* (DPCD 2013a; DPCD 2013b).

Reflecting the *LMS Plan's* economic and physical focus, the last section examines at how infrastructure should respond to increased demand. The *LMS Plan* identifies transport as particularly important and highlights the need for road facilities for both passenger and freight use as a priority for regional economic growth. The *CH Plan* similarly focuses primarily on road transport but also puts accessibility, safety and reliability of public transport ahead of specific recommendations for freight. Public transport is mentioned but is less central to the *LMS Plan's* focus (DPCD 2013a; DPCD 2013b).

These regional planning documents take a high level approach to population distribution.

They define a hierarchy for their urban settlements and broadly discuss how population growth and residential development should occur in different types of towns (Planisphere 2009). The plans note specific constraints in some towns and provide an overall priority for growth in Ballarat and Bendigo. They note that local councils will need to develop more detailed plans to address land supply, development options, housing types and demand for rural lots (DPCD 2013a; DPCD 2013b).

The relevant regional policies currently available and their status are summarised in Table 2.

Table 2 Regional policy settings

Policy document	Author(s)	Release date	Status / Details
CENTRAL HIGHLANDS			
Central Highlands Regional Strategic Plan(Trevor Budge et al, 2010)	Ararat Rural City City of Ballarat* Central Goldfields Shire Council* Golden Plains Shire Hepburn Shire Council* Moorabool Shire Council* Northern Grampians Shire Council Pyrenees Shire Council Regional Development Victoria, Department of State Development, Business and Innovation	June 2010	Reviewed 2011 Sets directions for implementation under *Regional Growth Plan*
Central Highlands Regional Growth Plan Draft Issues Paper v4.0 (DPCD 2012a)	Department of Planning and Community Development, "in consultation with state and local government partners and other key agencies"[20]	June 2012	
Central Highlands Regional Growth Plan Strategic Directions	Ararat Rural City City of Ballarat* Golden Plains Shire* Hepburn Shire Council* Moorabool Shire* Pyrenees Shire Council	July 2012	Feedback due August 2012
Central Highlands Regional Growth Plan Stakeholder Project Update Edition 4	Department of Planning and Community Development	March 2013	Notes that public consultation on strategic directions complete
Draft Central Highlands Regional Growth Plan (DPCD 2013a)	Ararat Rural City City of Ballarat* Golden Plains Shire Hepburn Shire Council* Moorabool Shire Council* Pyrenees Shire Department of Planning and Community Development	June 2013	Feedback due July 2013

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[20] http://www.dpcd.vic.gov.au/planning/plansandpolicies/ruralandregionalplanning/regionalgrowthplans/centralhighlands, accessed 8 April 2013.

Policy document	Author(s)	Release date	Status / Details
LODDON MALLEE SOUTH			
Loddon Mallee Regional Strategic Plan Southern Region	City of Greater Bendigo* Macedon Ranges Shire Council* Mount Alexander Shire Council* Central Goldfields Shire Council* Loddon Shire Regional Development Victoria Regional Development Australia	September 2010	
Loddon Mallee Regional Strategic Plan Southern Region Annual Report 2011-2012	City of Greater Bendigo* Macedon Ranges Shire Council* Mount Alexander Shire Council* Central Goldfields Shire Council* Loddon Shire Regional Development Victoria Regional Development Australia	No date	Update on implementation of the plan (included as referred to in the draft Regional Growth Plan)
Loddon Mallee South Draft Regional Growth Plan Background Report	City of Greater Bendigo* Macedon Ranges Shire Council* Mount Alexander Shire Council* Central Goldfields Shire Council* Loddon Shire State Government of Victoria	April 2013	Supporting documents to draft Regional Growth Plan
Loddon Mallee South Draft Regional Growth Plan (DPCD 2013b)	City of Greater Bendigo* Macedon Ranges Shire Council* Mount Alexander Shire Council* Central Goldfields Shire Council* Loddon Shire State Government of Victoria	April 2013	Feedback due May 2013

*Local councils in the project study region

4.2.1 Regional demographic and settlement directions in the regional growth plans

Demographic information from the policy documents is analysed to establish the regional context. This material should have informed the draft growth plans' policy recommendations.

The regional policy material is then analysed in two further sections:
- policy goals and proposed actions for specific population distribution and accommodation – particularly, land supply in townships and rural areas (including the role of rural lots), general development options and specific housing types, existing and proposed infrastructure
- how existing policies address population growth in different places – particularly, rural areas, different sized townships, fringe areas of townships

4.2.2 Demographic context of the region

As with all of regional Victoria, the study region's population is ageing faster than Melbourne's. Youth migration to Melbourne is a major factor, and particularly from rural areas and the smaller towns. Creating the opportunities for more student housing is one proposed strategy to address this demographic challenge, while also possibly strengthening the role of tertiary education in Ballarat and Bendigo.

The number of elderly people is growing quickly as the baby boomers age. Older people are also moving from rural properties and smaller townships into larger urban areas. The policy documents highlight the difficulties in providing adequate services to this population, especially given that it is dispersed. Proposals include better transport links to improve access to services which can only be provided in larger urban centres given the difficulty in attracting, for example, health professionals to small towns.

Changing household structures are also evident. Household size is falling and the number of lone person households is increasing, both of which are consistent with national demographic trends. Policy documents suggest a growing mismatch between the types of housing which households need, those in which they currently live and new dwelling stock. This is particularly relevant to older households.

Both regions' policy documents also highlight the option of introducing strategies or incentives to attract young families to their areas in order to sustain population growth.

As part of the Regional Strategic Planning process, both the Central Highlands and Loddon Mallee South region have developed a settlement hierarchy which describes the current role of different sized urban areas based on infrastructure and services under this hierarchy where most population growth will occur in the largest urban centres (Planisphere 2009). Regions can maintain the existing hierarchy or to decide on actions to change it, for example to increase the size of smaller settlements through upgrading infrastructure and services.

Population distribution and accommodation

Generally policy documents emphasise that population increases should only occur in existing settlements whose growth will:
- not negatively impact agricultural and environmentally sensitive land;
- be far from areas of high risk of bushfires and flooding; and,
- have access to appropriate infrastructure, services and jobs.

The *Loddon Mallee South Regional Growth Plan* is clear that the majority of population growth will occur in Bendigo and notes that smaller places need to be supported, whether growing or not. In the more detailed descriptions of specific places, the plan suggests that smaller towns such as Heathcote, Riddells Creek and Romsey have the capacity to double their populations (DPCD 2013b). This makes Bendigo's primary growth role less clear, as does the plan's identification of other towns' land supplies whose population capacity is equivalent Bendigo's official projected growth of 38,000 people (see Table 3 below). This mixed message is perhaps due to the regional stakeholders' hopes for a higher growth scenario than is currently officially projected.

The *Central Highlands Draft Regional Growth Plan* describes Ballarat and Bacchus Marsh as the main growth centres and includes details on towns in the region which have the capacity to grow (Ballan, Creswick and Clunes) (DPCD 2013a). These are places with existing land supply, opportunities for infill development, are generally on the train line and Creswick and Clunes are currently recipients of State Government funding from the *Advancing Country Towns* program for stimulating development and population growth in small towns experiencing rapid change (RDV 2014)[21]. The smaller towns of Gordon and Trentham, which are not serviced by rail, may also grow due to demand from commuters to Ballarat or Melbourne. The *Central Highlands Plan* recommends that Daylesford should not grow except through infill due to environmental and natural hazard constraints (DPCD 2013a).

The role of specific settlements

As this project is considering the future role of different urban settlements, the policy perspectives on specific urban places identified in the various documents establishes their regional policy contexts and goals. Figure 15 illustrates the location of the urban settlements in the study region.

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[21] Note that the *Loddon Mallee South Regional Growth Plan* does not mention this program in relation to Talbot which also received funding.

Figure 15 Urban settlements in the study region

Largest urban centres

Ballarat (City of Ballarat, Central Highlands region)

Defined as the provincial centre under the settlement hierarchy, a major regional activity centre under the *Strategic Plan*, and the regional city in the *Draft Regional Growth Plan*, Ballarat's 2011 population of 97,800 was five times larger than Bacchus Marsh's, the next largest urban settlement in the Central Highlands region (Planisphere 2009; Trevor Budge et al 2010; DPCD 2013a). Ballarat is likely to

continue to accommodate most of the region's population growth, which will include people moving from the surrounding rural areas. The *Regional Growth Plan* notes that this growth will be significant and promoted (DPCD 2013a).

New infill residential development will be encouraged in and around the central business district, and fringe development will be located in the west and south western growth areas. Both the *Regional Growth Plan Draft Issues Paper* and the *Regional Growth Plan* note that these areas need adequate planning for services, employment and infrastructure, including open space and recreation facilities (DPCD 2012a; DPCD 2013a). Leaving such details to local councils might encourage local initiative, however the plans have missed an opportunity to strongly endorse alternative development approaches to these existing urban areas.

The *Draft Issues Paper* suggests that the region will also have to consider future land supplies for growth once existing land supplies are developed. Broadhectare or greenfield development will be constrained by the presence of valuable volcanic soils and natural hazards such as bushfire to the north, north east and east (DPCD 2012a).

The *Strategic Plan* also notes that Ballarat is well connected to Melbourne and may become like an outer metropolitan activity centre. At the same time the city tends to dominate or even overshadow the region. The *Regional Growth Plan* takes a slightly different position, noting that major firms, universities, hospitals and emergency service providers are located in the city. The *Plan* also supports more jobs growth and industrial development in the Ballarat West Employment Zone (Trevor Budge et al 2010; DPCD 2013a).

As the region's main service and employment centre, it also needs efficient transport connections to and from surrounding smaller settlements, however little specific detail is provided on how to achieve these services.

Bendigo (City of Greater Bendigo, Loddon Mallee South region)

As the main provincial centre, Bendigo is likely to experience the largest population and job growth in the Loddon Mallee South region. The *Regional Growth Plan* aims to "reinforce the role of Bendigo as the regional city" and it will be one of the targeted centres for new growth (DPCD 2013b, p.15). With its range of employment and services, the plan suggests it could become an alternative city to Melbourne.

Enough land needs to be available to accommodate anticipated residential development which will be either higher density infill within the existing urban area or greenfield development in designated growth areas within the existing urban growth boundary. The *Regional Growth Plan* identifies Crown land, golf courses, former mines, the Gillies and Crystal Ices sites, and the station precinct as possible locations for infill development. It also notes that student housing is inadequate and could be also developed on CBD sites. A constraint to medium density development is a perceived lack of demand (DPCD 2013b).

Bushland lies beyond the boundary and is a strong constraint to further greenfield development. The *Regional Growth Plan* suggests that Maiden Gully and Marong

should be considered for growth, with the former possibly to be rezoned at higher than the current low density and the latter based around a proposed 300 hectare industrial and business park (DPCD 2013b).

Second tier towns

Bacchus Marsh (Moorabool Shire Council, Central Highlands region)

Bacchus Marsh is a district town / regional centre located next to one of Melbourne's growth areas. As a result, the town's population is increasing and is likely to continue to do so. Some residents commute to Melbourne for work the while the *Draft Issues Paper* notes that some Melbournians from outer areas may travel to Bacchus Marsh for health services and education (DPCD 2012a; DPCD 2013a).

The *Draft Regional Growth Plan* nominates Bacchus Marsh as the region's second growth area after Ballarat. It has opportunities for further infill and fringe residential development (zoned land in West Maddingly and potential in Underbank). This growth will bring pressure on physical and community infrastructure. Future expansion could either be in self-contained communities or the urban growth boundary could be expanded where it will not impact on the environment, landscape or the highly productive soils used for intensive farming on the nearby river flats. A non-urban break between Bacchus Marsh and Melbourne needs to be maintained (DPCD 2013a).

The *Regional Growth Plan* also recommends that more employment should be created locally to reduce reliance on commuting to Melbourne (DPCD 2013a).

Castlemaine (Mt Alexander Shire Council, Loddon Mallee South region)

The *Draft Regional Growth Plan* suggests that Castlemaine should be one of the region's district towns targeted for new growth as it has access to transport and provides services to its local region (DPCD 2013b). However the document also notes that the district centre has limited expansion opportunities because of bushfire risk and flooding hazards. Future residential development will have to take place within the existing urban area, including Campbells Creek. It may be medium density or shop top dwellings but these must not threaten the town's historic character. Surrounding towns such as Harcourt should also be encouraged to accommodate the demand from Castlemaine.

Gisborne (Macedon Ranges Shire Council, Loddon Mallee South region)

This district town will have a similarly strong growth role as Castlemaine. However the *Draft Regional Growth Plan* also notes that more local jobs could reduce the number of Gisborne residents commuting to Melbourne for work. Better transport connections to Bendigo may have a comparable impact (DPCD 2013b).

Kyneton (Macedon Ranges Shire Council, Loddon Mallee South region)

The *Draft Regional Growth Plan* proposes a similar growth role for Kyneton as for Castlemaine and Gisborne, particularly given its existing infrastructure which includes a hospital, a train station and the Calder Freeway. It has a large supply of

zoned residential land but also needs to plan for bushfire risk and flood hazard (DPCD 2013b).

<u>Maryborough (Central Goldfields Shire, Central Highlands and Loddon Mallee South region)</u>

Maryborough has grown little in the past and has implemented specific programs to try to attract new residents. The *Draft Regional Growth Plan* notes that the district town has sufficient services, infrastructure and both residential and industrial land to support significant population and job growth. However as with many of the towns in the study region, expanding beyond its current boundaries will require planning for bushfire and flood hazards, along with urban salinity risks (DPCD 2013b).

Third tier towns

<u>Ballan (Moorabool Shire Council, Central Highlands region)</u>

The *Regional Growth Plan* supports medium growth for the town of Ballan, with population growth likely given its location on the train line to Melbourne. It currently has sufficient land supply to meet projected growth, including infill (DPCD 2013a). As Bacchus Marsh starts to run out of land, pressure will increase on Ballan and it will need to start to identify land to the west or south and infrastructure to support growth in those areas. Commuting could be reduced by encouraging more jobs in the centre of the town or on industrial land.

<u>Clunes (Hepburn Shire Council, Central Highlands region)</u>

As Clunes is located on a train line, the *Regional Growth Plan* suggests that it will continue to grow with opportunities for incremental residential infill and fringe development to the west and east within the town's urban growth boundary (DPCD 2013a). While most residents commute to Ballarat and Maryborough for work, opportunities for local employment in tourism and retail should be explored. Any future plans and development must take into account the town's heritage and tendency to flood.

<u>Creswick (Hepburn Shire Council, Central Highlands region)</u>

This town should shift away from acting as a commuter town to Ballarat with more local jobs although it will also continue to grow as an alternative to Ballarat. It needs some improvements to the town centre and any new development needs to take account of flooding and heritage issues (DPCD 2013a).

<u>Harcourt (Mt Alexander Shire Council, Loddon Mallee South region)</u>

Even though Harcourt is currently unsewered and a pressurised pipeline reticulation network is currently under construction, the *Draft Regional Growth Plan* states that it has "…the infrastructure and opportunity to grow, offering an alternative country town lifestyle accessible to the regional city [Bendigo]. The growth of these smaller towns also has benefits for outlying agricultural areas and communities." (DPCD 2013b, p.37) The *Plan* notes that growth could be accommodated on rezoned land which is not in conflict with agriculture or at risk from bushfire. This town was not classified in

the settlement hierarchy work, perhaps due to its small population (Planisphere 2009; DPCD 2013b).

<u>Heathcote (City of Greater Bendigo, Loddon Mallee South region)</u>

This town has the potential to grow to 3,000 people but would require additional infrastructure. Twenty per cent of the homes are unsewered and the Energy for the Regions Program is currently investigating upgrades and extensions to natural gas supply for smaller towns such as Heathcote (DPCD 2013b).

<u>Riddells Creek and Romsey (Macedon Ranges Shire Council, Loddon Mallee South region)</u>

Both of these towns could relieve some of the growth pressure on other towns in Macedon Ranges and are nominated as growth centres in the *Draft Regional Growth Plan* (DPCD 2013b). Riddells Creek has appropriately zoned land for most of the projected growth, but new greenfield and infill land will need to be identified to accommodate the remainder. Romsey is in a similar situation to Riddells Creek however it does not have a train service. Future development in both towns will have to take into account flood hazards (DPCD 2013b).

Other towns and settlements

<u>Other towns with infrastructure and services</u>

The regional documents describe the towns of Talbot, Gordon and Trentham as places experiencing some growth and have existing or planned infrastructure and services. Only Talbot has a train station while growth in Gordon and Trentham are both influenced by residents commuting to Ballarat or Melbourne (DPCD 2013a, DPCD 2013b).

<u>Towns not designated for growth</u>

As a district town, Daylesford also has existing services, infrastructure and good road (but not rail) connections to Ballarat. It is under growth pressure from Melbourne and encouraging more growth (together with Maryborough) would "ensure that these towns remain vibrant." (DPCD 2012a, p.13) This statement in the *Draft Issues Paper* may have been superceded by the subsequent *Strategic Directions* which propose that Daylesford should have limited growth with environmental constraints and protecting tourism assets as limits to its expansion. The *Regional Growth Plan* clearly takes this position (DPCD 2013a).

The *Central Highlands Regional Growth Plan* also notes that small towns and rural settlements which are unlikely to grow still need to be supported as sustainable places. The *Plan* recommends planning for clusters of these smaller towns so they can share services and infrastructure. It also notes that changes in the economy or technology may bring unpredicted growth and this should trigger a re-evaluation of these places' roles (DPCD 2013a).

The following towns are only mentioned in passing in the regional documents and are not identified to grow: Lancefield and Mt Macedon in Loddon Mallee South;

Hepburn Springs in Hepburn Shire however the *Regional Growth Plan* does not mention it at all (DPCD 2013b).

Macedon Ranges Shire Council is currently examining detailed settlement planning in Woodend to determine where population growth should be located.

Table 3 summarises the population, growth and settlement hierarchy information for all of the towns in the study region and sourced from documents related to the regional growth planning process.

Table 3 Population projections and population which could be accommodated

Town	2011 census population	Projected additional population	SP / RGP projection	Hierarchy definition (Planisphere)	Additional future population based on land supply	Issues that might constrain growth
Ballarat* - Ballarat West				Provincial centre	UDP: 31,785 lots; 152 ha for infill 30,000 to 40,000	
Bendigo*	82,794	38,000 to 2041	between 50 and 100K to 2041	Provincial centre	10,200 for infill Total capacity: 121,375	Perceived lack of demand for density
Bacchus Marsh*		30,000 over 30 years		District town	1,600 approved in W Maddingly; rezone Underbank for more	UGB, farming
Castlemaine	9,124			District town	1,500	Bushfire, flooding, historic character
Gisborne*	8,057	15,000		District town	17,000	Bushfire, flooding
Kyneton*	4,460			District town	8,600	Bushfire, flooding
Maryborough (included in both regions)	7,174			District town	14,000	Low growth rates Bushfire, flooding, salinity
Ballan				Town		More land
Clunes				Town		Heritage, flooding
Creswick				Town		Heritage, flooding
Harcourt	479			Town	Needs to be rezoned	Flood, agriculture
Heathcote	1,688		Could grow to 3,000	Town		20% of dwellings not sewered
Marong	351		1,300 to 8,000 to 2031			
Riddells Creek*	2,976	6,000 to 2041		Town	4,900	Flooding
Romsey*	3,678			Town	6,000	Services, transport, flooding

Central Highlands urban settlement
Loddon Mallee South urban settlement

* towns designated in *Loddon Mallee South Regional Growth Plan* and *Central Highlands Regional Growth Plan Strategic Directions* to have strong growth

Source: DPCD2013b; DPCD 2013c; DPCD 2012a; DPCD 2013a Note that this last reference does not include equivalent population data.

4.3 Local government policy framework

All councils in the study region have documented their ageing populations and note their growing need for more diverse housing than currently exists. They share typical aspirations for well-designed and located homes which respond to their local natural and physical environment. But all seem to also experience frustration with encouraging developers to build significant numbers of dwellings at anything other than low densities.

Both the City of Ballarat and the City of Greater Bendigo have analysed parts of their residential markets in the past decade. Ballarat separates its housing types into medium density in the existing urban area (infill, CBD, activity centres) and low density in its growth area to the west. Bendigo seeks more residential development in its CBD and better coordinated infill but acknowledges its challenge to try to shift the dominant local preference for a three to four bedroom house with a garden.

Mount Alexander Shire produced a number of planning documents during the mid-2000s in response to increased population growth, upgrades to the Calder Freeway and the proposed Regional Rail project. These all addressed housing issues and consistently suggested focusing growth in Castlemaine and other smaller well-serviced centres. A similar approach is recommended by the Macedon Ranges Shire Council which recommends that most growth should occur in Gisborne and Kyneton based on land supply and demand analysis similar to this project's method for Bendigo.

Hepburn Shire Council has only specifically addressed residential issues through an agreement for affordable housing for people with disabilities in Daylesford and in its 2011 *Hepburn Planning Scheme Review Report* (Hepburn Shire Council 2010; Planit Urban Design and Planning et al 2011). Recent growth has occurred in the rural parts of the Shire and land supply in those areas may be a deterrent to housing development in towns. Central Goldfields Shire has similarly completed only a few planning strategies which relate to residential development and its focus is on growing Maryborough. Moorabool Shire has only recently started to address planning for future residential development and it also aims to direct growth into existing urban areas in Bacchus Marsh, Ballan and Gordon.

Councils which are proactive on residential issues

In 2008 Ballarat published a residential infill opportunities study built on a 2004 report on residential land supply (Aurecon et al 2008; Oliver Hume 2004. The findings of both suggested that while Ballarat is dominated by detached dwellings, demand is growing for medium density residential development in established parts of the city. The 2010 *Making Ballarat Central – the CBD Strategy*, does not include residential uses in its vision or key priorities but it does recommend promotional activities to increase interest in residential development (City of Ballarat 2010). The *CBD Strategy* also identifies specific redevelopment sites within three of the strategy's precincts. The *Interim Activity Centres Strategy* focuses on retail and the physical layout and function of all of Ballarat's centres although it does make passing reference to possible opportunities for medium density residential development (Renaissance Planning 2010). Ballarat also has a 2009 growth area plan and 2012 precinct structure plan for the Ballarat West Growth Area: this area will be mainly

residential at approximately 10 dwellings per hectare (Tract Consultants 2009;Smec Urban 2012) .

The City of Greater Bendigo is reviewing its 2004 *Residential Development Strategy* as recommended in its 2010 *Planning Scheme Review* (Parsons Brinkerhoff et al 2004; COGB 2010). The city has produced a series of technical reports and an audit which concluded that the principles of the strategy remain pertinent but implementation is an ongoing challenge (COGB 2014b). This particularly relates to infill residential development which is appropriate for the City's heritage architecture and changing demographics. Over twenty years of residential land supply is available in Bendigo, and the rural areas have an oversupply of rural residential land (COGB 2010). A large greenfield housing supply has been released recently for conventional housing. The *Review* notes that the area's small towns need structure plans to help determine where future growth might be accommodated. Bendigo's CBD is identified as a key area for higher density residential development with significant details about themes, precincts and building heights included in the 2005 *Bendigo CBD Plan*. (COGB 2014b; Planisphere et al 2005) That plan only included residential uses as a small component and is aspirational rather than specific in its details. It also suggests that higher density residential development in Bendigo is buildings of three or four storeys (Planisphere 2005).

Macedon Ranges Shire Council recognised that it needed a long term plan to manage growth and development and in 2011 published a settlement strategy (MRSC 2011). This built on the earlier *Rural Land Review* (RPD Group 2002), *Small Towns Study* (Conceptz et al 2006) and *Planning Scheme Review* (MRSC 2008). The *Settlement Strategy* recommends that only the largest towns in the Shire – Gisborne and Kyneton – should have significantly more residential development, and more modest growth should occur in Romsey, Lancefield, Riddells Creek and Woodend (MRSC 2011). Little development should occur in other smaller places given their lack of transport and other infrastructure. This is based on analysis similar to that in this project: the supply of residential lots in each town is compared to projected population growth, and recommendations and implications for towns are made for each of the larger settlements. The strategy assumes a residential development density of ten dwellings per hectare (MRSC 2011). More detail appears in specific structure plans and character studies for the six main towns. For the non-urban areas, the council is conducting a *Rural Living Planning Review*: the Shire notes that it seeks to prevent dispersed residential development in rural areas because of conflicts with agriculture (MSRC 2014).

Mount Alexander Shire's *Rural Living Study* found that approximately 40 per cent of all new dwellings were built in the Shire's rural areas between 1995 and 2002 (RPD Group 2006). Both this study and the 2013 *Rural Land Study Future Directions Paper* recommended methods to control this type of growth in poorly serviced areas, mainly through rezoning restrictions (Research Planning Design Group 2006; EnPlan 2013). The *Urban Living Study* recommended that the Shire instead focus growth in towns along the Calder Corridor with a consolidation approach in Castlemaine, a containment approach in Maldon and expansion limited in small towns outside the corridor (Planit 2004b). The subsequent land use strategy for Castlemaine identified the town as the main centre where growth generally should occur, while also making sure to protect "heritage, landscape and township values." (Planit 2004a, p.15) It

contains familiar planning elements such as a growth boundary, aspirations for housing diversity and affordability, encouraging responsive residential site design. The Shire published a thorough inventory of land supply and comparison with demand in 2010 which concluded that a shortfall of greenfield residential land is likely in the medium to long term, assuming densities of 10 and 15 dwellings per hectare (Philip DeAraugo 2010). It did not evaluate infill opportunities as these tend to occur in an ad hoc manner but it did suggest specific sites for redevelopment, particularly in Castlemaine (Philip DeAraugo 2010).

Councils which have done less work on residential issues

Residential growth in Moorabool municipalities has concentrated in Bacchus Marsh over the last 20 years and the Shire Council has recognised that it needs to develop a framework and vision to guide further development to 2041 (Moorabool Shire Council 2013). It has published structure plans for Gordon and Bacchus Marsh's central activity area and is preparing a plan for Ballan (Moorabool Shire Council 2014). These plans all focus on encouraging new residential development on existing zoned land in the short term, while in the medium to long term, new residential land should be released and rezoned in an orderly way consistent with projected demand. The council has committed to preparing urban and rural growth strategies which would give a larger context to the existing place-specific plans (Moorabool Shire Council 2013). Note that strategic planning and economic development are two separate units within the council but their interests in residential planning and development appear to overlap.

Recent residential development in the Shire of Hepburn has occurred mainly outside its urban settlements in the rural landscape. The 1999 land use strategy and its settlement review identified this as problematic given the lack of infrastructure and services in these places (RPD Group 1999; TBA Planners 1999). The issue was discussed again in the 2001 small towns planning review but the document concluded that existing zone controls were sufficient (RPD Group 2001). By 2007 the rural areas review recommended that the rural living zone should not be expanded, and to do so would require a Shire housing strategy (to meet the requirements of the Ministerial Direction Number 6 (Victorian Government Planning and Environment Act 1987) (EnPlan 2007). The Shire has not completed a strategy to date. The review highlighted the impact of new homes on the rural landscape and agriculture, noting that this type of rural lifestyle-related growth causes land use conflicts (EnPlan 2007). The 2011 *Planning Scheme Review* raised the same concerns but goes further in recommending analysis of housing opportunities in its larger towns versus land supply in low density and rural living areas (Planit 2011). A large land supply may act as a disincentive to higher in-town residential densities, which the review notes should widen the currently limited housing options available in the Shire (Planit 2011).

Central Goldfields Shire only has two documents available which address residential issues: the 2005 *Maryborough Urban Design Framework* which is actually a broader long term planning strategy for the town and a brief issues paper for the Shire's current (and incomplete) planning scheme review (Michael Smith 2005; CGSC 2012). The Shire has adopted an aggressive population growth policy for Maryborough and the rail corridor to Ballarat however no further detail is available in

the 2012 issues paper (CGSC 2012). It does note that infill development is occurring in Maryborough as described in the *Urban Design Framework* and further planning is required to guide the outcomes beyond the 2008 planning scheme amendment for rezoning of specific sites (Michael Smith 2005; CGSC 2012).

Chapter Five: Methodology

5.1 Introduction

This project evaluates the number of dwellings likely to be needed in the future across the study region and analyses whether existing zoned land can accommodate enough houses to meet that demand. This methodology section describes the approaches taken in analyzing demand and potential supply. The study area is first divided into two parts: the rural landscape and urban settlements. Their respective land supplies and projected dwelling demand are then defined.

Three rural scenarios test the extent to which rural land supplies subject to different planning regulations can meet projected dwelling demand:
- Business-as-usual under current planning regulations;
- Rural preservation where new houses can only be built and land can only be subdivided on lots which are a minimum of 40 hectares; and,
- Tenement control where new houses can only be built and land can only be subdivided on amalgamated lot holdings which are a minimum of 25 and 40 hectares.

The Rural preservation and Tenement control scenarios model shifting Business-as-usual demand away from the truly rural landscape to the edges of and within existing urban settlements.

A range of development pressure criteria and environmental impact factors determine the timing and location of future development in the Business-as-usual and Rural preservation scenarios.

Figure 16 illustrates the relationship between supply, demand, the application of the development pressure criteria and environmental impact factors, and how future demand is distributed.

Figure 16 conceptual framework for rural component

*Areas Identified with red rings indicate where Planning and Policy controls may be considered in Scenario fomulation
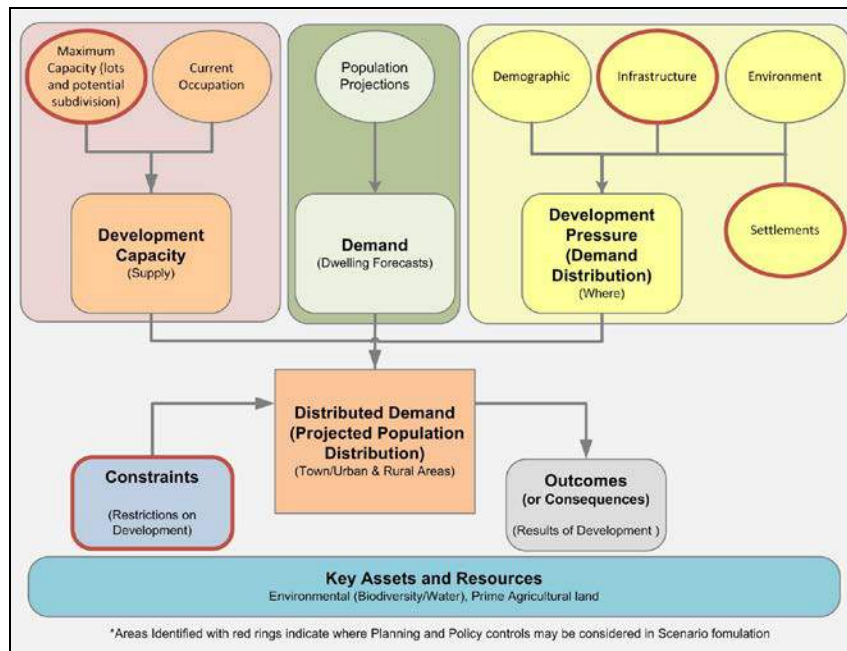
Under the Rural preservation and Tenement control scenarios, projected demand for which rural land is no longer available is transferred to the study region's urban settlements.

The urban settlements are then examined. The first approach analyses the length of time over which the residential land supply of four towns in the region will meet projected housing demand using a variety of dwelling density assumptions. The second focuses on the City of Greater Bendigo and develops different density scenarios using a variety of land supplies within the City's urban area. This part of the project does not apply development pressure criteria or environmental impact factors and development is assumed to take place to 2041.

The final component evaluates shifting projected dwelling demand in large urban settlements to smaller towns and it considers the infrastructure implications through examining data for Kyneton as a case study.

5.2 Defining rural and urban areas

As this project models land supplies in the study region's rural and urban areas, those areas first need to be defined. Current planning zones are used as a proxy to spatially identify those areas: all lots in the Farming, Rural Conservation and Rural Living zones define the extent of the rural parts of each SLA.

Some urban zones on the fringes of townships with the *physical characteristics* of rural landscapes have also been grouped with rural zones to demonstrate the capacity for the transfer of dwelling development rights from the three broadscale rural lots to township fringes. These zones are the Urban Growth and Comprehensive Development Zones which have never been developed and are over two hectares in area, and Township Zone where not in a built-up area (refer to Table 4).

Table 4 Rural areas: planning zones

Planning Zone	Abbreviation	Assumptions
Township Zone	TZ	Lots not in a built-up area (dense/moderately dense housing and buildings with definite boundaries as defined by Vicmap 2012), lots over 500sqm
Urban Growth Zone	UGZ	Lots greater than or equal to two hectares
Comprehensive Development Zone	CDZ	Lots are greater than or equal to two hectares
Rural Living Zone	RLZ	All lots over 500sqm
Rural Conservation Zone	RCZ	All lots over 500sqm
Farming Zone	FZ	All lots over 500sqm

Urban areas include the residential, Commercial, Industrial and Mixed Use zones (refer to Table 5)[22]. Each SLA then has a rural and urban component expressed as a ratio of its total area.

Table 5 Urban areas: planning zones

Planning Zone	Abbreviation	Assumptions
Residential Zone 1	R1Z	All lots
Low Density Residential Zone	LDRZ	All lots
Mixed Use Zone	MUZs	All lots
Township Zone	TZ	Lots in a built-up area , lots under 500sqm
Urban Growth Zone	UGZ	Lots under two hectares
Comprehensive Development Zone	CDZ	Lots under two hectares
Commercial Zones	CZs	All lots
Industrial Zones	IZs	Lots greater than or equal to two hectares

New land use planning zones have been developed under the Victorian state government's reformed zones initiative. Part of this project's purpose is to inform councils' future zone reviews and decisions about defining and applying the reformed zones.

Table 6 and Table 7 summarise the relationship between the existing (as used in this project), new and amended zones, using those introduced into the Victoria Planning Provisions through various amendments (DOI 1996). Councils must determine the spatial location of the new zones and provide content for the schedules to the zones. Schedules define permitted land uses in zones and requirements for specific types of development such as minimum subdivision lot sizes.

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[22] This project uses planning zones which existed prior to the July and September 2013 introduction of reformed planning zones to the Victoria Planning Provisions. Councils in the study region were given until 1 July 2014 to introduce reformed residential zones into their local planning schemes.

Table 6 Rural areas: existing and reformed planning zones

Existing Planning Zone	Replacement Zone	Comment
Farming Zone	Farming Zone (schedule not amended)	More permissive (uses)
Rural Conservation Zone	Rural Conservation Zone	More permissive (uses)
Rural Living Zone	Rural Living Zone (schedule not amended)	Default lot minimum area reduced from eight to two hectares for subdivision and dwelling
Township Zone	Township Zone	Highly permissive
Urban Growth Zone	No change	
Comprehensive Development Zone	No change	

Table 7 Urban areas: existing and reformed planning zones

Existing Planning Zone	Replacement Zone	Comment
Residential Zone 1	General Residential Zone	Permit required for construction or extension of dwelling increased from lots under 200 sqm to 300 sqm, and between 300 and 500 sqm; No limit on number of dwellings per lot (permit required); residential building height restriction only stated in Schedule or as per Clause 54 and 55; subdivision exempt from notice and review
Low Density Residential Zone	Low Density Residential Zone	Subdivision minimum for sewered dwellings reduced from 0.4 to 0.2 hectare
Mixed Use Zone	Mixed Use Zone	Most permissive of all zones with only five prohibited uses; permit required for construction of dwelling increased from lots under 80 sqm to 300 sqm; subdivision exempt from notice and review
Township Zone	Township Zone	Highly permissive
Urban Growth Zone	No change	
Comprehensive Development Zone	No change	
Business Zones 1,2, 5	Commercial Zone 1	More permissive; allows accommodation as-of-right, residential without permit if frontage under 2m; subdivision exempt from notice and review except within 30m of residential zone
Business Zones 3, 4	Commercial Zone 2	More permissive; subdivision exempt from notice and review except within 30m of residential zone
Industrial Zones		More permissive; industrial and office building floor area caps removed

Source: Reformed zones for Victoria - A discussion paper on reforming Victoria's planning zones (http://www.dpcd.vic.gov.au/planning/theplanningsystem/improving-the-system/new-zones-for-victoria/public-consultation-2012 accessed 30 October 2013);

This project uses planning zones which existed prior to the July and September 2013 introduction of reformed planning zones to the Victoria Planning Provisions. Councils in the study region were given until 1 July 2014 to introduce reformed residential zones into their local planning schemes.

The total private occupied dwellings in each SLA from the 2011 census is divided by the number of private occupied dwellings in the rural planning zones to give the proportion of each SLA that is defined as rural. The same applies to the urban areas. This is illustrated in Figure 17 and Figure 18.

Figure 17 Definition of rural and urban parts of SLAs

$$\frac{\text{Private occupied dwellings in rural planning zones in SLA}}{\text{SLA 2011 census total private occupied dwellings}} = \text{Proportion SLA area defined as } \textbf{rural}$$

$$\frac{\text{Private occupied dwellings in urban planning zones in SLA}}{\text{SLA 2011 census total private occupied dwellings}} = \text{Proportion of SLA area defined as } \textbf{urban}$$

The ratios are different for the three scenarios: lots and therefore dwellings are removed from SLAs' rural areas under the Rural preservation and Tenement control scenarios. The rural ratio is recalculated based on the reduced rural areas and thus dwelling counts, and the urban ratio, are also adjusted. The following diagram illustrates this process for the Rural preservation scenario and the same method applies for Tenement control for lots under 25 hectares. Further details on the rules which affect rural land supply are described for each scenario in the following sections.

Figure 18 Definition of Rural preservation scenario rural and urban parts of SLAs, with 40 hectare minimum rural lot size

1. BAU rural land – lots | rural land lots under 40 hectares | = Reduced number of rural lots
OR
= Revised SLA **rural area**

2. Revised SLA rural area as proportion of BAU rural area = Revised **rural** ratio

3. Proportion of SLA area defined as **urban** = 100 per cent – **rural** ratio

Even though some of the study region's SLAs are becoming more urban while others are becoming more rural, for simplicity the urban and rural ratios are kept constant into the future for each scenario.

5.3 Calculating future dwelling demand

This project examines how many dwellings are likely to be needed in the future across the study region and whether existing zoned land is sufficient to meet that demand. The Victorian State Government's official population and household projections, *Victoria in Future* (VIF), provides the base case for the project's three

scenarios (DPCD 2012b). These projections are based on past trends which the modellers project into the future, while taking into account emerging demographic shifts and some land supply considerations.

The Business-as-usual (BAU) scenario uses the *Victoria in Future* dwelling projections as future demand however these are only available at the statistical local area (SLA) level as shown in Figure 19 (DPCD 2012b). In this study, overall demand is represented by the number of occupied private dwellings[23] projected to be required for each SLA within the study area. The *Victoria in Future* projections forecast occupied private dwellings and population for SLA regions; however demand for dwellings does not distinguish between rural and urban areas.

Figure 19 Statistical Local Areas within the study area

Source: ABS 2011

To calculate demand in the rural and urban areas, for each SLA the rural and urban proportion of VIF demand is calculated by the formula shown below. Rural occupied

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[23] Occupied private dwellings (as defined by the ABS) were used as the basis for dwelling/household analysis.

private dwelling demand is shown as an example.

The sum of each SLA's rural occupied private dwellings and the SLA's urban dwellings is the total number of occupied dwellings in each SLA. The proportion of the rural dwellings is then applied to the *VIF* figure for each SLA which provides projected demand for rural areas. This can be represented using Macedon Ranges (S) Balance SLA as an example:

Number of dwellings in rural <u>planning zones in SLA: **3,436**</u> Total number of dwellings in SLA: **4,638 urban + 3,436 rural**	x VIF occupied private dwellings for SLA: **6,241**	= Rural dwelling demand for SLA: **2,684**
OR:		
Proportion of rural dwellings in SLA: **43 per cent**	Multiplied by demand for **6,241** dwellings in SLA	= Demand for **2,684** rural dwellings in Macedon Ranges (S) Bal

The first part of the equation results in a rural proportion or (share) of 43 per cent. The rural ratio or share is then multiplied by the overall VIF occupied private dwelling demand for the SLA of 6,241. This results in a total rural demand in rural areas for 2,684 occupied private dwellings in this SLA by 2041. Fifty seven per cent of demand is then apportioned to urban areas.

VIF only includes data to 2031. For this project, the projections are extrapolated to 2041 using the VIF average annual rate of growth from 2021 to 2031.

The Rural preservation and Tenement control scenarios are underpinned by the policy position that supply affects, if not determines, demand for land – and that the type and availability of lots arouses life style expectations and creates certain types of demand, and so, altering the type and amount of land supply, as witnessed by these scenarios, in certain categories and locations can change demand.

The mechanism used to model this policy position is to adjust the urban and rural splits shown above for both the Rural preservation and Tenement control scenarios[24].   This is achieved by accounting for the reduction in rural land lots that no longer qualify for development using an additional step in the calculation of rural demand.

For example, if the proportion of rural land lots remaining (lots still eligible for development after applying regulatory controls) was 20 per cent compared with BAU the rural dwelling counts are then also reduced proportionally by that amount. This new figure updates the dwelling counts that are used to determine the new rural and urban ratios or share of overall demand for the SLA.

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[24] Rural preservation: where new houses can only be built and land can only be subdivided on parcels which are a minimum of 40 hectares.
Tenement control: where new houses can only be built and land can only be subdivided on amalgamated parcel holdings which are a minimum of 25 and 40 hectares.

The difference between rural demand for BAU and Rural preservation for this SLA is termed "rural transfer". It now has to be accommodated in the urban areas of the SLA. More detail about the treatment of "rural transfer" is provided in section 5.4.2.4.

It is still possible to have a situation where there is still an inadequate revised rural land supply to meet the revised reduced rural demand in either the Rural preservation and Tenement control scenarios. For the purposes of this report this amount is not termed "rural transfer" but "unmet demand" and it is also added to the urban settlements. In general, this shortfall is considerably less than under BAU. These results are discussed in detail in the findings section.

5.4 Rural scenarios

5.4.1 Calculating future rural dwelling supply

Once demand is calculated for the rural and urban parts of the study region, the project then examines how that demand might be met. The development capacity of existing lots is calculated based on existing planning rules defining a parent lot's potential for subdivision under planning zones and schedules, and whether the parcel can be constructed given the lot's area. For example, lots zoned Rural Living 2 in Macedon Ranges Shire can be subdivided into two hectare lots. Lots must be at least 0.4 hectare for an owner to build a house. These rules change for the Rural preservation and Tenement control scenarios as discussed in the following sections.

Parts of lots are excluded if they are affected by a flood overlay and this reduces the total area of a lot which could be subdivided or considered as part of the minimum area required for a dwelling. The rural part of the study region also contains many very small and irregularly shaped lots. All scenarios therefore exclude lots under 500sqm as they are inappropriate for the construction of a dwelling in rural areas.

The overall lot is called a 'parent lot' and the subdivided lots 'child lots'. The sum of parent and child lots gives a total for occupied and unoccupied lots. This is then reduced by the number of lots which already hold dwellings. An overall development capacity figure represents the supply of lots in the rural landscape on which a new dwelling could be built. This is represented in Table 8.

Table 8 Rural land supply

A. Rural zoned lots	B. Additional lots from subdivision	C. Total occupied and unoccupied lots	D. Occupied lots	E. Development capacity
No. of parent lots under relevant planning zones	No. of child lots determined by planning zone area requirements (*Subdivision potential*)	No. of rural zoned lots and no. of subdivided lots (*Total capacity*)	Lots or part of parent lots with building(s) (*Currently occupied*)	Total lots less lots with buildings (*Supply*)
A	B	C = A + B	D	E = C - D

5.4.2 How does supply compare to demand? When and where will development occur? (Development pressure criteria)

The rural development capacity for each SLA is first compared to the projected demand for dwellings to 2041 to determine whether supply is adequate to satisfy demand.

The available rural lots are then analysed for the timing of their likely development or take up. This is done by applying a range of criteria to the lots which apply different amounts of development pressure, and affect when the lots will be developed. Four groups of criteria are applied: infrastructure, demographic, environmental and settlement factors, and are described in more detail in Table 9.[25]

Table 9 Development pressure criteria

Group	Classes
Infrastructure	
	Distance to major roads
	Distance to rail commuter nodes (service frequency weighted)
	Distance to bus commuter nodes (service frequency weighted)
	Access to NBN broadband (optic fibre)
	Access to NBN broadband (fixed wireless)
Demographic	
	Population density
	Recent population growth (2001 to 2011)
	Recent dwelling growth (2001 to 2011)
	SEIFA index of disadvantage (2006)
	SEIFA index of advantage (2006)
Environment	
	Significant landscapes (Environmental Overlay and Public Land Reserves)
	Woody vegetation density
	Distance from water bodies and watercourses
	Distance from coast
Settlement	
	Distance to Melbourne
	Distance to towns (population weighted)
	Distance to towns (services weighted)
	Distance to towns
	Identified growth area (Urban Development Program - UDP)

The results generated by applying the development pressure criteria are presented in maps to show the possible spatial distribution of development (Development pressure maps) and the possible timing of that development (Lot take up maps).

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[25] Also refer to Fish et al (2014) for further detail on the actual process of applying the criteria.

An additional step is the application of development impact factors which recognise that rural lot supply is affected by issues other than lot size restrictions and the pressure criteria. This is presented through a small case study rather than for the whole study region.

The model includes the following environmental impact factors affecting where and when new rural dwellings in the case study area could actually be built:
- Climate change considerations – flood events, sea level rise/surge, and fire events;
- Environmental values – biodiversity and water resources;
- Rural industry elements – intensive agriculture (including wine production), extractive industries, wind farming; and,
- Heritage Considerations – Heritage Overlay and Areas of Aboriginal Cultural Heritage Sensitivity.

The model assigns each lot in the case study region with a profile based on these development impact factors. A lot is impacted if more than 50 per cent of its area is affected by any of the impact factors. The model also calculates the proportion of the lot's total area that is impacted. It uses the Business-as-usual and Rural preservation supply and demand calculations for the relevant case study SLAs.

5.4.2.1 Business-as-usual (BAU) scenario

The Business-as-usual scenario models how future settlement patterns might appear if planning regulations do not change and policy settings do not influence demographic trends as represented in *Victoria in Future* population and dwelling projections.

Land supply in the BAU scenario is determined by current subdivision rules under planning zones and schedules, and whether the lot is large enough to be built on. Table 10 shows the minimum areas required for subdivision into child lots and construction of a dwelling in the different rural zones.

Table 10 Minimum areas for development by planning zone[26]

Zone	Minimum lot area for construction of a dwelling (ha)	Minimum parent lot area for subdivision (ha)
Farming	None	40 to 100
Rural Conservation	None	40 to 100
Rural Living	None	2 to 8
Township	None	0.4
Urban Growth	None	0.067
Comprehensive Development	None	0.067

The model assumes that a permit will be granted for all applications to build a new

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[26] See Table 45 in Fish et al (2014).

dwelling in this scenario, so no minimum lot size applies.[27]

Victoria in Future defines business as usual demand for dwellings to 2041.

This scenario assumes that employment is dispersed across the study region and that many residents will commute to work.

Demand is then compared to the Business-as-usual land supply. Development pressure is assumed to be strongly influenced by infrastructure, proximity to Melbourne and to well-serviced settlements. The model assumes that demographic trends will continue to influence development patterns and will reinforce past patterns of residential construction in rural areas. Areas identified for growth in the Urban Development Program have some influence on where development takes place and environmental factors continue to attract people across the study region.

5.4.2.2 Rural preservation scenario

This scenario aims to significantly reduce residential development in the rural landscape through modelling different zoning rules on rural lots.

The main tool used is minimum parent lot sizes for eligibility for dwelling construction, and for rural subdivision to reduce the capacity of development of surplus lots and rural land supply. Table 11 summarises these minimum sizes by zone.

Table 11 Minimum areas for development by planning zone

Zone	Minimum lot area for construction of a dwelling (ha)	Minimum parent lot area for subdivision (ha)
Farming	40	40
Rural Conservation	40	40
Rural Living	16	16
Township	None	0.05
Urban Growth	0.04	0.04
Comprehensive Development	0.04	0.04

This scenario uses the same land supply calculation method as Business-as-usual to produce a reduced overall development capacity for rural areas.

This calculation also contributes to changing the areas defined as rural and urban (see 5.2 Defining rural and urban areas, above) which alters the splitting of projected demand. Demand for rural dwellings in *Victoria in Future* is recalculated for this scenario using the reduced proportion of lots available for development. For example, if 90 per cent of BAU rural lots in one particular SLA are not able to be developed under this scenario's rules, the dwelling count also reduces by 90 per cent. This produces a new, smaller rural dwelling count for that SLA and rural demand is recalculated in relation to the reduced area available for new dwellings.

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[27] This is consistent with the Buxton, Alvarez et al (2011) project method.

The remaining BAU demand for rural dwellings must now be met in urban areas. This is referred to as the rural transferred demand and is discussed further in section 5.4.2.4.

This scenario's rural demand is then distributed across the study region using development pressure criteria which assumes that Ballarat, Bendigo and other smaller settlements will attract strong growth if they are well-serviced with good transport and social infrastructure. **The available rural lots close to the regional centres and other well-serviced settlements are expected to be developed first.** These rural lots are two hectares or larger in the Urban Growth and Comprehensive Development zones, and those over 500sqm in Township zones. Identified growth areas in the State government's Urban Development Program will also have a strong influence on development pressure.

Under this scenario, environmental attractors only play a minor role in attracting people into areas across the study region and past demographic trends will have little influence over settlement patterns. These reflect the stronger interventionist approach of this scenario which increases the role of urban settlements and reduces the opportunity for rural residential development.

5.4.2.3 Tenement control scenario

This scenario also models limiting as well as changing patterns of rural development through reducing rural land supply. It requires a minimum land size for multiple lots held by single owners for the purpose of construction of a new dwelling. Two sub-scenarios are modelled: a minimum land size comprising a collection of lots held by the same owner totalling 25 hectares or 40 hectares.

In this scenario, therefore one land owner must own lots which total at least 25 or 40 hectares to qualify for the construction of one dwelling. The landowner is also only able to subdivide a parent lot into child lots which have a minimum area of 25 or 40 hectares. The model, in effect, amalgamates the lots owned by one person for the purpose of construction of a dwelling while retaining land titles.[28]

The minimum area rules are then applied to the remaining jointly owned area to calculate development capacity.Table 12 identifies the relevant rural zone area rules.

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[28] Less than five per cent of multiple parcels owned by one person are not contiguous. They can be separated by over 100 metres to several kilometres. However the modelling could not systematically filter these parcels out. They are included and treated in the same manner as contiguous multiple parcels holdings by one owner with the same tenement control restrictions applied as for the majority of parcels. This results in an overestimation of the impact of the Tenement control scenario. Refer to Section 4.3 in Fish et al (2014) for further details.

Table 12 Minimum areas for development by planning zone for jointly owned lots only

Zone	SUB-SCENARIO A – 40 HA		SUB-SCENARIO B – 25 HA	
	Minimum lot area for construction of a dwelling (ha)	Minimum lot area for construction of a dwelling (ha)	Minimum parent lot area for subdivision (ha)	Minimum parent lot area for subdivision (ha)
Farming	40	40	25	25
Rural Conservation	40	40	25	25
Rural Living	40	40	25	25
Township	40	40	25	25
Urban Growth	40	40	25	25
Comprehensive Development	40	40	25	25

The development capacity of the remaining rural lots which are not jointly owned are modelled according to current planning zone and schedule controls as described in the Business-as-usual scenario.

As with the Rural preservation scenario, these two sub-scenarios reduce the amount of rural land available for residential development and therefore reduce the amount of demand which can be satisfied in rural areas. The revised rural proportions are then applied to the rural dwelling count to calculate revised rural demand for each SLA, as described in section 1.3.2, for the 25 hectare and 40 hectare sub-scenarios.

As with the Rural preservation scenario, this scenario also has demand for residential development which can no longer be met in the rural areas and is transferred to urban areas. This discussed in the next section.

Modelling development pressure and likely lot-take-up is beyond the current scope of this study for these two sub-scenarios.

5.4.2.4 Transferring rural demand to urban settlements

Urban areas have their own BAU VIF demand based on the BAU rural and urban dwelling counts as described in section 1.2 Calculating future dwelling demand.

Under both the Rural preservation and Tenement control scenarios, the rural and urban proportions are recalculated based on the reduced rural land supply as described in section 5.2. Rural lot supply is reduced by applying the scenario rules for minimum lot sizes for the construction of a dwelling and subdivision as described in sections 5.4.2.2 Rural preservation scenario and 5.4.2.3 Tenement control scenario.

Under these two scenarios, reducing the available land supply for rural development also affects the proportion of demand for dwellings which can be met in the rural areas. The reduced demand calculations are described in section 5.3 Calculating

future dwelling demand.

5.4.2.4.1 Rural preservation and transferred rural demand to urban settlements

For the Rural preservation scenario, each SLA's rural transfer demand is calculated and then aggregated to an LGA total. Each SLA's rural transfer amount is then distributed among its LGA's urban settlements proportional to their urban lot count.[29] For example, the transferred rural demand from Moorabool Shire's three SLAs shifts proportionately to settlements in the following order: Bacchus Marsh, Ballan, Hopetoun Park, Gordon and Parwan. Local government areas, their constituent statistical local areas and the urban settlements in each area are listed in Table 13. The order of settlements also reflects the size order of urban lot count within each LGA which is summarised in Table 14. This is also represented spatially in Figure 20.

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[29] See Fish et al (2014) for discussion of SLA versus LGA approach to distributing transferred rural demand.

Figure 20 Settlements to which rural demand is transferred in Rural preservation scenario
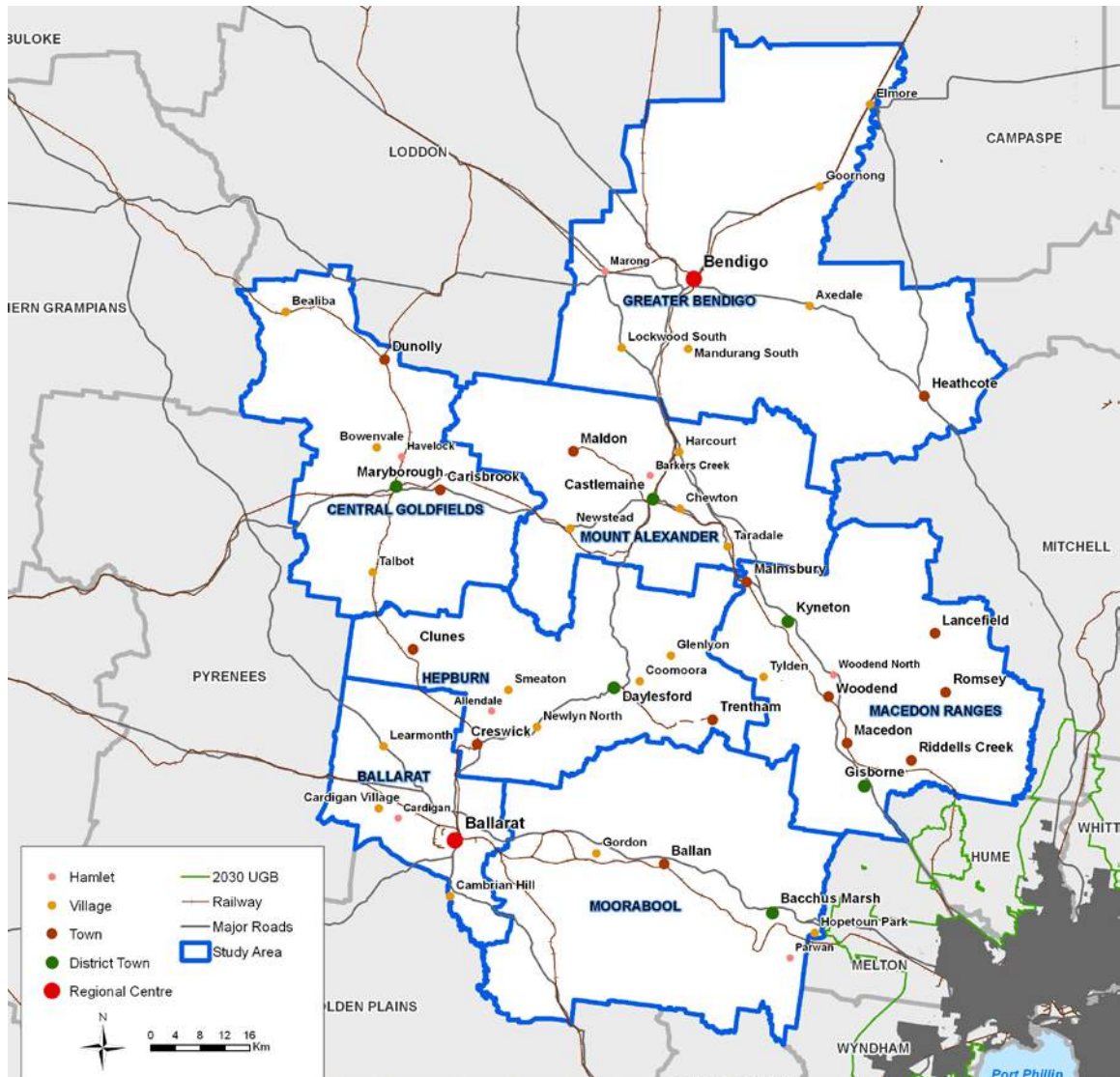
Source: Victorian Government 2013

As Table 13 shows, some towns are located in more than one SLA: the LGA approach makes the transfer and proportional allocation of the rural transfer based on overall settlement lot count straightforward. Malmsbury is the only town in more than one LGA but the majority of its lots are in Macedon Ranges Shire so its rural transfer amount is allocated to that council area.

Table 13 Settlement hierarchy by SLA

Local government area	Statistical local areas	Settlement	Hierarchy
City of Ballarat	Ballarat (C) - Central	Ballarat	Regional Centre
	Ballarat (C) - Inner North	Ballarat	Regional Centre
	Ballarat (C) - South	Ballarat	Regional Centre
	Ballarat (C) - North	Learmonth	Village
	Ballarat (C) - Inner North	Cardigan Village	Village
	Ballarat (C) - South	Cambrian Hill	Village
	Ballarat (C) - Inner North	Cardigan	Hamlet
Central Goldfields Shire	C. Goldfields (S) - M'borough	Maryborough	District Town
	C. Goldfields (S) Bal	Maryborough	District Town
	C. Goldfields (S) Bal	Dunolly	Town
	C. Goldfields (S) Bal	Carisbrook	Town
	C. Goldfields (S) Bal	Talbot	Village
	C. Goldfields (S) Bal	Bowenvale	Village
	C. Goldfields (S) Bal	Bealiba	Village
	C. Goldfields (S) Bal	Havelock	Hamlet
City of Greater Bendigo	Gr. Bendigo (C) - Central	Bendigo	Regional Centre
	Gr. Bendigo (C) - Eaglehawk	Bendigo	Regional Centre
	Gr. Bendigo (C) - Inner East	Bendigo	Regional Centre
	Gr. Bendigo (C) - Inner North	Bendigo	Regional Centre
	Gr. Bendigo (C) - Inner West	Bendigo	Regional Centre
	Gr. Bendigo (C) - Pt B	Bendigo	Regional Centre
	Gr. Bendigo (C) - S'saye	Bendigo	Regional Centre
	Gr. Bendigo (C) - Pt B	Heathcote	Town
	Gr. Bendigo (C) - Pt B	Elmore	Village
	Gr. Bendigo (C) - Pt B	Goornong	Village
	Gr. Bendigo (C) - Pt B	Axedale	Village
	Gr. Bendigo (C) - Pt B	Mandurang South	Village
	Gr. Bendigo (C) - S'saye	Mandurang South	Village
	Gr. Bendigo (C) - Inner West	Lockwood South	Village
	Gr. Bendigo (C) - Pt B	Lockwood South	Village
	Gr. Bendigo (C) - Inner West	Marong	Hamlet
	Gr. Bendigo (C) - Pt B	Marong	Hamlet
Hepburn Shire	Hepburn (S) - East	Daylesford	District Town
	Hepburn (S) - West	Creswick	Town
	Hepburn (S) - West	Clunes	Town
	Hepburn (S) - East	Trentham	Town
	Hepburn (S) - East	Malmsbury	Town
	Hepburn (S) - East	Coomoora	Village
	Hepburn (S) - West	Newlyn North	Village
	Hepburn (S) - East	Glenlyon	Village
	Hepburn (S) - West	Smeaton	Village
	Hepburn (S) - West	Allendale	Hamlet

Local government area	Statistical local areas	Settlement	Hierarchy
Macedon Ranges Shire	Macedon Ranges (S) Bal	Gisborne	District Town
	Macedon Ranges (S) - Kyneton	Kyneton	District Town
	Macedon Ranges (S) Bal	Woodend	Town
	Macedon Ranges (S) - Romsey	Romsey	Town
	Macedon Ranges (S) - Romsey	Riddells Creek	Town
	Macedon Ranges (S) - Romsey	Lancefield	Town
	Macedon Ranges (S) Bal	Macedon	Town
	Macedon Ranges (S) - Kyneton	Malmsbury	Town
	Macedon Ranges (S) - Kyneton	Tylden	Village
	Macedon Ranges (S) Bal	Woodend North	Hamlet
Moorabool Shire	Moorabool (S) - Bacchus Marsh	Bacchus Marsh	District Town
	Moorabool (S) - Ballan	Ballan	Town
	Moorabool (S) - Bacchus Marsh	Hopetoun Park	Village
	Moorabool (S) - Ballan	Gordon	Village
	Moorabool (S) - Bacchus Marsh	Parwan	Hamlet
Mount Alexander Shire	Mount Alexander (S) - C'maine	Castlemaine	District Town
	Mount Alexander (S) Bal	Castlemaine	District Town
	Mount Alexander (S) Bal	Maldon	Town
	Mount Alexander (S) Bal	Newstead	Village
	Mount Alexander (S) Bal	Chewton	Village
	Mount Alexander (S) Bal	Harcourt	Village
	Mount Alexander (S) Bal	Taradale	Village
	Mount Alexander (S) Bal	Barkers Creek	Hamlet

Source: Planisphere 2009

Table 14 Urban lot count

Settlement type	Urban lot count
Hamlet	Under 25
Village	25 to 500
Town	501 to 3,000
District Town	3,001 to 10,000
Regional Centre	Over 10,001

5.4.2.4.2 Tenement control and transferred rural demand to urban settlements

The Tenement control scenario includes an additional step which preferences the transfer of rural demand to larger, well-serviced urban settlements. It uses the hierarchy based on an urban lot count (Planisphere 2009). This transferred rural demand is not allocated to any villages or hamlets and is only transferred to towns and district towns with a train service. The eligible settlements are shown on Figure 21 and Table 15. As with the Rural preservation scenario, this transferred demand is allocated proportionately by the lot count but only for the eligible urban settlements. This is done for both the 25 hectare and 40 hectare sub-scenarios.

Figure 21 Settlements to which rural demand is transferred in Tenement control scenario
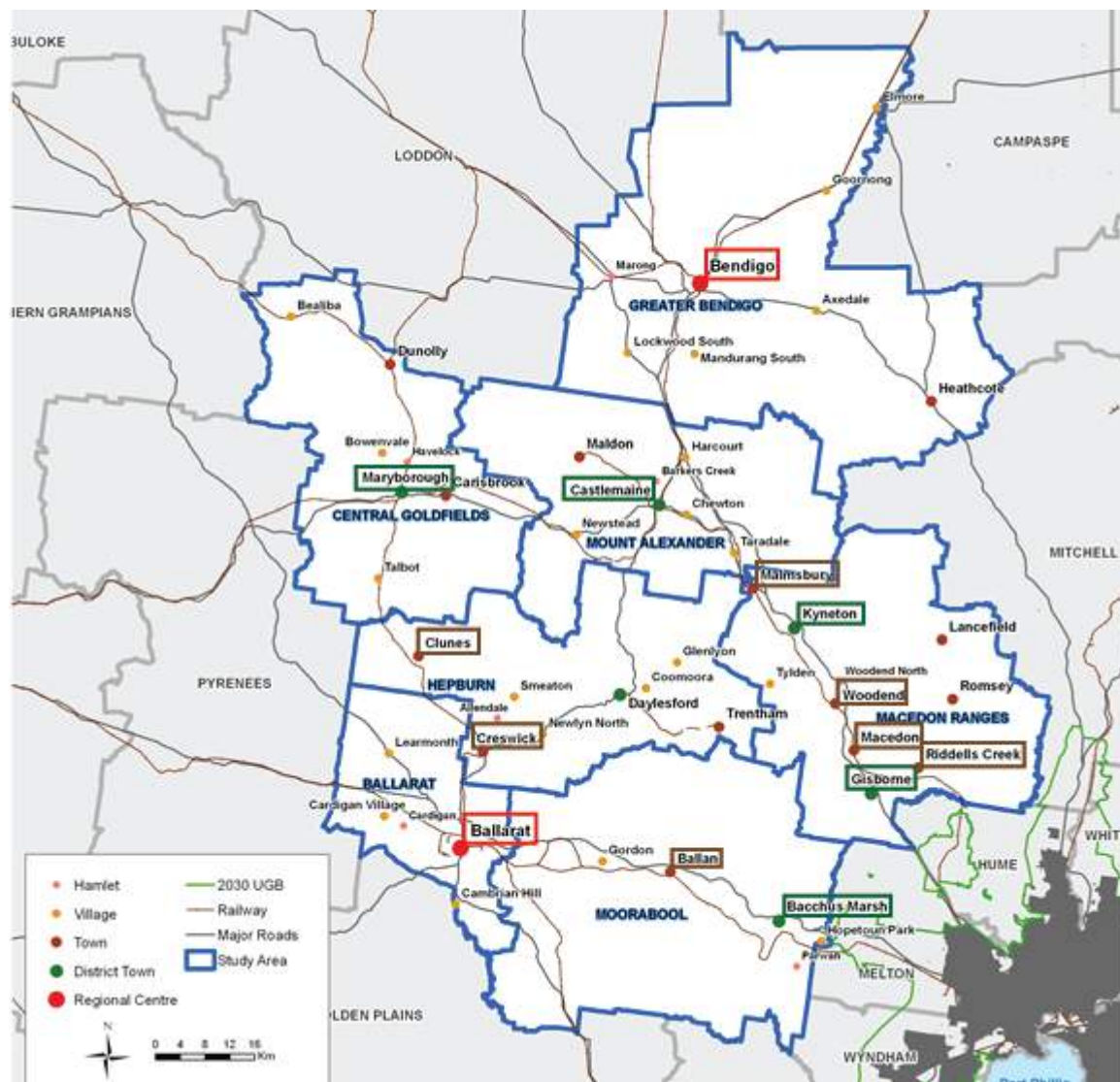
Source: Victorian Government 2013

Table 15 Eligible settlements for rural transfer demand under Tenement control scenario

Local government area	Statistical local areas	Settlement	Hierarchy
City of Ballarat	Ballarat (C) - Central	Ballarat	Regional Centre
	Ballarat (C) - Inner North	Ballarat	Regional Centre
	Ballarat (C) - South	Ballarat	Regional Centre
Central Goldfields Shire	C. Goldfields (S) - M'borough	Maryborough	District Town
	C. Goldfields (S) Bal	Maryborough	District Town
	C. Goldfields (S) Bal	Dunolly	Town
	C. Goldfields (S) Bal	Carisbrook	Town
City of Greater Bendigo	Gr. Bendigo (C) - Central	Bendigo	Regional Centre
	Gr. Bendigo (C) - Eaglehawk	Bendigo	Regional Centre
	Gr. Bendigo (C) - Inner East	Bendigo	Regional Centre
	Gr. Bendigo (C) - Inner North	Bendigo	Regional Centre
	Gr. Bendigo (C) - Inner West	Bendigo	Regional Centre
	Gr. Bendigo (C) - Pt B	Bendigo	Regional Centre
	Gr. Bendigo (C) - S'saye	Bendigo	Regional Centre
	Gr. Bendigo (C) - Pt B	Heathcote	Town
Hepburn Shire	Hepburn (S) - East	Daylesford	District Town
	Hepburn (S) - West	Creswick	Town
	Hepburn (S) - West	Clunes	Town
	Hepburn (S) - East	Trentham	Town
	Hepburn (S) - East	Malmsbury	Town
Macedon Ranges Shire	Macedon Ranges (S) Bal	Gisborne	District Town
	Macedon Ranges (S) - Kyneton	Kyneton	District Town
	Macedon Ranges (S) Bal	Woodend	Town
	Macedon Ranges (S) - Romsey	Romsey	Town
	Macedon Ranges (S) - Romsey	Riddells Creek	Town
	Macedon Ranges (S) - Romsey	Lancefield	Town
	Macedon Ranges (S) Bal	Macedon	Town
	Macedon Ranges (S) - Kyneton	Malmsbury	Town
Moorabool Shire	Moorabool (S) - Bacchus Marsh	Bacchus Marsh	District Town
	Moorabool (S) - Ballan	Ballan	Town
Mount Alexander Shire	Mount Alexander (S) - C'maine	Castlemaine	District Town
	Mount Alexander (S) Bal	Castlemaine	District Town
	Mount Alexander (S) Bal	Maldon	Town

5.4.2.4.3 Density analysis of urban demand

For both the Rural preservation (RP) and Tenement control (TC - 25 hectare only) scenarios, basic density analysis shows the change required to accommodate this transferred rural demand within the study region's urban settlements. As the available data does not include information as to whether an urban lot already contains a house, an indicative measure of density is calculated in the following way:

1. The area of each urban settlement's residential zones[30] is divided by the 2011 VIF dwelling number providing an approximate measure of current residential density
2. The same area is divided by the 2041 BAU demand, the 2041 RP and the 2041 TC (25ha) demand to indicate approximate dwelling densities required to accommodate projected dwelling growth, without councils having re-zoned for residential uses between 2011 and 2041

This approach gives a general indication as to whether the Business-as-usual growth and the additional growth arising from transferring rural demand to townships under the two alternative rural scenarios will dramatically change township residential densities. A short case study on Kyneton examines the more local implications of and opportunities for more growth and higher density residential development.

The results and comparisons of each scenario are presented in the Results section and implications for councils, policy makers and land owners are outlined in the Discussion section.

5.5 Urban settlement scenarios

The scenarios presented in Section 1.3 analyse the rural landscape and transfer some demand into urban settlements in the study region. This section looks in more detail at land supply and demand within urban areas through a number of consequential scenarios. These demonstrate that existing land supplies can meet projected dwelling demand if residential development occurs at higher than current densities. This should eliminate the need to rezone rural land beyond existing urban areas to accommodate future residential growth.

This urban work has two parts:
- the first, *Regional Housing Futures*, evaluates demand and supply in Ballarat, Bendigo, Ballan and Castlemaine using a variety of density assumptions for infill and greenfield land in four different scenarios (Groenhart et al 2013); and,
- the second examines a range of scenarios for different densities of development in various locations in **Bendigo**, and compares these to the demand calculations from the *Regional Housing Futures* work.

The next section discusses the *Regional Housing Futures* work on projecting dwelling demand, identifying land supplies and density assumptions for the different types of land. The following section turns to Bendigo and the methods used in analysing a variety of housing futures for that regional centre.

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[30] Note that this is a smaller area than the urban parcels cover. The urban parcel count includes parcels in all urban zones – residential, business, mixed use, industrial, etc.

5.5.1 *Regional Housing Futures* (Groenhart et al 2013)

This part of the project models the impact of alternative approaches to residential development on a defined land supply. Four case studies are modelled using *Victoria in Future* population projections and three scenarios. The case studies are Bendigo in the City of Greater Bendigo, Ballarat in the City of Ballarat, Castlemaine in the Shire of Mount Alexander and Ballan in the Shire of Moorabool. The scenarios are: *Business as usual* under existing planning controls*; Urban density*; and, increased settlement *Fringe Density*. The results of each scenario are reported on their land consumption over time in comparison to the identified land supply in the *Urban Development Program* (UDP) (DPCD 2011). The overall method used is summarised in Figure 22.

Figure 22 Method for *Regional Housing Futures*
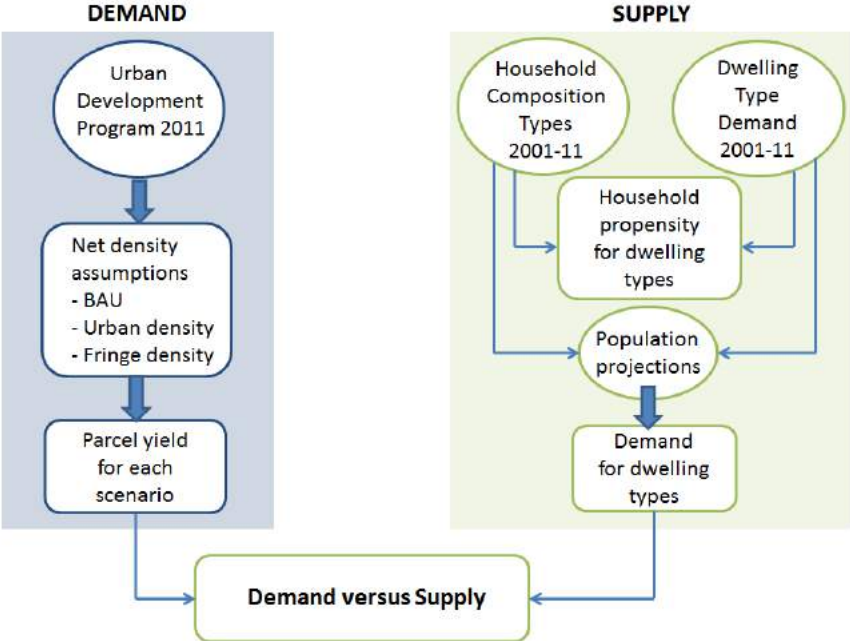
The following sections discuss in detail the demand and supply components and calculations represented in the diagram above.

5.5.1.1 Demand for dwellings in the case study urban areas

This analysis uses the proportions for land designated as rural and urban as described in 5.2. These proportions then determine the share of the forecast growth in occupied dwellings to 2041 for urban and rural areas.

Victoria in Future includes only counts of dwellings: it has no detail on projected household types (at the SLA level) or dwelling types. This modelling work examines household and dwelling type trends from the 2001, 2006 and 2011 censuses for each of the case study towns to determine the past propensities of particular kinds of households to live in certain types of dwellings. These propensities are then applied into the future to 2041, using the projected dwelling data for each town, to determine future demand for different types of new homes. Table 16 shows the different household and dwelling types.

Table 16 Household and dwelling types

Household type	Dwelling type
Couple family with children	Separate house
Couple family without children	Townhouse
One parent family	Flat, unit or apartment
Other family	Other dwelling
Group household	Not stated
Lone person household	

5.5.1.2 Urban land supply for the case study towns

In 2010 and 2011 DPCD collected unique land supply data from regional Victorian councils, using the same methodology as for the metropolitan Melbourne *Urban Development Program* (UDP) (DPCD 2011). This part of the project uses the residential data as the land supply information the four case study towns. It includes data on sites in the development pipeline on broadhectare (greenfield), major and minor / township infill lots.

5.5.1.3 *Regional Housing Future* scenarios

The ability of the UDP land supply to accommodate projected demand by dwelling type was analysed as part of this project using three scenarios:

- The *Business as usual* (BAU) scenario has a high proportion of future housing as low density detached houses.
- The *Urban density* scenario has higher proportions of townhouses and apartments, and lower proportions of low density detached houses.
- The *Fringe density* scenario models higher densities in broadhectare areas as compact detached dwellings (Groenhart et al 2013).

Table 17 shows the various density assumptions by scenario.

Table 17 Net density assumptions (site plus roads and half public road frontage)

	Apartment	Townhouse	Compact detached	BAU detached	Total
Dwellings per hectare	70	35	20	15	
Scenario 1 BAU					
Minor Infill / Township	5%	5%	30%	60%	100%
Major Infill		5%	25%	70%	100%
Broadhectare				100%	100%
Scenario 2 Urban density					
Minor Infill / Township	10%	40%	40%	10%	100%
Major Infill	10%	40%	40%	10%	100%
Broadhectare			70%	30%	100%
Scenario 3 Fringe density					
Minor Infill / Township	5%	15%	60%	20%	100%
Major Infill	5%	15%	60%	20%	100%
Broadhectare			80%	20%	100%

These scenarios are represented graphically in Figure 23.

Figure 23 *Regional Housing Futures* scenarios – land supply types and density
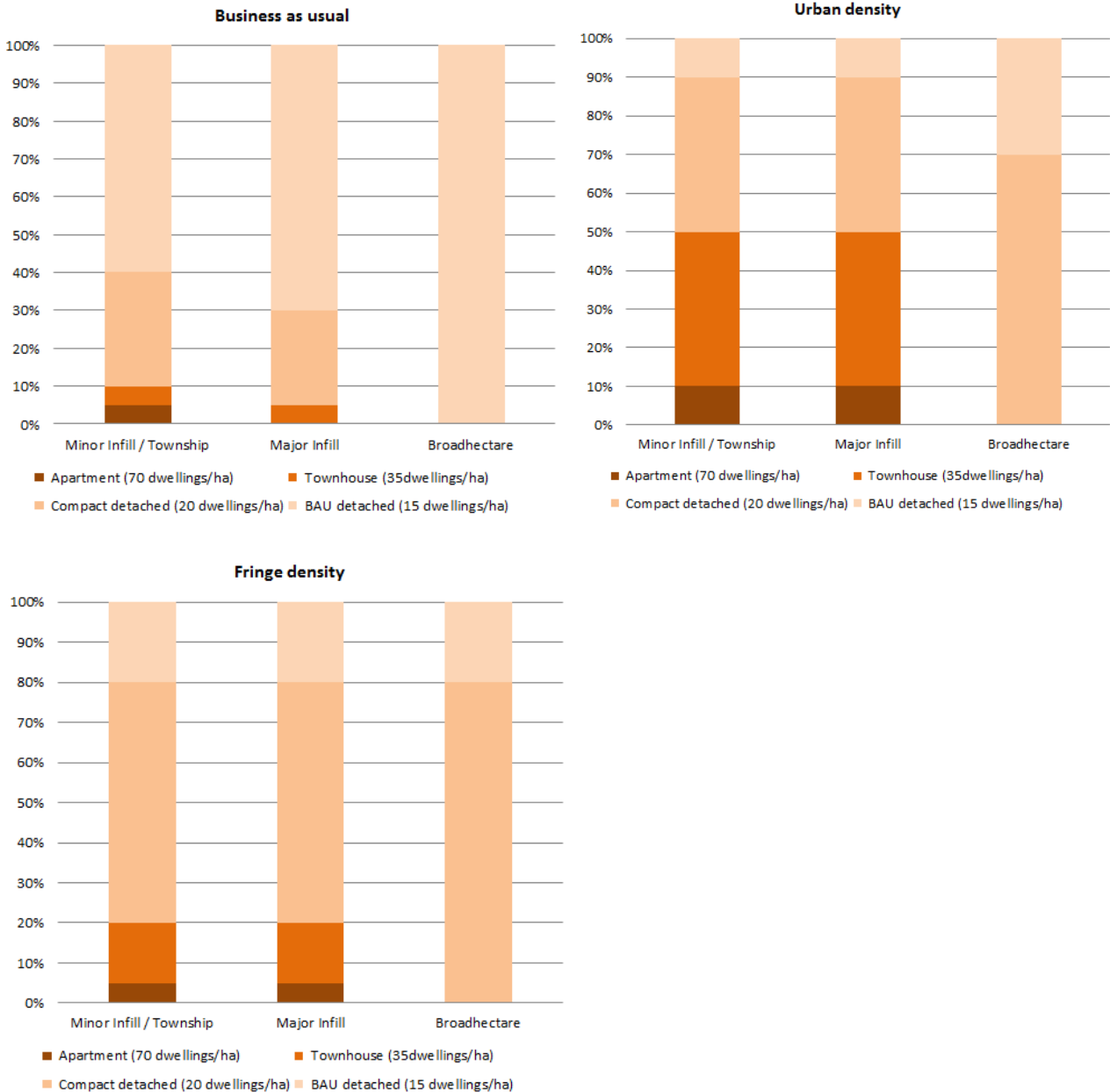
In each scenario, the model calculates the year by which land supply would be exhausted in each of the towns, given the density assumptions for dwelling types, land supply and projected dwelling demand growth.

This work is useful as one approach to predicting demand for dwelling types in urban settlements in the study region. However, it assumes that dwelling preferences will not change from those expressed in the past by particular household types. This work also gives an important insight into overall dwelling yields and the longevity of an identified land supply. It does not attempt a comprehensive analysis of all urban land in the four settlements but focuses on the current and future land supply

identified in the *Urban Development Program* (DPCD 2011).

5.5.2 Bendigo's Housing Futures

While the UDP data collected by DPCD is invaluable for land supply analysis, the Department does not intend to repeat the process in regional Victoria. It expects local councils to take responsibility for future data collection and analysis. The City of Greater Bendigo is currently reviewing its residential development strategy and has used this as an opportunity to update its residential land supply information.

The Bendigo scenarios examine possible development outcomes in particular parts of the city's urbanised (or urbanising) areas such as the fringe, local activity centres and the central business districts. This contrasts with the *Regional Housing Futures* approach which looked at scenarios using UDP land across the whole of the four urban areas.

The City of Greater Bendigo has also commissioned MSG Architects to examine three redevelopment sites to assess their development capacity and possible built form. They are unlikely to carry out such assessment on every lot that has few constraints on development or the likely take up of specific sites. This project takes a systematic approach to doing so using GIS to analyse fringe, infill and the central business district areas of the city.

5.5.2.1 Dwelling demand and supply in Bendigo

Regional Housing Futures demand calculations are used to test whether the updated land supply and scenarios are sufficient to meet Bendigo's projected growth (Groenhart et al 2013). For dwelling supply, the project differs to the *Regional Housing Futures* work (above) as it does not limit analysis to available land or land identified by councils as specifically available for development within a defined time period as occurs in the UDP. Rather all lots are assumed to be available for development, given the various assumptions that apply to each scenario. This is done partly because of the relatively few vacant lots currently in Bendigo. It also indicates the development potential of existing urban lots. No specific timeline on development is calculated.

This approach is possible as the City of Greater Bendigo (COGB) has shared detailed lot data from its *GIS model* (along with extracts from its property database). The COGB has developed criteria to indicate the likelihood of individual lot development given planning zone and overlay, infrastructure and access constraints. Less than five per cent of all lots are currently vacant and the remaining lots currently have uses which generally conform to their planning zone. These criteria are illustrated in Table 25 and are discussed in more detail in the specific scenarios which use this data. Planning zone information for individual lots is also from Vicmap (Victorian Government 2013).

5.5.2.2 Development scenarios in Bendigo

A range of scenarios use the land supply information to test different approaches to development within Bendigo as shown in Table 18. These each have different goals which are discussed in their individual sections, but they also show the overall impact of increasing allowable or even required densities on development yields.

Table 18 Summary of urban scenarios

Scenario	Description
Business as usual broadhectare	Residential development at current trend densities
Higher density broadhectare	Maximum yield possible of all lots over one hectare at 25 dwellings per hectare
Dual occupancy infill	Development on existing occupied and vacant residential lots between 700 and 1,000 square metres
Activity centre infill	Development occurs on sites within 400 metre radius of lots zoned for business
Residential infill	Development occurs on residential sites identified as green by COGB in their GIS model
Redevelopment on non-residential land	Residential development occurs on infill sites zoned business and industrial (outside the CBD)
Central Bendigo redevelopment	Mixed use development on CBD lots

Each of the scenarios uses a unique set of lots as the land supply. That is, the land supply does not overlap between scenarios. For example, no lots within 400 metres of a business zone are included in the dual occupancy scenario.

These scenarios do not model a specific dwelling on individual lots but rather deal with gross land supply and the number of dwellings that could be built on that area at the given net residential densities.

The *Central Bendigo redevelopment scenario* is the one exception given the complexity of lots and mix of uses. For the other scenarios, details about site subdivision, dwelling orientation, services and other factors that would have a more local influence on yields are not addressed but are an opportunity for future research.

The scenarios also do not consider development over time. Rather they indicate a complete use of urban land under the various assumptions. They therefore show overall development potential of Bendigo's land supply as defined by the scenarios in this section of the project. This differs to the UDP land supply used in the *Regional Housing Futures* work. The dwelling supply result of each *Regional Housing Futures* scenario using Bendigo land is compared to dwelling demand (also calculated in *Regional Housing Futures*) (Groenhart et al 2013). This indicates whether one or multiple scenarios will be needed to satisfy demand for new dwellings in Bendigo to 2041.

As calculated in 1.3.2.2 and 1.3.2.3, the transferred rural demand from the Rural preservation and Tenement control rural scenarios is also added to Bendigo's projected dwelling demand to analyse the city's capacity to accommodate that extra demand for new homes to 2041. This is done for each Bendigo scenario.

5.5.2.3 Boundaries for fringe / broadhectare, infill and the CBD of Bendigo

Before explaining the detailed methodology for each scenario, the definition of boundaries must be outlined as this influences how the scenarios operate.

Bendigo's urban area is defined by lots with an urban zoning as shown in Table 19 below and by Figure 24 by the red border. This relates directly to the definition of rural and urban areas through zoning as described in 5.2. The blue borders indicate ABS suburbs, some of which extend well beyond this project's definition of the city's urban area.

Table 19 Urban planning zones

Planning Zone	Abbreviation
Residential	R1Z
Low density residential	LDRZ, LDRZ1
Mixed-use	MUZ
Industrial	IN1, 3Z
Business (commercial)	B1, 2, 3, 4, 5Z
Public use	PUZ1, 2, 3 4, 5, 6, 7
Public park and recreation	PPRZ
Public conservation and resource	PCRZ
Road	RDZ1, 2
Special use	SUZ1, 2, 3, 4, 5, 6, 9, 10
Urban floodway	UFZ

Source: DTPLI 2014c

Bendigo's broadhectare area includes all lots that are beyond a three kilometre radius of the Town Hall. As shown on the map below, this buffer almost reaches the edge of the urban area to the southeast and south. Nonetheless the broadhectare area does include the corridors to the west, east, north, the area to the northwest and Strathfieldsaye to the southeast.

The 2005 COGB *CBD Strategy* defines the extent of the CBD area (Planisphere et al 2005). This is indicated by the green boundary in Figure 24.

Figure 24 Bendigo: urban area
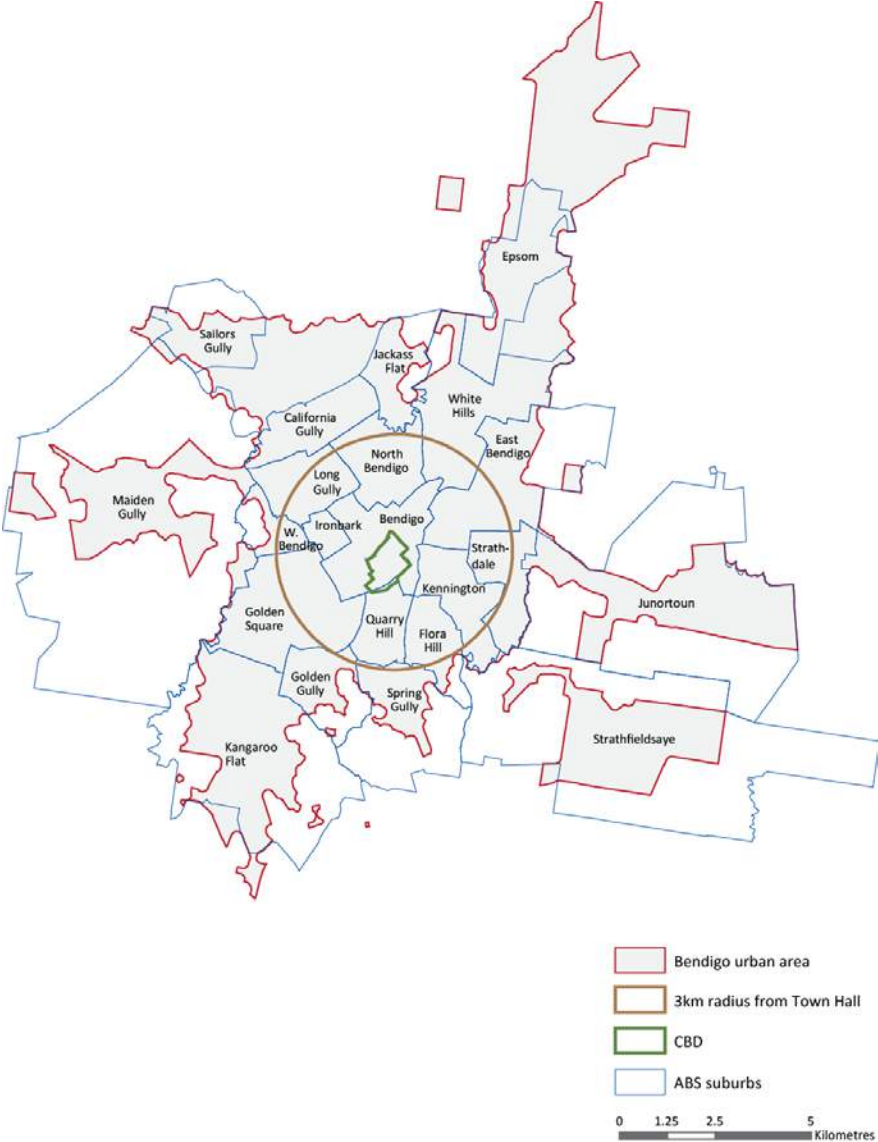
5.5.2.4 Fringe sites: business as usual and future higher density broadhectare scenarios

These two scenarios show how increasing density on the same land supply can significantly increase dwelling numbers. The business as usual scenario uses a density assumption based on recent broadhectare development trends in Bendigo. This density assumption is then increased to 25 dwellings units per hectare to produce a higher density and dwelling supply scenario.[31]

Lots beyond the three kilometre buffer from the Town Hall are defined as broadhectare land supply. Only lots over one hectare are included for consistency with the *Urban Development Program* (UDP). These are the parent lots, which may then be subdivided into a number of child lots. The parent lots are not necessarily

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[31] The United Kingdom's *Planning Policy Guidance 3: Housing*, published in 2000, noted that "New housing development in England is currently built at an average of 25 dwellings per hectare" and that local authorities should "encourage housing development which makes more efficient use of land (between 30 and 50 dwellings per hectare net)." (DETR/TSO 2000, p.15).

vacant: this is a key difference to the UDP. The COGB vacancy data does not include many vacant lots over one hectare so this constraint is not applied.

The lots defined as broadhectare land supply are those with the 2013 residential one (R1Z) and low density residential (LDRZ) planning zones and those with the geographically relevant design development (DDO) and development plan (DPO) overlays. The rules for these DDOs and DPOs are applied within a subscenario to demonstrate their effect. Their geographic areas are included to try to accurately reflect broadhectare land supply. Lots with other overlays such as environmental audit (EAO), heritage (HO), land subject to inundation (LSIO) are excluded which is the general approach for the project's urban analysis (DTPLI 2014c).

BAU densities are calculated from the COGB *Planning Register of Applications Received* (COGB 2014a). Subdivision applications submitted between 2010 and 2013 generally have the parent lot size and number of child lots. Subdivisions of 10 or more lots produce a density of approximately 12 dwellings per hectare. This is assumed to be trend density for the business as usual broadhectare scenario.

Table 20 summarises this scenario's assumptions.

Table 20 Fringe scenarios: assumptions

Criteria	Assumptions
Location of lots	Beyond 3 kilometre buffer from Town Hall
Minimum lot size	One hectare
Zoning	R1Z, LDRZ
Overlays	Only geographically relevant DDO and DPO (insert map)
Vacancy	Insufficient information so all lots included
Density	BAU: 12 dwellings per hectare based on trends in COGB Planning Register (COGB 2014a)
	Higher density scenario: 25 dwellings per hectare

Some examples of current broadhectare subdivisions follow in Figure 25 with their average densities noted as these directly influence the Business as usual density assumption. The third and fourth developments are noted by the City of Greater Bendigo (COGB) as attempting to increase densities: they have a greater range of lot sizes, and lots are generally smaller than the more standard first and second examples.

The built form in broadhectare subdivisions is at least in part influenced by restrictive covenants produced by the land developers. These might include minimum floor areas for houses, such as 120sqm, that building materials must be at least 80 per cent new and 50 per cent brick, and that lots are not to be subdivided further. These covenants are designed to be included on lot titles and expire in six to ten years.

Figure 25 Examples of broadhectare subdivisions

Oakesford Estate, Villawood

Lot sizes: 570 – 981sqm
Average density: 12 dwellings / hectare
Zone: R1Z
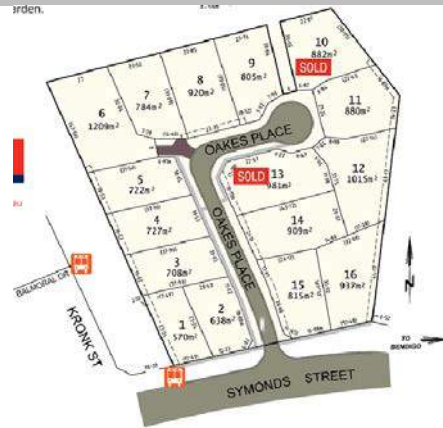
Source: http://www.oakesfordestate.com.au/, accessed 24 May 2013

Atkins Ridge, Villawood

Lot sizes: 414 – 1,952sqm
Average density: 15 dwellings / hectare
Zone: R1Z

Source: http://www.akinsridgestate.com.au/, accessed 24 May 2013

Yellow Gum Estate, YourLand

Lot sizes: 333 – 995sqm
Average density: 17 dwellings / hectare
Zone: R1Z

Source:
http://www.yourland.com/Estates/Current_Estates/YellowGum.aspx, accessed 24 May 2013

Viewpoint, Integra

Lot sizes: 414 – 792sqm
Average density: 21 dwellings / hectare
Zone: R1Z

Source: http://www.viewpointbendigo.com.au, accessed 24 May 2013

5.5.2.5 Dual occupancy infill

This scenario measures the lot and density yield from subdividing larger existing lots into two lots. This dual occupancy approach represents a relatively straightforward and common method of dividing lots in existing urban areas. It also offers opportunities for incremental infill development in newer areas which may have large existing lots suited to two lot subdivision.

In Bendigo, the Planning Register shows that between 2010 and 2013, two lot subdivisions have occurred on lots which are at least 700sqm (COGB 2014a). The lot size assumption for this scenario is for lots sized between 700 and 1,000sqm. Sites over 1,000sqm should have market values to support subdivision into more than just two lots.

This scenario only includes lots zoned R1Z. Lots under all overlays are excluded, except for DPO2 and DPO10 which specifically encourage infill development on their sites. The COGB lot data shows only 260 vacant lots which meet the criteria for this scenario. These lots are assumed to accommodate two new dwellings while the remaining lots can take one additional dwelling.

Table 21 summarises this scenario's assumptions.

Table 21 Dual occupancy infill scenario: assumptions

Criteria	Assumptions
Location of lots	No restriction
Lot size	Between 700 and 1,000sqm
Zoning	R1Z
Overlays	DPO2 and DPO10 (infill sites)
Vacancy	Very few so all lots included
Density	No assumption – calculated from lot yield

The following images in Figure 26 illustrate an eligible lot. As this site is vacant, under this scenario it would yield two dwellings.

Figure 26 Lot eligible for dual occupancy

Site area: 717sqm (approximately 12.5m x 41m)
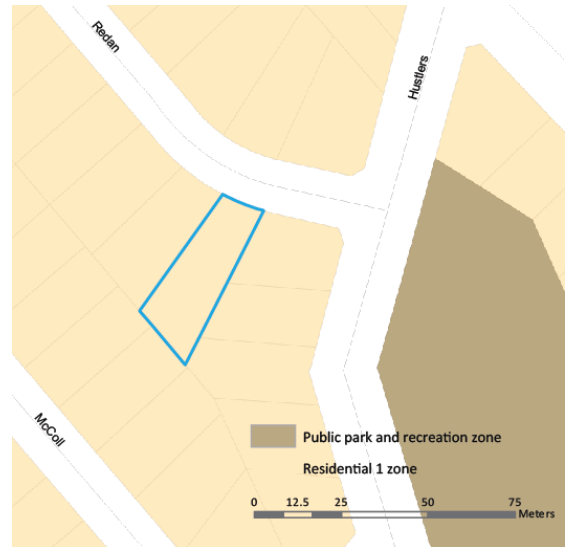
Source: VicMap

Source*:* Google Maps, accessed 25 July 2013

Source:
http://www.dennisfamily.com.au/dual-occupancy/richmond, accessed 25 July 2013

5.5.2.6 Activity centre infill

This scenario identifies sites with residential zoning which are suited to redevelopment into medium density housing within or close to Bendigo's local activity centres. The goal of this scenario is to demonstrate that higher residential densities can be achieved within well located and serviced centres.

The 2013 Business zones (B1Z – B5Z) were used as a proxy for activity centres (see Figure 29 with business zones coloured red). Lots zoned R1Z and MUZ within a 400 metre radius of lots zoned for business are included (see Figure 29 for spatial extent). Even though the new commercial zones in the City of Greater Bendigo's planning scheme allow residential development, no commercial zone lots are included in the scenario's lot sample (DTPLI 2014c). This was to be consistent in testing the adequacy of the supply of residential land supply in comparison with projected demand for dwellings.

The City of Greater Bendigo's planning scheme also includes 400 metres as a standard distance for walking to bus stops and as a required distance to an activity centre for all higher density dwellings. (DTPLI 2014c: 56.03-1, 56.04-1) It is therefore relevant to this scenario and is one of the spatial criteria for selecting eligible lots.

Some of the lots within Bendigo's activity centres are extremely small and would be difficult to develop without site amalgamation. As a result all lots under 150sqm are excluded. Lots already used in the broadhectare scenario are also excluded.

Given the small number of vacant lots found in the dual occupancy scenario, both vacant and occupied lots are considered.

As the COGB land use data does not include detail on dwellings, it does not allow for calculating current residential densities in these types of locations. Instead this scenario uses an assumed density of 35 dwellings per hectare to indicate the possible yield from lots within activity centres. The following examples in Figure 27 illustrate types of dwellings which would achieve at a net density of 36 dwellings per hectare. The first is from Darmstadt, Germany (2004-2006) and the second was built in south west London in the 1970s.

Figure 27 Dwellings with net density of 36 dwellings per hectare
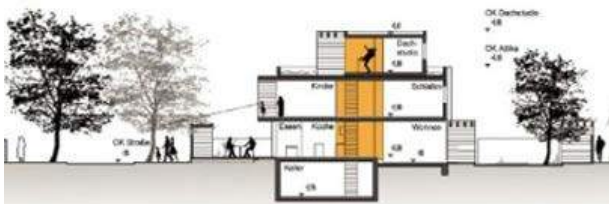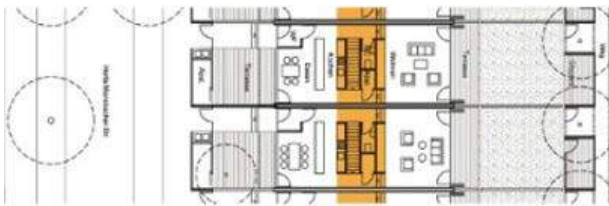
Source: http://www.raum-z.de/index.php?/arcpro/k62/ (accessed 5 November 2013)

Location plan at 1:2500 scale

Source: https://www.london.gov.uk/priorities/planning/research-reports/planning-for-housing-publications, accessed 5 November 2013

Duplex (short block)
Lot: 9 x 17m (150sqm)
Height: 2 storey
Bedrooms: 2
Parking: 1 space in garage
Open space: 30sqm, back yard
Floor area: 85sqm
Net density: 36 dwellings per hectare
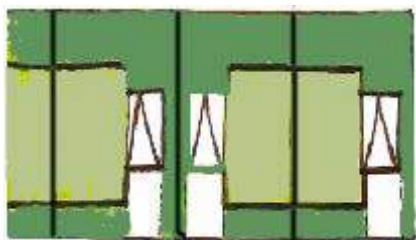
Source*: Landcom 2011

Table 22 summarises this scenario's assumptions.

Table 22 Activity centre infill scenario: assumptions

Criteria	Assumptions
Location of lots	Within 400m of any business zone
Minimum lot size	150sqm
Zoning	R1Z, MUZ
Overlays	Only geographically relevant DPO and DDOs
Vacancy	Very few so all lots included
Density	35 dwellings per hectare

Figure 28 illustrates the planning zones within Bendigo's urban area. Figure 29 then shows the location of Bendigo's business zones and 400 metre buffers around those areas within which sites are analysed for residential development yields. Note that lots within the CBD boundary are not included in this scenario.

Figure 28 Bendigo: all planning zones

	Residential 1 Zone
	Low density residential zones
	Mixed use zone
	Business zones
	Industrial zones
	Public recreation zones
	Public use zones
	Road zones
	Special use zones
	Farm zone

0 0.5 1   2   3   4
Kilometers
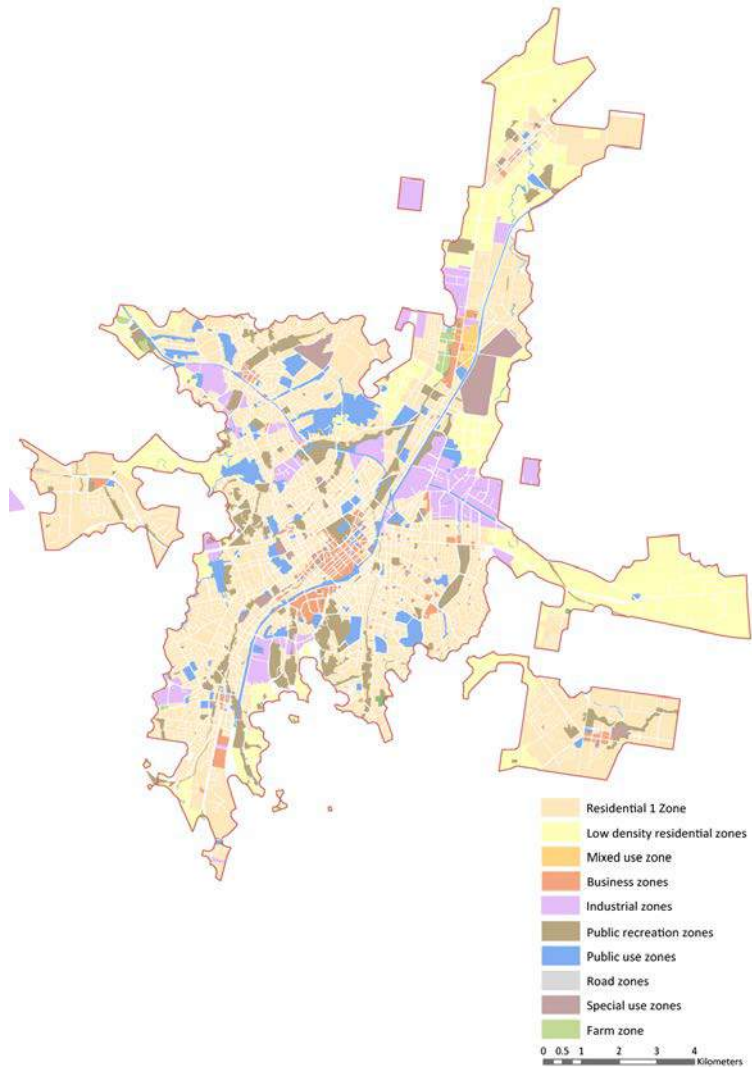
Figure 29 Bendigo: 400 metre buffer from business zones

	400m buffer
	Business 1 Zone
	Business 2 Zone
	Business 3 Zone
	Business 4 Zone
	Business 5 Zone
	Mixed Use Zone
	Residential 1 Zone
	CBD boundary

0 0.5 1   2   3   4
Kilometers
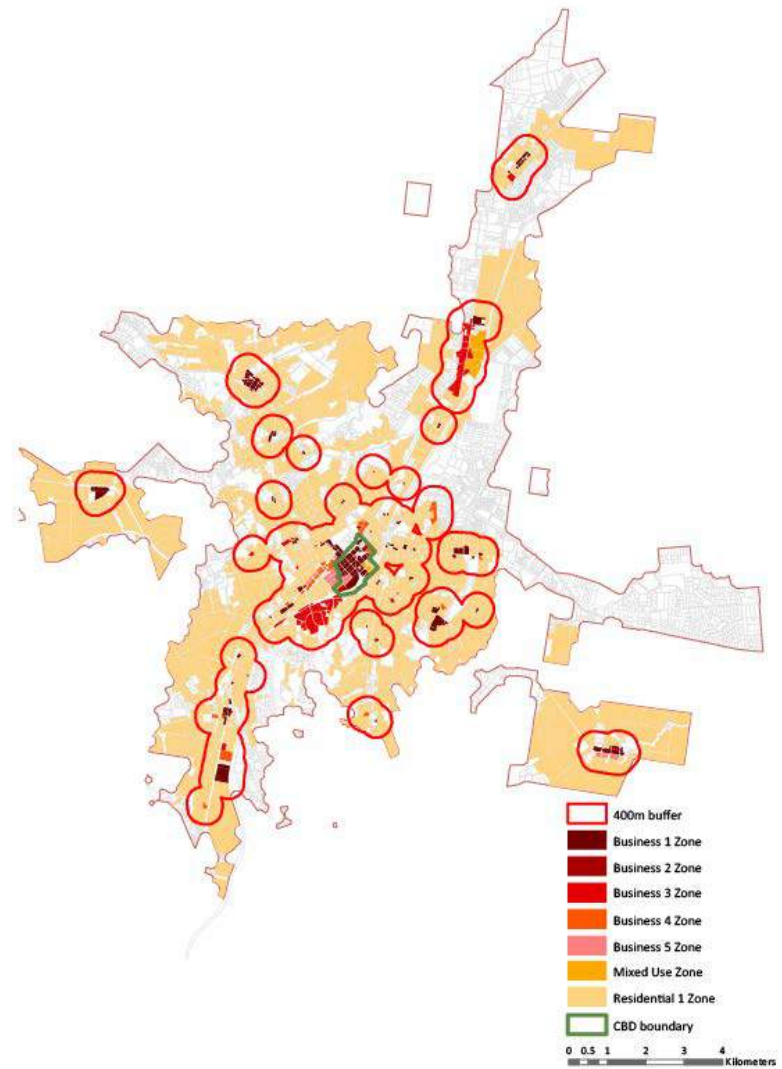
5.5.2.7 Residential infill

The previous two infill scenarios focus on particular types of development and locations. This scenario takes a broader approach to residential infill across Bendigo based on the COGB's own assessment of development potential. This allows the identification of opportunities to increase residential densities that are not limited to broadhectare or activity centre locations or to dual occupancy outcomes.

The COGB has developed a GIS model which identifies currently occupied and unoccupied lots zoned for residential uses which are appropriate for redevelopment under a wide range of criteria. (refer to Table 25 below) For example, sites receive a green rating if they do not have bushfire management or flooding overlays, are within 800m of public transport or within two km of a train station, and have good access to reticulated infrastructure (water, sewerage, gas, electricity, telephone, etc.). Sites must also be over 0.1 hectare or 1,000 square metres in area and the majority currently include dwellings. Figure 30 shows in green the developable lots produced by these criteria. Note that the COGB has a larger urban area than is defined for this project (shown as red outline on map below). The project's urban boundary still applies in the analysis with lots outside that boundary excluded from the calculations.

Figure 30 City of Greater Bendigo GIS model redevelopment sites
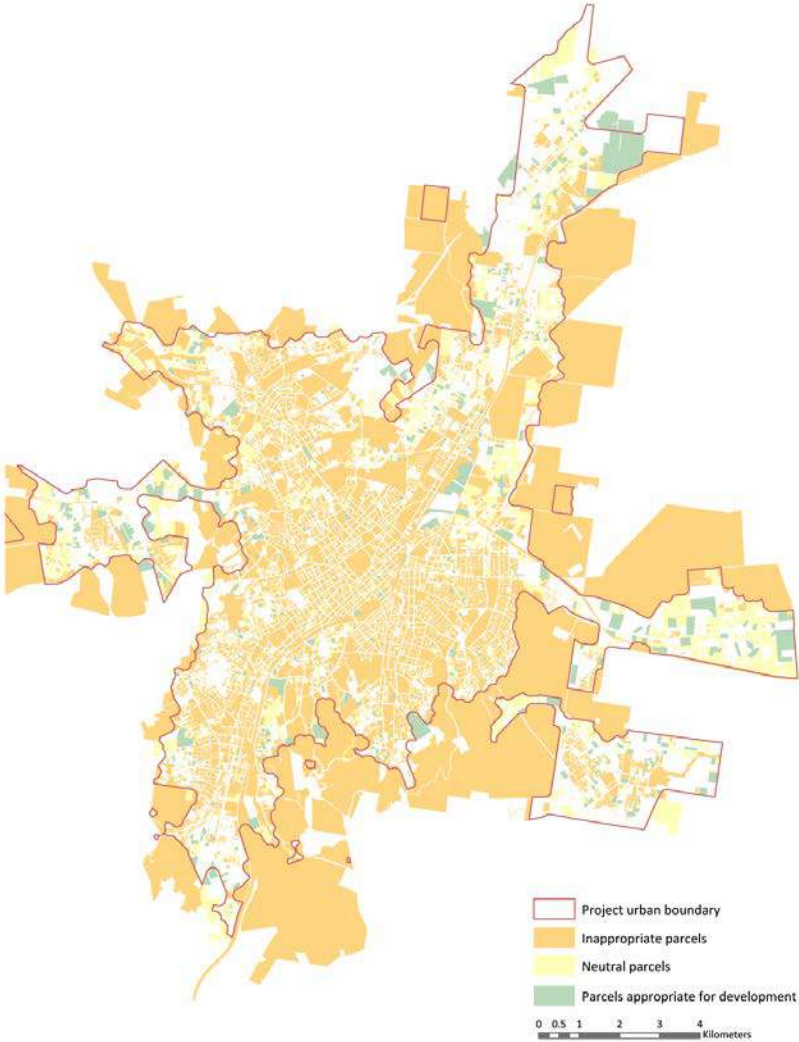
For this scenario, only those sites appropriate for development (shown in green) and zoned R1Z are included. Sites included in the previous scenarios are not considered. If a site has a planning overlay, it is also excluded. The medium density assumption of an average of 35 dwellings per hectare is used again in this scenario.

Table 23 summaries this scenario's assumptions.

Table 23 Residential infill scenario: assumptions

Criteria	Assumptions
Location of lots	Outside CBD
Minimum lot size	1,000sqm
Zoning	R1Z
Overlays	Nil
Vacancy	Included where defined as such by CoGB GIS model
Density	35 dwellings per hectare

5.5.2.8 Other infill redevelopment sites

Opportunities for residential development may exist on land which is not currently zoned for that use. This scenario recognizes that land uses do change over time and that planning zones may be slow to reflect those changes. Land zoned for business or industrial uses may also be located on large lots which may be well suited to larger medium density residential projects although some sites may also have contamination issues. This scenario assumes that if the lots' market value makes residential development viable, then sites remediation will also occur.

This scenario again uses the CoGB GIS model data for green rated sites and criteria from the Residential Infill scenario. (see Table 25) It excludes any lots zoned for residential uses (which represent approximately 80 per cent of the lots in the COGB GIS model).

Table 24 summarises this scenario's assumptions.

Table 24 Other infill redevelopment sites scenario: assumptions

Criteria	Assumptions
Location of lots	Outside CBD
Minimum lot size	1,000sqm
Zoning	NOT R1Z, LDRZ, LDRZ1 or RL
Overlays	Nil
Vacancy	Included where defined as such by CoGB GIS model
Density	35 dwellings per hectare

Table 25 City of Greater Bendigo GIS model

Dataset	Description	Unit	3	2	1	0	-1	-2	-3
Environment									
Bushfire	Based on distance from the revised BMO mapping	Distance in metres				>100	51-100	0-50	Within BMO
Vegetation (EVC)	EVC Conservation Status (check against aerial photos)	Status				Least Concern	Depleted	Vulner-able	Endan-gered
Flooding	Floodway/Flood extent mapping from Exponare.	Flood Type				No Flooding	Localised Flooding	Flood Extent	Flood way
Access									
Public transport	Bus stops, bus routes, school bus routes and taxi ranks	Distance in metres	0-200	201-400	401-800	>800			
Walking	Footpaths	Distance in metres	0-200	201-400	401-800	>800			
Cycling	On and off road paths	Distance in metres	0-200	201-400	401-800	>800			
Major Roads	Includes VicRoads highways and CoGB collector roads	Distance in metres	0-500	501-1000	1001-2000	>2000			
Railway Station	Existing and proposed railway station at Epsom	Distance in metres	0-500	501-1000	1001-2000	>2000			
Infrastructure									
Sewerage	Based on the cost of getting the infrastructure to the site	Distance in metres	0-400	401-800	801-1600	>1600			
Gas	Based on the cost of getting the infrastructure to the site	Distance in metres	0-400	401-800	801-1600	>1600			
Electricity	Based on the cost of getting the infrastructure to the site	Distance in metres	0-400	401-800	801-1600	>1600			
Telephone	Based on the cost of getting the infrastructure to the site	Distance in metres	0-400	401-800	801-1600	>1600			
Sealed road	Based on the cost of getting the infrastructure to the site	Distance in metres	0-400	401-800	801-1600	>1600			
Drainage	Based on the cost of getting the infrastructure to the site	Distance in metres	0-400	401-800	801-1600	>1600			

Dataset	Description	Unit	3	2	1	0	-1	-2	-3
Buffers	To industry, water treatment plant, rural industry	Distance in metres				>1600	801-1600	401-800	0-400
Services									
Activity Centres	Incl. CBD, Regional and Village Centres in retail hierarchy	Distance in metres	0-400	401-800	801-1600	>1600			
Health Services	Includes hospitals, medical centres, primary care	Distance in metres	0-400	401-800	801-1600	>1600			
Primary school/C-care	Includes kindergarten, registered childcare centres	Distance in metres	0-400	401-800	801-1600	>1600			
Secondary/ Tertiary	Public and private	Distance in metres	0-400	401-800	801-1600	>1600			
Passive Open Space	Playgrounds, local, sub-municipal, municipal, regional	Distance in metres	0-200	201-400	401-800	>800			
Active Open Space	Sports grounds, etc	Distance in metres	0-400	401-800	801-1600	>1600			
Land									
Vacant Lots	Residential 1 Zone	Lot size (ha)	>1.0	0.1-1.0 (vacant)	0.1-1.0 (house)	<0.1			
Vacant land (other)	Not Residential 1 Zone	Lot size	>5.0	1.0-5.0	0.1-1.0	<0.1			
Character	Existing planning scheme controls	PS provisions				Other Overlays	SLO	NCO	HO
Overlay controls	AEO, EMO, ESO, SMO	% block covered				<25%	25-50%	50-75%	75-100%

Source: City of Greater Bendigo

5.5.2.9 Central Bendigo redevelopment

This scenario evaluates land supply within Bendigo's central business district (CBD), an area defined by the *CBD Strategy* (Planisphere et al 2005). It examines individual sites rather than calculating dwelling yields from an overall land supply as in the previous scenarios. This scenario's goal is to show how specific interventions can produce significant dwelling gains within a complex land use pattern. Most of the CBD lots are currently zoned for business use although the actual uses vary, including residential, car parking and open space. Only a small portion of the area is zoned mixed use; this scenario models many more sites with a mix of uses.

Anecdotally, demand exists in Bendigo for housing types other than detached dwellings and villa units. The CBD currently contains approximately 90 apartments but most of these are used for temporary accommodation. The COGB estimates existing demand for up to 400 dwelling units for students (senior secondary and tertiary) however education providers have not taken on residential projects aside from those on campus such as at Latrobe University.

Recent residential development projects have focused on building conversions, typically of heritage buildings above street level. Current projects and proposals are generally for expensive and large apartments which typically cost more than a detached house within nearby residential areas. They often include ground floor retail uses, first and possibly second floor office space, and some apartments above. The CoGB seeks greater housing diversity and choice in the CBD and views residential development as important to support local businesses.

The CBD scenario models a possible build out of lots included under the scenario assumptions (see Table 26). It does not model development over time. It excludes sites under 150sqm and with overlays other than DDO5 and DPO20 as both conditions potentially make development more difficult (see Figure 31 for overlay extents). Building heights for potential development are as defined in the *CBD Strategy* as shown in Figure 33 and by DDO5 (Planisphere 2005; DTPLI 2014c). The scenario does not model any site amalgamation or assembly as current ownership patterns are not publicly available.

Table 26 Central Bendigo redevelopment sites scenario: assumptions

Criteria	Assumptions
Location of lots	Within *CBD Strategy* boundary
Minimum lot size	150sqm
Zoning	All (see **Source**: Victorian **Government 2013** Figure 32)
Overlays	DDO5, DPO20
Vacancy	Vacant sites included
Density	No assumption – calculated from lot yield
Height	Defined in *CBD Strategy* and DD05

Figure 31 Bendigo: CBD planning overlays

Source: Victorian Government 2013

Figure 32 Bendigo: CBD planning zones
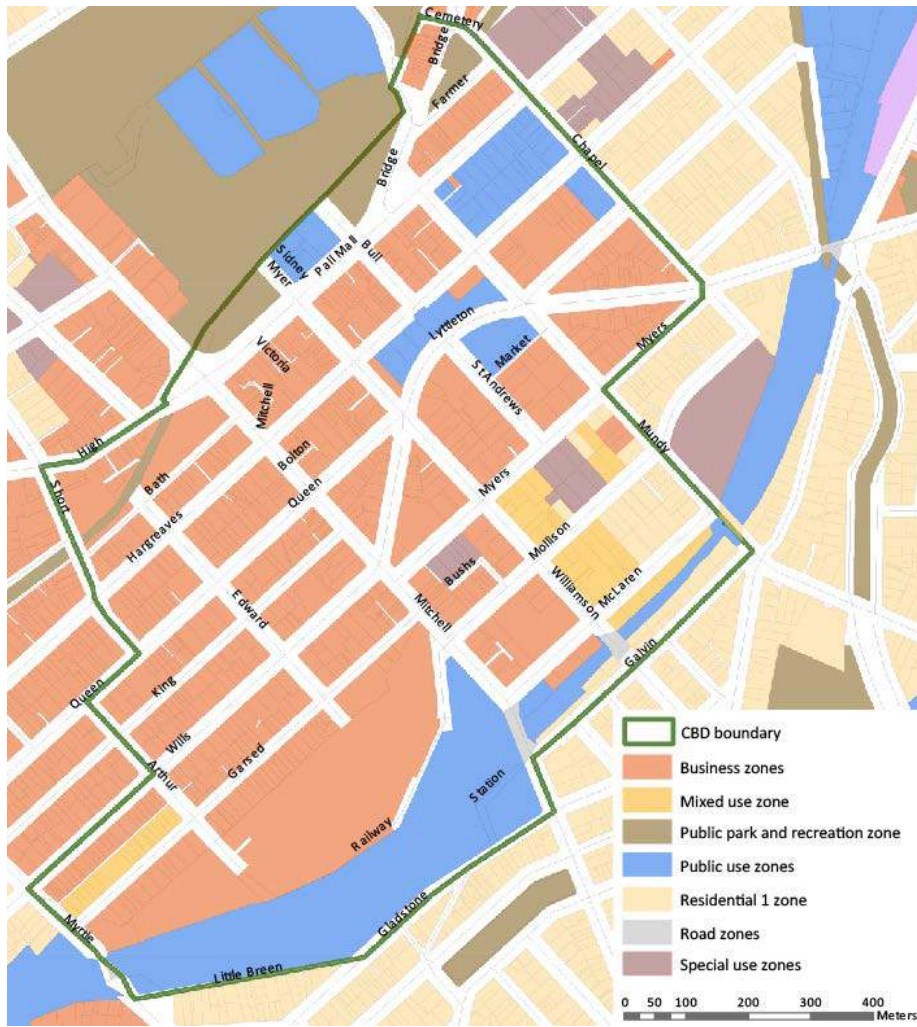
Source: Victorian Government 2013

Figure 33 *CBD Strategy* **building heights**

Source: Planisphere at al 2005

Specific assumptions about the CBD scenario building configurations include:
- Mixed use development, with retail or office space on the ground floor and residential above
- Average apartment size of 150sqm, based on one bedroom apartments of 100sqm, two bedroom apartments of 150sqm and three bedroom apartments of 200sqm[32]
- Apartment areas include an allowance for common areas, car and bicycle parking
- Lot size determined the number of apartments per floor (see Table 27)

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[32] Advice from the City of Greater Bendigo suggested that the project should assume larger sizes than average Melbourne apartments.

Table 27 Central Bendigo redevelopment sites scenario - site assumptions

Lot size (sqm)	Number of apartments per floor
Under 200	1.5
200 to 300	1.5
300 to 400	2
400 to 500	3
500 to 600	3.5
600 to 700	4
700 to 800	4.5
800 to 900	5.5
900 to 1,000	6
1,000 to 1,100	7
1,100 to 1,200	7.5
1,200 to 1,300	8
1,300 to 1,400	8.5
1,400 to 1,500	9
1,500 to 1,600	10
1,600 to 1,700	10.5
1,900 to 2,100	12
2,100 to 2,200	13.5
2,300 to 2,400	15
2,600 to 2,700	17
2,700 to 2,800	18
2,800 to 2,900	18.5
2,900 to 3,000	19

Source: Derived from ACT Planning and Land Authority 2006.

The lots remaining after the assumptions are applied are assessed in Bendigo, using Google's Map Engine and Street view, and through discussions with the COGB. Each site's land use, height of buildings, on site car parking and age of buildings are noted and used to decide whether the site is appropriate for redevelopment (see Figure 34). A few lots are also excluded because their shape or lack of continuity would make development very difficult. These exclusions are based on visual inspection and qualitative judgement.

Figure 34 Example of online CBD site information
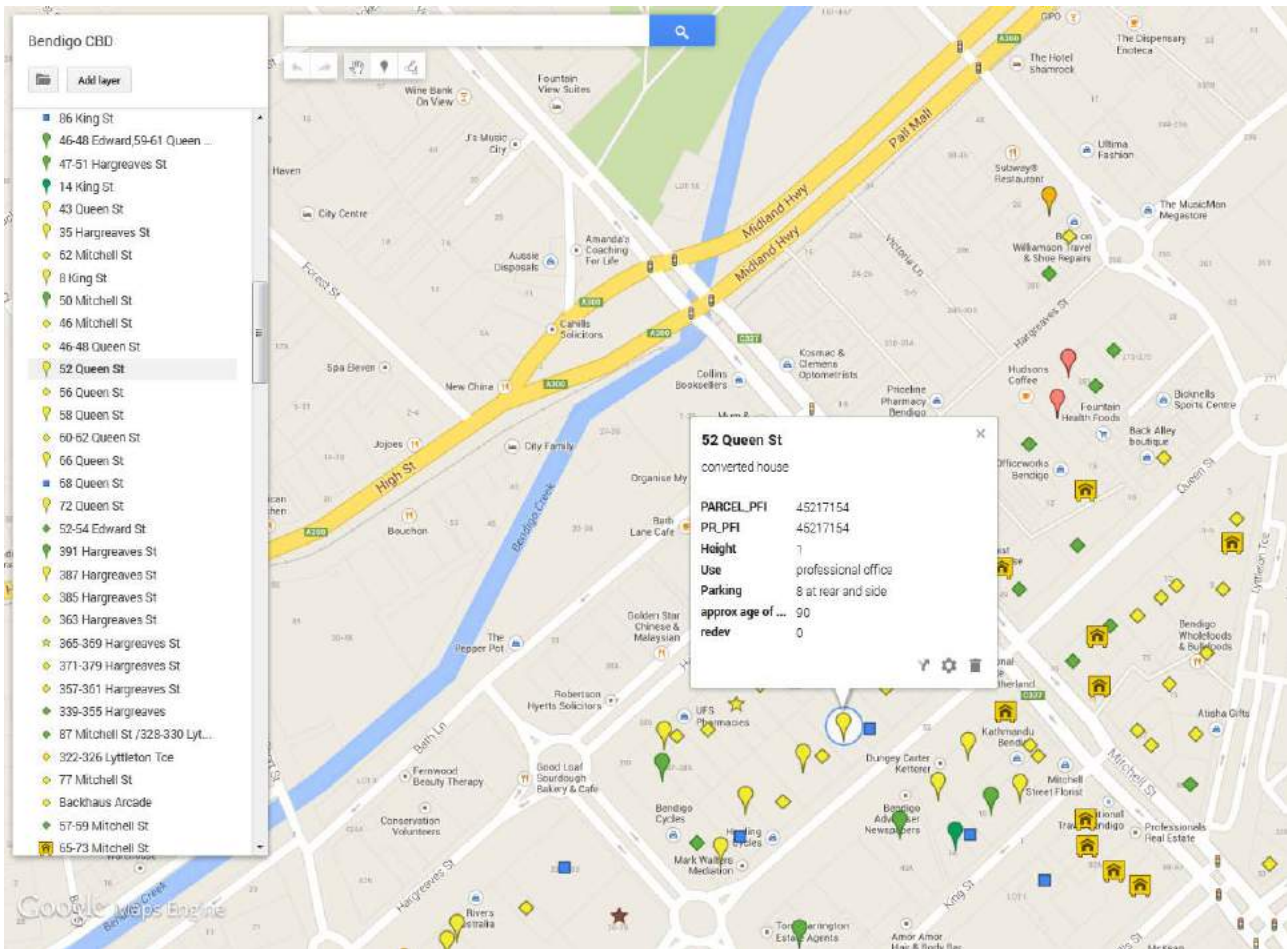
Source: Google Maps

The Gillies Pies and Crystal Ice major redevelopment sites identified by the COGB are not included in this analysis. These lots currently have environmental audit overlays due to contamination and thus were excluded through the standard project assumptions. However the COGB has commissioned analysis from *MGS Architecture Planning Interior design* to examine potential residential, commercial and retail yields on these sites. The CBD scenario work takes a similar approach and should be complementary to that work.

5.6 Transferring demand from large to smaller settlements

Ballarat and Bendigo (along with Geelong) are regional Victoria's urban settlements projected to grow the most and fastest over the next 30 years (DPCD 2012b). But what would happen if they no longer accommodate any new residential development and if their projected population and household growth was transferred instead to smaller settlements?

The rural and urban scenarios described previously all use the Victorian State Government's official population and dwelling projections, *Victoria in Future* (DPCD 2012b). In the previous sections, the project manipulates VIF dwelling projections in the following ways:
- SLA totals are split into an urban and rural component based on the number of lots in urban and rural areas
- These ratios change when the lot supply changes under the two rural scenarios, Rural preservation and Tenement control
- With the reduced lot supply under the two rural scenarios, projected rural demand from *Victoria in Future* can no longer met in the rural areas. This outstanding demand by SLA is amalgamated to the appropriate LGA, and then distributed to each LGA's urban settlements based on the settlement hierarchy (urban lot count) and rail services
- The Bendigo case study uses the dwelling type projections which are extrapolated from VIF (which only has population and household projections) to compare supply and demand

This section takes a different approach: it analyses the impact of shifting the regional centres' growth to district towns and towns with a rail service. It also examines whether towns and villages (with a rail service) have the capacity to take those regional centres' and district towns' projected growth. It uses the urban component of VIF as calculated in the rural BAU scenario for 2011 and 2041 and calculates Ballarat and Bendigo's increase in dwellings over that period.

These projected amounts are then proportionately distributed to:
1. District towns with a rail service
2. Towns with a rail service

These towns are described in Table 28.

Table 28 Settlement hierarchy and LGAs

Hierarchy	Settlement	LGA
Regional Centre	Ballarat	City of Ballarat
	Bendigo	City of Greater Bendigo
District Town	Maryborough	Central Goldfields Shire
	Gisborne	Macedon Ranges Shire
	Kyneton	Macedon Ranges Shire
	Bacchus Marsh	Moorabool Shire
	Castlemaine	Mount Alexander Shire
Town	Creswick	City of Greater Bendigo
	Clunes	City of Greater Bendigo
	Woodend	Macedon Ranges Shire
	Riddells Creek	Macedon Ranges Shire
	Macedon	Macedon Ranges Shire
	Malmsbury	Macedon Ranges Shire
	Ballan	Moorabool Shire

Source: Planisphere 2009

Distribution of projected dwelling demand is based on each urban settlement's proportion of the total area of residential lots in that group of settlements. In the rural scenarios, the rural transferred demand is allocated proportionately by urban lot count. However to analyse the impact of shifting demand on residential densities, allocating that demand by the area of residential lots is more appropriate as it is an indicator of residential land supply (whether currently occupied or not). It demonstrates the types of overall densities that will need to be achieved to accommodate the extra growth. This then could give council planners another criterion by which to assess residential development applications.

A revised total for projected dwelling growth is calculated for each urban settlement. This is then divided by the total area of the residential lots to produce an average net residential density that would be required to accommodate the additional dwelling growth no longer met in Ballarat and Bendigo.

A further step then also includes the transferred rural projected dwelling demand for which there is no longer land supply in the Rural preservation and Tenement control scenarios (see section 5.4.2.4.1: rural land supply is reduced under the scenarios' rules, so demand is then also reduced proportional to the reduced area of rural land supply) . This reinforces the role of urban settlements with train services, given that the Tenement control scenario requires demand to be transferred from rural landscapes and into towns served by trains. Note that this only applies to the district town scenario as towns do not receive any transferred demand under Tenement control (see section 5.4.2.4.1 for a definition of Tenement control and transferred demand). This is summarised in Table 29.

Table 29 Sources of dwelling demand for transfer to smaller settlements

Scenarios	BAU regional centre projected dwelling demand	Rural preservation transferred dwelling demand	Tenement control transferred dwelling demand
1. District towns with rail service	Goes to district towns	Included	Included
2. Towns with a rail service	Goes to towns only	Included	Nil (demand only transferred to regional centres and district towns)

In addition to train services, these smaller settlements also contain existing infrastructure which makes them well suited to accommodate more dwelling growth in preference to other small or poorly serviced towns. As Table 31 shows, the study region's District towns generally contain a larger number and wider range of utilities, educational facilities, and services including government, postal, health and emergency than smaller places (designated as Towns in the settlement hierarchy – see Table 13 Settlement hierarchy by SLA). Aside from the District town of Daylesford which is excluded from receiving any additional growth because it lacks a train station, the remaining towns and villages have even fewer services and facilities.

While the current Regional Growth Plans (RGPs) relevant to the study region identify most growth as likely to occur in regional centres, identifying District towns and Towns to take additional growth because of the existing capacity of their infrastructure and services is broadly consistent with the RGP policies (DPCD 2013a; DPCD 2013b). Smaller towns in the *Loddon Mallee South Regional Growth Plan* also noted with potential for growth include Carisbrook, Dunolly, Elmore, Heathcote, Lancefield, Mount Macedon and Maldon (DPCD 2013b). All these are included in this study's list of small places which do not have train stations and are generally less well serviced than other urban settlements.

A short case study on Kyneton examines the implications of additional dwelling demand resulting from the proportional transfer of demand from Ballarat and Bendigo for utilities and services in the town. This uses per capita measures developed by Essential Economics in their two reports on the infrastructure implications of population growth in Victoria's ten regional cities[33] (Essential Economics 2009; Essential Economics 2012). It includes three scenarios: the additional infrastructure needed under Business-as-usual projected dwelling demand; that required if Kyneton were to take its proportional share of Ballarat and Bendigo's projected demand for dwellings; and the result of transferring rural demand into urban settlements such as Kyneton under the Rural preservation and Tenement control scenarios. The specific hard and soft infrastructure and services and their per capita measures are summarised in Table 30. Where the item is age specific, the proportion of that age group of the total VIF 2031 population is multiplied by the revised projected and larger populations including growth from Ballarat, Bendigo and the rural

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[33] Essential Economics (2012) provide figures for projected additional services needed by 2031 for the ten regional centres. These are then divided by the total population of the ten cities to produce a per capita measure for the municipality. This is assumed to be the same as a per capita measure for Kyneton. For example, the regional cities will need 42 more bus services by 2031 under the base case scenario (VIF). This is divided by 208,070 which is the base case's increase in population for the ten cities to 2031. This produces a per capita measure of 0.0002 buses per capita for the Shire of Macedon Ranges and also for Kyneton. This per capita measure is then applied to the various population scenarios for Kyneton.

transfer.

Table 30 Infrastructure and services per capita measures

	Per capita measure
Transport	
Daily bus services in municipality	0.0002
Weekly rail services to and from Melbourne	0.002
Health	
Hospital beds (public and private)	0.01
Emergency department presentations	0.5
General practitioners in municipality	0.001
Education	
Childcare places in municipality	0.1 per each 0 to 4 year old
Kindergarten places in municipality	1 per each 3 and 4 year old
Primary school places in municipality	1 per each 5 to 12 year old
Secondary school places in municipality	1 per each 13 to 18 year old
Council facilities	
Library floor space in municipality (sqm)	0.03
Arts and cultural facilities in municipality	0.0001
Other	
Aged care places in municipality	0.1 per each person aged 70 and over

Source: Essential Economics 2012

Some of Essential Economics's variables are excluded from this analysis as they are measured by the additional cost per household, such as water, gas and electricity (Essential Economics 2012). In addition, university and TAFE places are not included as they are most likely to be provided at a regional scale rather than at a town level. Future demand is also hard to project given the wide range of ages of people who attend tertiary institutions.

Table 31 Utilities and services in study region urban settlements

Location			Population		Utilities				Government Services			Education: Public			Education: Private					Postal Services				Country Fire Authority				Police		Ambulance			Medical				
Settlement	LGA		Population (2006 ABS) – Based on Towns in Town 2006	Population (2011 ABS) – Based on Towns in Town 2011	Electricity	Reticulated Water	Reticulated Sewer	Natural Gas	Local Gov. Office (Service Centre)	Main Local Gov. Office	State Gov. Office	Primary School	Primary / Secondary	Secondary School	Primary School	Primary / Secondary	Secondary School	TAFE	University	Community Postal Services	Post Office (Licenced)	PostSHOP (Bank)	POST Business Centre	Brigade	Sub-Regional HQ	Regional HQ	Integrated Brigade	Non 24 Hr Station	24 Hr Station	Community Branch	Prof. Branch (on call)	Professional Branch	Rural Health Centre	Public Rural Hospital	Private Rural Hospital	Rural Hospitals with A & E	Major Regional Hospital
Transfer demand out of Regional Centres																																					
Ballarat	Ballarat	Provincial Centre	76,040	85,314	✓	✓	✓	✓		✓	✓	20	1	4	11	3	2	3	4		11	2	1			✓	✓		✓			✓				✓	✓
Bendigo	Greater Bendigo	Provincial Centre	73,680	81,933	✓	✓	✓	✓		✓	✓	18	1	4	8	3	1	2	1		13	1	1		✓		✓		✓						2	✓
District Towns to which rural demand is transferred																																					
Maryborough	Central Goldfields	District Town	7,238	7,139	✓	✓	✓	✓		✓	✓		1		1			1	1		1							✓				✓		✓			
Gisborne / New Gisborne	Macedon Ranges	District Town	6,283	7,906	✓	✓	✓	✓		✓		2			1	3					1	1						✓			✓		✓				
Kyneton	Macedon Ranges	District Town	4,191	4,349	✓	✓	✓	✓		✓		1			1	1		1	1		1							✓				✓		✓			
Bacchus Marsh	Moorabool	District Town	13,051	14,779	✓	✓	✓	✓	✓		✓	3			1	1	1				1							✓				Metro		✓			
Castlemaine	Mount Alexander	District Town	8,689	8,965	✓	✓	✓	✓		✓	✓	4			1	1		1			1	1						✓				✓		✓			
Towns to which rural demand is transferred																																					
Creswick	Hepburn	Town	2,423	2,582	✓	✓		✓	✓			2			1						1							✓						✓			
Clunes	Hepburn	Town	1,054	1,393	✓	✓	✓					1									1							✓						✓			
Woodend	Macedon Ranges	Town	3,087	3,389	✓	✓	✓	✓	✓			1			1	1					1							✓			✓		✓			
Riddells Creek	Macedon Ranges	Town	2,548	2,879	✓	✓	✓	✓				1									1							✓						✓			
Macedon	Macedon Ranges	Town	1,377	2,581	✓	✓	✓	✓				1				1					1							✓						✓			
Malmsbury	Macedon Ranges	Village	616	645	✓	✓	✓					1									1							✓						✓			
Ballan	Moorabool	Town	1,770	2,008	✓	✓	✓	✓		✓		1			1						1							✓						✓		✓	
Smaller towns and villages which do not receive additional rural demand																																					
Daylesford	Hepburn	District Town	3,080	3,294	✓	✓		✓		✓	✓	2			1	3					2							✓				✓			✓		
Trentham	Hepburn	Town	622	682	✓	✓						1									1							✓					✓				
Carisbrook	Central Goldfields	Village	691	728	✓	✓		✓				1									1							✓									
Dunolly	Central Goldfields	Village	589	644	✓	✓	✓					1									1							✓									
Elmore	Greater Bendigo	Town	683	656	✓	✓	✓					1				1					1							✓					✓				
Heathcote	Greater Bendigo	Town	1,521	1,655	✓	✓	✓		✓		✓	1				1					1							✓			✓		✓				
Lancefield	Macedon Ranges	Town	1,160	1,216	✓	✓	✓	✓				1				1					1							✓					✓				
Mount Macedon	Macedon Ranges	Village	1,066	incl in Macedon	✓	✓						1									1							✓									
Romsey	Macedon Ranges	Town	3,457	3,578	✓	✓	✓	✓	✓			1				1					1							✓						✓			
Maldon	Mount Alexander	Town	1,203	1,225	✓	✓	✓					1									1							✓		✓				✓			

Source: Planisphere – Regional Victoria Mapping, 2009. Updated with DTPLI Towns in Time 2011

Chapter Six: Results

6.1 Introduction

The study compares dwelling yields for rural land across three scenarios, transfers rural dwelling land supply, explores the transfer also of demand, and examines how demand in townships can be met through alternative developmental scenarios.

Three rural scenarios test the extent to which rural land supplies subject to different planning regulations can meet projected dwelling demand:
- Business-as-usual under current planning regulations;
- Rural preservation where new houses can only be built and land can only be subdivided on lots which are a minimum of 40 hectares; and,
- Tenement control where new houses can only be built and land can only be subdivided on amalgamated lot holdings which are a minimum of 25 and 40 hectares.

The Rural preservation and Tenement control scenarios model shifting Business-as-usual demand away from the truly rural landscape to the edges of and within existing urban settlements.

Generally, existing controls are too permissive to achieve this project's goal of dramatically reducing rural development. As a region, the study area has excess development capacity compared to projected demand. Under the Business-as-usual scenario, the region's rural areas could accommodate 72,185 dwellings more than for which demand is projected.

The Rural preservation scenario substantially reduces rural land supply for new houses: only 5,911 new dwellings could be built in rural zones in this scenario compared to 48,261 in Business-as-usual. At the same time, the Rural preservation scenario increases land supply in the future urban zones adjacent to existing urban settlements. The future urban zones - Township, Urban Growth and Comprehensive Development zones - could accommodate 106,083 new dwellings in this scenario. In the Business-as-usual scenario, these zones could have an additional 38,938 dwellings. The Rural preservation scenario successfully shifts the location of new dwellings from the truly rural landscape to areas much closer to existing urban settlements. This does however produce a counter intuitive result for the whole rural area as this scenario has a larger number of potential future dwellings than Business-as-usual: 111,994 compared to 87,195.

The Tenement control scenario clearly demonstrates that excess rural lot supply capacity for new dwellings can be greatly reduced. Applying the minimum 25 hectare lot size for a subdivision and a new dwelling reduces the potential number of new rural dwellings from 87,195 in Business-as-usual to 41,162. The 40 hectare minimum rule further reduces the possible supply of new rural dwellings to 33,960. Unlike the Rural preservation scenario, these area rules apply to both the rural and future urban zones so the large (and counter intuitive) yield of the previous scenario is avoided.

From the demand side, the Business-as-usual scenario projects that the study region will need to increase its number of dwellings by 60 per cent between 2011 and 2041. Ballarat, Bendigo and Bacchus Marsh's SLAs will need the most new dwellings and will also experience the greatest percentage increase in their housing stock. The Rural preservation and Tenement control scenarios transfer some of that demand from rural to

urban areas, however these are relatively small amounts compared to projected urban demand.

Nonetheless projected dwelling demand by house type – based on past trends – shows the ongoing dominance of demand for separate dwellings. Bendigo can easily accommodate overall projected dwelling growth but it will be unable to meet projected demand for separate dwellings. This highlights the tension between assuming that past trends in dwelling preferences will continue into the future. An important goal of this project's is to demonstrate that higher densities can produce more than enough new houses to meet overall demand.

If the population and dwelling projections are accurate for this region, and stakeholders decide that preserving the rural landscape is a priority, then planning regulations need to specifically require greater diversity in dwelling types, higher residential densities within or adjacent to urban settlements and large rural minimum lot sizes for subdivision or new homes.

The following sections discuss the modelling results which have led to these conclusions. The first section explains the difference between rural and urban areas in the study region as this is the first step in determining both land supply and future demand for dwellings. The next section defines demand for the whole region, and then this is analysed in the rural landscape in relation to rural land supply. This rural modelling is done for Business-as-usual, that is, if planning regulations remain the same through to 2041 and for two additional scenarios: Rural preservation and Tenement control. These two scenarios model altered planning rules and shift rural demand into urban areas.

The rural modelling component is then followed by the section on urban scenarios. This work includes analysis of housing futures in Ballarat, Bendigo, Castlemaine and Ballan given an identified land supply drawn from the Victorian state government's *Urban Development Program* (DPCD 2011). This work is then explored in greater detail through the Bendigo case study: a series of development density scenarios demonstrate the effectiveness of increasing residential densities to extend the life of the existing supply of land for new housing development. This urban component's core purpose is to demonstrate that councils do not need to rezone more rural land for fringe urban development, and thus remove the urban impact on the rural landscape which the rural scenarios are designed to protect.

The final section analyses an alternative approach to managing the demand for new houses in regional Victoria. Rather than reinforcing the current dominance of the regional centres of Ballarat and Bendigo, this work demonstrates the implications of redirecting their projected growth to smaller centres. A case study on Kyneton highlights the types of residential densities that would be required under much higher growth scenarios, and briefly evaluates the associated heightened demand for infrastructure and services.

6.2 Rural and urban areas

The first step for all of the subsequent modelling is to define the rural and urban areas of SLAs using current zoning. The rural and urban areas are defined by planning zones and the number of occupied private dwellings in those areas (see methodology for details).

These proportions change for the two scenarios, Rural preservation (RP) and Tenement control (TC), because the rural land available for development is reduced (see Figure 35). For example, where the Rural preservation scenario has reduced developable rural lots by

90 per cent, then the rural dwelling count also shrinks by 90 per cent. Demand for rural and urban areas is re-calculated for the two scenarios. The following table contains the initial and two revised sets of rural and urban shares.

Figure 35 shows the spatial distribution of rural lots available for development under the three scenarios. Both the Rural preservation and Tenement control scenarios dramatically reduce the amount of land zoned for farming that can be developed.

Figure 35 Rural lots available for development under the three scenarios

Business-as-usual scenario
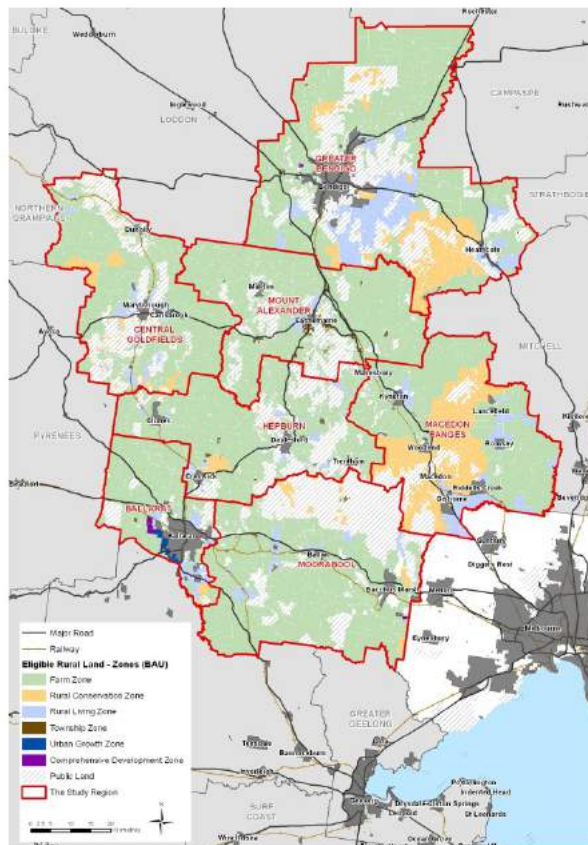
Rural preservation scenario

Tenement control scenario
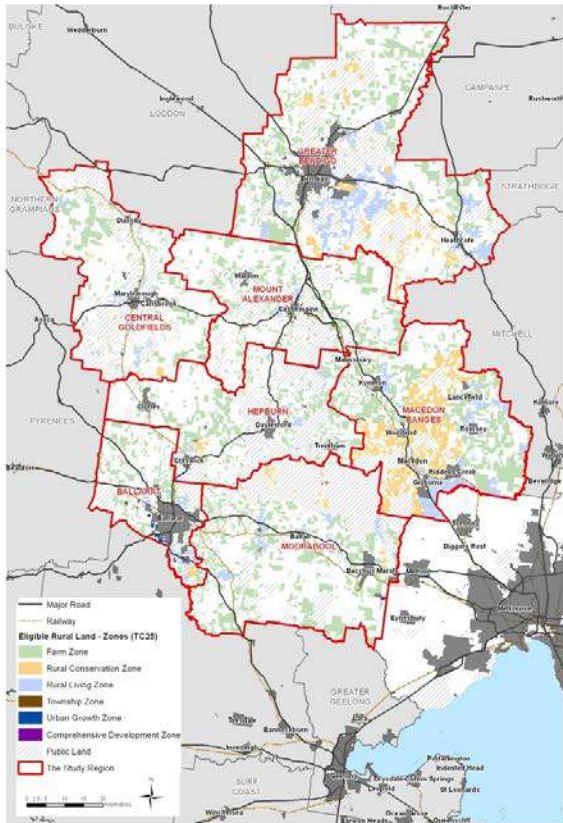
The Rural preservation scenario has larger urban than rural proportions of land available for development compared to the Business-as-usual scenario as it severely limits new rural dwellings and subdivision to rural lots over 40 hectares. This rule reduces the total rural land supply, and thus the proportion of the study region defined as rural.
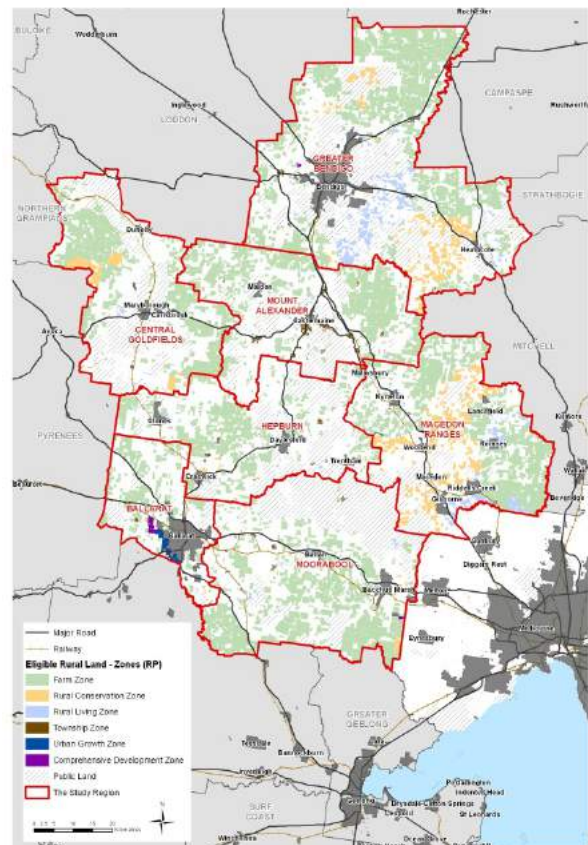
The Tenement control scenario also has a larger proportion of land designated as urban than Business-as-usual. The Tenement control rules also restrict the available rural land supply through requiring that multiple lots in the one ownership total a minimum of 25 or 40 hectares before a house can be built. As with the Rural preservation scenario, this results in a reduced total rural land supply and a smaller area of the study region defined as rural.

6.3 Business-as-usual demand for dwellings across the study region

Under Business-as-usual, the study region is projected to require a 58 per cent increase in its number of dwellings between 2011 and 2041. As shown in Table 32 and Figure 36, Ballarat, Bendigo and Bacchus Marsh's SLAs will need the most new dwellings and will also experience the greatest percentage increase in their housing stock.

Table 32 Business-as-usual demand

SLA	2011	2021	2031	2041	Required dwelling increase 2011 to 2041 (number)	(%)
Ballarat (C) - Central	15,129	16,480	17,597	18,755	*3,626*	23.97%
Ballarat (C) - Inner North	12,405	15,739	19,107	22,850	*10,445*	84.20%
Ballarat (C) - North	373	412	469	529	*156*	41.82%
Ballarat (C) - South	10,119	13,075	15,863	18,958	*8,839*	87.35%
C. Goldfields (S) - Maryborough	3,444	3,715	3,947	4,186	*742*	21.54%
C. Goldfields (S) Balance	2,211	2,388	2,554	2,726	*515*	23.29%
Gr. Bendigo (C) - Central	8,092	8,789	9,405	10,044	*1,952*	24.12%
Gr. Bendigo (C) - Eaglehawk	4,037	4,747	5,420	6,144	*2,107*	52.19%
Gr. Bendigo (C) - Inner East	10,245	11,071	11,909	12,780	*2,535*	24.74%
Gr. Bendigo (C) - Inner North	4,450	6,407	8,416	10,743	*6,293*	141.42%
Gr. Bendigo (C) - Inner West	7,196	9,416	11,688	14,242	*7,046*	97.92%
Gr. Bendigo (C) - Part B	4,808	5,434	6,052	6,707	*1,899*	39.50%
Gr. Bendigo (C) - Strathfieldsaye	2,702	3,719	4,809	6,061	*3,359*	124.32%
Hepburn (S) - East	3,470	4,072	4,659	5,290	*1,820*	52.45%
Hepburn (S) - West	2,803	3,190	3,570	3,975	*1,172*	41.81%
Macedon Ranges (S) - Kyneton	3,610	4,033	4,464	4,919	*1,309*	36.26%
Macedon Ranges (S) - Romsey	4,269	5,346	6,387	7,533	*3,264*	76.46%
Macedon Ranges (S) Balance	7,844	9,878	11,876	14,085	*6,241*	79.56%
Moorabool (S) - Bacchus Marsh	6,720	9,199	11,651	14,438	*7,718*	114.85%
Moorabool (S) - Ballan	2,470	2,966	3,453	3,982	*1,512*	61.21%
Moorabool (S) - West	1,375	1,496	1,607	1,722	*347*	25.24%
Mount Alexander (S) - Castlemaine	3,310	3,596	3,894	4,205	*895*	27.04%
Mount Alexander (S) Balance	4,394	5,003	5,614	6,263	*1,869*	42.54%
Total	*125,476*	*150,171*	*174,411*	*201,137*	*75,661*	*58.43%*

Source: DPCD 2012b

Figure 36 Additional dwellings (rural and urban) required for study region by 2041

Source: DPCD 2012b
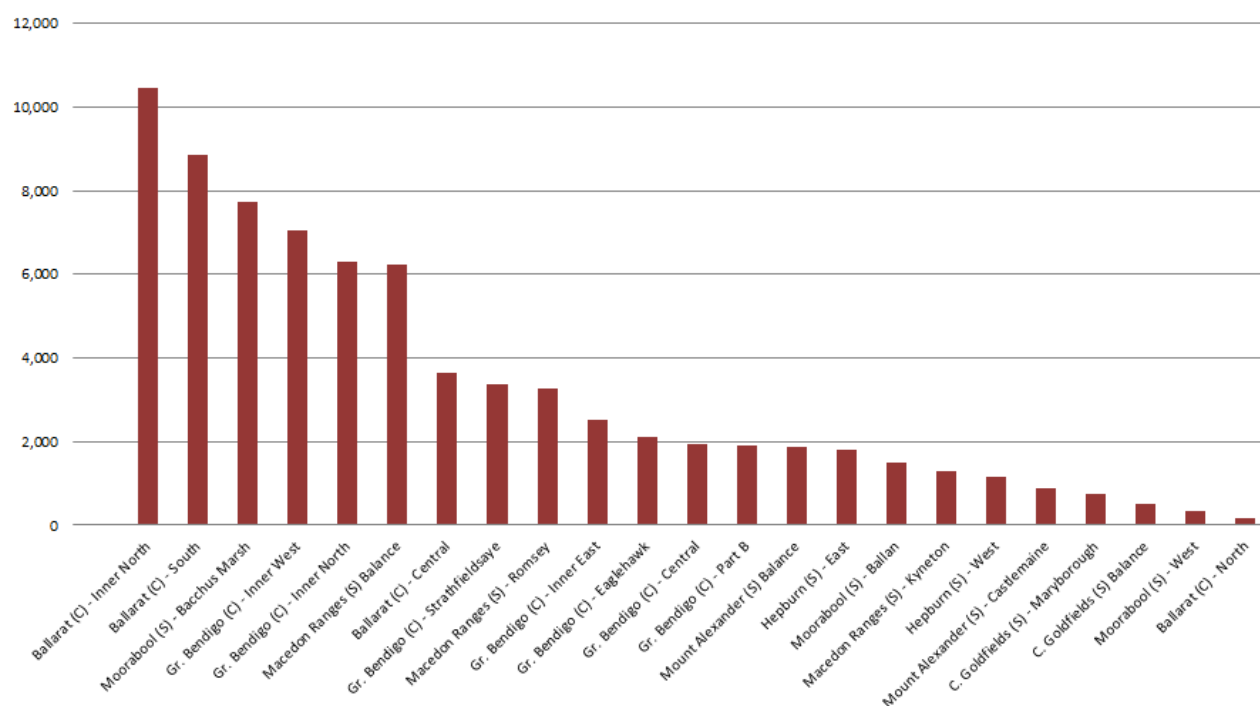
The following two sections discuss how this demand might be met in rural and urban areas under the Business-as-usual, Rural preservation and Tenement control scenarios.

6.4 Rural scenarios

The rural parts of the study region have extensive capacity for new dwellings and residential subdivisions under existing planning regulations. The stricter planning rules under the Rural preservation and Tenement control scenarios reduce some of the rural land supply available under the Business-as-usual scenario but as Table 33 demonstrates, overall supply remains much greater than needed to meet projected demand.

Table 33 Study region rural dwelling demand and lot supply to 2041

	Business-as-usual	Rural preservation	Tenement control (25 ha)
Supply	87,195	111,994	41,162
Demand	15,010	3,928	10,763
Excess supply	*72,185*	*108,066*	*30,399*

The results from each of the scenarios – Business-as-usual, Rural preservation and Tenement control – are discussed below, with the data presented for each Statistical Local Area (SLA). Across the region, these SLAs differ in character. Results for some specific or notable SLAs are discussed in more detail to highlight their particular outcomes. Charts also try to show differences and usually sort data by magnitude rather than the SLA result tables' alphabetical order.

In each scenario, supply is presented first and is followed by the results for dwelling demand. These two are then compared, followed by the results of the development

pressure and timing of development modelling for Business-as-usual and Rural preservation scenarios. As both the Rural preservation and Tenement control scenarios transfer some of the Business-as-usual rural demand for dwellings to urban areas, this process is discussed in the last section for these two scenarios. The overall findings are presented again in a concluding section on the rural landscape.

6.4.1 Business-as-usual

The rural parts of the study region can potentially accommodate 72,185 rural dwellings more than for which rural demand is likely to exist. This is the case in most of region's SLAs: Ballarat (C) – Inner North has sufficient lots for 22,637 new dwellings but projected demand for only 1,150 houses. Only three of the 23 study region SLAs have more projected demand for dwellings than is able to be met by development capacity.

The following sections present the results for Business-as-usual land supply, projected demand for dwellings, and how supply is likely to meet demand including when and where rural development might take place over time to 2041.

6.4.1.1　Land supply in rural areas

In the study region, 79,075 lots exist in rural planning zones. In addition, under existing planning zones and schedules, these lots could be subdivided to produce 39,436 additional rural lots. With 31,316 lots currently occupied, 87,195 additional rural dwellings could be built on both the existing and newly subdivided lots. This excludes the substantial potential for additional dwellings under excision clauses (which lead to the creation of additional lots over those allowed under subdivision rules for zones). Table 34 has these development capacity details for each SLA in the study region.

Table 34 Business-as-usual rural lot supply

SLA	Lots with rural zoning A	Additional lots from subdivision of existing lots B	Total lots A+B = C	Lots which currently have a dwelling D	Additional new dwellings C-D
Ballarat (C) – Central	19	0	19	9	*10*
Ballarat (C) - Inner North	2,623	21,354	23,977	1,340	*22,637*
Ballarat (C) – North	1,313	95	1,408	474	*934*
Ballarat (C) – South	1,444	7,178	8,622	692	*7,930*
C. Goldfields (S) - Maryborough	123	4	127	84	*43*
C. Goldfields (S) Balance	10,876	1,099	11,975	2,249	*9,726*
Gr. Bendigo (C) - Eaglehawk	7	0	7	4	*3*
Gr. Bendigo (C) - Inner East	7	0	7	2	*5*
Gr. Bendigo (C) - Inner North	649	663	1,312	318	*994*
Gr. Bendigo (C) - Inner West	1,586	1,398	2,984	858	*2,126*
Gr. Bendigo (C) - Part B	11,897	1,669	13,566	4,621	*8,945*
Gr. Bendigo (C) - Strathfieldsaye	877	38	915	594	*321*
Hepburn (S) – East	5,897	410	6,307	2,313	*3,994*
Hepburn (S) – West	5,117	323	5,440	1,640	*3,800*
Macedon Ranges (S) - Kyneton	3,876	299	4,175	1,884	*2,291*
Macedon Ranges (S) - Romsey	2,846	354	3,200	1,581	*1,619*
Macedon Ranges (S) Balance	4,862	457	5,319	3,176	*2,143*
Moorabool (S) - Bacchus Marsh	1,938	1,772	3,710	1,023	*2,687*
Moorabool (S) - Ballan	4,853	216	5,069	2,231	*2,838*
Moorabool (S) - West	4,235	225	4,460	1,897	*2,563*
Mount Alexander (S) - Castlemaine	538	7	545	262	*283*
Mount Alexander (S) Balance	13,492	1,875	15,367	4,064	*11,303*
Total	*79,075*	*39,436*	*118,511*	*31,316*	*87,195*

Source: Victorian Government 2013; DTPLI 2014

Figure 37 shows the spatial distribution of rural development capacity by SLA across the study region.

Figure 37 SLA distribution of Business-as-usual rural lots development capacity
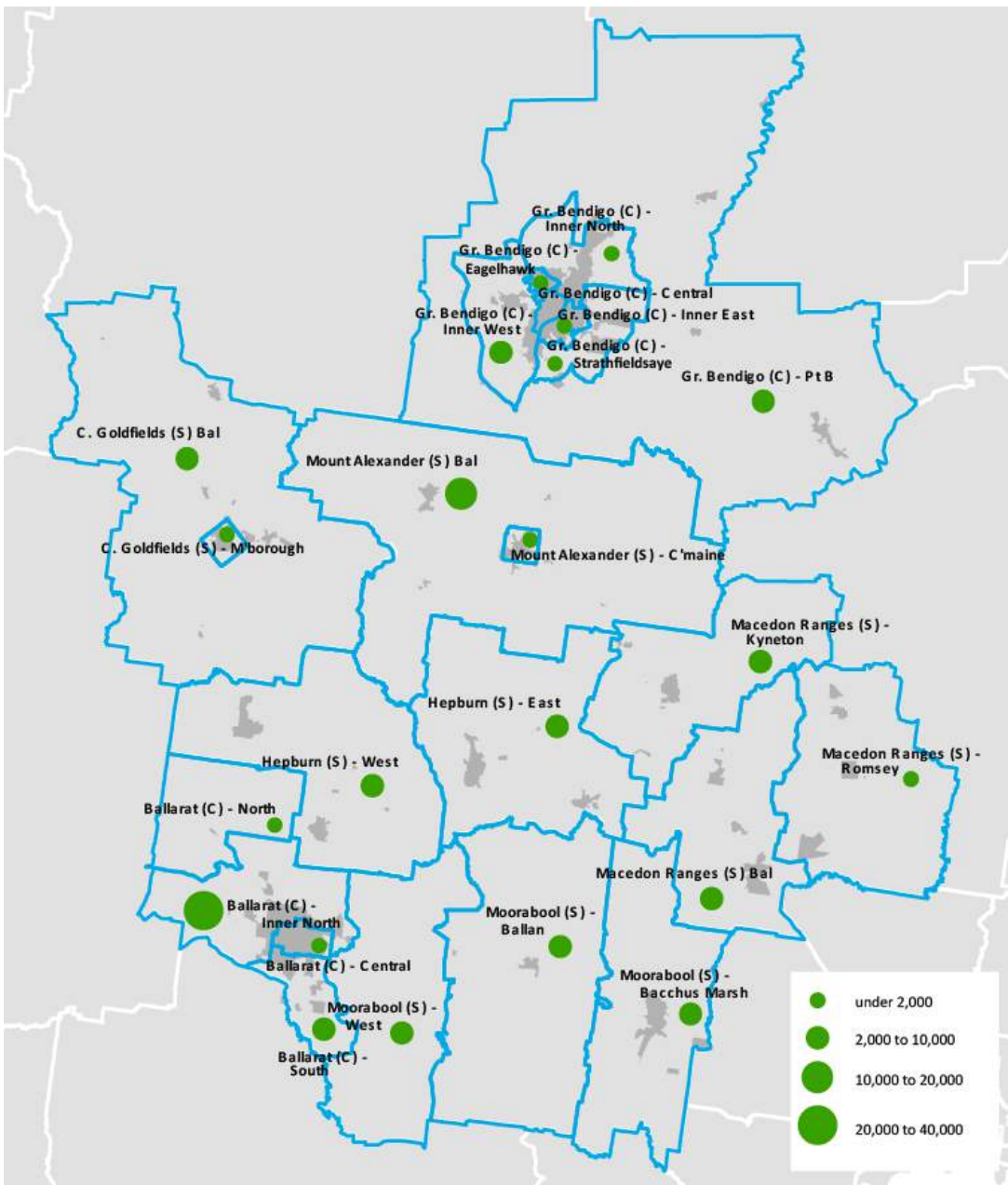
Only one SLA, Greater Bendigo (C) – Central, has no rural lots and is defined as completely urban. By contrast, Greater Bendigo (C) – Part B has the most and largest area of Rural Conservation (RCZ) and Rural Living Zone (RLZ) lots, and while it does not have the most Farming Zone (FZ) lots it does have the largest area in that zone of any SLA. This is clearly illustrated in Figure 38 and Figure 39. The study region has numerically more lots zoned Rural Living than Rural Conservation (15,000 compared to 9,000) but their total area is smaller: this suggests that shires such as Hepburn and Moorabool have fragmented rural landscapes with many small lots which are not necessarily used for farming.

Figure 38 Lots in rural zones
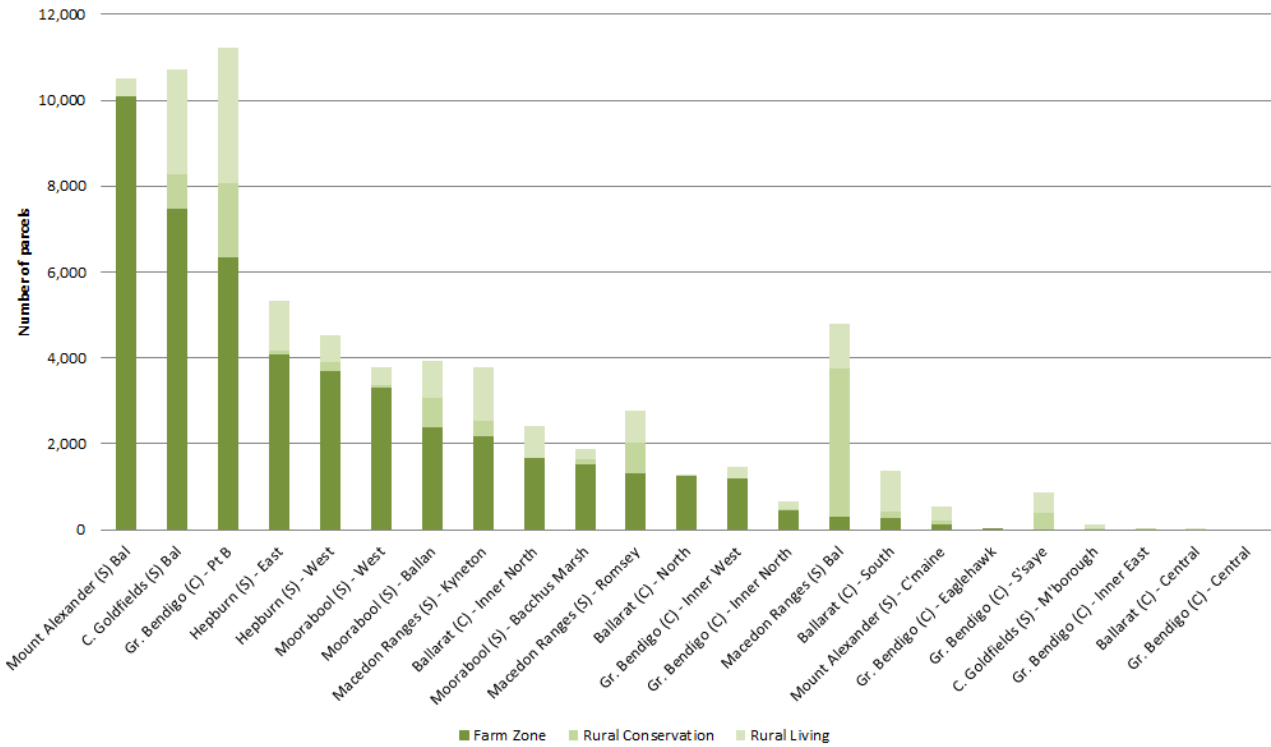
Source: Victorian Government 2013

Figure 39 Area of lots in rural zones
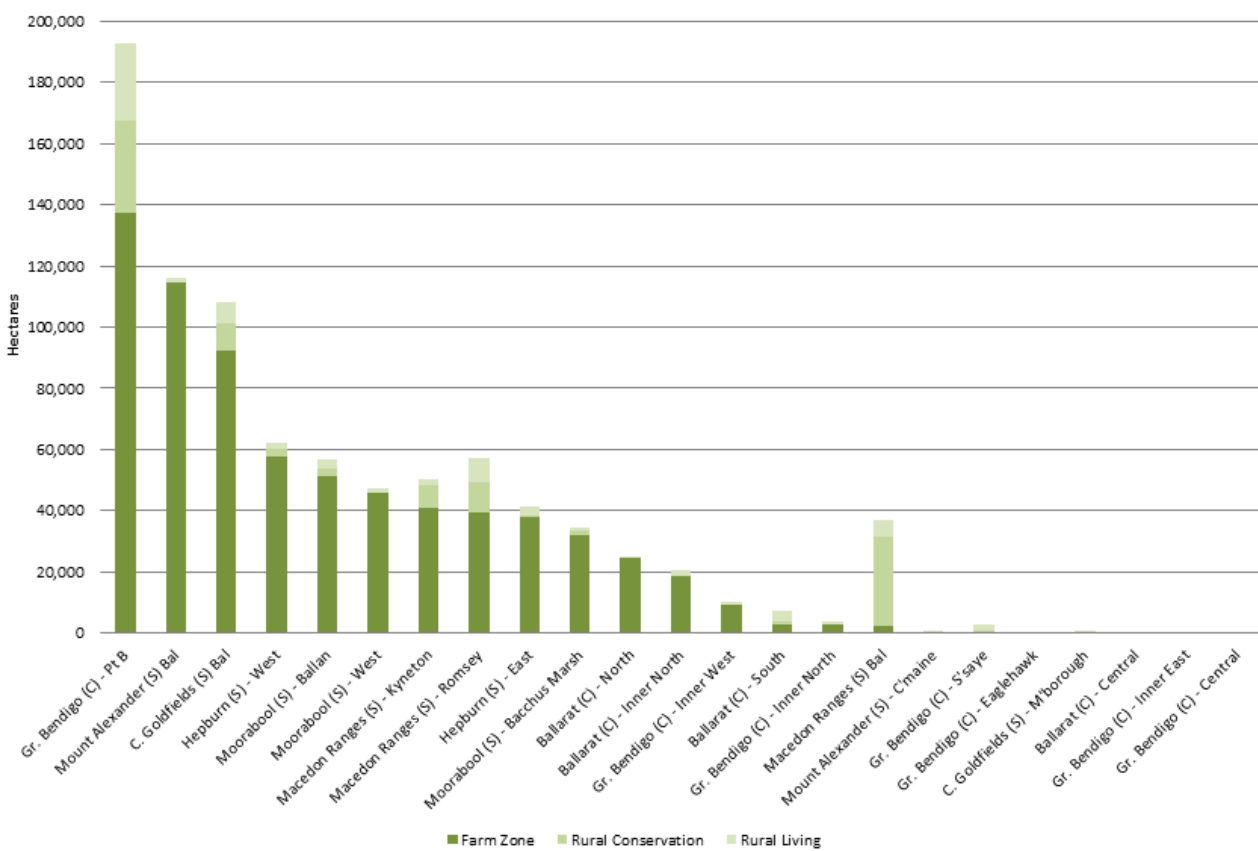
Source: Victorian Government 2013

One exception is Macedon Ranges (S) Balance which has a large number and area of lots

zoned Rural Conservation rather than for farming. These lots have an average area of eight hectares: the planning scheme schedule for this zone requires a minimum of 40 or 50 hectares for subdivision but does not contain an area requirement for a new dwelling. This zone's overall purpose is to protect the natural environment while also allowing agricultural uses which do not compromise environmental or landscape values (DTPLI 2014c: Macedon Ranges Planning Scheme, Municipal Strategic Statement clause 21.07 and Rural Conservation Zone clause 35.06 and Schedule 1).Despite the planning scheme restricting future subdivision, the current pattern of relatively small lots illustrated in Figure 40 suggests that achieving such protection is difficult under existing planning rules. A large proportion of these Rural Conservation Zone lots do not currently contain houses so the majority of Business-as-usual demand is satisfied by these lots rather than by new subdivision.

Figure 40 Macedon Ranges (S) Balance: zones and cadastre
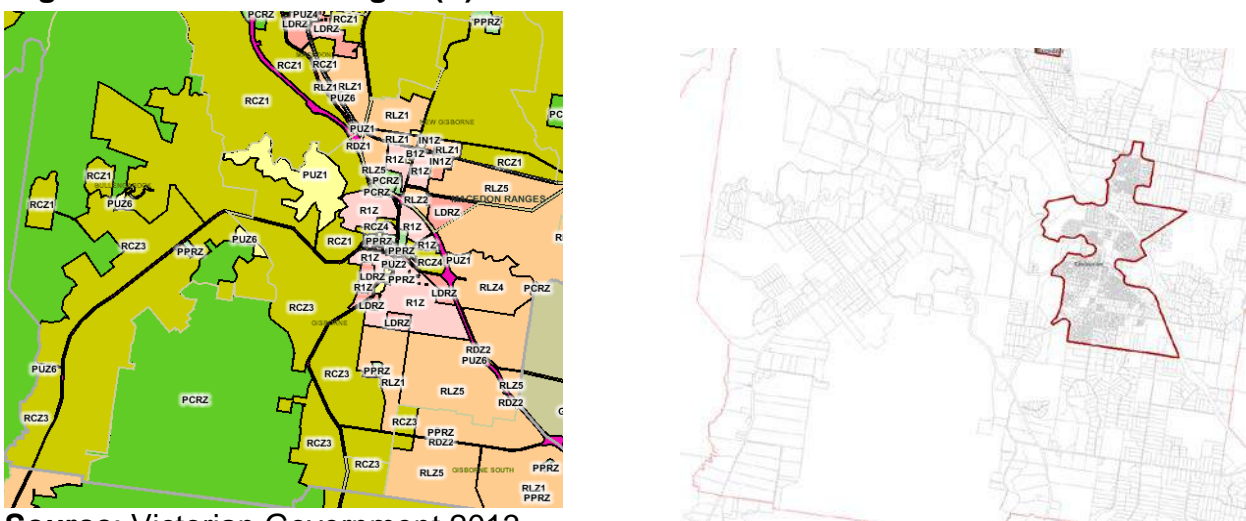
Source: Victorian Government 2013

 Rural Conservation Zone

The size of existing lots also affects landscapes and land use. Greater Bendigo (C) – Part B, Macedon Ranges (S) – Romsey, and Moorabool (S) – Ballan and Bacchus Marsh all contain farm zone lots which on average are over 20 hectares. This contrasts with smaller average farm lots of around 11 hectares in the SLA with the most farm lots, Mt Alexander (S) Balance. Six of the study region's SLAs contain farm zone lots under an average of ten hectares. These averages smooth out possible variations, where some farms could be very large while others are very small.[34]

Nonetheles Table 35 shows that the majority of rural lots across the study region are under ten hectares.

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[34] The relevant planning schemes typically require a minimum of 40 hectares for subdivision or a new dwelling (DTPLI 2014c).

Table 35 Area of rural lots

	Lot Size (hectares)						
	0 to 4	4 to 10	10 to 20	20 to 40	40 to 80	Over 80	*Total*
Number of lots	29,372	14,919	8,072	18,370	9,065	7,397	*87,195*
Proportion of all lots	34%	17%	9%	21%	10%	8%	*100%*

Source: Victorian Government 2013

As discussed in the Methodology, the rural areas include landscapes which are currently rural in character but are most likely to become urban in the future, and are zoned Township (lots larger than 500sqm), Urban Growth (lots larger than two hectares) and Comprehensive Development Zones (lots larger than two hectares)[35]. As shown in Figure 41 and Figure 42, only Ballarat and Bendigo municipalities contain lots zoned Urban Growth and, along with Bacchus Marsh, are the only areas in the study region with a Comprehensive Development Zone. These lots cover larger areas than their small numbers might suggest. Township Zone is more common as this is the zone used in smaller towns (rather than, for example, residential zones) and so has a smaller overall area. Mt Alexander (S) Balance is an exception however as the Township Zone area is extremely small when compared to the area of the SLA in rural zones (see Figure 39 above).

Figure 41 Lots in future urban zones
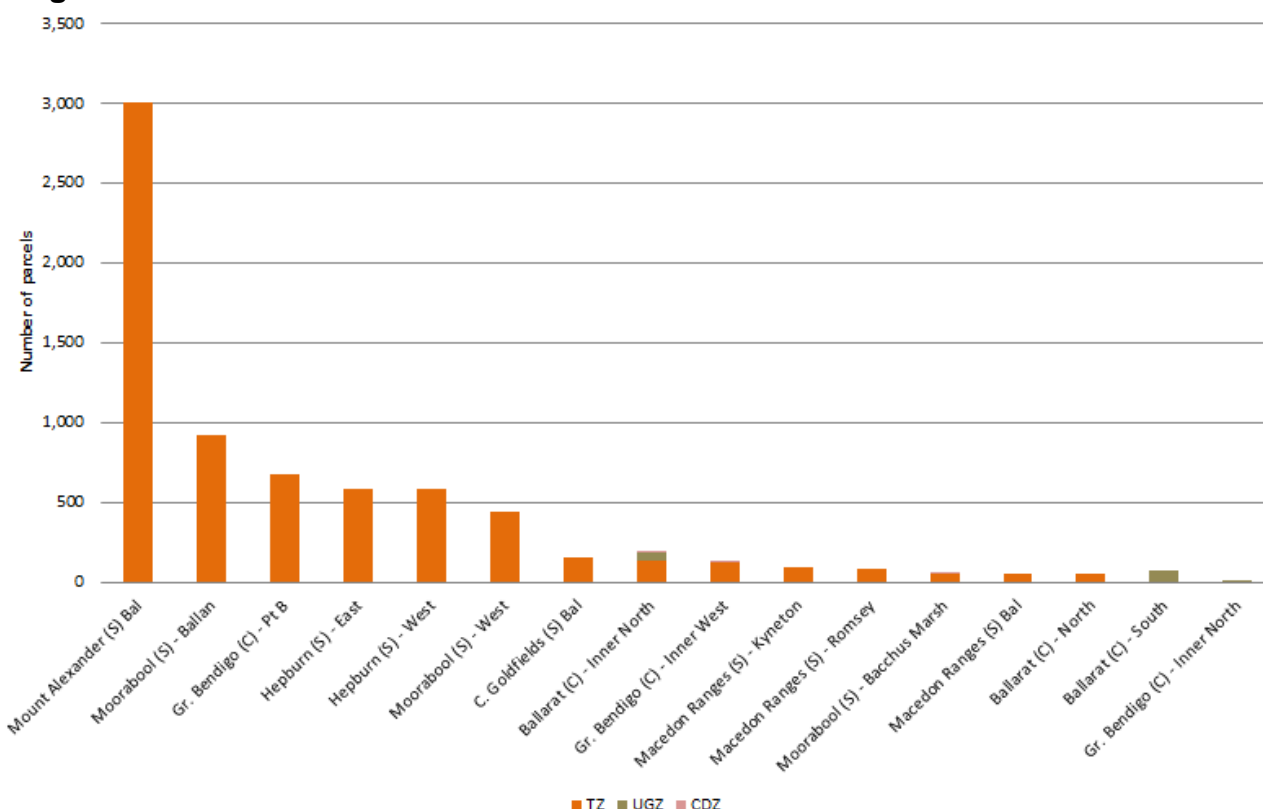
Source: Victorian Government 2013

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[35] See 5.4.2.1 in Methodology for detail on zone rules

Figure 42 Area of lots in future urban zones
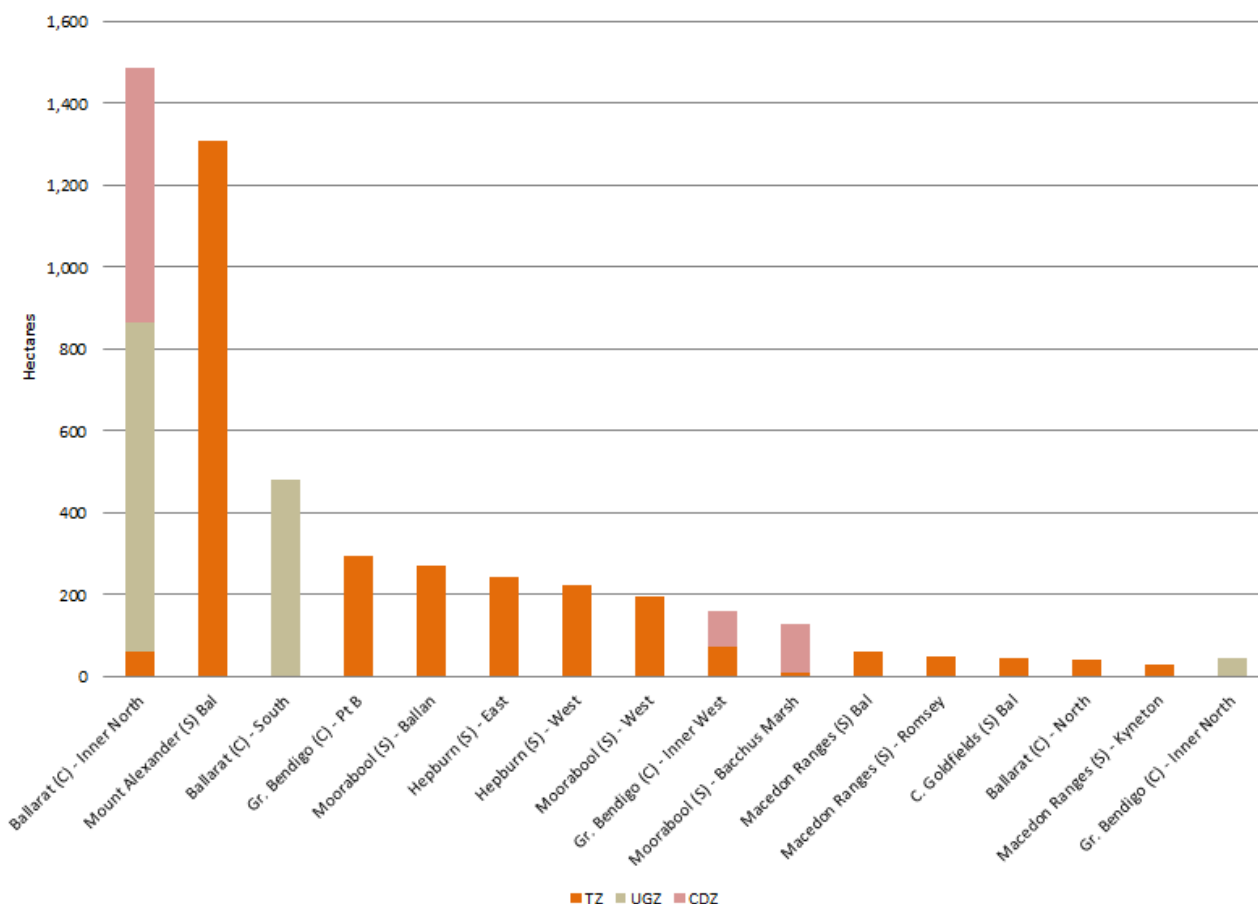

Source: Victorian Government 2013

In summary, the study region contains a large potential supply of developable rural land. The SLAs with the largest areas contain the largest supply of lots in rural zones but both Mt Alexander (S) Balance and Moorabool (S) – Ballan also contain larger numbers of lots in future urban zones.

The next section examines the pattern of Business-as-usual projected demand in across the region and demand and supply are compared in the subsequent section.

6.4.1.2   Demand for dwellings in rural areas

Dwelling demand for the rural part of the study region to 2041is calculated as described in section 6.2. Demand varies by how rural an SLA is: Moorabool (S) – West has no urban settlements so all demand will be in the rural landscape while Ballarat (C) – Central has no rural lots so it has no demand for rural dwellings (and does not appear in the table 8).

The western part of the Shire of Macedon Ranges is projected to experience the greatest increase in rural dwellings to 2041, followed by the majority of the Shire of Mount Alexander (outside Castlemaine). While Macedon Ranges (S) – Balance is served by rail and has grown due to family households moving out of Melbourne, growth is very contentious in the towns along the rail corridor (DPCD 2010[36]). The projected growth in Mount Alexander continues the tree change, second home and housing affordability migration trends of the past ten years, particularly among 35 to 65 year olds (id 2011c).

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[36] This DPCD report shows a net gain of 800 people in Macedon Ranges (S) Balance between 2001 and 2006 (DPCD 2010). Another 1,500 (net) moved to Macedon Ranges Shire between 2006 and 2011, with over 300 aged between 35 and 44 years (id 2011b).

Bendigo and Ballarat are likely to experience their own localised peri-urban or further fringe growth in the SLAs beyond their established urban areas. Table 36 shows the projected total demand for dwellings for the study region SLAs in ten year periods to 2041. The last column shows the net increase in dwellings required to 2041.

Table 36 Business-as-usual demand for dwellings in rural areas

SLA	2011	2021	2031	2041	Projected net dwelling growth
Ballarat (C) - Inner North	1,365	1,731	2,102	2,514	*1,149*
Ballarat (C) - North	317	350	399	450	*133*
Ballarat (C) - South	708	915	1,110	1,327	*619*
C. Goldfields (S) Balance	1,481	1,600	1,711	1,826	*345*
Gr. Bendigo (C) - Inner East	102	111	119	128	*26*
Gr. Bendigo (C) - Inner North	222	320	421	537	*315*
Gr. Bendigo (C) - Inner West	864	1,130	1,403	1,709	*845*
Gr. Bendigo (C) - Part B	3,366	3,804	4,236	4,695	*1,329*
Gr. Bendigo (C) - Strathfieldsaye	621	855	1,106	1,394	*773*
Hepburn (S) - East	1,492	1,751	2,003	2,275	*783*
Hepburn (S) - West	1,121	1,276	1,428	1,590	*469*
Macedon Ranges (S) - Kyneton	1,624	1,815	2,009	2,214	*590*
Macedon Ranges (S) - Romsey	1,451	1,818	2,172	2,561	*1,110*
Macedon Ranges (S) Balance	3,373	4,248	5,107	6,057	*2,684*
Moorabool (S) - Bacchus Marsh	806	1,104	1,398	1,733	*927*
Moorabool (S) - Ballan	1,606	1,928	2,244	2,588	*982*
Moorabool (S) - West	1,375	1,496	1,607	1,722	*347*
Mount Alexander (S) - Castlemaine	331	360	389	420	*89*
Mount Alexander (S) Balance	3,515	4,002	4,491	5,010	*1,495*
Total	*25,740*	*30,614*	*35,455*	*40,750*	*15,010*

Source: DPCD 2012b

The next section compares these demand figures to the supply calculations in the previous section.

6.4.1.3 How rural land supply meets rural dwelling demand

Generally the study region has sufficient rural land development potential to meet projected demand for rural dwellings (see Table 37). Exceptions include the areas surrounding Bendigo's existing urban area and the western part of the Shire of Macedon Ranges. Existing planning controls constrain the subdivision and new dwelling construction potential in these three SLAs where most affected lots are zoned Farming, Rural Conservation and Rural Living. This results in the rural parts of these three SLAs having insufficient development potential to meet projected demand for new dwellings ie. demand is unmet.

This further supports the scenario modelling aims to shift demand for development in rural areas to urban settlements. These two examples suggest that the demand for 473 dwellings that cannot be met in the surrounding rural areas could instead occur in areas urban residential zones in Bendigo, and 541 extra dwellings could be built in the urban settlements such as Gisborne, Macedon and Woodend in the Shire of Macedon Ranges.

Table 37 Business-as-usual rural supply and demand to 2041

SLA	Supply	Demand	Un/met rural dwelling demand
Ballarat (C) - Central	10	0	10
Ballarat (C) - Inner North	22,637	1,149	21,488
Ballarat (C) - North	934	133	801
Ballarat (C) - South	7,930	619	7,311
C. Goldfields (S) - Maryborough	43	0	43
C. Goldfields (S) Balance	9,726	345	9,381
Gr. Bendigo (C) - Central	0	0	0
Gr. Bendigo (C) - Eaglehawk	3	0	3
Gr. Bendigo (C) - Inner East	5	26	21
Gr. Bendigo (C) - Inner North	994	315	679
Gr. Bendigo (C) - Inner West	2,126	845	1,281
Gr. Bendigo (C) - Part B	8,945	1,329	7,616
Gr. Bendigo (C) - Strathfieldsaye	321	773	452
Hepburn (S) - East	3,994	783	3,211
Hepburn (S) - West	3,800	469	3,331
Macedon Ranges (S) - Kyneton	2,291	590	1,701
Macedon Ranges (S) - Romsey	1,619	1,110	509
Macedon Ranges (S) Balance	2,143	2,684	541
Moorabool (S) - Bacchus Marsh	2,687	927	1,760
Moorabool (S) - Ballan	2,838	982	1,856
Moorabool (S) - West	2,563	347	2,216
Mount Alexander (S) - Castlemaine	283	89	194
Mount Alexander (S) Balance	11,303	1,495	9,808
Total	*87,195*	*15,010*	*72,185*

Figure 43 orders the study region SLAs by supply: Ballarat (C) – Inner North has a large supply of rural lots but relatively little demand. The SLAs on the far right have no rural demand or no rural lots.

Figure 43 Business-as-usual lot supply and demand
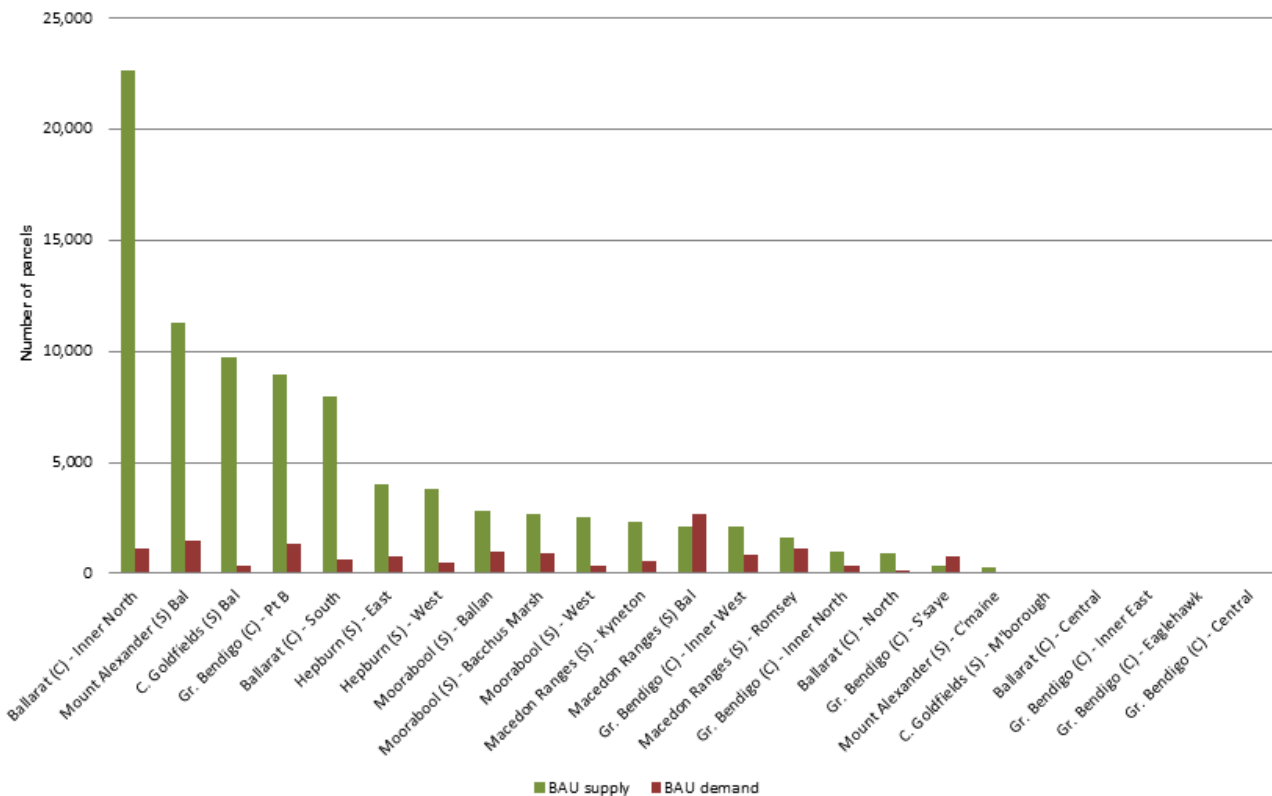
These results show a general pattern of an excess of rural land supply (green) in comparison to demand for rural dwellings (red) even under Business-as-usual projections. Under existing planning controls, the rural landscape has the latent potential for extensive residential development. At this time, projections do not suggest demand is likely to exist to produce such a result. However if current trends dramatically change and planning controls remain the same, the rural landscape could be radically changed through new residential development that is legally permitted. Modelling scenarios to reduce this development potential can illustrate the possibility of reducing its overall impact on the rural landscape.

The next section analyses where and when development may take place in the rural landscape.

6.4.1.4 Where and when will rural development occur?

The model not only looks at whether development capacity is sufficient to meet projected demand but it also allows the demand to be distributed spatially across the study region given certain development pressure criteria. Criteria such as infrastructure, demographics, environment and settlement patterns influence when development will occur. The details for the development pressure criteria are discussed in the Methodology in section 5.4.2.

Under the Business-as-usual scenario, development pressure is greatest close to well-serviced settlements, Melbourne and existing transport infrastructure, and so this scenario continues the pattern of past urbanising trends. Figure 44reflects those pressure patterns with areas under greatest development pressure in red and with less pressure in blue.

Figure 44 Development pressure (Business-as-usual)
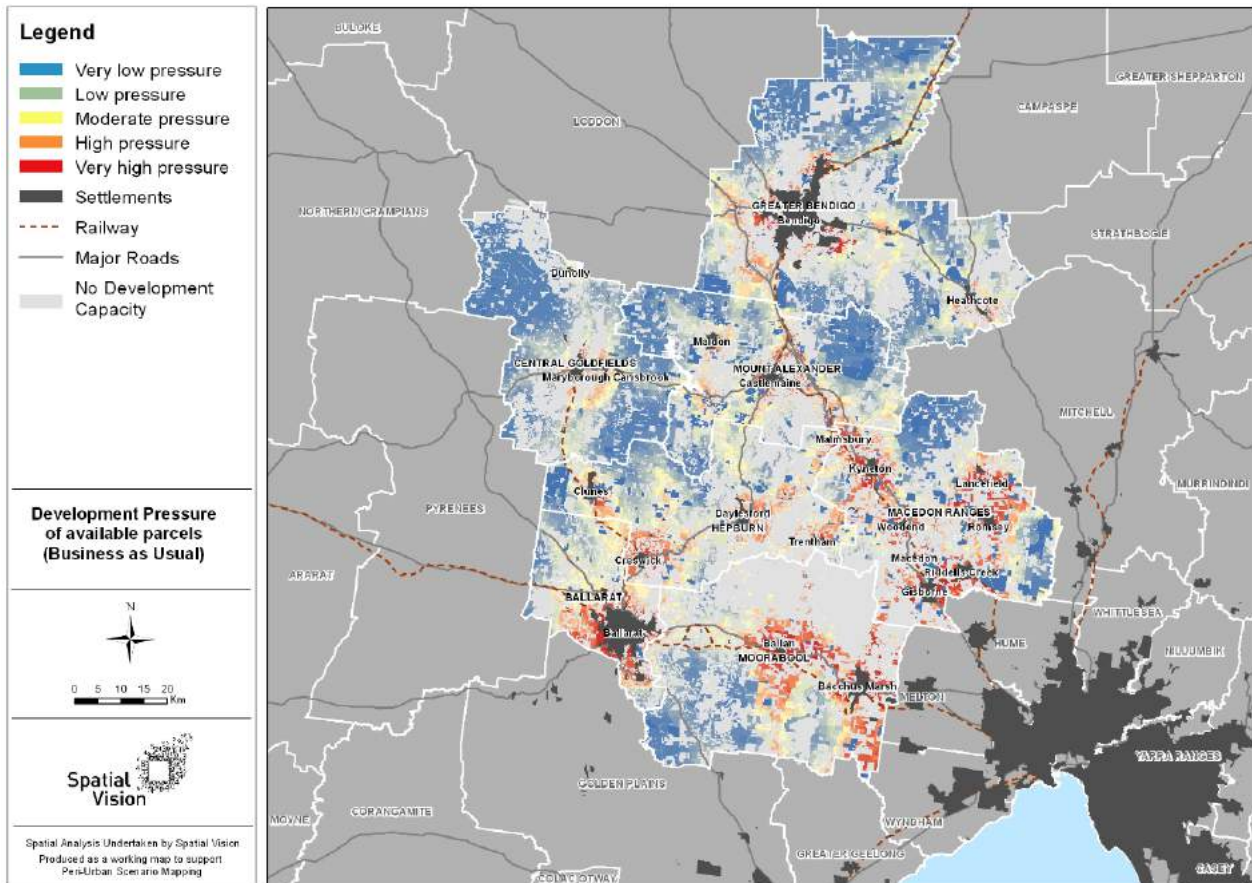
Figure 45 indicates the time periods during which the lots under most pressure are likely to be developed. Take up occurs closest to existing urban settlements and infrastructure. Macedon Ranges Shire is subject to extensive pressure and early take-up due to the shortage of rural land to meet projected demand in its western area. By contrast, Central Goldfields Shire, Mount Alexander Shire and the most rural parts of the City of Greater Bendigo to the north all contain extensive areas with undeveloped capacity. This again indicates the large available supply of land in the rural landscape.

Figure 45 Lot take-up, Business-as-usual
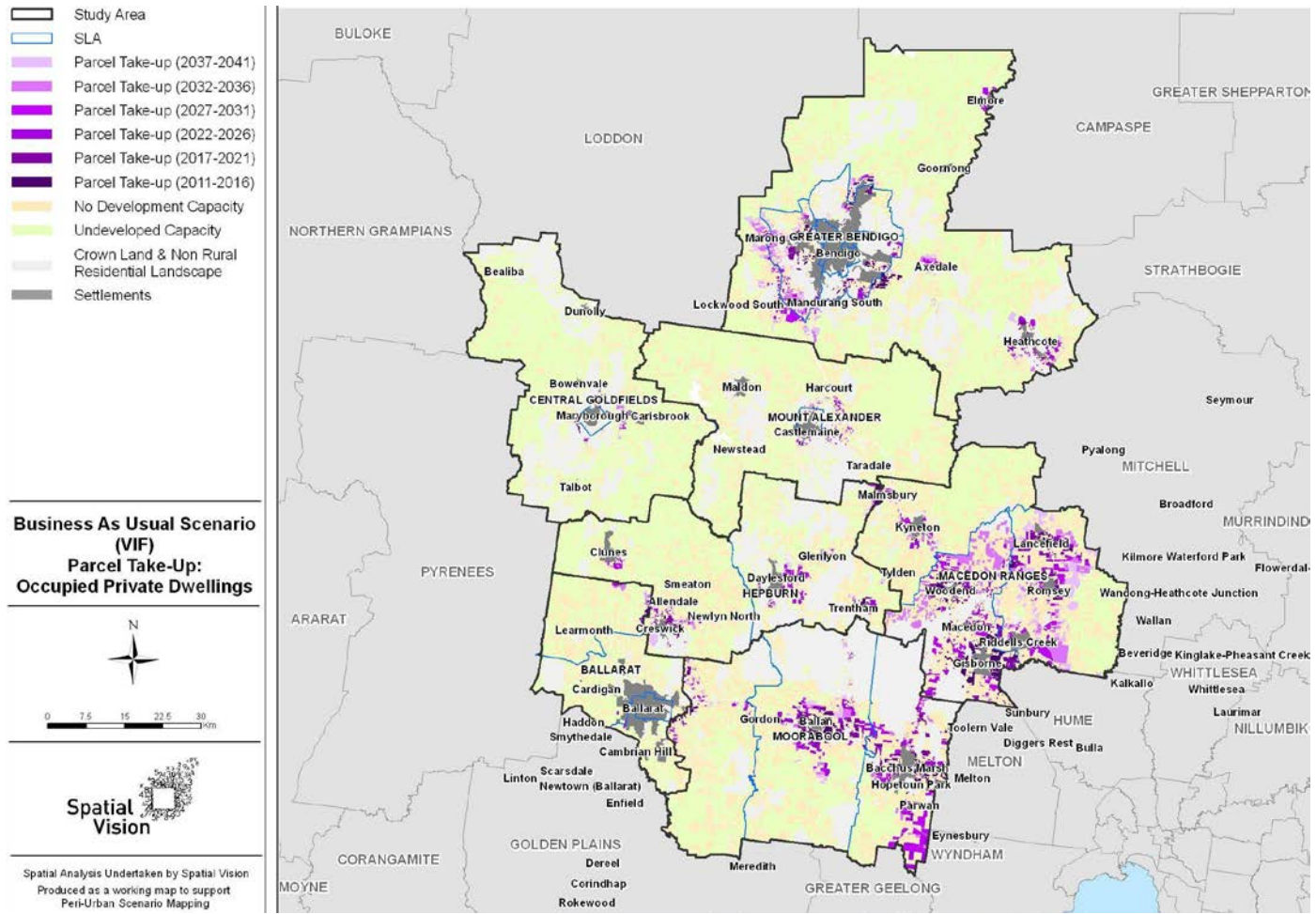
The next section presents the results from the second scenario, Rural preservation. It differs to the Business-as-usual situation by restricting new rural dwellings and subdivisions to lots of larger minimum sizes than currently exist in the planning zones. These sizes vary by zone and dramatically reduce the number of lots eligible for development in the rural landscape.

6.4.2 Rural preservation

The Rural preservation scenario reduces the demand for and the amount of development that could occur in the rural landscape by applying a minimum lot size for a new dwelling. It also increases the development potential of areas close to urban settlements which currently appear rural and are zoned Urban Growth, Comprehensive Development and Township. The scenario shifts demand from the truly rural landscape to the edges of existing urban settlements, and also transfers demand for rural dwellings into those urban settlements.

This scenario requires a minimum 40 hectare rural land lot size before the lot qualifies for the construction of a dwelling on rural lots in the Farm, Rural Conservation and Rural Living zones. This size limit also reduces the number of lots with potential for subdivision. At the same time it reduces the minimum areas for township fringe lots in future urban zones: Township, Urban Growth and Comprehensive Development zones.

By applying the scenario's lot size rules in the rural landscape, the overall supply of rural land is reduced and the urban proportion of the study region increases. Demand for rural dwellings is then recalculated based on these changed rural-urban area proportions (see section 6.2 Rural and urban areas). As a result, this scenario has reduced demand for rural dwellings. The difference between this reduced amount of demand and Business-as-usual demand for rural dwellings must now be accommodated within the study region's urban settlements. This is referred to as rural transferred demand.

Under this scenario, over 70 per cent of the projected development in the study region's rural areas could occur closer to existing urban settlements in the future urban zones: Urban Growth and Comprehensive Development. The result for all rural areas produces a larger total supply of lots for residential development than in the Business-as-usual scenario due to this preference given to the future urban zones which have relatively small minimum lot areas for dwellings and subdivision as shown in Table 38.

As a result, the Rural preservation scenario produces a larger development potential than in Business-as-usual, far in excess of that needed to meet projected demand. As shown in Table 33, under this scenario the study region enough lots of land to accommodate 108,066 more dwellings than for which demand is projected. All but one of the region's SLAs also have excess development capacity in comparison to projected demand for dwellings. Under this scenario, Ballarat (C) – Inner North contains over 36,000 lots to meet demand for 100 houses, compared to a 22,000 lot supply to meet a 1,150 lot demand under the Business-as-usual scenario. This shows both the impact of the changed planning rules which further increase land supply, particularly in future urban zones, while at the same time reducing demand for rural dwellings. This scenario is effective at limiting further rural residential development and prioritises development close to urban settlements in those future urban zones.

Table 38 summarises the minimum lot sizes by zone for this scenario.

Table 38 Rural preservation minimum areas for rural development by planning zone

Zone	Minimum lot area for construction of a dwelling (ha)	Minimum parent lot area for subdivision (ha)
RURAL ZONES		
Farming	40	40
Rural Conservation	40	40
Rural Living	16	16
FUTURE URBAN ZONES (which currently appear rural)		
Township	None	0.05
Urban Growth	0.04	0.04
Comprehensive Development	0.04	0.04

The following sections present the results for this scenario's land supply, projected demand for dwellings, and how supply is likely to meet demand including when and where rural development might take place over time to 2041.

6.4.2.1 Land supply in rural areas

While this Rural preservation scenario reduces the number of lots with rural and future urban zoning by around 66,000 (from 79,075 in the Business-as-usual scenario to 12,726 lots in this scenario), the total number of houses which could be built has increased from 87,195 in Business-as-usual to 111,994 in this scenario. These additional 24,799 dwellings could be built due to significantly reducing the minimum area required to subdivide or build a house in the Township Zone, Urban Growth and Comprehensive Development zones compared to current schedules. These are future urban zones currently retaining rural characteristics on the edges of towns. They are suitable locations for shifting rural demand from Farming, Rural Conservation and Rural Living zones to the edges townships and so their yields are included in the Rural preservation scenario. Under the Business-as-usual scenario, lots in the Township Zone could only be subdivided into lots of a minimum area of 0.4 hectares; this scenario models their development capacity with a minimum child lot size of 0.05 hectares.

Five SLAs no longer have any rural lots under this scenario and they join Greater Bendigo (C) – Central as being defined as completely urban. Only Mount Alexander (S) – Castlemaine had over fifty available lots in Business-as-usual, with the others having between three and 43. These SLAs cover parts of Ballarat, Maryborough, Bendigo and Castlemaine where any lots zoned Rural Conservation or Rural preservation are too small to be subdivided or have a house under this scenario's minimum lot sizes. This also applies to about 100 Farming Zone lots in Castlemaine. Table 39 has data for the remaining SLAs which still have development capacity in their rural areas.

Table 39 Rural preservation scenario rural development capacity

SLA	Lots in rural and future urban zones	Subdivision Potential	Total Capacity	Currently Occupied	Development Capacity (Supply)
Ballarat (C) - Inner North	286	36,587	36,873	130	36,743
Ballarat (C) - North	195	792	987	92	895
Ballarat (C) - South	92	11,931	12,023	54	11,969
C. Goldfields (S) Bal	760	1,051	1,811	242	1,569
Gr. Bendigo (C) - Inner North	18	1,080	1,098	10	1,088
Gr. Bendigo (C) - Inner West	155	3,463	3,618	56	3,562
Gr. Bendigo (C) - Pt B	2,231	5,763	7,994	806	7,188
Gr. Bendigo (C) - S'saye	20	6	26	10	16
Hepburn (S) - East	737	4,057	4,794	272	4,522
Hepburn (S) - West	981	3,693	4,674	441	4,233
Macedon Ranges (S) - Kyneton	435	613	1,048	235	813
Macedon Ranges (S) - Romsey	682	1,132	1,814	441	1,373
Macedon Ranges (S) Bal	267	1,236	1,503	213	1,290
Moorabool (S) - Bacchus Marsh	327	3,172	3,499	161	3,338
Moorabool (S) - Ballan	1,239	4,217	5,456	536	4,920
Moorabool (S) - West	642	3,476	4,118	291	3,827
Mount Alexander (S) Bal	3,659	22,138	25,797	1,149	24,648
Total	*12,726*	*104,407*	*117,133*	*5,139*	*111,994*

Ballarat (C) – Inner North is the most extreme example of this shifting of rural supply to areas closer to urban settlements that currently have a rural character and zones. Under Business-as-usual this SLA's development capacity was 22,637 dwellings and this has increased under this scenario to 36,743 (see Table 40). At the same time, the number of lots on which dwellings could be built has fallen from 2,623 to 286. This is due to the Rural preservation scenario's much smaller minimums for subdivision and lot size required for a dwelling in the Township, Urban Growth and Comprehensive Development zones.

For example, compared to Business-as-usual this SLA's 42 Urban Growth Zone lots within the Ballarat West Growth Area could accommodate twice as many dwellings and the 14 Comprehensive Development Zone lots (Lake Federation Resort) could have over 6,000 extra dwellings At the same time the number of lots on which dwellings could be built has dramatically fallen from 2,623 to 286.

Table 40 Ballarat (C) - Inner North Business-as-usual and Rural preservation scenario results

	Lots in rural and future urban zones	Subdivision Potential	Total Capacity	Currently Occupied	Development Capacity (Supply)
Business-as-usual	2,623	21,354	23,977	1,340	*22,637*
	- FZ: 1,686				- FZ: 947
	- RLZ: 742				- RLZ: 363
	- TZ: 139				- TZ: 96
	- UGZ: 42				- UGZ: 11,990
	- CDZ: 14				- CDZ: 9,241
Rural preservation	286	36,587	36,873	130	*36,743*
	- FZ: 86				- FZ: 86
	- RLZ: 5				- RLZ: 5
	- TZ: 139				- TZ: 1,054
	- UGZ: 42				- UGZ: 20,111
	- CDZ: 14				- CDZ: 15,487

By contrast, under this scenario Central Goldfields (S) Balance can accommodate 8,157 fewer dwellings than in Business-as-usual as shown in Table 41. The major influence of the scenario rules in this SLA is the large reduction in the number and area of Farming Zone lots and, to a lesser extent, Rural Living and Rural Conservation lots. This is also illustrated in Figure 46.

Table 41 C. Goldfields (S) Balance Business-as-usual and Rural preservation scenario results

	Lots in rural and future urban zones	Subdivision Potential	Total Capacity	Currently Occupied	Development Capacity (Supply)
Business-as-usual	10,876	1,099	11,975	2,249	*9,726*
	- FZ: 7,483				- FZ: 6,614
	- RCZ: 802				- RCZ: 694
	- RLZ: 2,433				- RLZ: 2,281
	- TZ: 158				- TZ: 137
Rural preservation	760	1,051	1,811	242	*1,569*
	- FZ: 511				- FZ: 689
	- RCZ: 49				- RCZ: 82
	- RLZ: 42				- RLZ: 36
	- TZ: 158				- TZ: 762

Figure 46 Change in number of lots and total area of all lots by planning zone: Central Goldfields (S) Balance
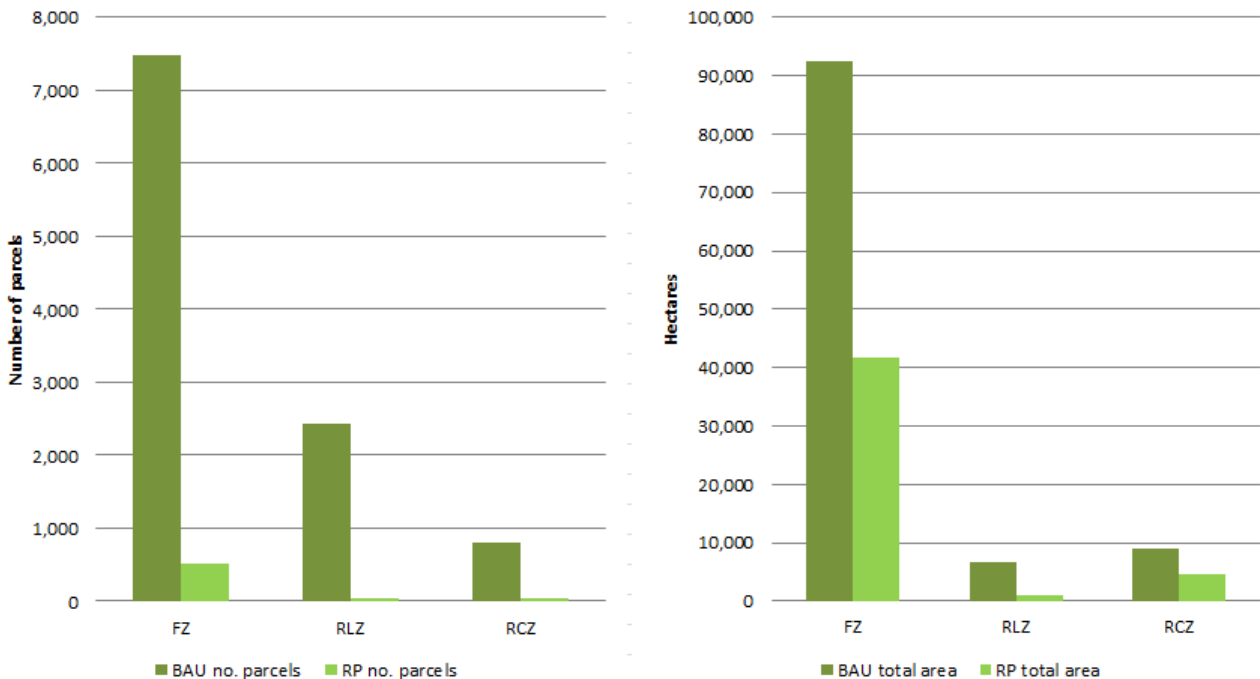
Large rural SLAs such as Mount Alexander (S) Balance, Greater Bendigo (C) – Part B and Moorabool (S) – Ballan contain the largest supplies of rural lots for development due to the size of their physical area. Only two more urban SLAs – Ballarat (C) – Inner North and South – have very large rural development capacity but this will be in the future urban zones, Urban Growth and Comprehensive Development.

The next section examines the revised demand for houses after the Rural preservation rules are applied to both the rural and urban areas of the SLAs and their associated dwelling projections.

6.4.2.2 Demand for dwellings in rural areas

As described in the Methodology section 5.2, this scenario's projected demand is directly influenced by the areas defined as rural and urban. These areas change under this scenario because rural lots are removed from eligibility for rural development through applying the scenario's minimum lot size rules. The proportional reduction in lots is then applied to the rural dwelling count which is the proxy definition of the extent of the rural parts of the study region SLAs. This then produces a revised urban to rural ratio which is applied to split the projected number of dwellings for the whole SLA.

The application of this method leads to the greatest falls in demand in Macedon Ranges (S) Balance and Ballarat (C) – Inner North as far fewer of their lots are defined as rural in this scenario (consistent with the findings above in relation to lot / dwelling supply). Macedon Ranges (S) Balance retains only four per cent of its dwellings in rural areas once the reduced eligibility of rural land lots is taken into account, compared to 43 per cent under the Business-as-usual scenario. This is due to its large number of small lots in the Rural Conservation and Rural Living zones: once they are subject to the Rural Conservation Zone 40 hectare and Rural Living Zone 16 hectare minimum area rules for this scenario, many are no longer eligible for rural development. This redefines a much smaller area as rural for the SLA and therefore reduces the projected demand for rural dwellings from 2,684 under Business-as-usual to 249 by 2041 (see Figure 47).

Table 42 Rural preservation – projected demand for rural dwellings to 2041

SLA	2011	2021	2031	2041	Projected total demand for dwellings to 2041
Ballarat (C) - Inner North	124	157	191	228	104
Ballarat (C) - North	168	185	211	238	70
Ballarat (C) - South	101	131	159	190	89
C. Goldfields (S) Bal	265	287	306	327	62
Gr. Bendigo (C) - Inner West	72	94	117	142	70
Gr. Bendigo (C) - Pt B	1,490	1,685	1,876	2,079	589
Gr. Bendigo (C) - S'saye	27	37	48	61	34
Hepburn (S) - East	278	326	373	423	145
Hepburn (S) - West	308	351	393	437	129
Macedon Ranges (S) - Kyneton	289	323	357	394	105
Macedon Ranges (S) - Romsey	470	588	703	829	359
Macedon Ranges (S) Bal	314	395	475	563	249
Moorabool (S) - Bacchus Marsh	134	184	233	289	155
Moorabool (S) - Ballan	766	919	1,070	1,234	468
Moorabool (S) - West	1,375	1,496	1,607	1,722	347
Mount Alexander (S) Bal	2,241	2,552	2,863	3,194	953
Total	8,422	9,710	10,982	12,350	3,928

Figure 47 Projected dwelling demand to 2041: Business-as-usual and Rural preservation scenarios
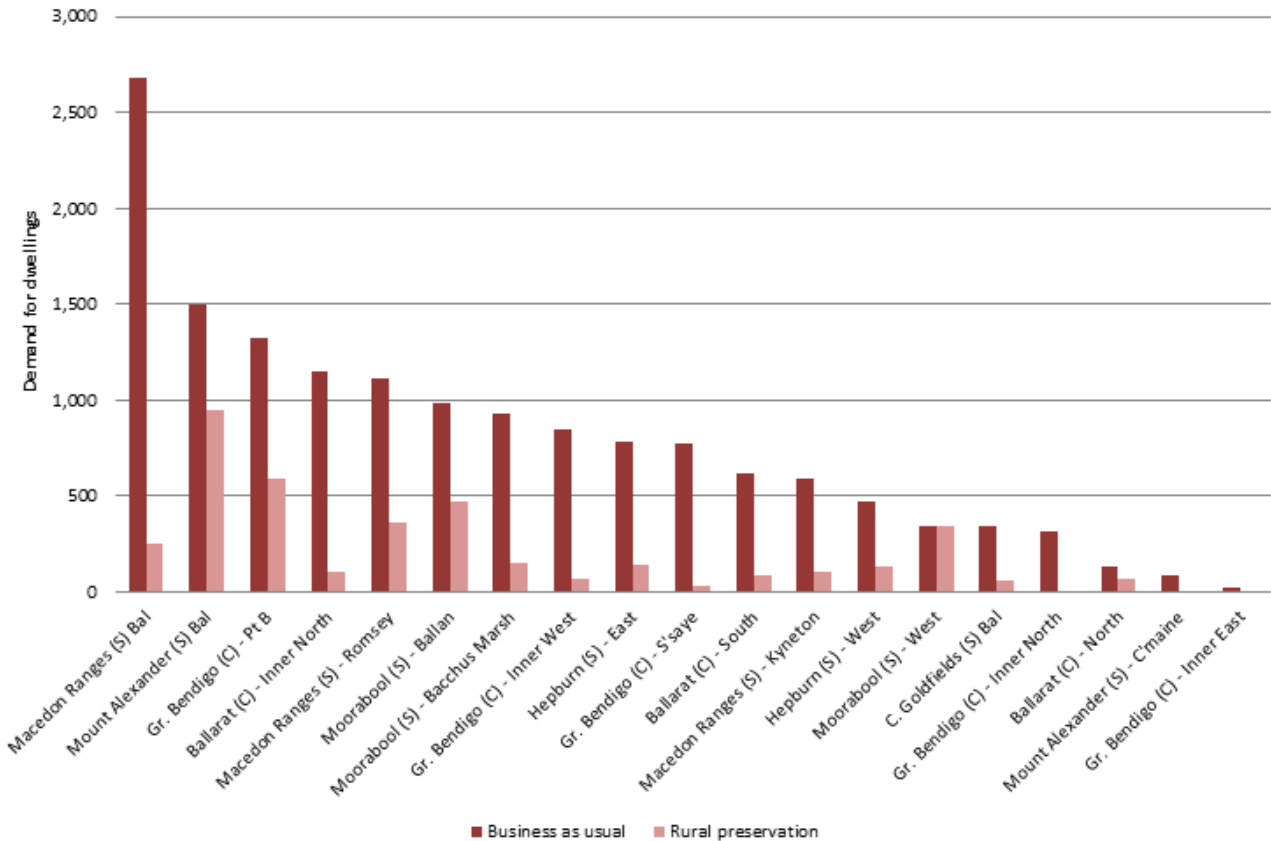
Source: DPCD 2012b

Overall rural demand falls by 11,000 dwellings across the study region. This demand can be met in the urban settlements and this is discussed in section 6.4.2.5 Meeting additional urban demand through rural transfer. The next section compares this overall demand and demand in some individual SLAs with the supply calculated in the previous section.

6.4.2.3 How rural land supply meets rural dwelling demand

Similar to the Business-as-usual scenario, under the Rural preservation scenario all but one of the study region's SLAs has sufficient development capacity to meet projected rural demand for dwellings. Only Greater Bendigo (C) – Strathfieldsaye has a small shortfall and it is projected to need relatively little development in comparison to other SLAs such as Mount Alexander (S) Balance or Greater Bendigo (C) – Part B. This is illustrated in Figure 48.

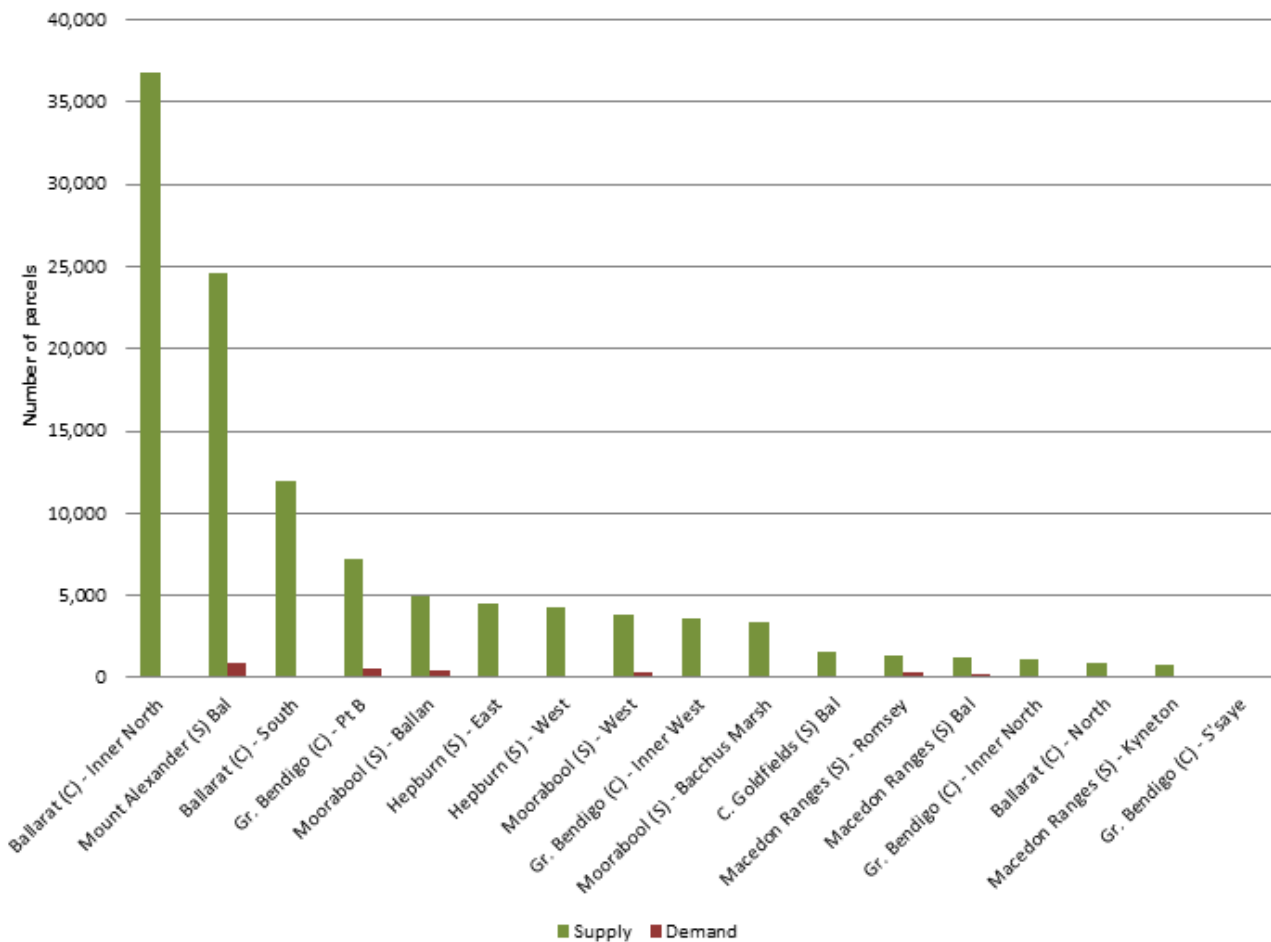**Figure 48 Rural preservation lot supply and demand**

Table 45 highlights the large oversupply of lots in this scenario once the dramatic increase in the supply of lots zoned Township, Urban Growth and Comprehensive Development is calculated. Mount Alexander (S) Balance alone has an extra 20,000 Township Zone lots which could be developed under this scenario, but it only has a projected demand for 950 rural homes.

Increasing the minimum area for subdivision and dwelling eligibility in the Rural Conservation and Rural Living zones under the Rural preservation scenario for Greater Bendigo (C) – Strathfieldsaye leads to much less land available for development and a corresponding fall in demand for future rural homes. Bendigo's urban area could potentially accommodate the small shortfall and this is addressed in the next section, 6.4.2.5 Meeting additional urban demand through rural transfer.

The Urban Growth and Comprehensive Development zones in Ballarat (C) – Inner North account for almost all of the 36,000 dwelling supply in that SLA while its demand is only for around 100 houses. Supply in this scenario is over 13,000 greater than in Business-as-usual. This is due to the scenario's increased development capacity for land close to urban settlements in the future urban zones. Rural and urban areas are redefined by eliminating rural lots that can no longer be developed under the scenario's rules (see

Table 40 Ballarat (C) - Inner North Business-as-usual and Rural preservation scenario results). This produces a smaller proportion of demand for the rural areas. Ballarat (C) – Inner North has relatively few rural lots in this scenario (with most of the Farm Zone lots eliminated under the 40 hectare rule) but lots zoned Urban Growth and Comprehensive Development have almost doubled their development capacity.

Figure 49 shows the effect of the scenarios on these zones in Ballarat (C) – Inner North.

Figure 49 Ballarat (C) – Inner North: Business-as-usual and Rural preservation scenarios (supply)
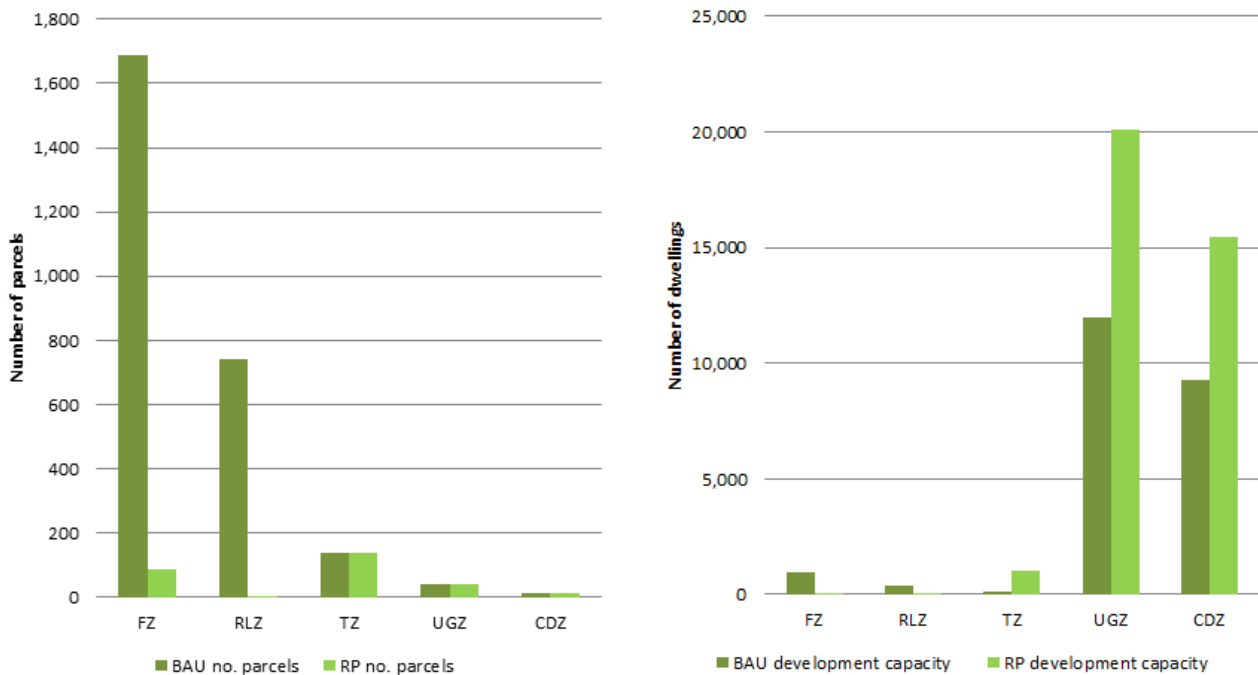
This result clearly demonstrates the impact of the future urban zones, Urban Growth, Comprehensive Development and Township. Places with extensive areas covered by these zones have significant capacity to accommodate dwelling growth well beyond projected demand. While this may appear to contradict the desired goal of this scenario – to preserve rural land – it does prioritise rural development in the areas closest to urban settlements rather than allow the continued haphazard building of houses in rural areas. The following section looks at the location and timing of development in more detail.

6.4.2.4 Where and when will rural development occur?

This scenario also examines how demand will be distributed spatially across the study region given the defined development pressure criteria[37].

Development pressure in this scenario is based on the greater attraction of transport and well serviced urban settlements. Unlike the Business-as-usual scenario, environmental factors under this scenario are not development attractors. The following map reflects those pressure patterns with the remaining lots eligible for development and under the greatest development pressure shown in red. A clear relationship exists between urban settlements, transport routes and development pressure, and this pressure is more concentrated than in Business-as-usual (see Figure 44 Development pressure (Business-as-usual) in section 6.4.1.4 Where and when will rural development occur?).

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[37]Refer to Methodology section 5.4.2.

The more rural parts of the study region will experience less development pressure and the map indicates those areas in blue.

The most notable difference between the Rural preservation and Business-as-usual scenarios is the increase in areas without any development capacity where previously they had low development pressure.

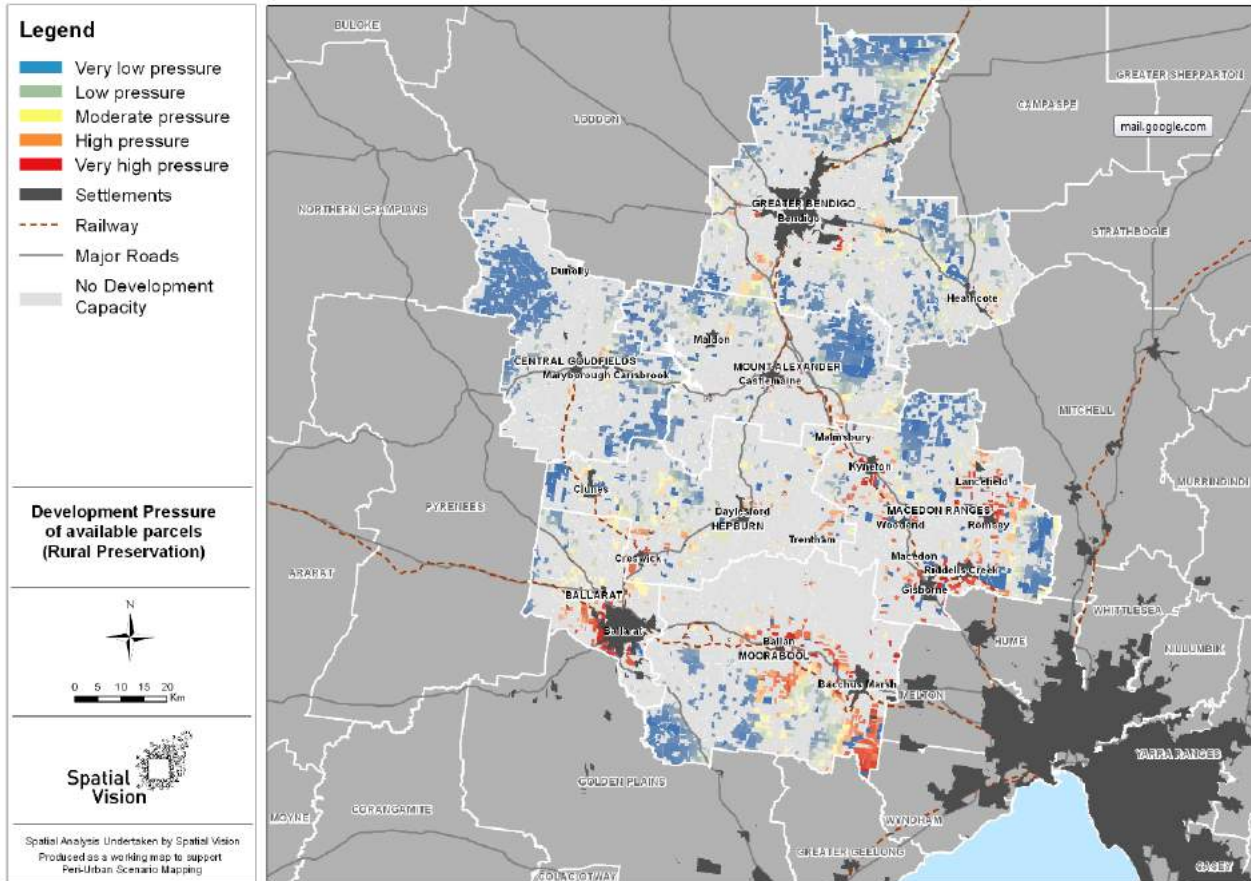**Figure 50 Development pressure, Rural preservation**

Figure 51 also highlights how this scenario has increased the rural areas in the study region which have no capacity for development in comparison to the Business-as-usual scenario. Overall take up of rural lots is also reduced, with the purple areas much smaller than in Business-as-usual. Development is also concentrated much more around urban settlements, which reflects the prioritizing of future residential development on more urban zones through smaller minimum lot sizes for subdivision and new dwellings.

This scenario has reduced the demand for rural dwellings by defining rural lots as ineligible for development. But this demand needs to be met somewhere. The next section discusses how this previously rural demand is shifted to urban settlements.

Figure 51 Lot take up, Rural preservation
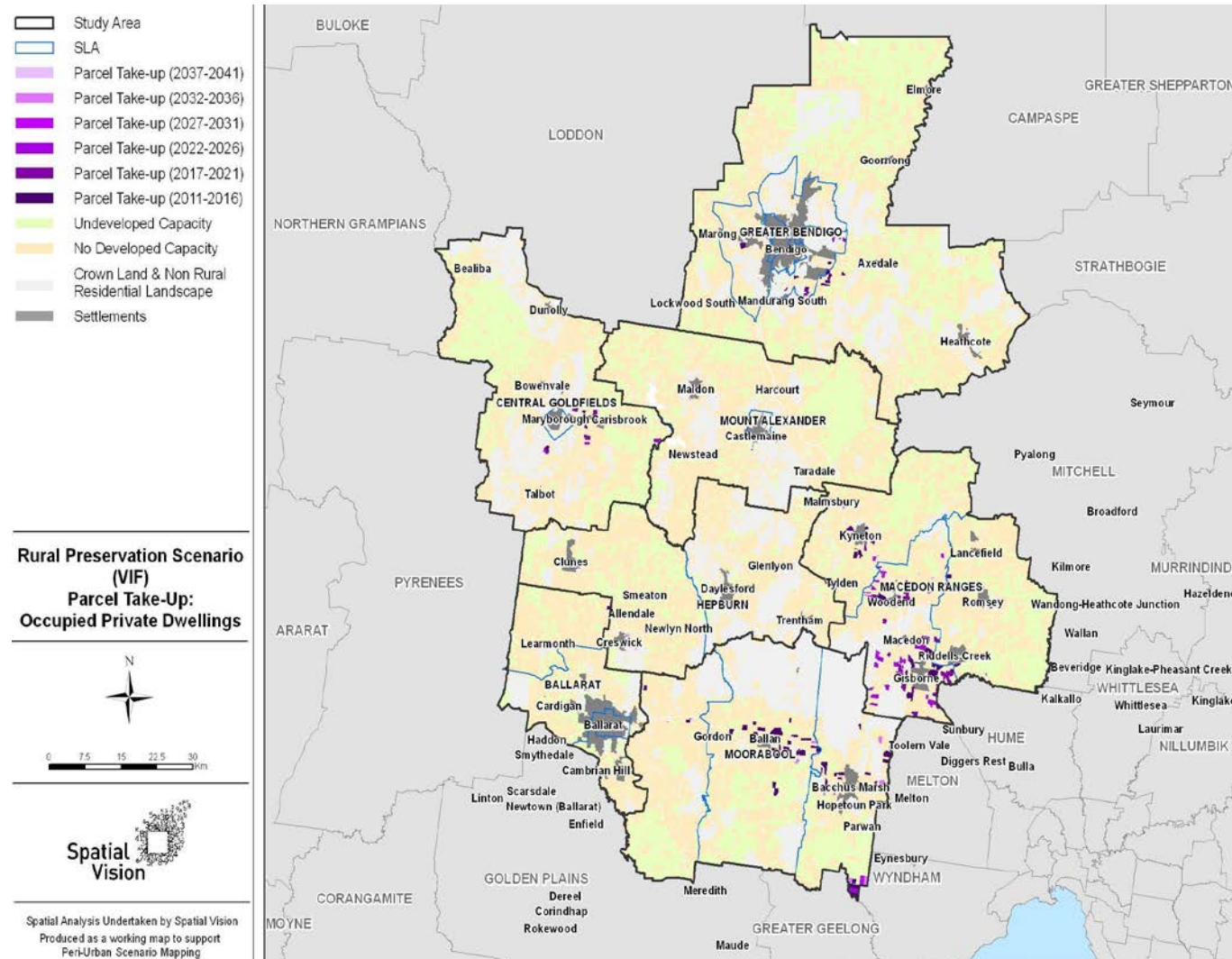
6.4.2.5 Meeting additional urban demand through rural transfer

In this scenario, stronger planning controls reduce the proportion of projected dwelling demand that is met in the rural areas and it is transferred to urban settlements. The total projected dwelling numbers for the study regions' SLAs do not change and land supply remains as it is defined in 2011 VIF data, but the proportions defined as rural and urban do change in relation to rural land no longer available under the scenario's planning zone area rules (DPCD 2012b). This section concludes with a discussion of the density implications for urban settlements as a result of increased demand for dwellings within their current boundaries. Note that this section does not discuss development characteristics of the future urban zones but focuses on development within the defined urban areas.

The transferred demand is calculated as follows:
1. Demand transferred from the rural part of each SLA is added to the existing urban demand for the LGA.
2. Demand is then redistributed proportional to the urban lot count for each settlement within the LGA[38].

This approach assumes that urban settlements will maintain their proportional sizes into the future. Table 44 shows how this transferred demand is distributed to study region's SLAs which have urban settlements.

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[38]See Fish et al 2014 section 2.6 for discussion of aggregating to SLA versus LGA.
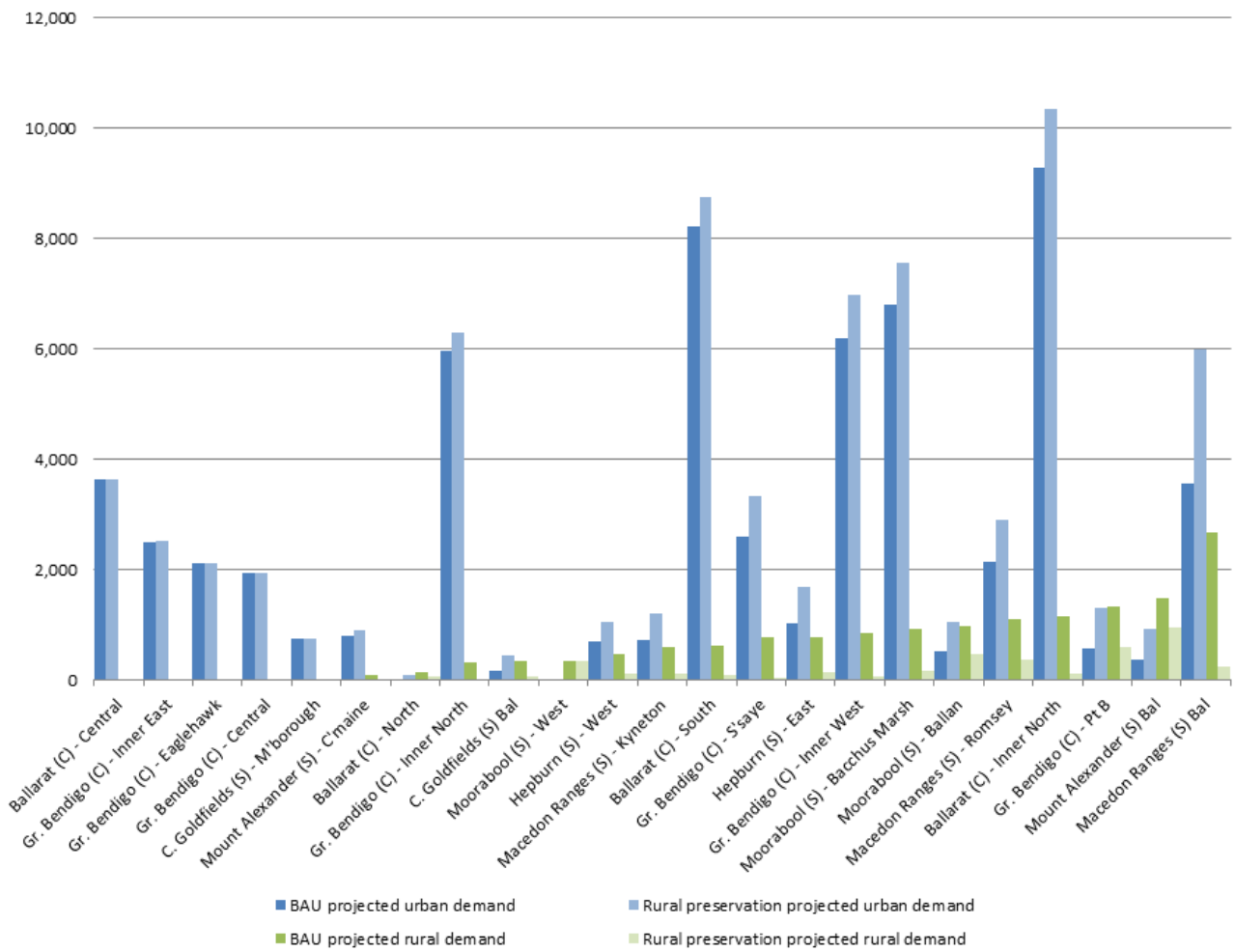
Table 43 Rural preservation – projected demand for dwellings in urban settlements to 2041[39]

SLA Name	2011	2021	2031	2041	Projected dwelling demand to 2041
Ballarat (C) - Central	15,129	16,480	17,597	18,755	3,626
Ballarat (C) - Inner North	12,281	15,582	18,916	22,622	10,341
Ballarat (C) - North	205	227	258	291	86
Ballarat (C) - South	10,018	12,944	15,704	18,768	8,750
C. Goldfields (S) - M'borough	3,444	3,715	3,947	4,186	742
C. Goldfields (S) Bal	1,946	2,101	2,248	2,399	453
Gr. Bendigo (C) - Central	8,092	8,789	9,405	10,044	1,952
Gr. Bendigo (C) - Eaglehawk	4,037	4,747	5,420	6,144	2,107
Gr. Bendigo (C) - Inner East	10,245	11,071	11,909	12,780	2,535
Gr. Bendigo (C) - Inner North	4,450	6,407	8,416	10,743	6,293
Gr. Bendigo (C) - Inner West	7,124	9,322	11,571	14,100	6,976
Gr. Bendigo (C) - Pt B	3,318	3,749	4,176	4,628	1,310
Gr. Bendigo (C) - S'saye	2,675	3,682	4,761	6,000	3,325
Hepburn (S) - East	3,192	3,746	4,286	4,867	1,675
Hepburn (S) - West	2,495	2,839	3,177	3,538	1,043
Macedon Ranges (S) - Kyneton	3,321	3,710	4,107	4,525	1,204
Macedon Ranges (S) - Romsey	3,799	4,758	5,684	6,704	2,905
Macedon Ranges (S) Bal	7,530	9,483	11,401	13,522	5,992
Moorabool (S) - Bacchus Marsh	6,586	9,015	11,418	14,149	7,563
Moorabool (S) - Ballan	1,704	2,047	2,383	2,748	1,044
Moorabool (S) - West	0	0	0	0	0
Mount Alexander (S) - C'maine	3,310	3,596	3,894	4,205	895
Mount Alexander (S) Bal	2,153	2,451	2,751	3,069	916
Total	*119,065*	*142,482*	*165,460*	*190,828*	*71,733*

Figure 52 shows a comparison of future demand for dwellings under Business-as-usual and Rural preservation, for both urban and rural parts of each of the study region's SLAs. This highlights the magnitude of urban demand in comparison to rural demand for dwellings to 2041 and also shows the impact of the Rural preservation rules in reducing rural and increasing urban demand as compared to Business-as-usual. The first five SLAs are completely urban so are unaffected by the Rural preservation scenario and Moorabool (S) – West contains only rural lots so it experiences no change in demand.

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[39] Figures are based on applying the remaining urban preference (or share) based on percentages identified in section 6.2 Rural and urban areas, to total SLA growth estimates.

Figure 52 Business-as-usual and Rural preservation projected urban and rural dwelling demand to 2041

The model distributes the additional, transferred projected demand to urban settlements as shown in Table 44 for the Business-as-usual and Rural preservation scenarios. The urban lot count indicates the size of each settlement and is the number used to calculate the urban share of the projected dwellings. Note that these are not vacant lots but the total within each urban settlement. Occupation information for urban lots is not available.

Table 44 Demand in urban settlements

| Settlement and LGA	Urban lot count	Settlement hierarchy	BAU urban demand to 2041	RP transferred demand to 2041	*RP total urban demand to 2041*
City of Ballarat					
Ballarat	47,368	Regional Centre	21,070	1,629	*22,700*
Learmonth	142	Village	23	5	*28*
Cardigan Village	92	Village	59	3	*62*
Cardigan	15	Hamlet	10	1	*10*
Cambrian Hill	5	Village	3	0	*4*
Central Goldfields Shire					
Maryborough	4,945	District Town	753	199	*951*
Dunolly	785	Town	60	32	*91*
Carisbrook	690	Town	52	28	*80*
Talbot	395	Village	30	16	*46*
Bowenvale	139	Village	11	6	*16*
Bealiba	90	Village	7	4	*10*
Havelock	3	Hamlet	0	0	*0*
City of Greater Bendigo					
Bendigo	47,853	Regional Centre	21,255	2,456	*23,711*
Heathcote	1,589	Town	346	82	*427*
Elmore	482	Village	105	25	*130*
Goornong	207	Village	45	11	*56*
Axedale	186	Village	40	10	*50*
Mandurang South	138	Village	66	7	*73*
Lockwood South	85	Village	38	4	*43*
Marong	15	Hamlet	8	1	*8*
Hepburn Shire					
Daylesford	3,658	District Town	846	461	*1,307*
Creswick	1,693	Town	364	213	*577*
Clunes	1,469	Town	316	185	*501*
Trentham	615	Town	142	78	*220*
Coomoora	157	Village	36	20	*56*
Newlyn North	62	Village	13	8	*21*
Glenlyon	54	Village	12	7	*19*
Smeaton	31	Village	7	4	*11*
Allendale	18	Hamlet	4	2	*6*
Macedon Ranges Shire					
Gisborne	3,774	District Town	2,104	993	*3,097*
Kyneton	3,073	District Town	582	809	*1,391*
Woodend	1,998	Town	1,114	526	*1,640*
Romsey	1,663	Town	949	438	*1,387*
Riddells Creek	1,284	Town	733	338	*1,071*
Lancefield	828	Town	472	218	*690*

Settlement and LGA	Urban lot count	Settlement hierarchy	BAU urban demand to 2041	RP transferred demand to 2041	*RP total urban demand to 2041*
Macedon	586	Town	327	154	*481*
Malmsbury	541	Town	103	142	*245*
Tylden	180	Village	34	47	*81*
Woodend North	22	Hamlet	12	6	*18*
Moorabool Shire					
Bacchus Marsh	7,943	District Town	6,559	1,069	*7,628*
Ballan	1,231	Town	491	166	*656*
Hopetoun Park	280	Village	231	38	*269*
Gordon	99	Village	39	13	*53*
Parwan	1	Hamlet	1	0	*1*
Mount Alexander Shire					
Castlemaine	5,282	District Town	883	457	*1,340*
Maldon	1,301	Town	192	113	*304*
Newstead	261	Village	38	23	*61*
Chewton	214	Village	32	19	*50*
Harcourt	149	Village	22	13	*35*
Taradale	84	Village	12	7	*20*
Barkers Creek	1	Hamlet	0	0	*0*

Source: ABS 2012; Planisphere 2009; DPCD 2012b

The size of the transferred demand is proportionately small for larger settlements and proportionately greater for smaller places where its impact will be more noticeable. For example, the 1,629 additional dwellings that will be needed in Ballarat by 2041 due to the transfer of rural demand will require 48 per cent of Ballarat's 47,238 urban lots compared to the Business-as-usual demand requiring 45 per cent. By contrast, over 80 per cent of Macedon's urban lots will be needed by 2041 under Rural preservation compared to around 56 per cent without the scenario's demand transferred from rural areas.

Figure 53 indicates the rural transfer amount as a proportion of the total demand for each urban settlement under this scenario.

Figure 53 Business-as-usual and Rural preservation projected dwelling demand to 2041
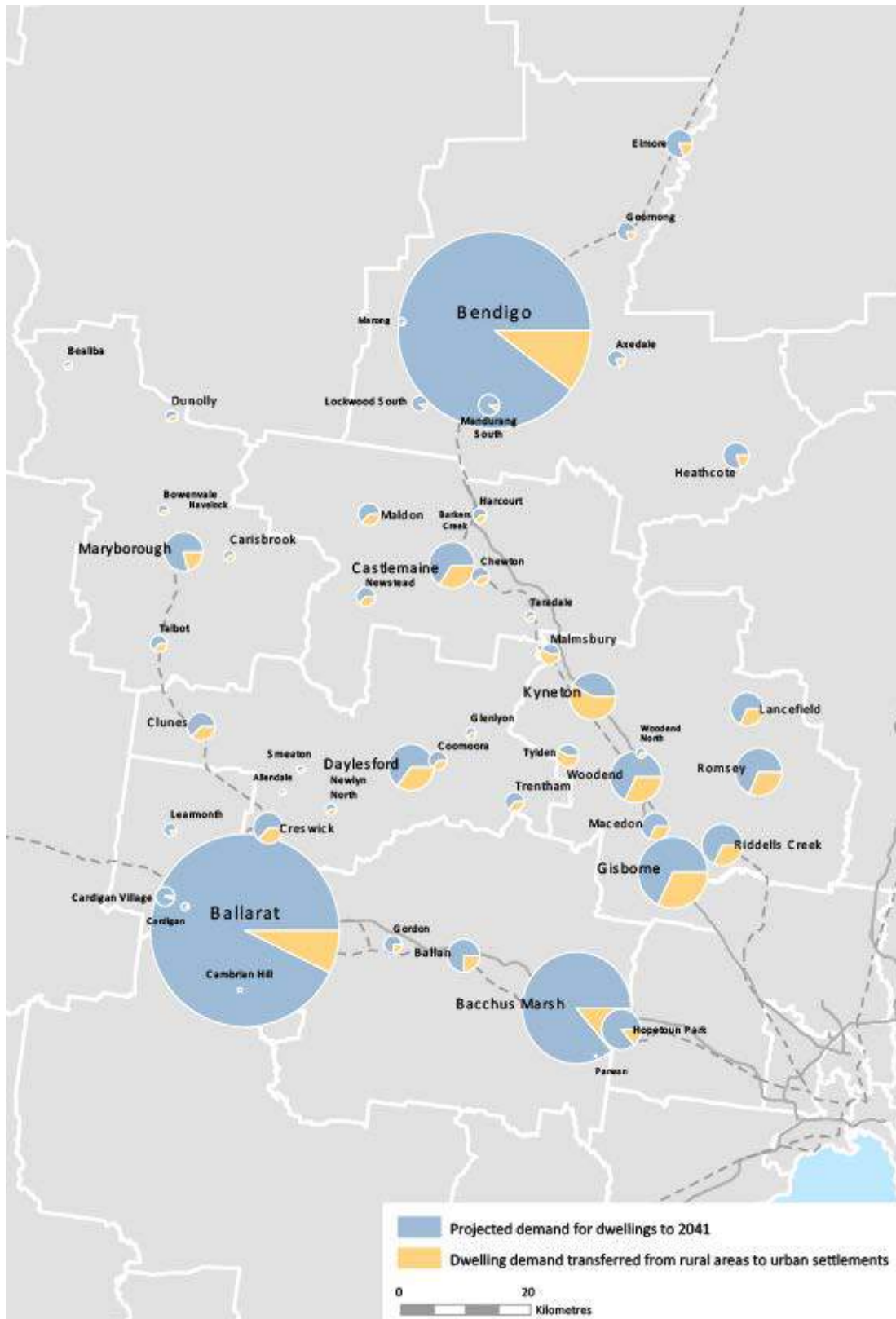
A simple analysis of urban density indicates as to whether the Business-as-usual growth and the additional growth that results from the transferring of rural demand into township boundaries in this scenario will demand dramatic change in residential densities. Figure 54 and Figure 55 illustrate the situation using the settlement hierarchy of regional centres and district towns (Planisphere 2009).

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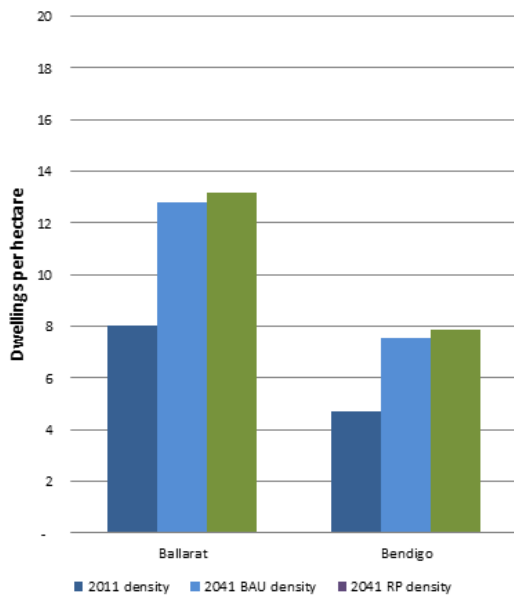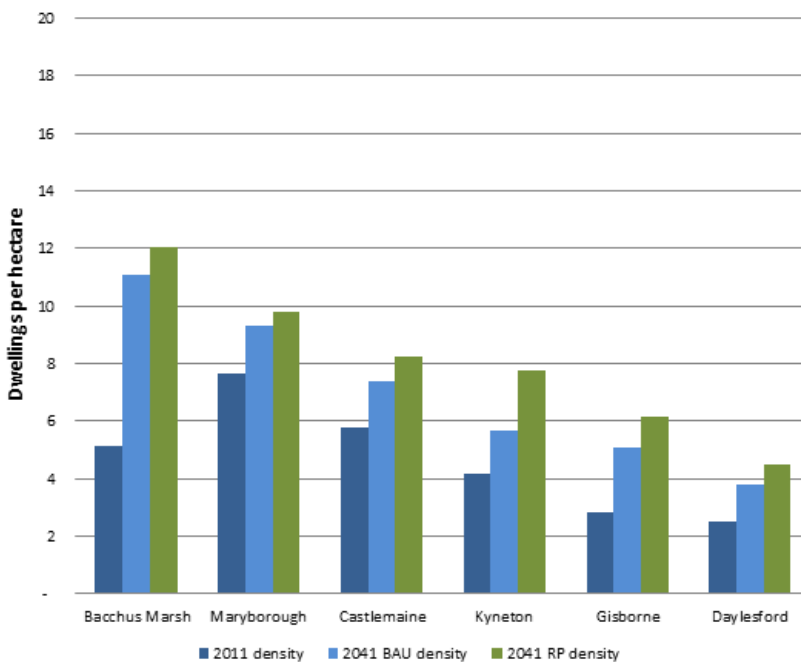**Figure 54 Dwelling densities in Regional centres**


Figure 55 Dwelling densities in District towns

Regional centres and district towns generally have very low average residential densities at the moment: all contain fewer than ten homes per hectare using the 2011 VIF dwelling count. By 2041 in Business-as-usual, only Bacchus Marsh is approaching ten dwellings per hectare and Ballarat is slightly over it. The Rural preservation scenario pushes the densities slightly higher again. Even though Ballarat has significant land supplies in its western growth area, in order to accommodate both Business-as-usual and growth that would have occurred otherwise in rural areas, residential densities will have to rise to over an average of 13 dwellings per hectare. Bacchus Marsh is the only district town in a similar situation: it has the combined pressure of peri-urban growth from Melbourne and maintaining viable agriculture. Increasing densities in the town is potentially an option for accommodating both.

Other towns need large increases in required densities to accommodate both Business-as-usual and this scenario's growth as shown in Figure 56. For example, Woodend's 2011

average density will have to double from four to eight dwellings per hectare to accommodate just the projected Business-as-usual demand for 1,114 new dwellings by 2014 (see Table 44 Demand in urban settlements). Under the Rural preservation scenario, Woodend will need to achieve an even higher density of almost ten dwellings per hectare to accommodate the transferred demand for 526 new dwellings from the rural parts of Macedon Ranges Shire. Woodend has constrained residential land supply: it currently has 323 hectares of residential lots which will need to accommodate the extra 1,114 dwellings while the smaller town of Romsey has over 400 hectares for 438 additional dwellings within its urban boundary.

Nonetheless these urban residential densities are still very low. The Victorian government's *Plan Melbourne* sets an aspirational target of 18 dwellings per hectare in Melbourne's growth areas (DTPLI 2014a). Slightly increasing densities to these levels are an alternative to the typical practice of rezoning land on the fringes of existing towns, an approach this project demonstrates should not be required.

Figure 56 Dwelling densities in Towns
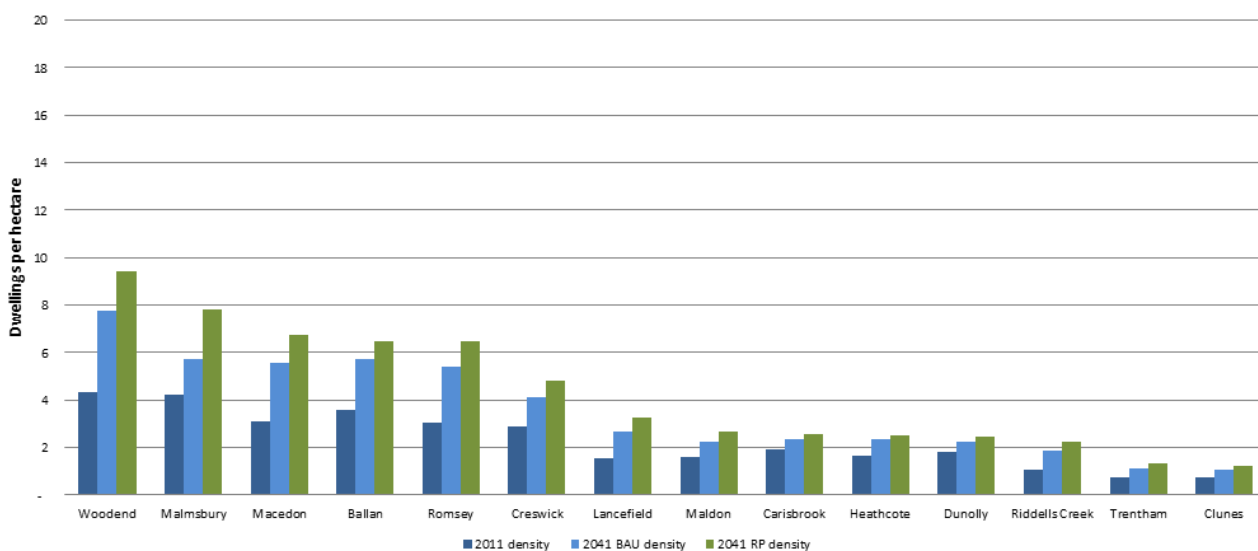
As noted previously, urban lot occupation information is not available but the cadastre and aerial images in Figure 57 indicate the greater constraints on new development within Woodend's urban boundaries compared to Romsey. Such constraints suggest that requiring higher residential densities would be a logical approach to planning for projected dwelling demand rather than rezone rural lots on the edges of these towns.

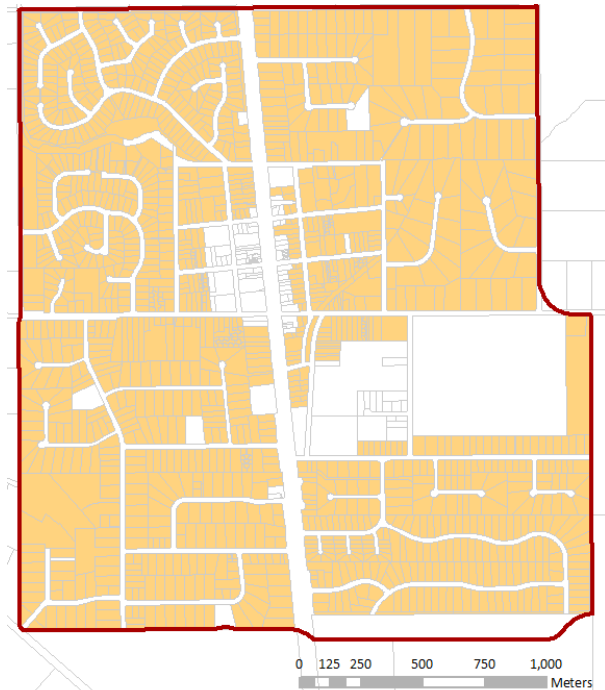**Figure 57 Woodend and Romsey cadastre and aerial images**
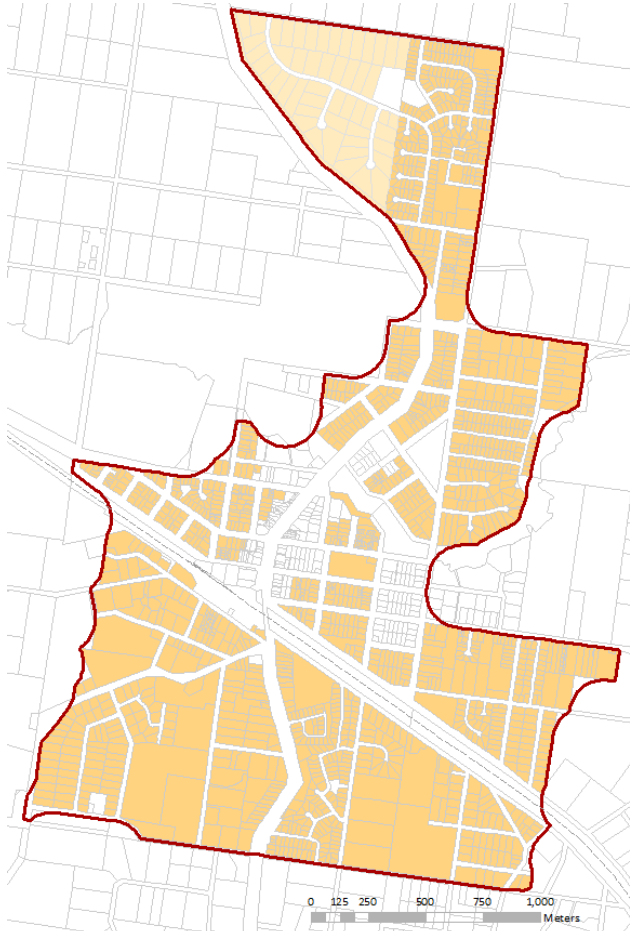
Woodend: cadastre showing R1 and LDR zone lots
Source: Victorian Government 2013

Woodend: aerial photograph
Source: Google maps, accessed 18 Sept. 2013

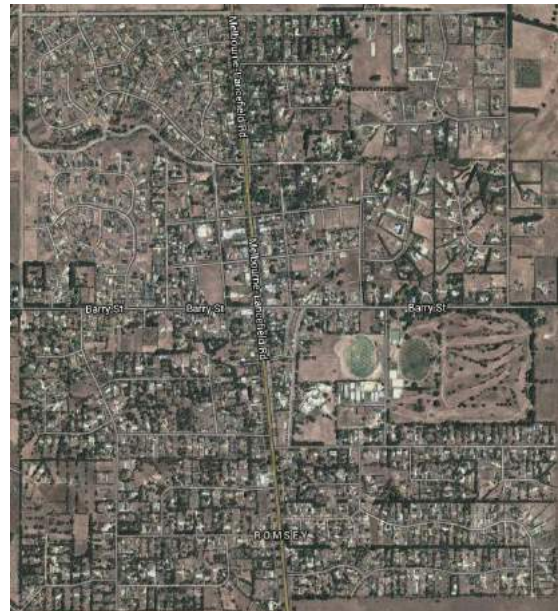**Romsey: cadastre showing R1 zone lots**
Source: Victorian Government 2013

Romsey: aerial photograph
Source: Google maps, accessed 18 Sept. 2013

All villages except Cardigan Village currently have residential densities under six dwellings per hectare. Cardigan Village is an exception in all three cases: it only has eight hectares of land which results in almost ten dwellings per hectare currently. With around another 60 dwellings required on that small land supply by 2041 under both scenarios, the density will need to increase to 17 dwellings per hectare within the existing town boundaries.

However this situation in Cardigan Village may be due to the initial project definition of urban and rural using planning zones. Figure 58 shows this project's urban boundary in which Township Zone lots in built up areas and under 500sqm are included. The second map illustrates the larger area in the Township Zone from planning scheme maps and an aerial image. The larger lots adjacent to the project's defined urban area are much less densely developed: under current planning regulations they are most likely to be developed in the future rather than densities increase significantly in the northwestern corner as is assumed in this density analysis.

Figure 58 Cardigan Village cadastre, planning zones and aerial image

Cardigan village: cadastre showing project urban boundary
Source: Victorian Government 2013

**Cardigan village: planning zones**
Source: DTPLI 2014b

Cardigan village: aerial photograph
Source: Google maps, accessed 18 Sept. 2013

Mandurang South will require 66 additional dwellings by 2041 as a result of transferred rural demand but it has 240 hectares within its urban boundary on which those houses

could be built. Figure 59 shows the density results for each village in the study region.

Figure 59 Dwelling densities in Villages
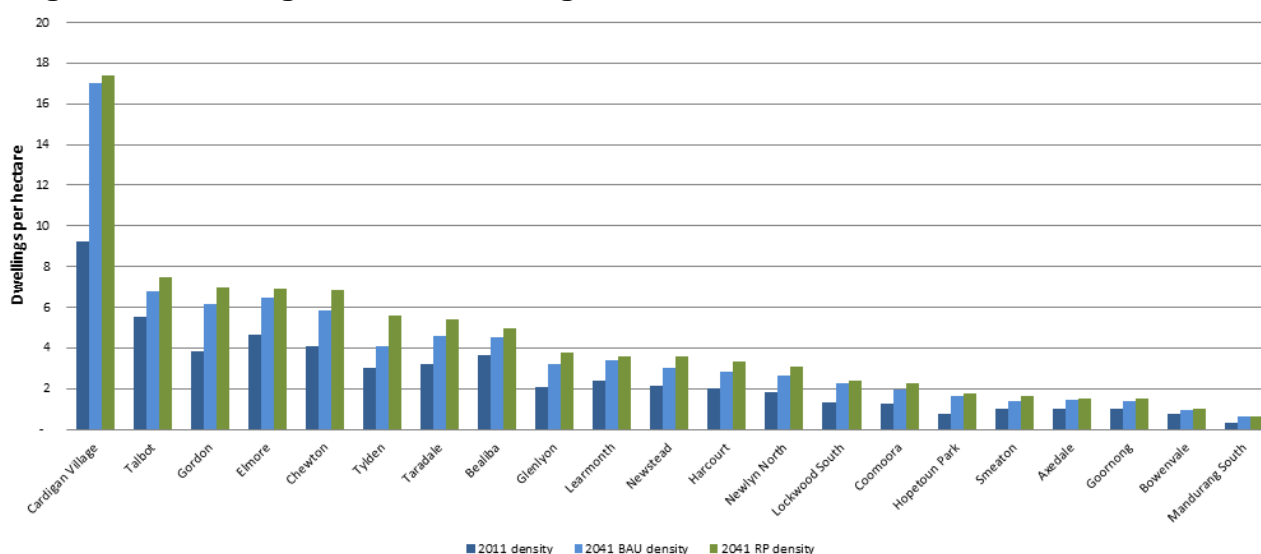
One village and three hamlets currently do not have any land zoned for residential uses but the model projects that they will need to accommodate new dwellings under both Business-as-usual and the Rural preservation scenario. The numbers are very small but the City of Greater Bendigo is examining appropriate residential development to support the expanding business park in Marong on land currently zoned for business and industrial uses (COGB 2011). Table 45 repeats the details for each town from Table 44 Demand in urban settlements, above.

Table 45 Towns without any residential lots

Settlement and LGA	Urban lot count	Settlement hierarchy	BAU urban demand to 2041	RP transferred demand to 2041	*RP total urban demand to 2041*
Cambrian Hill	5	Village	3	0	*4*
Marong	15	Hamlet	8	1	*8*
Parwan	1	Hamlet	1	0	*1*
Woodend North	22	Hamlet	12	6	*18*

Source: ABS 2012; Planisphere 2009; DPCD 2012b

Compared to projected demand for dwellings in urban areas, Business-as-usual rural demand is relatively small for the entire study region. As a result, the amount of demand transferred to urban settlements under Rural preservation is also relatively small in comparison to that Business-as-usual projected urban demand for dwellings. This is evident in the small increases required to the Business-as-usual urban residential densities to accommodate the extra demand transferred from rural areas. As in the Business-as-usual scenario, the Rural preservation scenario shows the large potential oversupply of rural land for future residential development in comparison to projected demand for houses.

The next section looks at the project's third scenario, Tenement control. This scenario has a less severe set of minimum area rules for development than the Rural preservation, modelling the impact of amalgamating rural jointly owned lots to make lots eligible for

residential development.

6.4.3 Tenement control

The Tenement control scenario produces a smaller development potential than in Business-as-usual but this still exceeds that needed to meet projected rural demand for dwellings. As shown in Table 33 Study region rural dwelling demand and lot supply to 2041, in this scenario the study region has a potential supply of 30,399 rural dwellings more than for which rural demand is projected. All but three of the region's SLAs also have excess rural development capacity in comparison to projected demand for rural dwellings. That excess capacity varies greatly, from just one dwelling in Greater Bendigo (C) – Eaglehawk to over 5,000 in Greater Bendigo (C) – Part B.

This excess is produced as a result of the application of current planning rules to individual lots under the Business-as-usual scenario. Contiguous lots may be sold separately under existing planning controls and usually houses can be constructed unless other conditions apply such as limitations under bushfire risk provisions. The tenement control scenario applies a requirement for a minimum area of land for single dwelling eligibility to multiple rural zoned lots in the same ownership to reduce the number of lots with potential for construction of a dwelling in the rural landscape. The Tenement control scenario's impact is only on multi-owned lots, that is, where one owner holds more than one contiguous lot. The benefit of a tenement control compared to the use of a minimum qualifying lot size for dwelling construction is that the multiple lot owner retains the right to construct at least one dwelling on multiple land lots. Demand for rural dwellings is higher in this scenario than in the Rural preservation scenario because more land is eligible for development but much less than under the Business-as-usual scenario.

The reduced supply or (development capacity) modelled by this scenario is the result of analysis of single and multiple lots in single ownership. This scenario evaluates the impact of applying either a 25 hectare or 40 hectare minimum tenement control to the multiple lots with a single owner to limit development on small rural lots. Individually owned lots subject to existing planning regulations retain the same yield as in the Business-as-usual scenario. Table 46 summarises the minimum jointed owned lot sizes by zone and Figure 60 illustrates the number of lots currently in the rural zones which are multi and single owned lots.

Table 46 Minimum areas for development by planning zone for jointly owned lots only

Zone	SUB-SCENARIO A – 40 HA		SUB-SCENARIO B – 25 HA	
	Minimum lot area for construction of a dwelling (ha)	Minimum lot area for construction of a dwelling (ha)	Minimum parent lot area for subdivision (ha)	Minimum parent lot area for subdivision (ha)
Farming	40	40	25	25
Rural Conservation	40	40	25	25
Rural Living	40	40	25	25
Township	40	40	25	25
Urban Growth	40	40	25	25
Comprehensive Development	40	40	25	25

Figure 60 Current zoning on rural multi and single owned lots
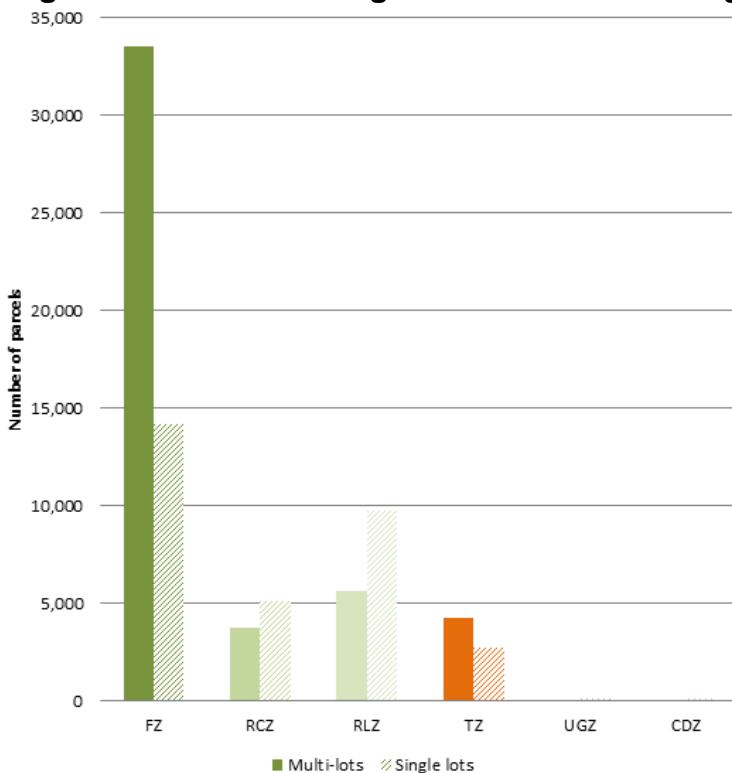
Source: Victorian Government 2013

As Table 46 shows, the Tenement control scenarios do not give priority to development in the future urban zones as occurs in the Rural preservation scenario's more liberal planning rules for those zones. At the same time, they limit future development and demand in farming and other truly rural areas by requiring a 25 or 40 hectare minimum area.

Multiple farming zone lots in single ownership are most affected in this scenario, and these represent approximately 70 per cent of all farm zone lots in the study region's rural

landscape. Similarly single owners with multiple Township Zone lots control 60 per cent of all lots in that zone. This shows that multiple lot ownership is a strong characteristic of the study region and also provides great potential for a tenement control to reduce potential rural dwelling yield.

Figure 61 and Figure 62 show the distribution of multiple and single lots in the farming zone across the relevant SLAs, by number and by area. The order of SLAs is the same in both charts which illustrates that some SLAs have many lots but are smaller in total area. For example, Mt Alexander (S) Balance has the most multi-lots but Greater Bendigo (C) – Part B has a larger area of these types of lots, so individual multi-lots will therefore be larger on average in Greater Bendigo (C) – Part B. As this Tenement control scenario focuses on amalgamating multiple small lots, Greater Bendigo (C) – Part B is less affected by its rules.

Figure 61 Number of single and multi-lots in Farm Zone
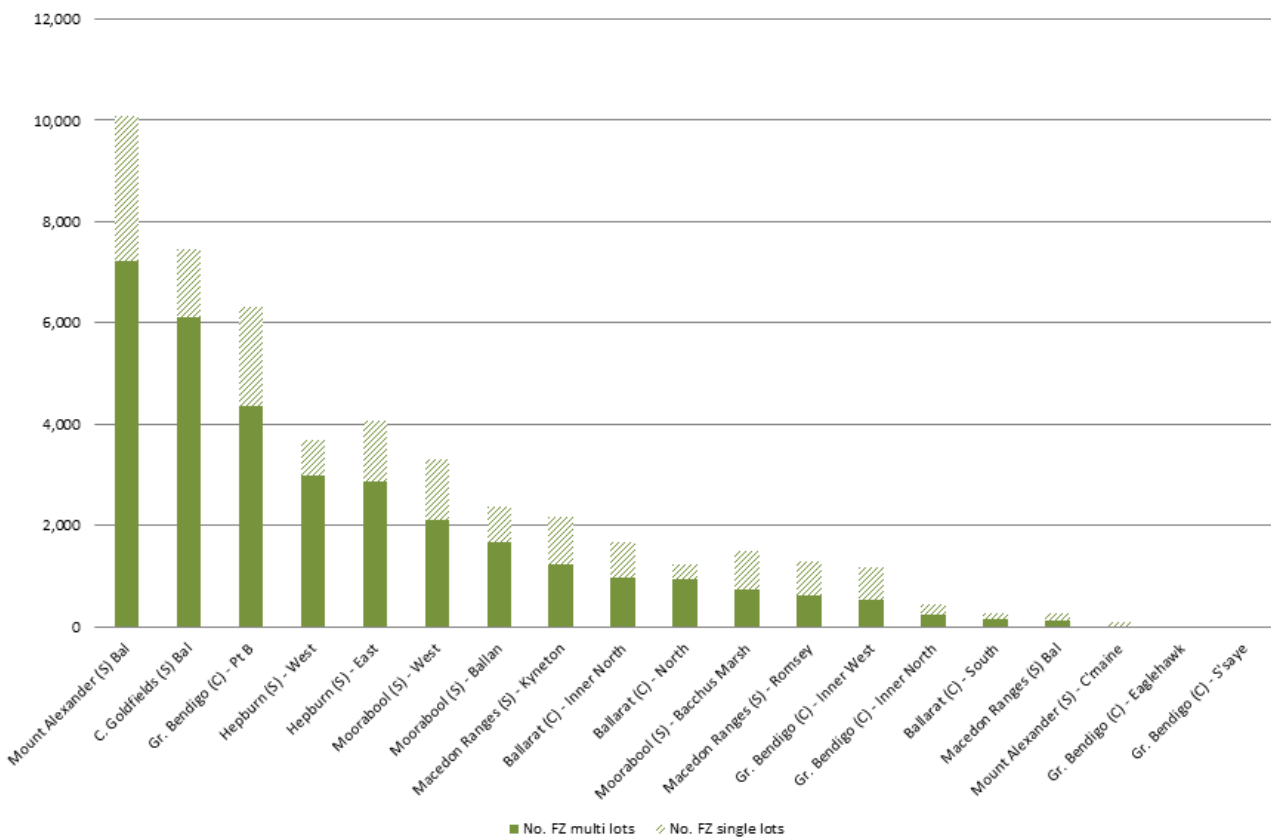
Source: Victorian Government 2013

Figure 62 Area of single and multi-lots in Farm Zone
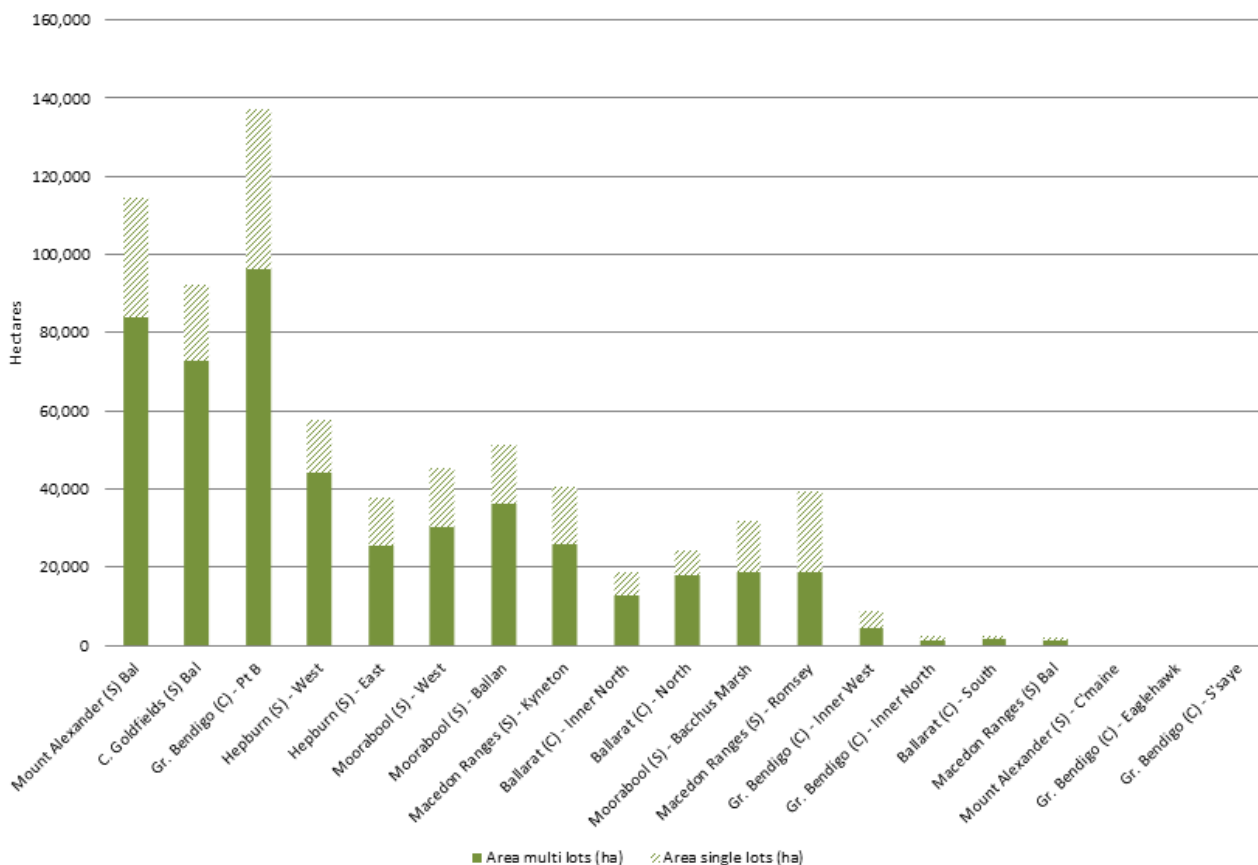
Source: Victorian Government 2013

As is discussed in the following section, applying this scenario's minimum area rules results in less than ten per cent of jointly owned rural lots in the study region remaining available for development. Similar to the Rural preservation scenario, this reduces the ability of rural areas to meet projected demand. The recalculated rural demand is lower and the remainder of the BAU projected demand is transferred to urban settlements. This scenario models this by prioritizing growth to urban settlements with rail services.

6.4.3.1 Land supply in rural areas

The number of new rural dwellings which could be built in Business-as-usual is reduced from 87,195 to 41,162 under the 25 hectare tenement control and to 33,960 dwellings under the 40 hectare tenement control. These reduced development capacities are the result of fewer jointly owned lots with rural or future urban zoning being available for new rural dwellings. In Business-as-usual, the study region has 46,179 jointly owned lots (see Table 47) for which there are 10,196 owners on which dwellings could be built. Table 47 shows that the Farming Zone has by far the largest number of multi-lots in the study region.

Table 47 Multi-lots by current planning zone

SLA	RURAL ZONES			FUTURE URBAN ZONES			
	FZ	RCZ	RLZ	TZ	UGZ	CDZ	Total
Ballarat (C) – Central		4	5				9
Ballarat (C) - Inner North	996		243	8	27	12	1,286
Ballarat (C) – North	944		4	32			980
Ballarat (C) – South	172	56	348		23		599
C. Goldfields (S) - Maryborough		16	20				36
C. Goldfields (S) Balance	6,115	614	1,511	123			8,363
Gr. Bendigo (C) - Eaglehawk	2						2
Gr. Bendigo (C) - Inner East		5					5
Gr. Bendigo (C) - Inner North	248	6	53		2		309
Gr. Bendigo (C) - Inner West	546	1	88	26		1	662
Gr. Bendigo (C) - Part B	4,379	1,029	897	371			6,676
Gr. Bendigo (C) - Strathfieldsaye		18	135				153
Hepburn (S) – East	2,887	59	445	322			3,713
Hepburn (S) – West	2,991	140	278	375			3,784
Macedon Ranges (S) - Kyneton	1,252	116	479	50			1,897
Macedon Ranges (S) - Romsey	624	276	129	22			1,051
Macedon Ranges (S) Balance	137	1,018	94				1,249
Moorabool (S) - Bacchus Marsh	762	30	25	22			839
Moorabool (S) - Ballan	1,678	235	153	374			2,440
Moorabool (S) - West	2,139	12	125	261			2,537
Mount Alexander (S) - Castlemaine	94	67	140				301
Mount Alexander (S) Balance	7,241	11	193	1,843			9,288
Total	*33,207*	*3,713*	*5,365*	*3,829*	*52*	*13*	*46,179*

Source: Victorian Government 2013

Table 48 shows that the 25 hectare tenement control rule reduces the total number of developable single and multi-lot rural lots to 4,357, and the 40 hectare rule to 3,457. Note that the total 32,896 individually owned lots have the same development potential as in Business-as-usual.

As in the Business-as-usual scenario, only Greater Bendigo (C) – Central is defined as completely urban and so it does not appear in the table.

Table 48 BAU, RP, TC25 and TC40 rural development capacity by SLA

SLA	BAU supply	RP supply	TC25 supply	TC40 supply
Ballarat (C) – Central	10	0	3	2
Ballarat (C) - Inner North	22,637	36,743	4,528	4,354
Ballarat (C) – North	934	895	587	348
Ballarat (C) – South	7,930	11,969	5,033	5,010
C. Goldfields (S) - Maryborough	43	0	20	20
C. Goldfields (S) Balance	9,726	1,569	4,165	3,048
Gr. Bendigo (C) - Eaglehawk	3	0	1	1
Gr. Bendigo (C) - Inner East	5	0	1	1
Gr. Bendigo (C) - Inner North	994	1,088	591	576
Gr. Bendigo (C) - Inner West	2,126	3,562	1,218	1,178
Gr. Bendigo (C) - Part B	8,945	7,188	6,316	4,621
Gr. Bendigo (C) - Strathfieldsaye	321	16	217	212
Hepburn (S) – East	3,994	4,522	1,425	1,150
Hepburn (S) – West	3,800	4,233	1,804	1,199
Macedon Ranges (S) - Kyneton	2,291	813	1,492	1,105
Macedon Ranges (S) - Romsey	1,619	1,373	1,367	1,047
Macedon Ranges (S) Balance	2,143	1,290	1,448	1,333
Moorabool (S) - Bacchus Marsh	2,687	3,338	2,648	2,383
Moorabool (S) - Ballan	2,838	4,920	1,953	1,449
Moorabool (S) - West	2,563	3,827	1,251	923
Mount Alexander (S) - Castlemaine	283	0	73	73
Mount Alexander (S) Balance	11,303	24,648	5,021	3,927
Total	*87,195*	*111,994*	*41,162*	*33,960*

Ballarat (C) – Inner North is again the most affected SLA but under the Tenement control scenario it has the largest reduction in supply. This SLA has the greatest increase in development capacity in the Rural preservation scenario because of the types of planning zones in this SLA. The following discusses first the SLA's characteristics under BAU and then describes the impact of the Tenement scenarios' rules.

Figure 63 and Figure 64 show the number and area of single lot and multiple lot ownership in this SLA under Business-as-usual. It shows that the Farm Zone multi-lot lots dominate and these have an average area of 13 hectares prior to applying the scenario rules of a minimum of 25 or 40 hectares for subdivision or a dwelling. This produces a development capacity of almost 950 lots under current planning regulations.

Figure 63 Ballarat (C) - Inner North: number of lots by planning zone
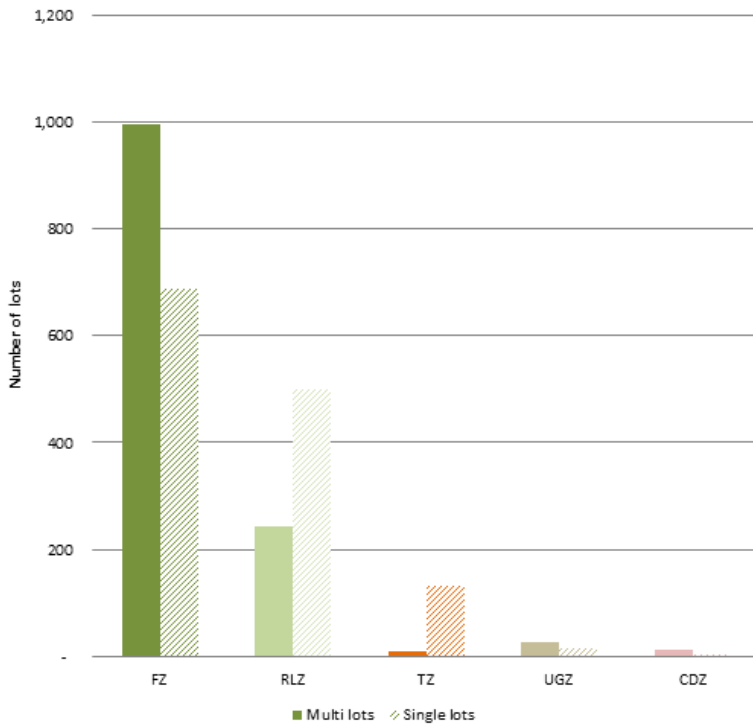
Source: Victorian Government 2013

Figure 64 Ballarat (C) - Inner North: area of lots by planning zone
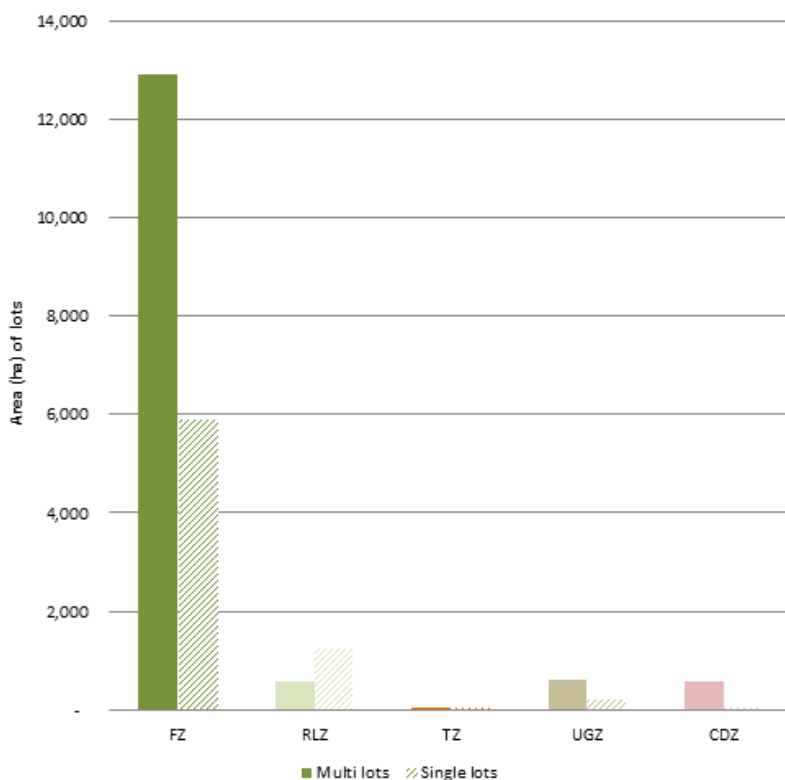

Source: Victorian Government 2013

However the Comprehensive Development and Urban Growth zones in this SLA have far more development capacity under the Business-as-usual scenario than the Farm Zone lots. Even though the two future urban zones have relatively few lots and cover a small area compared to the Farm Zone, their BAU development capacity is for just over 9,000

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lots in the CDZ and almost 12,000 lots in the UGZ. These are also the zones which have the greatest impact on supply in the Rural preservation scenario which preferences these zones as they are close to existing urban areas.

Once the tenement control rules are applied to Ballarat (C) – Inner North, its overall development capacity falls to less than 5,000 lots because the scenario rules have dramatically affected the capacity for development in the future urban growth zones.

Figure 65 illustrates the difference in development capacity between the Urban Growth and Comprehensive Development zones under BAU and the development capacity for all rural and future urban planning zones in the SLA as a result of the 25 and 40 hectare tenement control rules. This highlights the large impact of tenement control on lots in all planning zones, whether rural or future urban.

**Figure 65 Ballarat (C) - Inner North: development capacity**
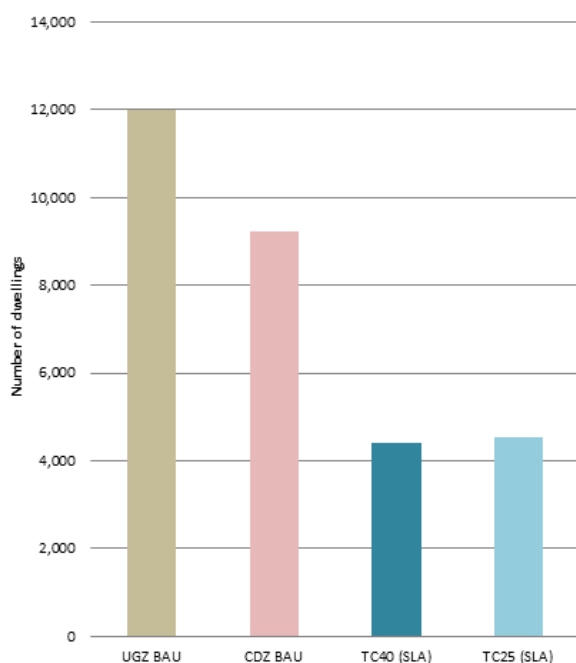
Joint ownership of multiple lots also contributes to this result, accounting for the majority of lots in these two future urban zones. These multiple lots under single ownership also cover a much larger total area than the single lots. However their average lot sizes are 48 hectares for CDZ and only 22 hectares for UGZ. Tenement controls specifically impact the possible yields from these multiple lots with one owner. Groups of these lots zoned UGZ or CDZ may be owned by one land developer, and this Tenement control scenario almost completely prevents those developers' anticipated subdivisions in the future urban areas.

A much more rural example illustrates the impact of the tenement control rules in the rural landscape. Mt Alexander (S) - Balance is a rural SLA with 95 per cent of its area zoned for farming. In the Business-as-usual scenario, those lots have the development potential for 7,000 lots. Many of these existing lots are also multiple lots with one owner. The use of a tenement control is effective in this situation as it reduces the amount of possible subdivision in the whole rural landscape from over 11,000 lots to 4,000 under the 40 hectare rule and to 5,000 under the 25 hectare rule. Figure 66illustrates the number of dwellings which could be built under Business-as-usual across the rural part of the SLA and that the majority of those would be in the Farming Zone. The 40 hectare tenement

control reduces the number of possible dwellings for the rural part of the SLA by almost two thirds and the 25 hectare control by about half. Both tenement control results are less for the rural part of the SLA than the Business-as-usual result for lots in the Farming Zone.

**Figure 66 Mt Alexander (S) - Balance: development capacity**
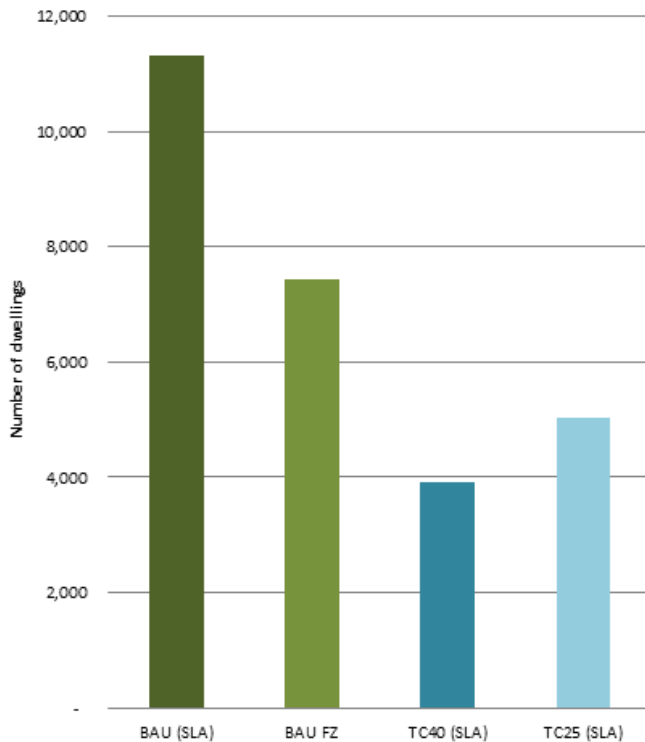
Applying the model's rules for the two sub-scenarios of 40 and 25 hectare minimum areas leaves a similar number of rural lots available for subdivision or a new dwelling. The 40 hectare minimum begins with fewer overall eligible lots and then reduces the yield from subdividing parent lots. Fewer lots are occupied in this sub-scenario, a function of fewer lots remaining with any development potential after the 40 hectare rule is applied to all rural lots.

In almost all SLAs, the 40 hectare tenement control has a greater impact on reducing lots on which a house could be built than the 25 hectare control. The exceptions are the more urban SLAs where fewer lots are either in rural planning zones or are multiple lots with one owner. These include Ballarat (C) – Central, Greater Bendigo (C) – Eaglehawk, Greater Bendigo (C) – Inner East and Mount Alexander (S) – Castlemaine.

Figure 67 separates out the single and jointly controlled lots for the study region to illustrate the development capacity in the two sub-scenarios compared to the Business-as-usual scenario. It illustrates the large impact of the minimum area rules on the multiple lots with one owner while individual lots are still subject to existing planning rules. The single lot development capacity is identical in each situation.

Figure 67 Comparison of all SLAs' development capacity
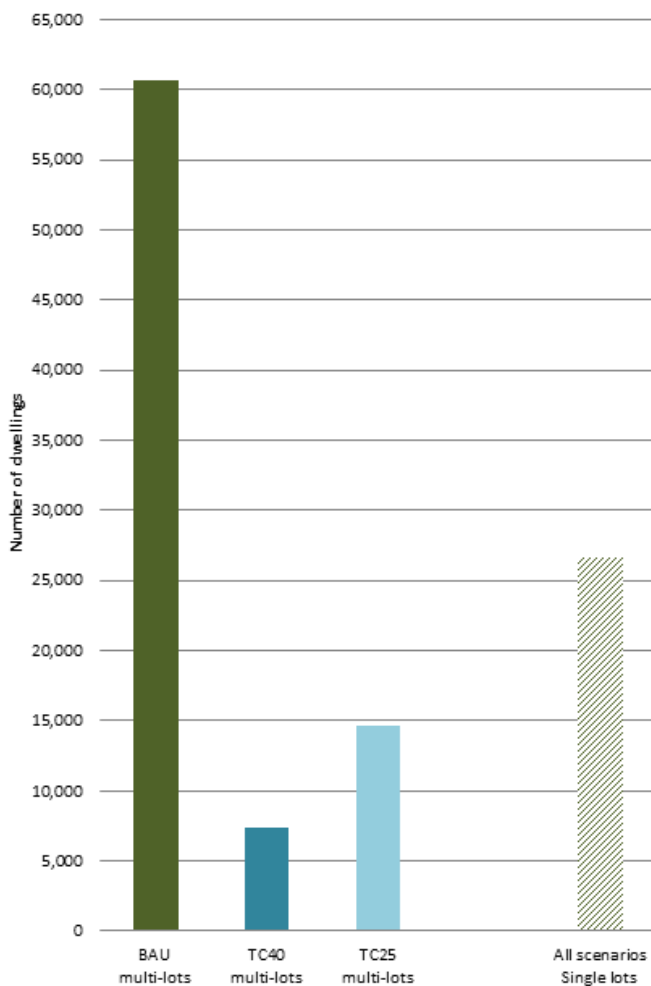
As in the Rural preservation scenario, applying the sub-scenario minimum area rules changes the study region's definitions of rural and urban areas by removing rural lots from consideration. The next section discusses this impact on calculating future rural dwelling demand.

6.4.3.2 Demand for dwellings in rural areas

As a result of applying this scenario's area rules to rural jointly owned lots, demand across the study region is projected for almost 5,000 fewer rural dwellings than under the Business-as-usual scenario. The difference between the two is the demand that will need to be accommodated in urban settlements, as is also modeled in the Rural preservation scenario. This is the rural transfer demand.

Only the 25 hectare sub-scenario is reported, as the process of removing lots able to be developed produces a similar number for both the 25 and 40 hectare sub-scenarios. Re-calculating the rural and urban splits therefore gives very similar demand amounts.

Table 48 shows demand for each scenario by SLA. As the Rural preservation scenario rules are so strong in the rural areas, its application removes more rural land than under Tenement control and therefore results in much less demand in that part of the study region. The 40 hectare minimum for farm and rural conservation zones reduces the Business-as-usual FZ total area by more than half and by almost two thirds in the RCZ . The application of a tenement control still reduces rural dwelling demand by a third compared to Business-as-usual. This demand will be met in the region's urban settlements

(see section 6.4.3.4).

Table 49 Demand for rural dwellings in each scenario

SLA	BAU demand to 2041	RP demand to 2041	TC25 demand to 2041
Ballarat (C) - Inner North	1,149	104	627
Ballarat (C) - North	133	70	108
Ballarat (C) - South	619	89	442
C. Goldfields (S) Bal	345	62	185
Gr. Bendigo (C) - Inner East	26	0	0
Gr. Bendigo (C) - Inner North	315	0	188
Gr. Bendigo (C) - Inner West	845	70	563
Gr. Bendigo (C) - Pt B	1,329	589	1,026
Gr. Bendigo (C) - S'saye	773	34	639
Hepburn (S) - East	783	145	419
Hepburn (S) - West	469	129	211
Macedon Ranges (S) - Kyneton	590	105	419
Macedon Ranges (S) - Romsey	1,110	359	849
Macedon Ranges (S) Bal	2,684	249	2,247
Moorabool (S) - Bacchus Marsh	927	155	617
Moorabool (S) - Ballan	982	468	756
Moorabool (S) - West	347	347	347
Mount Alexander (S) - C'maine	89	0	36
Mount Alexander (S) Bal	1,495	953	1,084
Total	*15,010*	*3,928*	*10,763*

Once again Moorabool (S) – West has the same demand in each scenario because it has no urban settlements. Its defined rural areas and thus demand remains the same in each case.

This data can also be represented in a chart. Figure 68 shows the SLAs in order of the proportions of their area that this project defines as rural (see section 6.2). This shows the impact of the scenario rules in reducing demand compared to Business-as-usual, particularly under Rural preservation. No correlation appears to exist between whether an SLA is more or less rural and its change in demand under the scenarios: this may be due to the influence of demographic and other spatial factors on demand, such as internal migration patterns to particular SLAs or their proximity to an employment centre.

Figure 68 Projected demand for dwellings in rural areas to 2041
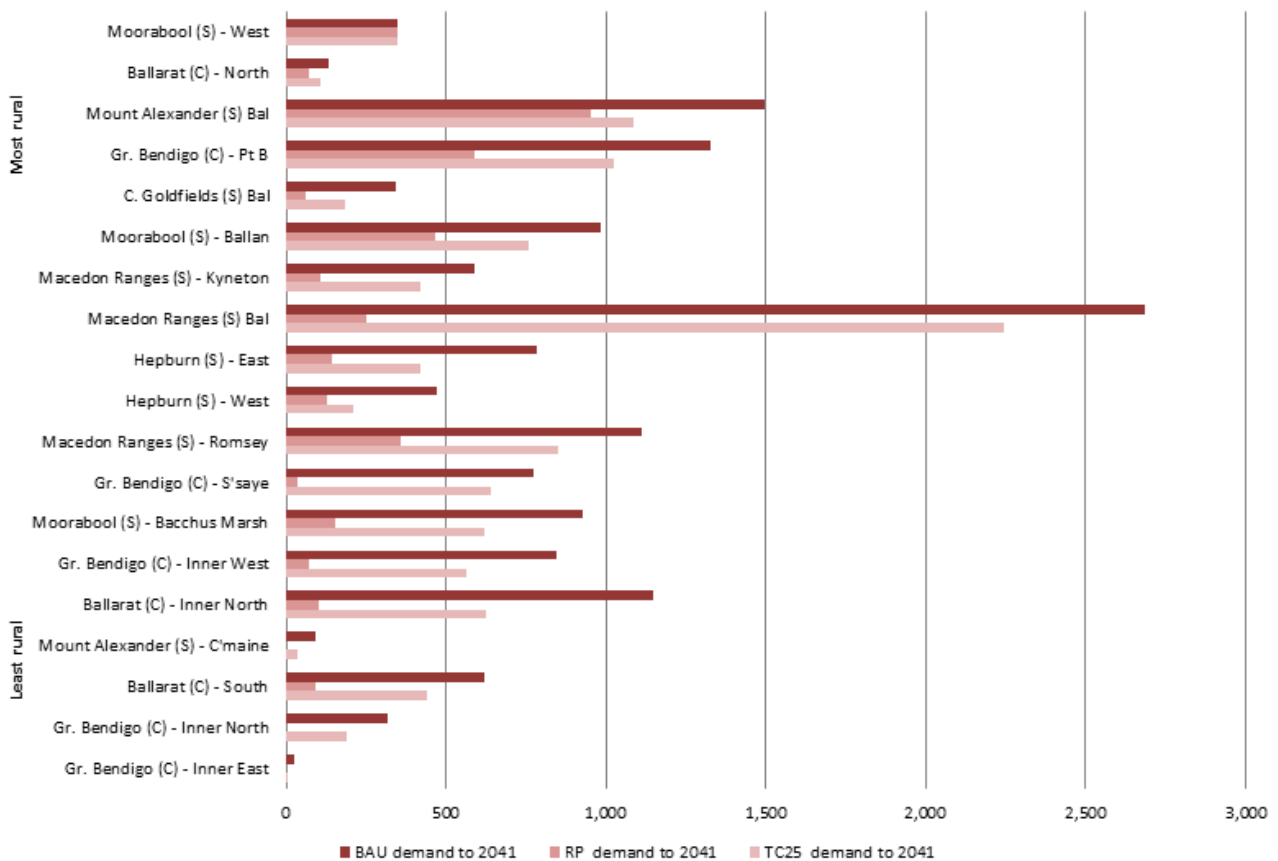
Source: DPCD 2012b

Macedon Ranges (S) Balance may be representative of this situation. The Victorian government projects strong growth for this SLA and this study predicts that the urban and rural areas will receive almost an even share under the Business-as-usual scenario (DPCD 2012b). The Shire's median age is younger than in the other study region local governments, which suggests that families are more likely than older people to move to this area. The improved regional train service has made commuting to Melbourne more feasible from this SLA. These factors all contribute to the large projected demand for the rural part of the SLA under Business-as-usual. The Tenement control rules only affect one quarter of the SLA's lots because the majority are individually owned as shown in Figure 69, so demand does not change as much as in other SLAs because the rural area is not reduced in size to the same extent.

**Figure 69 Macedon Ranges (S) Balance single and jointly owned lots**
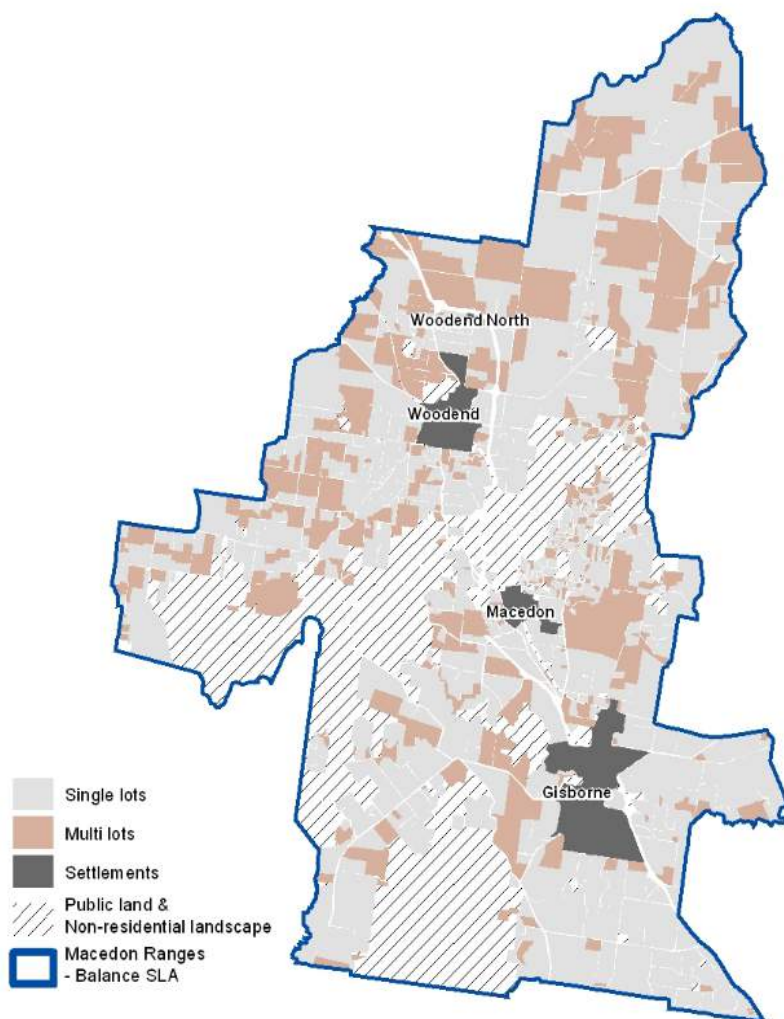
The Tenement control scenario reduces demand for rural dwellings to 2041 compared to Business-as-usual but is higher than for the Rural preservation scenario as more lots are still eligible for development. The next section looks at how that demand might be satisfied by the scenario's land supply.

6.4.3.3 How rural land supply meets rural dwelling demand

The SLAs with the largest oversupply of rural lots in the 25 hectare Tenement control scenario are also those with oversupply in the other scenarios. However the total oversupply is much less than in the other two scenarios because the scenario does not give priority to development in the future urban zones or Township Zone as occurs in the Rural preservation's more liberal planning rules for those zones. At the same time, it limits future development and demand in farming and other truly rural areas by requiring a 25 hectare minimum area.

Only three of the study region's SLAs have insufficient land supply to meet projected demand for the Tenement control scenario. The majority of SLAs have an oversupply of lots in relation to projected demand for dwellings. Figure 70shows the situation for each of the study region's SLAs.

Figure 70 Tenement control lot supply and demand
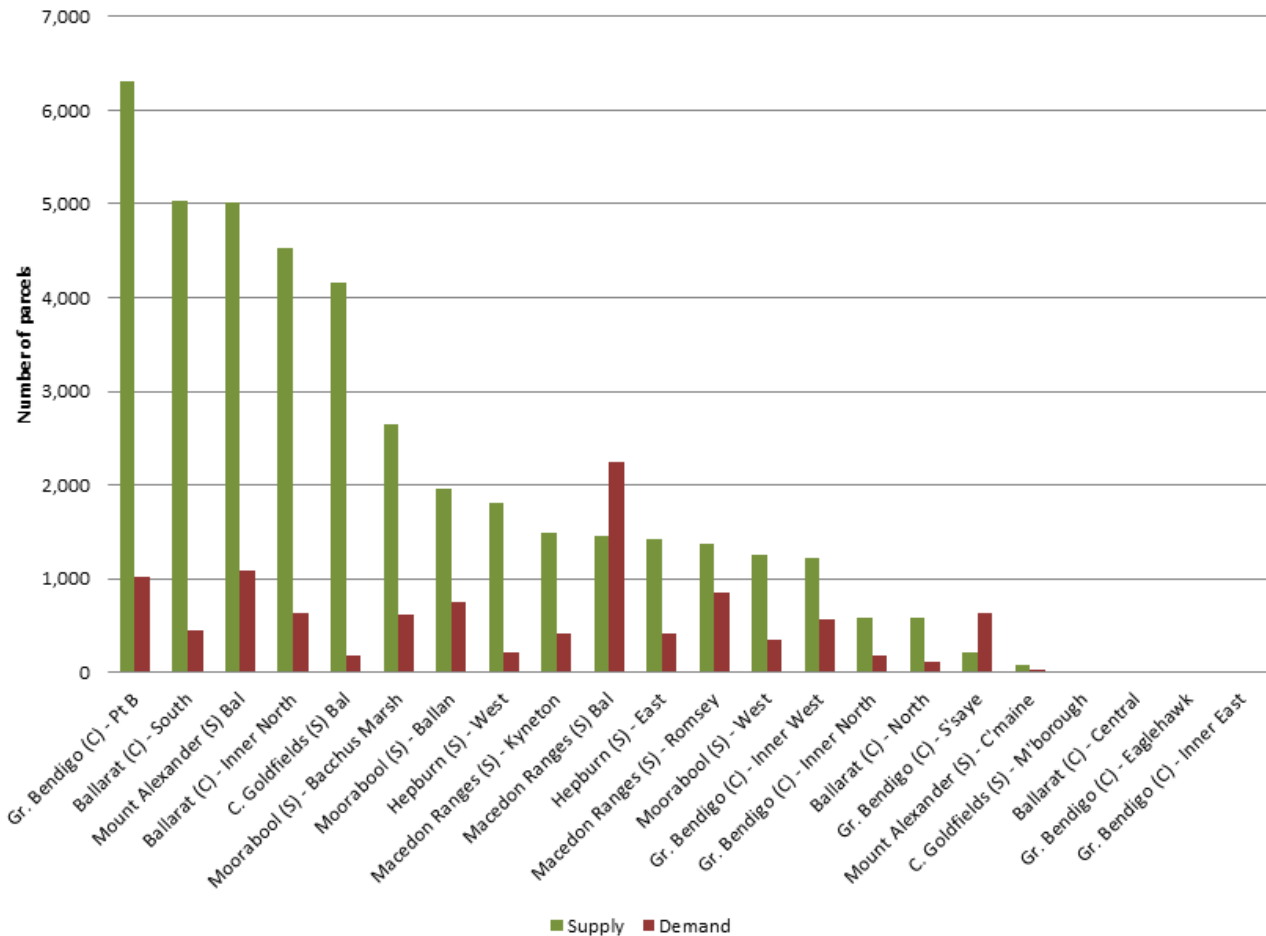
This scenario includes two SLAs which will retain insufficient supply to meet projected demand. As in the Rural preservation scenario, Greater Bendigo (C) – Strathfieldsaye again does not retain enough development capacity but the shortage is more pronounced with a 400 dwelling shortfall, similar to the Business-as-usual scenario. The shortfall is partly a result of the tenement control rules on the Rural Living Zone multi-lots but also reflects the influence of existing planning regulations on the more numerous single lots. This shortfall could be accommodated within the urban area of Bendigo and the implications of this approach are discussed in section 6.4.3.4.

Macedon Ranges (S) Balance has the largest unmet rural demand, needing 800 more dwellings than are available for development. This is 300 dwellings more than the unmet rural demand in the Business-as-usual scenario. This is attributable to the tenement control rules applied to multi-lots in the Rural Conservation Zone which form a larger proportion by number and area than in Strathfieldsaye. This both reduces the actual land supply which could accommodate demand as well as changes the development capacity of the remaining lots to also accommodate demand. As the proportion of single lots is much higher, the impact of existing planning regulations in the Rural Living (one to 40 hectare minimum) and Rural Conservation (40 to 50 hectare minimum) zones are also evident. Figure 71 and Figure 72 illustrate the zone proportions for the SLA.

Figure 71 Macedon Ranges (S) Balance: proportion of lots by planning zone
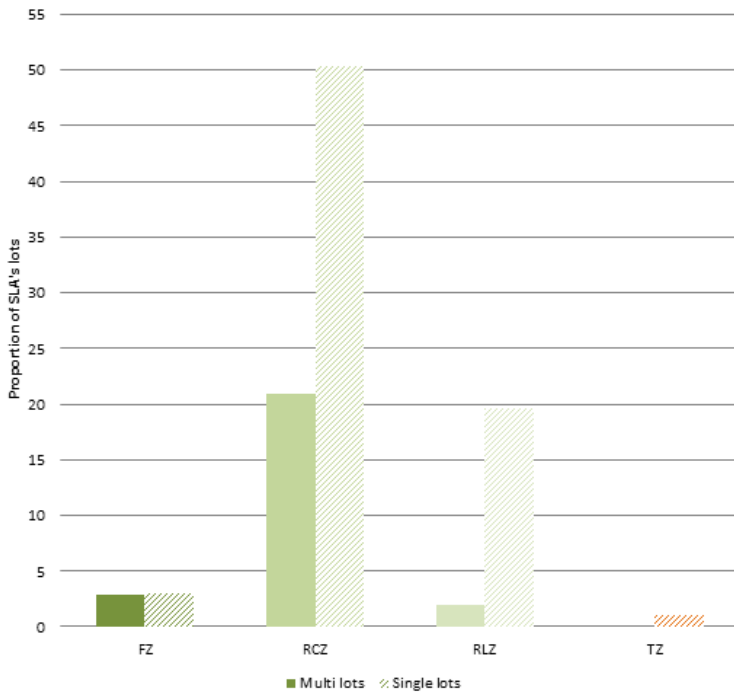
Source: Victorian Government 2013

Figure 72 Macedon Ranges (S) Balance: proportional area of lots by planning zone
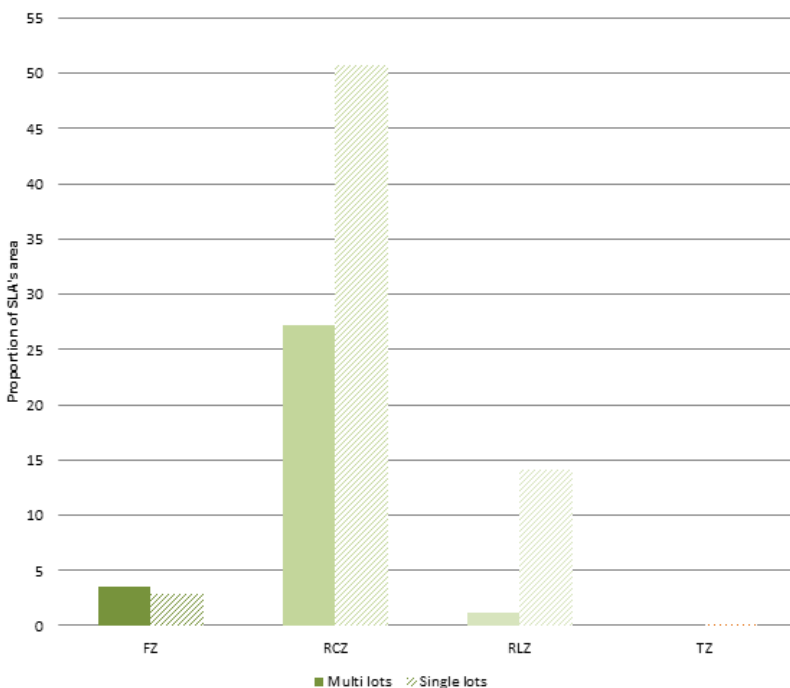
Source: Victorian Government 2013

The main urban settlement in Macedon Ranges (S) Balance is Gisborne. Its ability to accommodate this shortage of rural dwellings to meet projected demand is discussed in the next section which looks more generally at the implications for the study region's urban areas in taking demand that would previously have been met in its rural areas.

6.4.3.4 Meeting additional urban demand through rural transfer

Demand for dwellings which can no longer be met in rural areas due to stronger planning

controls transfers to urban settlements based on their position in the settlement hierarchy (see Methodology section 5.4.2.4) (Planisphere 2009). The settlement hierarchy is based on the urban lot count. Figure 73 indicates the location of each town and their hierarchy classification.

Under the Rural preservation scenario, the rural transfer demand for an SLA is calculated and then aggregated to an LGA total. Each rural transfer amount for an SLA is then distributed among the LGA's urban settlements proportional to their urban lot count.

The Tenement control scenario includes an additional step which preferences the transfer of rural demand to the larger settlements. However, the transferred rural demand is not allocated to any villages or hamlets. Rural demand is only transferred to regional centres, towns and district towns if they currently have a train service.

Figure 73 Study region settlement hierarchy
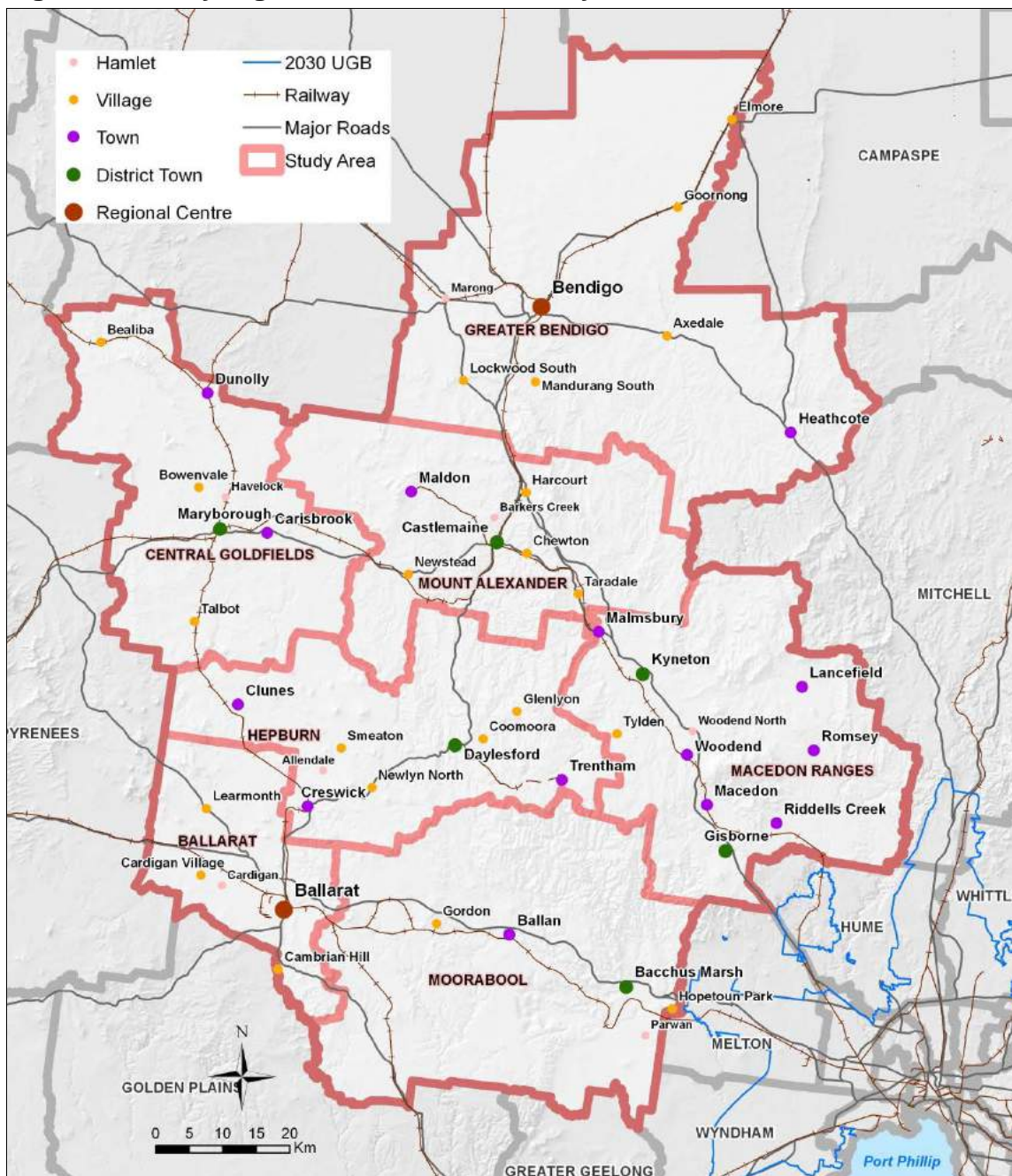
Source: Planisphere 2009

Table 50 shows how demand is distributed to the urban parts of SLAs under the 25 hectare Tenement control sub-scenario.

Table 50 Tenement control: Projected occupied private dwellings in urban settlements to 2041

SLA	2011	2021	2031	2041	Projected dwelling growth
Ballarat (C) - Central	15,129	16,480	17,597	18,755	3,626
Ballarat (C) - Inner North	11,661	14,795	17,961	21,479	9,818
Ballarat (C) - North	116	128	145	164	48
Ballarat (C) - South	9,613	12,421	15,070	18,010	8,397
C. Goldfields (S) - M'borough	3,444	3,715	3,947	4,186	742
C. Goldfields (S) Bal	1,415	1,528	1,635	1,745	330
Gr. Bendigo (C) - Central	8,092	8,789	9,405	10,044	1,952
Gr. Bendigo (C) - Eaglehawk	4,037	4,747	5,420	6,144	2,107
Gr. Bendigo (C) - Inner East	10,245	11,071	11,909	12,780	2,535
Gr. Bendigo (C) - Inner North	4,316	6,215	8,164	10,421	6,105
Gr. Bendigo (C) - Inner West	6,620	8,663	10,753	13,103	6,483
Gr. Bendigo (C) - Pt B	2,212	2,500	2,784	3,085	873
Gr. Bendigo (C) - S'saye	2,189	3,012	3,895	4,909	2,720
Hepburn (S) - East	2,672	3,135	3,587	4,073	1,401
Hepburn (S) - West	2,298	2,616	2,927	3,260	962
Macedon Ranges (S) - Kyneton	2,455	2,742	3,036	3,345	890
Macedon Ranges (S) - Romsey	3,159	3,956	4,726	5,574	2,415
Macedon Ranges (S) Bal	5,020	6,322	7,601	9,014	3,994
Moorabool (S) - Bacchus Marsh	6,182	8,463	10,719	13,283	7,101
Moorabool (S) - Ballan	1,235	1,483	1,726	1,991	756
Moorabool (S) - West	0	0	0	0	0
Mount Alexander (S) - C'maine	3,178	3,452	3,738	4,037	859
Mount Alexander (S) Bal	1,845	2,101	2,358	2,630	785
Total	*107,133*	*128,334*	*149,103*	*172,032*	*64,899*

As in both Business-as-usual and the Rural preservation scenarios, Ballarat (C) – Inner North's urban area is projected to have the largest increase in dwellings in the study region to 2041. Ballarat's other constituent SLAs are also likely to experience a lot of growth, followed by Bendigo's SLAs.

Table 50 shows the projected dwellings for towns for both Business-as-usual and Tenement control (25 hectares) scenarios. Only regional centres, district towns and towns with existing train services receive the transferred rural demand in this scenario to prioritise growth in larger, well serviced settlements. As in the Rural preservation scenario, this transferred amount has a disproportionate effect on the total overall demand in smaller places because it is a larger proportion of that total. For example, Creswick and Clunes would gain almost twice as much growth with the transferring of rural demand as is projected in the Business-as-usual scenario. Bendigo and Ballarat would only receive about four per cent more growth.

## Table 51 : Projected demand for dwellings in urban settlements to 2041

Settlement and LGA	Settlement hierarchy	Train service	BAU urban demand to 2041	TC transferred demand to 2041	*TC total urban demand to 2041*
City of Ballarat					
Ballarat	Regional Centre	Yes	21,070	724	*21,794*
Learmonth	Village	No	23	-	*23*
Cardigan Village	Village	No	59	-	*59*
Cardigan	Hamlet	No	10	-	*10*
Cambrian Hill	Village	No	3	-	*3*
Central Goldfields Shire					
Maryborough	District Town	Yes	753	160	*913*
Dunolly	Town	No	60	-	*60*
Carisbrook	Town	No	52	-	*52*
Talbot	Village	Yes	30	-	*30*
Bowenvale	Village	No	11	-	*11*
Bealiba	Village	No	7	-	*7*
Havelock	Hamlet	No	0	-	*0*
City of Greater Bendigo					
Bendigo	Regional Centre	Yes	21,255	872	*22,127*
Heathcote	Town	No	346	-	*346*
Elmore	Village	No	105	-	*105*
Goornong	Village	No	45	-	*45*
Axedale	Village	No	40	-	*40*
Mandurang South	Village	No	66	-	*66*
Lockwood South	Village	No	38	-	*38*
Marong	Hamlet	No	8	-	*8*
Hepburn Shire					
Daylesford	District Town	No	846	-	*846*
Creswick	Town	Yes	364	336	*700*
Clunes	Town	Yes	316	286	*602*
Trentham	Town	No	142	-	*142*
Coomoora	Village	No	36	-	*36*
Newlyn North	Village	No	13	-	*13*
Glenlyon	Village	No	12	-	*12*
Smeaton	Village	No	7	-	*7*
Allendale	Hamlet	No	4	-	*4*
Macedon Ranges Shire					
Gisborne	District Town	Yes	2,104	295	*2,399*
Kyneton	District Town	Yes	582	235	*817*
Woodend	Town	Yes	1,114	156	*1,270*
Romsey	Town	No	949	-	*949*
Riddells Creek	Town	Yes	733	96	*829*
Lancefield	Town	No	472	-	*472*
Macedon	Town	Yes	327	43	*370*
Malmsbury	Town	Yes	103	43	*146*
Tylden	Village	No	34	-	*34*
Woodend North	Hamlet	No	12	-	*12*

Settlement and LGA	Settlement hierarchy	Train service	BAU urban demand to 2041	TC transferred demand to 2041	*TC total urban demand to 2041*
Moorabool Shire					
Bacchus Marsh	District Town	Yes	6,559	466	*7,025*
Ballan	Town	Yes	491	70	*561*
Hopetoun Park	Village	No	231	-	*231*
Gordon	Village	No	39	-	*39*
Parwan	Hamlet	No	1	-	*1*
Mount Alexander Shire					
Castlemaine	District Town	Yes	883	464	*1,347*
Maldon	Town	No	192	-	*192*
Newstead	Village	No	38	-	*38*
Chewton	Village	No	32	-	*32*
Harcourt	Village	No	22	-	*22*
Taradale	Village	No	12	-	*12*
Barkers Creek	Hamlet	No	0	-	*0*

Source: ABS 2012; Planisphere 2009; DPCD 2012b

Figure 74 shows how urban settlement growth in the Tenement control scenario would be distributed across the study region, including the proportion of additional growth that is transferred from rural areas.

Figure 74 Business-as-usual and Tenement control projected dwelling demand to 2041
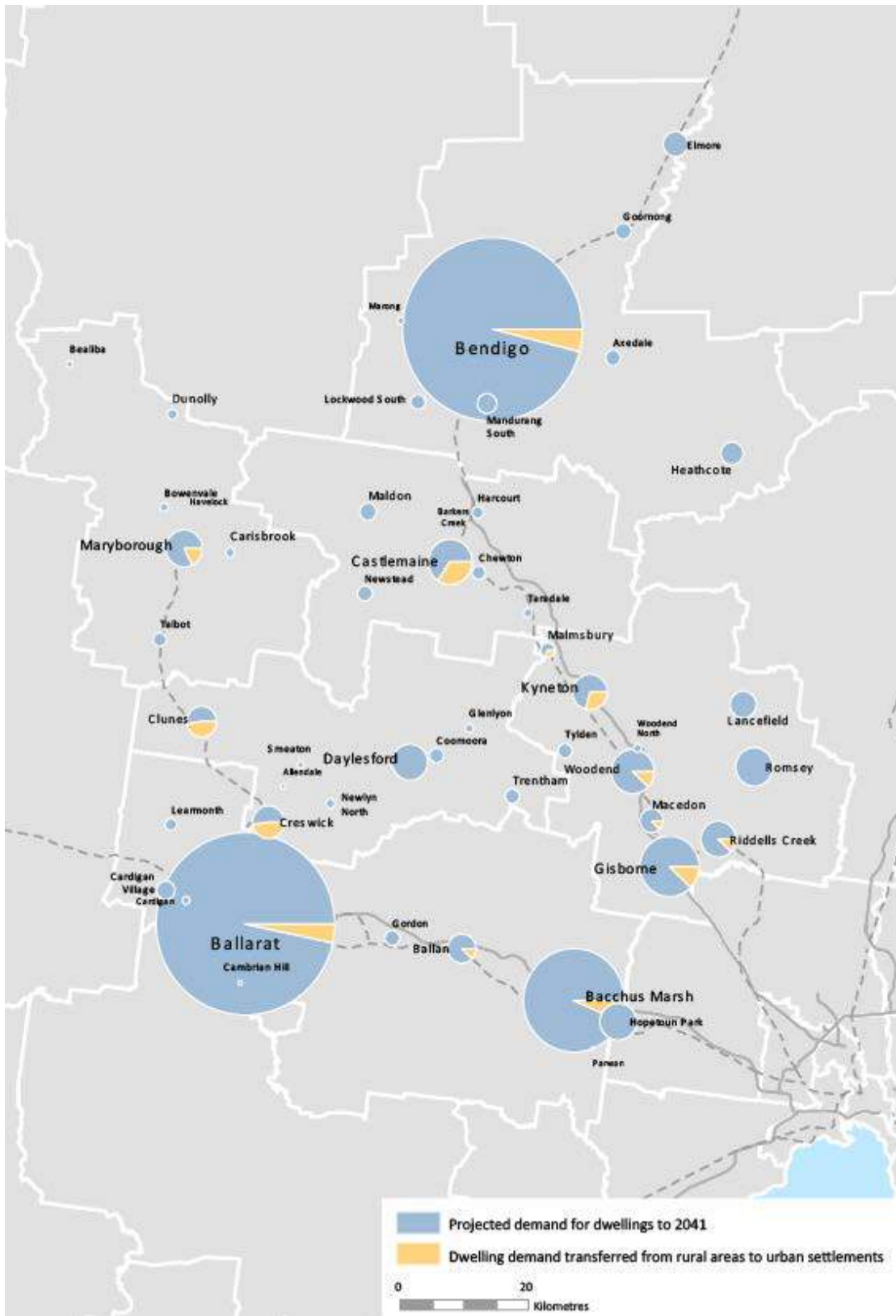
In addition to the rural transfer of demand, this approach could also include the shortfall in supply that occurs in the rural areas.

Table 52 shows the unmet rural demand for the three relevant SLAs.

Table 52 Tenement control unmet rural demand

| SLA	Supply	Demand	Unmet rural demand
Gr. Bendigo (C) - Inner East	1	188	187
Gr. Bendigo (C) - S'saye	217	639	422
Macedon Ranges (S) Bal	1,448	2,247	799

As noted above, Strathfieldsaye's unmet rural demand might be accommodated within Bendigo's urban area and Macedon Ranges (S) Balance's in Gisborne. Bendigo would also be the closest choice for Greater Bendigo (C) – Inner East. Table 53 provides the revised totals for the transfer of rural demand to these two urban settlements.

Table 53 : Rural transfer to Bendigo and Gisborne

Settlement and LGA	BAU urban demand to 2041	TC unmet rural demand	TC transferred demand to 2041	*Revised TC total urban demand to 2041*
Bendigo	21,255	187+422	872	*22,736*
Gisborne	2,104	799	295	*3,198*

How then would the additional growth that no longer will occur in rural areas actually appear in these settlements? As with the Rural preservation scenario, some general residential density analysis provides an indication of the change that is required to accommodate the transferred growth in comparison to Business-as-usual. Figure 75 illustrates this comparison for the relevant fourteen urban settlements, including data on current residential densities.

Figure 75 Regional centres, district towns and towns with train services
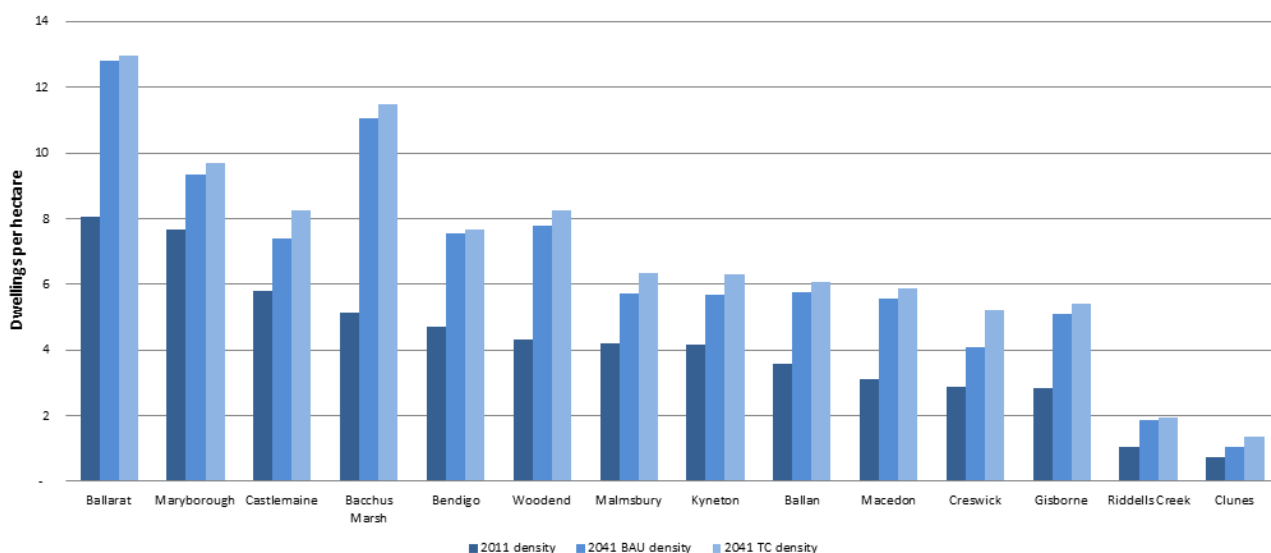
All urban settlements will need to increase their densities to accommodate Business-as-usual growth. As with the Rural preservation scenario, transferring some rural demand into urban settlements will require their residential densities to increase again compared to that projected Business-as-usual scenario, if no further land is available for housing development. Only Creswick and Clunes will need to achieve higher densities under

Tenement control than Rural preservation but by less than half a house per hectare.

These density results are very general. They tell little about the actual places and how even small increases in density might impact the residential built environment. The next section of this report examines how changes in density might be achieved in Bendigo given the current land supply.

6.5 Urban scenarios

This section of the project focuses on urban settlements. It examines the impact of increased average residential densities on land supply for broadhectare areas on the fringes of townships, and for nominated areas within established township boundaries. It has two components: the first analyses land supply and density scenarios against projected demand for dwellings in Ballarat, Bendigo, Castlemaine and Ballan in the study region; the second examines different density scenarios for residential development within Bendigo to meet the same projected demand.

Using past propensities to project future dwelling preferences results in very large demand for separate dwellings. This would occur in most places in Australia. The modelling in the *Regional Housing Futures* component strongly highlights the influence of this dwelling type and the challenge of finding enough land to continue to build such homes (Groenhart et al 2013). The alternative scenarios demonstrate that even small increases in residential densities can extend the possibility for current land supplies to accommodate future dwelling demand.

This also occurs in the Bendigo case study. This case study models higher density scenarios for different parts of the city, and combining scenarios could preclude the need to rezone more fringe or agricultural land for future residential development. The *Regional Housing Futures* work provides valuable projected dwelling demand information against which to compare the yields from these different density approaches within Bendigo (Groenhart et al 2013).

The next section discusses the results for the four towns in the *Regional Housing Futures* work and the results of the Bendigo-specific scenarios are presented in the following section. The implications for Bendigo the transfer of rural demand to urban settlements are also highlighted.

6.5.1 Regional Housing Futures

This component of the urban work examines the capacity of Ballarat, Bendigo, Castlemaine and Ballan to accommodate projected dwelling growth given current residential land supplies in greenfield and infill areas. It analyses how this projected demand can be satisfied under three scenarios: *Business as usual*, *Urban density* and *Fringe density* using work by Groenhart et al (2013) as part of this overall project. These scenarios have varying assumptions about the mix of dwellings types (and densities) and the proportion of development on infill and greenfield or broadhectare land.

The model shows that only Ballarat lacks enough land to meet demand in all scenarios and that Castlemaine is constrained in its land supply for low density development. Increasing densities on both broadhectare and infill land could allow much more development to occur than if *Business as usual* practices continue. Similarly increasing the proportion of infill compared to greenfield development will extend the supply of land.

The next sections present the results of demand modelling based on household

propensities to live in particular dwelling types, each town's land supply from the Victorian government's *Urban Development Program*, and an analysis of how that supply meets the projected demand (DPCD 2011).

6.5.1.1 Household demand for dwellings

First the model examines past trends in household structures and dwelling types for each of the towns. This information determines the propensity of particular types of households to live in certain types of dwellings. These propensities are then applied into the future, using the VIF projected dwelling data for each town, to determine future demand for new homes (DPCD 2012b). Figure 76 shows how households have changed over two inter-censal periods, using Bendigo as an example. Bendigo is consistent with Australian trends of falling numbers of households containing couples with children, and increasing numbers of households containing couples without children and lone persons.

Figure 76 Bendigo: proportion of household types, 2001 to 2011
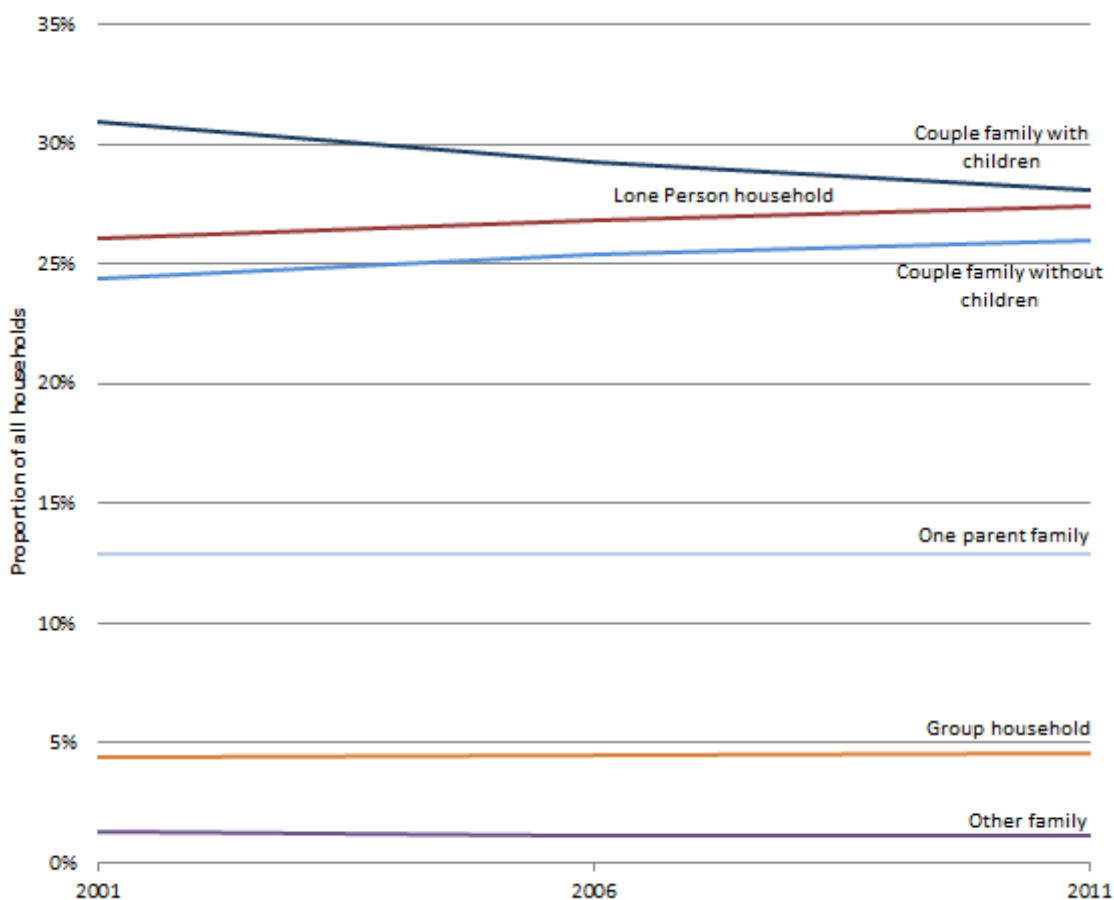

Figure 77 shows the dwelling types those households lived in over the same time period. The strong and growing preference for separate houses is consistent across all household types except other family households (which are a very small proportion of all households as indicated in Figure 76).

Figure 77 Bendigo: proportion of household types by dwelling type, 2001 to 2011
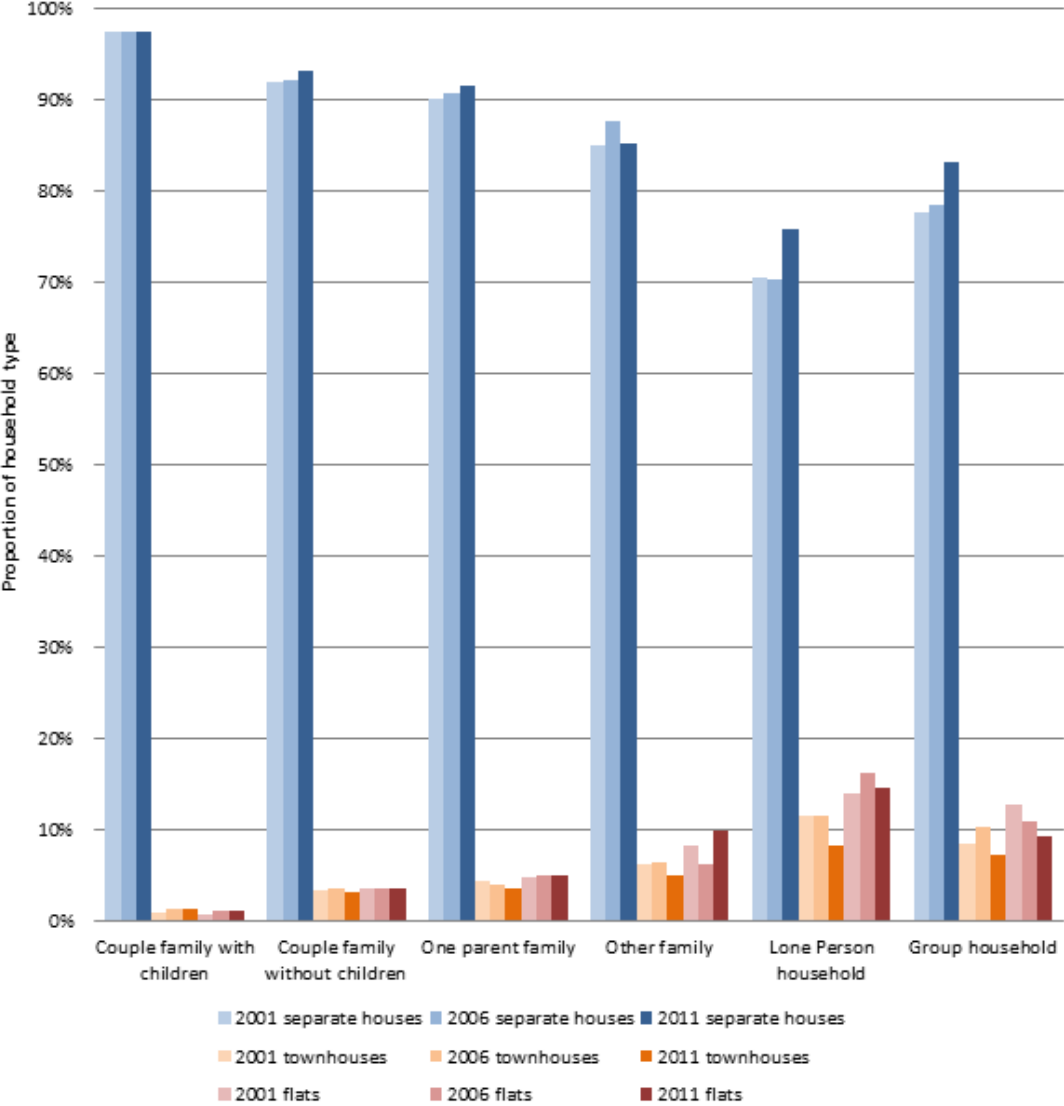
Projecting households and dwelling types into the future is directly influenced by the past propensities, and these projections do not necessarily reflect a particular policy preference or desired planning outcome, or even personal preferences. The next section of this report examines Bendigo and applies specific dwelling densities associated with particular dwelling types to land supply, and then compares these to the demand calculated in this model.

Data for Bendigo in Table 54 illustrates the details of dwelling projections; Table 55 provides the dwelling totals for each town and Figure 78 Proportions of projected dwelling types to 2041 shows demand by the proportion of different dwelling types to 2041.[40]

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[40]For more data and information about projected households and dwelling types, see Groenhart et al 2013.

Table 54 Bendigo – total demand by dwelling type for all SLAs

	2016	2021	2026	2031	2036	2041	Total for each dwelling type to 2041
Separate house	3,027	3,249	3,208	3,121	3,533	3,533	*19,672*
Townhouse	83	86	83	81	88	88	*509*
Flat, unit or apartment	165	174	170	165	182	182	*1,037*
Other dwelling	22	23	22	22	25	25	*138*
Total dwellings for each period	*3,296*	*3,531*	*3,484*	*3,389*	*3,828*	*3,828*	*21,356*

Source: Groenhart et al 2013

Table 55 Demand for dwellings to 2041

	Ballarat	Bendigo	Castlemaine	Ballan
Separate house	18,421	19,672	714	510
Townhouse	1,169	509	30	2
Flat, unit or apartment	1,647	1,037	65	35
Other dwelling	96	138	7	18
TOTAL TO 2041	*21,334*	*21,356*	*815*	*566*

Source: Groenhart et al 2013

Figure 78 Proportions of projected dwelling types to 2041
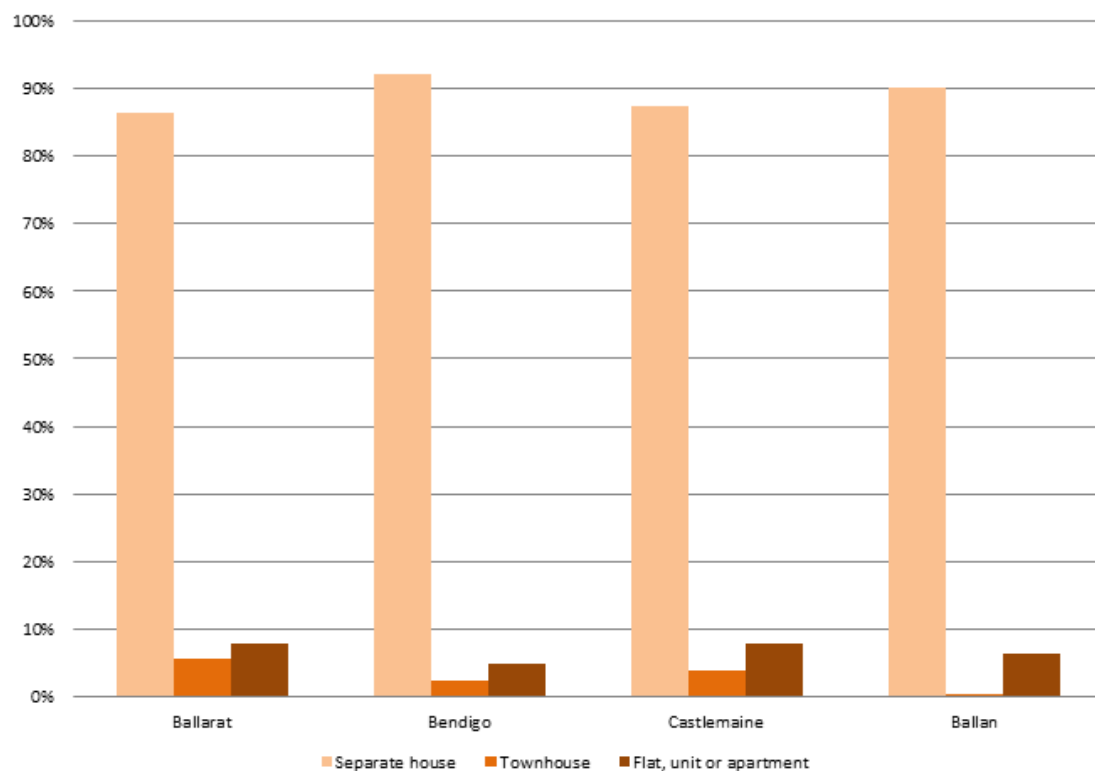
Source: Groenhart et al 2013

Demand remains strongest for detached dwellings in all towns, which is expected given the dominance of this dwelling type in 2001, 2006 and 2011. This preference for separate houses then has a strong influence on the ability of the towns – and Bendigo specifically in the following section – to accommodate demand to 2041. If housing preferences shifted to slightly higher density housing, the towns' land supply would last longer. These supplies are discussed in the next section.

6.5.1.2 Urban land supply

As discussed in section 1.7.1.2 of the methodology, the DPCD 2010/2011 *Urban Development Program* (UDP) data on land supply in the four towns provides information on sites available for development, on broadhectare (greenfield), major and minor / township infill lots (DPCD 2011). Table 56 summarises the supply identified by the UDP in each town.

Table 56 Urban Development Program future land supply

	Lots	Total area (ha)
Ballarat		
Minor Infill	648	142
Major infill	50	100
Broadhectare	68	553
Bendigo		
Minor Infill	787	183
Major Infill	826	301
Broadhectare	63	888
Castlemaine		
Township Zone Vacant	98	17
Broadhectare	9	27
Ballan		
Township Zone Vacant	108	17
Broadhectare	14	38

Source: DPCD 2011

The UDP also reports on the possible timing of development of the lots, the yield from the supply lots and an average lot size (DPCD 2011). This information is not used in the model as the scenarios have their own density assumptions and land development is assumed to be consistent across each five year period.

The next section looks at whether these land supplies in each town are adequate to meet projected demand for the different dwelling types under three different density scenarios.

6.5.1.3 How supply meets demand

The model allocates density rules for each dwelling type to the various land types under the three scenarios: *Business as usual*, *Urban density* and *Fringe density* (Groenhart et al 2013). Table 57 illustrates those densities, the different land types and the proportions of dwelling types in each scenario.

Table 57 Net density assumptions (site plus roads and half public road frontage)

	Apartment	Townhouse	Compact detached	BAU detached
Dwellings per hectare	70	35	20	15
Scenario 1 Business as usual				
Minor Infill / Township	5%	5%	30%	60%
Major Infill		5%	25%	70%
Broadhectare				100%
Scenario 2 Urban density				
Minor Infill / Township	10%	40%	40%	10%
Major Infill	10%	40%	40%	10%
Broadhectare			70%	30%
Scenario 3 Fringe density				
Minor Infill / Township	5%	15%	60%	20%
Major Infill	5%	15%	60%	20%
Broadhectare			80%	20%

Source: Groenhart et al 2013

The model applies the density assumptions to the defined land supply which then allows comparison with the projected dwelling demand growth. The supply and demand results for the four towns to 2041 appear in Table 58. Other dwellings are not included in the modelling because they are an indeterminate housing type and so the totals Table 58 are slightly smaller than those in Table 55 Demand for dwellings to 2041 in the previous section (Groenhart et al 2013).

Table 58 Demand and supply to 2041

	Apartment	Townhouse	Compact detached	BAU detached	TOTAL
Ballarat					
Demand to 2041	*1,647*	*1,169*	*-*	*18,421*	*21,237*
Business as usual supply	496	422	1,348	10,618	12,884
Urban density supply	1,688	3,377	9,674	2,851	17,590
Fringe density supply	844	1,266	11,746	2,383	16,239
Bendigo					
Demand to 2041	*1,037*	*509*	*-*	*19,672*	*21,218*
Business as usual supply	639	846	2,599	18,117	22,201
Urban density supply	3,383	6,766	16,295	4,720	31,164
Fringe density supply	1,691	2,537	20,003	4,113	28,344
Castlemaine					
Demand to 2041	*65*	*30*	*-*	*714*	*809*
Business as usual supply	60	30	104	560	754
Urban density supply	121	242	516	147	1,026
Fringe density supply	60	91	639	133	923
Ballan					
Demand to 2041	*35*	*2*	*-*	*510*	*547*
Business as usual supply	58	29	99	718	904
Urban density supply	116	231	663	195	1,205
Fringe density supply	58	87	805	163	1,113

Source: Groenhart et al 2013

Only Ballarat has insufficient land supply to meet overall demand for dwellings in each of the scenarios. This may be due to the model excluding the large growth areas in Ballarat's southwest and west which for the purposes of this study are included in the rural part of the region, but the state government's projections may have taken those into account. These areas could accommodate approximately 8,000 *Business as usual* detached dwellings and over 10,000 compact detached dwellings which would more than account for the scenarios' shortfalls. Castlemaine also has a shortage of business as usual detached dwellings under the *Business as usual* scenario. The other two scenarios clearly demonstrate the effectiveness of slightly higher densities to meet that shortfall. Figure 79 illustrates the scenarios' dwelling supply for each town in comparison to their projected demand (Groenhart 2013).

Figure 79 Demand for dwellings compared to density supply scenarios
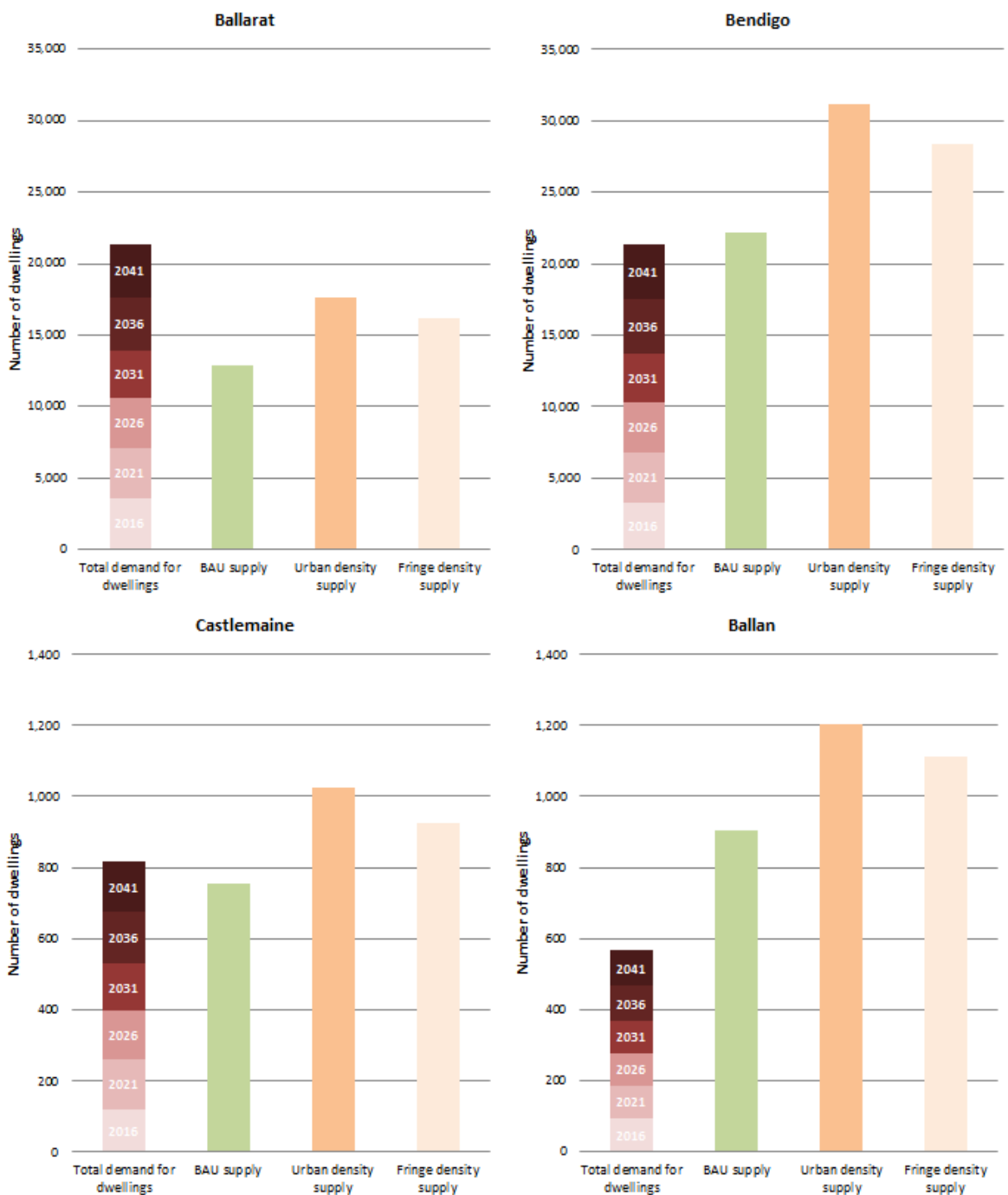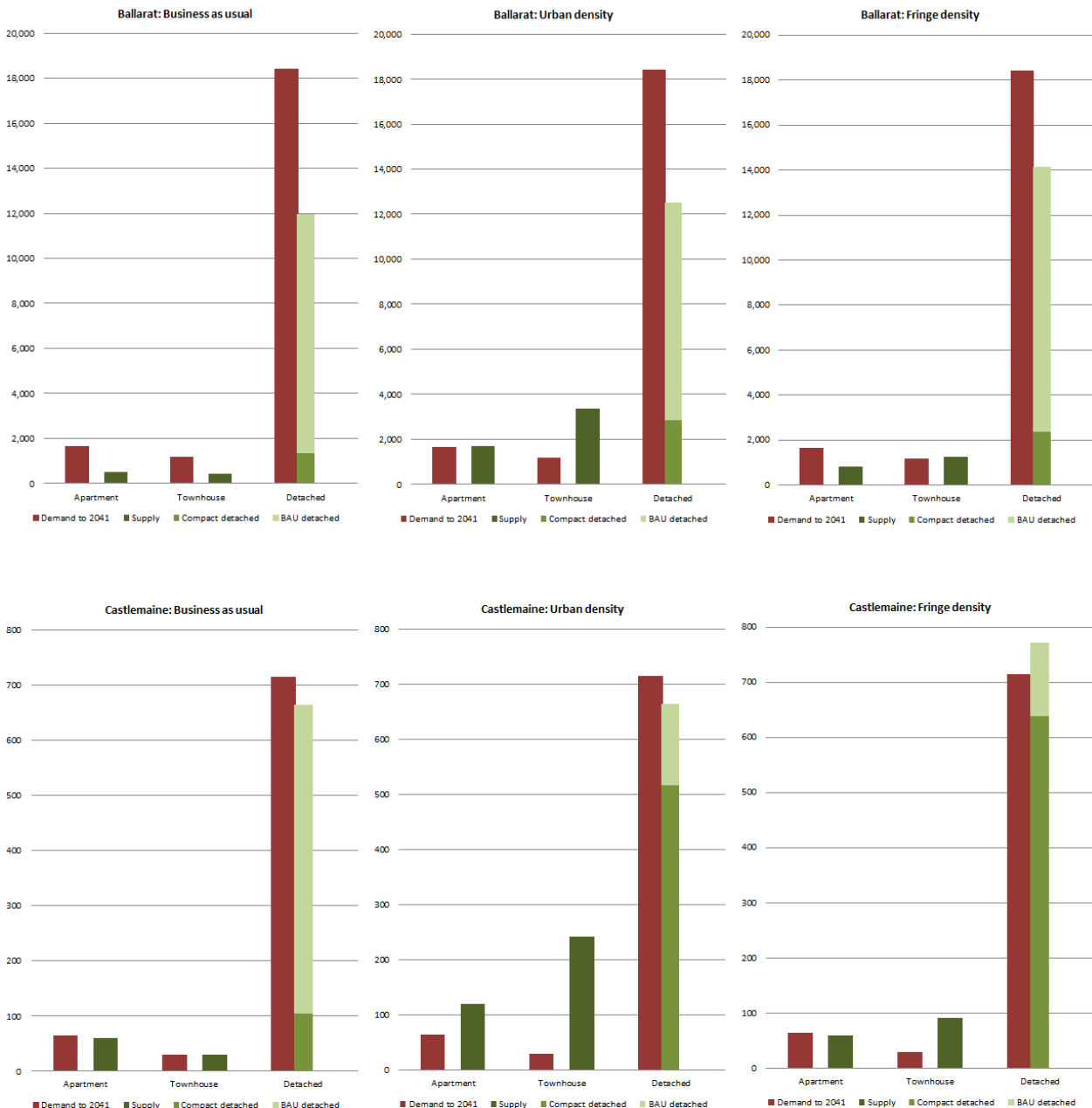

Source: Groenhart et al 2013

These scenarios demonstrate that these four major centres in the study region have sufficient land supply to meet overall projected dwelling demand to 2041, except in Ballarat and under *Business as usual* in Castlemaine (Groenhart et al 2013).

Figure 80 compares supply and demand for the different dwelling types within Ballarat and Castlemaine. They demonstrate that the possible future dwelling shortages are mainly for detached dwellings and that the higher density scenarios are closer to meeting projected demand than if current land and housing development practices continue (Groenhart et al 2013).

Figure 80 Supply and demand for dwelling types, Ballarat and Castlemaine

Source: Groenhart et al 2013

The City of Ballarat anticipates that its western growth area will develop at around ten dwellings per hectare (Smec Urban 2012). This will result in Ballarat needing to rezone land sooner than shown through this project's *Business as usual* scenario. Alternatively the council could consider requiring densities such as those used for the compact

detached dwellings in these scenarios as this would bring much greater yields in greenfield areas. If all broadhectare land and detached houses are developed at 20 dwellings per hectare, Ballarat will only have a shortage of around 3,000 detached dwellings by 2041 (Groenhart et al 2013).

Castlemaine does not have many options for greenfield development. It has large areas of bush surrounding the town along with rural low density zones such as Rural Living and Rural Conservation. If both the Urban density and Fringe density scenarios are able to accommodate projected demand, this suggests that Castlemaine most urgently needs to rethink its approach to regulating *Business as usual* residential development densities (Groenhart et al 2013).

The projections calculated in this *Regional Housing Futures* model suggest that Ballarat and Bendigo will experience similar growth and thus demand for new dwellings (Groenhart et al 2013). The next section of this report examines in more detail different approaches to and locations of new housing development within the urban area of the City of Greater Bendigo. It also examines all land within Bendigo's urban area rather than just the land supply identified by the *Urban Development Program* (DPCD 2011). This gives a slightly different view of the city's housing future using existing planning regulations with new density rules. These yields are then compared to the projections of future dwelling types from the *Regional Housing Futures* modelling to identify any shortages or oversupply of particular types of homes (Groenhart et al 2013). The results show various possible built forms which would most importantly remove the need to rezone any more fringe land for residential development.

6.5.2 Bendigo's Housing Futures

In order to meet Bendigo's projected demand for dwellings without rezoning any additional greenfield land, residential development densities will have to increase. As demonstrated in the rural scenarios (see sections 6.4.2.5 and 6.4.3.4 Meeting additional urban demand through rural transfer), the city's residential densities are currently below five dwellings per hectare. This will need to rise to around eight dwellings per hectare by 2041 to meet the state government's projections and to take the transferred demand from both the Rural preservation and Tenement control scenarios, if only the current land supplies remain available. However these density figures do not take into account variation in residential character and the complexity of land uses across the city.

The scenarios modelled in this section of the report focus on different parts of Bendigo, such as the fringe for broadhectare development of detached houses and the CBD for new apartments built on redevelopment sites. The scenarios show how higher densities could be achieved. Demand for townhouses could be easily met through infill development in activity centres, and on identified residential and non-residential redevelopment sites. If apartments are only built in Bendigo's CBD, they will adequately meet projected demand.

However each individual scenario does not produce sufficient dwellings to meet Bendigo's overall projected demand. They also do not provide enough detached dwellings for which demand is calculated to 2041 in the *Regional Housing Futures* work (Groenhart et al 2013). The council could instead consider using a range of these approaches to avoid the need to rezone fringe land and on further consideration of the application of new zones. For example, the higher density broadhectare and dual occupancy infill scenarios together will satisfy demand for separate houses.

The following section introduces more detail about each scenario and their general

implications for the rural scenario models.

6.5.2.1 Summary of Bendigo scenarios

The Bendigo scenarios analyse land supply on the city's fringe and within existing urban areas to produce a general indication of possible dwelling yields using basic density assumptions. These are compared to the projected demand for different dwelling types in the *Regional Housing Futures* work to identify any shortfalls or over supply (Groenhart et al 2013). The implications of the unmet and transferred rural demand are also discussed in each case.

Table 59 summarises the scenarios, each of which forms a section below.

Table 59 Summary of urban scenarios

Scenario	Description
Business as usual broadhectare	Residential development at current trend densities
Higher density broadhectare	Maximum yield possible of all lots over one hectare at 25 dwellings per hectare
Dual occupancy infill	Development on existing occupied and vacant residential lots between 700 and 1,000 square metres
Activity centre infill	Development occurs on sites within 400 metre radius of lots zoned for business
Residential infill	Development occurs on residential sites identified as green by CoGB in their GIS model
Redevelopment on non-residential land	Residential development occurs on infill sites zoned business and industrial (outside the CBD)
Central Bendigo redevelopment	Mixed use development on CBD lots

In addition to Bendigo's projected dwelling demand calculated in the *Regional Housing Futures* work, the project's rural scenarios also have implications for dwelling supply through the transferred rural demand as a result of the reduced rural land supply in the Rural preservation and Tenement control scenarios and the unmet rural demand (Groenhart et al 2013). This unmet rural demand occurs in two SLAs adjacent to the project's urban boundary for Bendigo so it should logically be accommodated within the city. The model specifically requires that the transferred demand should be allocated to urban settlements. Table 60 shows the magnitude of these demand figures.

Table 60 Dwelling demand in Bendigo

	Business-as-usual	Rural preservation	Tenement control
Projected BAU dwelling demand	21,218	23,674	22,090
Transferred rural demand	-	2,456	872
Unmet demand for rural dwellings	473	18	609
Revised total demand	*21,691*	*26,148*	*23,571*

Source: DPCD 2012b

This additional demand is a relatively small proportion of the Business-as-usual projected dwelling demand for Bendigo. However given that this demand is either not met in or is

transferred from rural areas, it will have implications for the demand for particular dwelling types, and most likely for detached houses. If households had originally intended to live in rural areas, their preference is most likely to be for a detached home. Can supply-led demand shift those preferences to slightly higher density housing and thus remove the need to rezone further greenfield land for separate houses?

6.5.2.2 Business as usual and future higher density broadhectare development

This scenario focuses on two residential development options on Bendigo's fringe. This scenario defines that area as those lots beyond a three kilometre radius of the Town Hall and within this project's defined urban area for Bendigo based on planning zones. It only considers land zoned for residential uses and excludes any lots with planning overlays (DTPLI 2014b).[41] This results in 770 hectares of broadhectare land suited for greenfield development and is indicated in green in Figure 81.

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[41]A separate sub-scenario which applies the overlay rules associated with Design Development and Development Plan overlays is discussed below.

Figure 81 Bendigo: broadhectare land supply
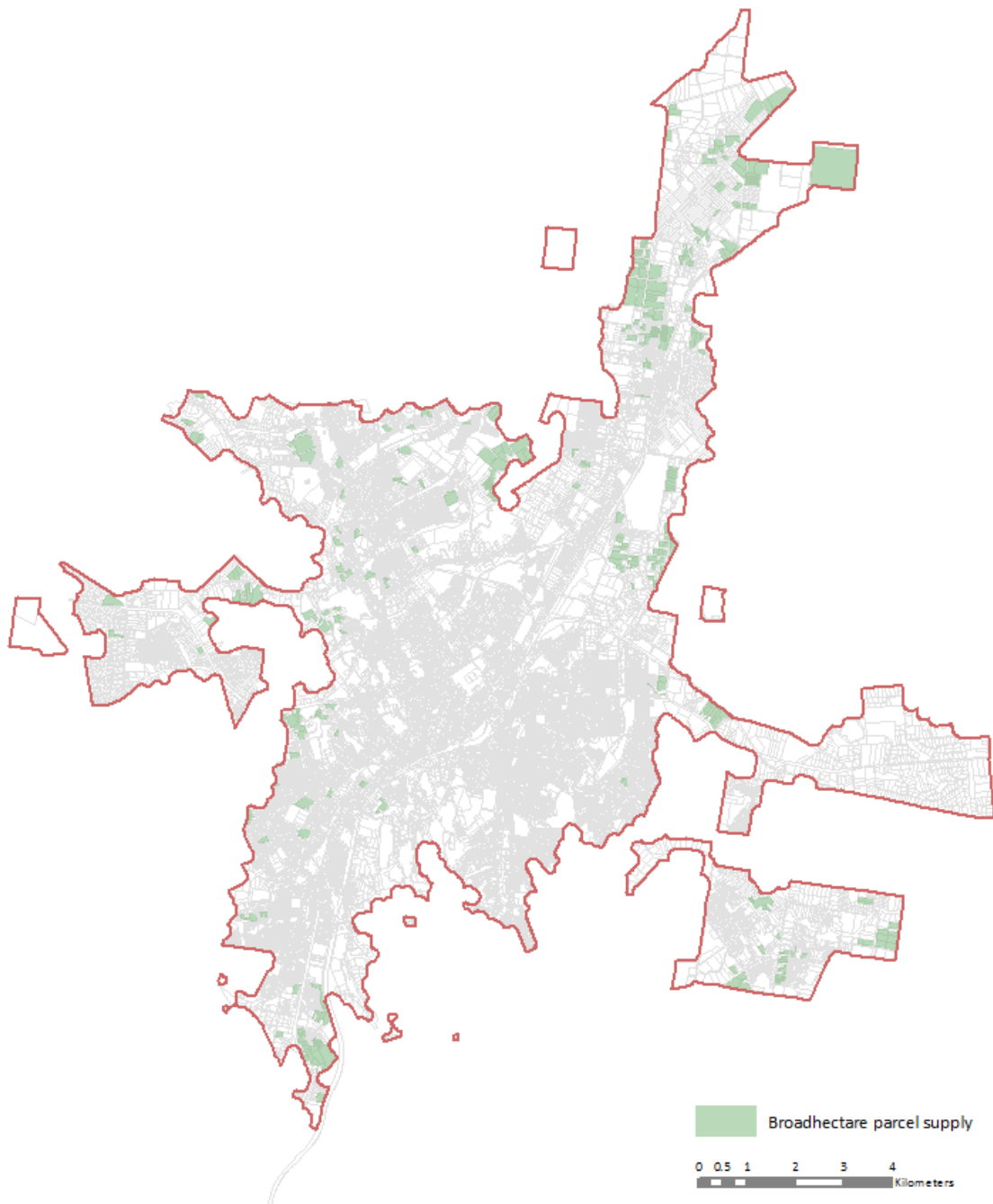
Source: Victorian Government 2013

Figure 81 shows the dispersed and fragmented pattern of broadhectare land supply. The largest lot is 74 hectares and the smallest is one hectare (the minimum size assumption for this scenario). This is quite different to the more contiguous distribution of Melbourne's urban growth zones (a zone which Bendigo does not use at all, which reflects its relatively constrained fringe land supply) (GAA 2012). This characteristic may support a more differentiated approach to broadhectare development rather than the large scale and more standardised approach to land subdivision typical on Melbourne's fringe. Some of the lots defined as broadhectare using the scenario's assumptions may actually function as infill rather than greenfield development, by taking into account existing and surrounding residential areas. The City of Greater Bendigo's *Planning Register of Applications Received* shows that residential broadhectare development of ten or more lots between 2010 and 2013 has occurred at approximately 12 dwellings per hectare (COGB 2014a).

This is the density assumption applied to the land supply described above. The straightforward calculation of land supply multiplied by density results in a Business as usual dwelling supply of 9,240.

A sub-scenario applies the relevant DDOs' and DPOs' larger lot size requirements to the Business as usual broadhectare supply (DTPLI 2014c). The planning rules are specifically related to particular locations. For example, DDO7 requires a minimum lot size of 1,500 square metres to protect native vegetation. The Business as usual yield from the affected lots but without applying the DDOs and DPOs is 6,054; this reduces to 4,279 when the additional planning rules are applied to the relevant lots. As a result, the revised yield for Business as usual on broadhectare land is 7,465 at 12 dwellings per hectare. Given the added complexity of applying these rules, the overall Business as usual result is used for the rest of this report. However these DDOs and DPOs do illustrate the effectiveness of applying lot size restrictions to affect dwelling yield, an approach followed by this project's two rural scenarios (DTPLI 2014c).

Table 61 provides detail for each DDO and DPO, including their associated rules and the revised yield for the affected lots.

Table 61 Broadhectare Design and Development and Development Plan Overlays' impact on yield

Overlay	Area	Schedule minimum lot size	Lot size restrictions	Yield (revised)
DDO6	33.1ha	4,000sqm	Nil	83
DDO7	1.1ha	1,500sqm	Nil	7
DDO10	15.2ha	1,500sqm	Nil	101
DDO11	8ha	700sqm	Nil	114
DPO3	10.6ha	4,000sqm	Nil	27
DPO4	285.1ha			
	- 69.8	- 0.8ha	23 lots, only 12 over 1.6ha	75
	- 10.3	- 1ha	9 lots, only one over 2ha	10
			25 lots, only 5 over 2ha	
	- 45.4	- 1ha	Assume 833sqm	37
	- 156.7	Nil		1,880
DPO21		Between 300 and 1,000sqm	Assume 650sqm	402
DPO25	86.8ha	Nil	Nil (assume 833sqm)	1,042
DPO26	41.8ha	Over 300sqm	Assume 833sqm	502
			Total	4,279

 Source: DTPLI 2014c

The *Regional Housing Futures* work calculates that by 2041, Bendigo will need 19,672 more detached dwellings (see Table 58 Demand and supply to 2041) (Groenhart et al

2013). To make the comparison between this demand figure and the supply identified in this scenario, supply is assumed to be all separate dwellings on Bendigo's fringe. This may not actually occur in reality, where achieving the 12 dwellings per hectare may come from a combination of medium density townhouses on small lots and large houses on large lots. But taking this simple approach allows for an indication of a date by which the current broadhectare supply land developed with separate houses is exhausted.

If no more land is rezoned to accommodate broadhectare development and densities remain at 12 dwellings per hectare, no more broadhectare land will be available by 2026 in the Business as usual scenario or under the additional constrains of the DDO and DPO rules.

An alternative approach to rezoning land to address this shortfall is to raise required residential densities for new development. A higher density scenario of 25 dwellings per hectare could produce 19,250 dwellings on the same land supply compared to 9,240 in the Business-as-usual scenario. This results in a shortfall of approximately 400 separate houses by 2041.

These demand and supply results are illustrated graphically in Figure 82.

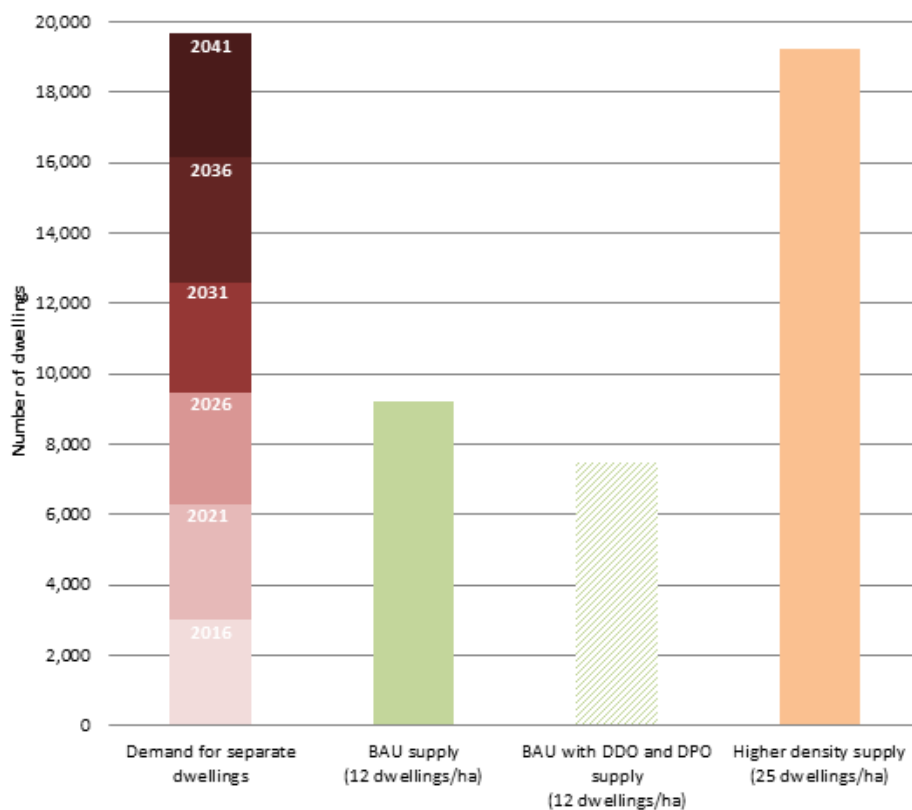**Figure 82 Demand for and supply of separate dwellings in Bendigo**

Figure 83 contains two examples from Landcom (NSW) of dwellings at approximately 25 dwellings per hectare. These demonstrate how separate houses can be built at higher densities while still including the typical greenfield dwelling characteristics of three bedrooms, a backyard and space for car parking.

Figure 83 Examples of residential densities over 20 dwellings per hectare

Zero lot house (short block)
Lot: 12.5 x 20m (200sqm)
Height: 1 (or 2) storey
Bedrooms: 2 or 3
Parking: 1, or 2 spaces, in garage
Open space: 35-50sqm, back yard
Floor area: 1 storey – 100sqm
            2 storey – 170sqm
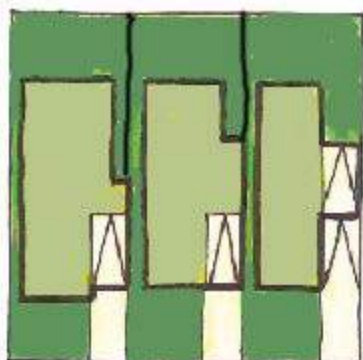*Net density:* 24 dwellings per hectare
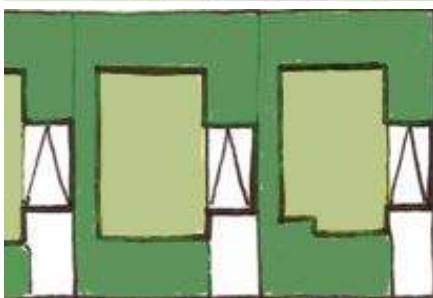
Source: Landcom 2011

Zero lot house (long block)
Lot: 10 x 30m (300sqm)
Height: 1 (or 2) storey
Bedrooms: 3
Parking: 1 space in garage
Open space: 40-90sqm, back yard
Floor area: 1 storey – 160sqm
            2 storey – 215sqm
*Net density:* 21 dwellings per hectare

Source: Landcom 2011

Increasing the required density in broadhectare areas will also help meet the additional demand that cannot be met in rural areas. As discussed in sections 6.4.2.3 and 6.4.3.3 on rural supply and demand, both Greater Bendigo (C) – Inner East and Greater Bendigo (C) – Strathfieldsaye do not have enough dwellings lots to meet all of the rural demand in the rural scenarios. If these shortfalls are met in Bendigo's broadhectare areas, assuming that demand is for detached homes, then the Bendigo Business as usual broadhectare scenario will exhaust its land supply even earlier than 2026. This will occur particularly in the rural Business as usual and Tenement control scenarios where an additional 473 and 609 dwellings respectively are needed in Bendigo's urban area (see Table 60 Dwelling

demand in Bendigo). The 25 dwellings per hectare broadhectare Bendigo scenario will exhaust land to accommodate those extra dwellings which rural areas cannot supply, but only by 2041.

The rural scenarios also transfer demand to urban areas (see Table 60) and for this broadhectare scenario, this demand is assumed to be for separate houses. As with the undersupply of rural dwellings, Bendigo's broadhectare land supply developed at 12 dwellings per hectare will also have difficulty in accommodating the transferred rural demand in the 2020s. The Rural preservation scenario has the largest impact, requiring 2,456 dwellings in Bendigo rather than in the rural parts of the council's SLAs. The Tenement control scenario transfer demand for 872 dwellings into the Bendigo urban area.

Figure 84 summarises the demand for separate dwellings in Bendigo for Business as usual and as a result of the rural scenarios (again assuming that unmet and transferred rural demand is for detached houses).

**Figure 84 Demand for and supply of separate dwellings in Bendigo in relation to rural scenarios**
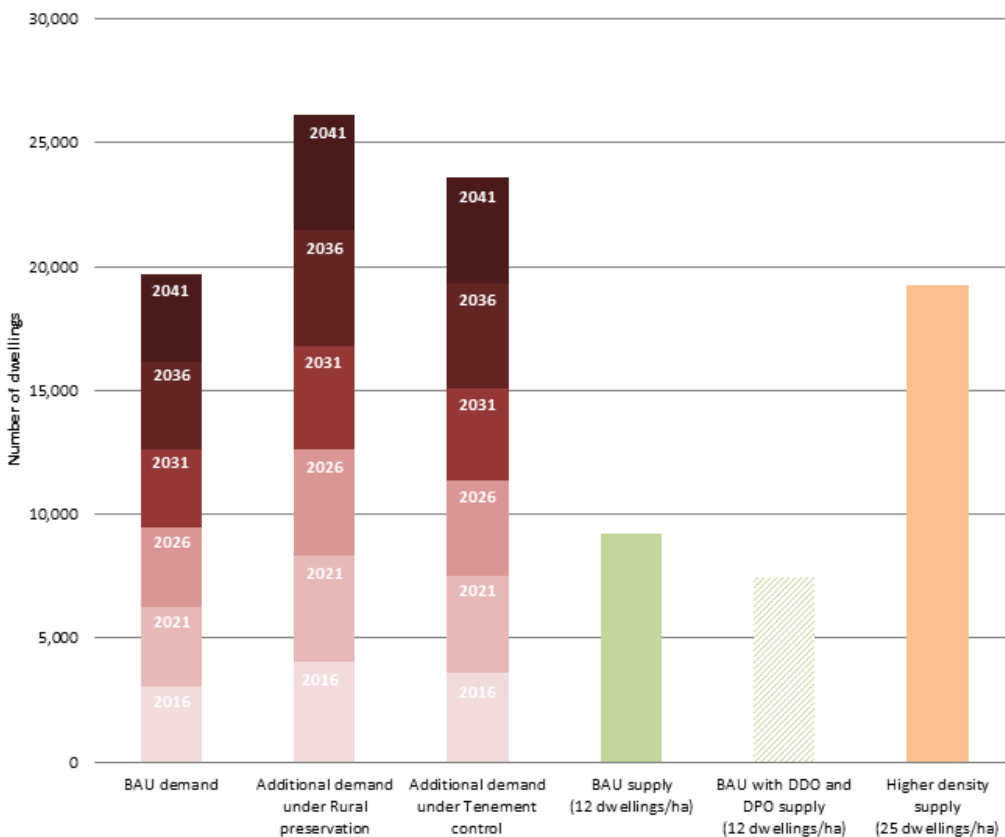
Bendigo's inability to accommodate these extra demands for dwellings highlights the city's long term shortage of broadhectare land supply if it is developed at low densities. The council could choose to follow existing practices and rezone surrounding farmland to Residential 1 or Low Density Residential, or it could take a different approach and require higher densities in new subdivisions. Given that the supply resulting from 25 dwellings per hectare also does not meet the additional demand from rural areas by 2041, a higher net density may be necessary. This could also be achieved through a diverse range of house types rather than a uniform density requirement for separate houses on individual lots. This can be modelled by combining some of the scenarios described in this part of the report.

6.5.2.3 Dual occupancy infill

This scenario analyses lots in Bendigo which are between 700 and 1,000 square metres. The minimum size for dual occupancy development is based on the subdivision data in the council's *Planning Register of Applications Received* (COGB 2014a). The relevant lots are distributed throughout the parts of Bendigo's urban area zoned Residential 1. Some lots are excluded: those which are within 400 metres of an activity centre (Activity centre scenario), those rated green by COGB (Residential infill) and any lot of this size that are within the CBD boundary (Central Bendigo redevelopment scenario). Figure 85 shows the distribution of the eligible lots, which is quite different to the previous scenario's.

Figure 85 Bendigo: dual occupancy land supply

Source: Victorian Government 2013

200
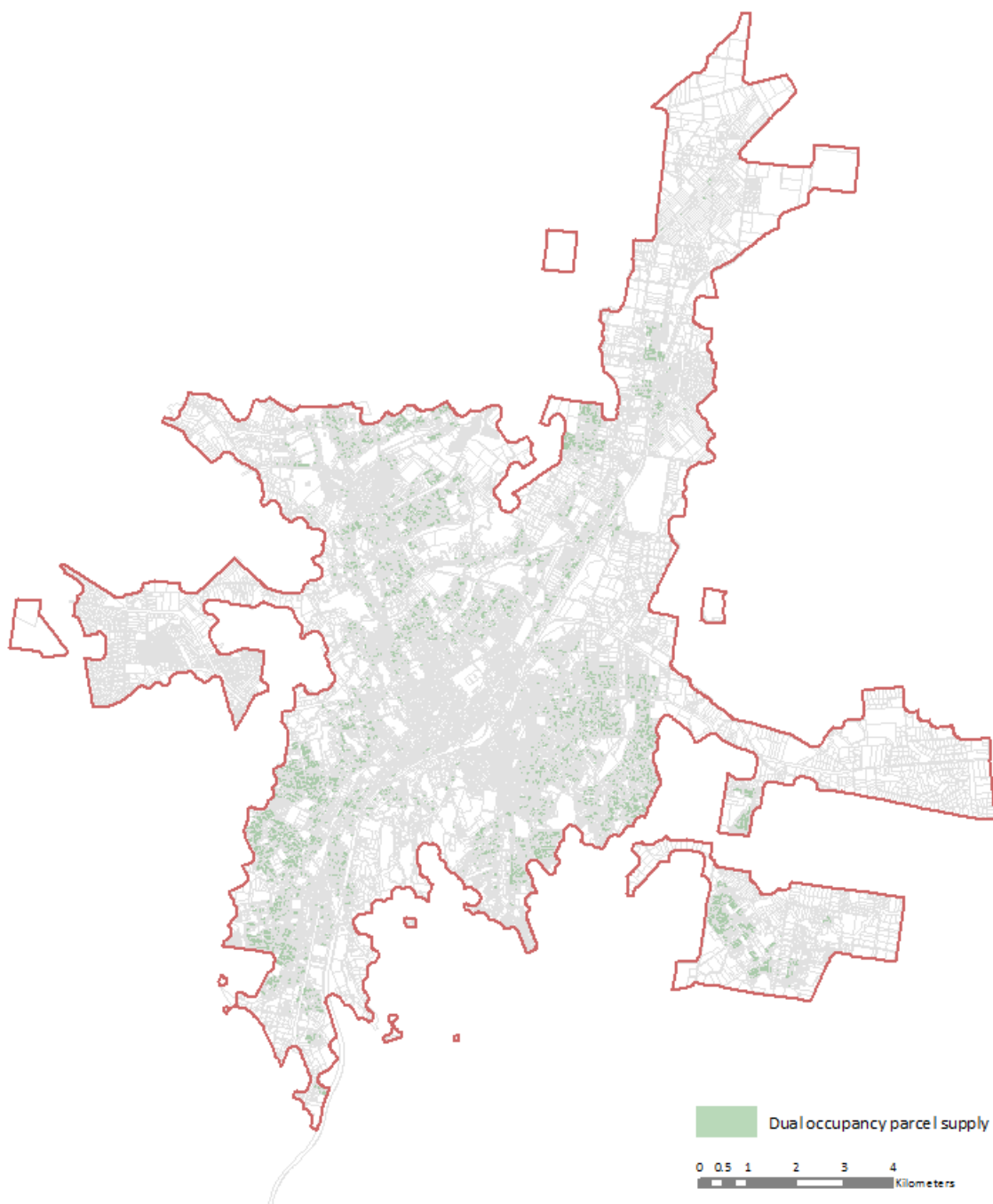
The elimination process results in around 6,800 eligible lots of which 220 are vacant. Those vacant lots could accommodate two new dwellings while the remainder could have one additional home. This then produces almost 7,000 extra dwellings on 555 hectares of land supply.

If dual occupancy dwellings were only built as detached homes, this scenario could satisfy all of Bendigo's demand for 6,275 detached houses to 2021. This again would remove the need to rezone land until closer to that year.

More realistically, dual occupancy could contribute to meeting demand for detached dwellings with broadhectare development. This scenario's yield of 6,275 and the higher density greenfield development's 19,250 (or 15,400 using the *Regional Housing Futures'* density of 20 dwellings per hectare) will be more than adequate to meet the *Regional Housing Futures* model's demand for separate houses to 2041 (Groenhart et al 2013).

However the land supply in this scenario is defined as one extra dwelling per lot, or two per vacant lot. The *Regional Housing Futures* projections for dwelling demand are not suitable for comparison with the Dual occupancy scenario's yield (supply) as they do not have an equivalent land supply (Groenhart et al 2013).

This scenario's lot configuration constraint is better analysed using Birrell et al's (2012) calculations of overall proportions of recent infill and broadhectare development in Melbourne as 30 and 50 per cent respectively. Defining infill as all dual occupancy, these proportions could supply the dwellings as shown in Table 62.

Table 62 *Regional Housing Futures* projected demand for detached dwellings in Bendigo compared to supply

	2016	2021	2026	2031	2036	2041	Total to 2041
DEMAND for separate houses	3,027	3,249	3,208	3,121	3,533	3,533	*19,672*
30 per cent as *dual occupancy*	908	975	963	936	1,060	1,060	*5,902*
50 per cent as *broadhectare*	1,513	1,624	1,604	1,561	1,767	1,767	*9,836*
Remaining 20 per cent	605	650	642	624	707	707	*3,935*
TOTAL SUPPLY	*3,026*	*3,249*	*3,209*	*3,121*	*3,534*	*3,534*	*19,673*

Given this Dual occupancy infill scenario's calculated supply of 6,976 dwellings, this scenario could meet the demand for 30 per cent of all detached houses to 2041. The 50 per cent assumption for broadhectare demand is almost satisfied by the business as usual supply of 9,240 dwellings to 2041. The remaining 20 per cent or 4,000 detached dwellings would need to be built in other locations to meet overall demand.

The lots sized between 700 and 1,000 square metres used in this scenario produce a residential density on its lots of approximately 13 dwellings per hectare. This is only marginally higher than the Business as usual broadhectare density. If the council decides

that development needs to be at densities greater than 12 or 13 dwellings per hectare, they could encourage dual occupancy on lots under 700 square metres. The maximum lot size should also be reduced if this alternative approach is taken so that more than two dwellings could be accommodated on 1,000 square metres. Currently the planning scheme has lot design and access requirements for two lot subdivision sites under 300 square metres, between 300 and 500 square metres and over 500 square metres (DTPLI 2014c: Bendigo Planning Scheme Clause 32.01 R1 Zone; Clause 56 / Rescode). It does not make any reference to density on such lots.

As in the Business as usual broadhectare scenario, this scenario assumes that dwellings will be separate houses and this produces the relatively low density and numerical supply. A yield based only on separate houses also results in this scenario being unable to contribute to meeting the transferred and unmet rural demand (see Table 60 Dwelling demand in Bendigo in section 6.5.2.8 Summary of Bendigo's residential development scenarios above). Using Birrell et al's (2012) proportions again, these additional rural demand amounts could be added to the remaining 20 per cent identified above which would need to be accommodated using methods other than dual occupancy. Alternatively higher density requirements as discussed above would also help encourage or require land owners to build additional urban dwellings. This could be a good opportunity to meet the 2041 demand for 500 townhouses.

The next scenario focuses specifically on residential development at townhouse-type densities in well-serviced locations.

6.5.2.4 Activity centre infill

This scenario focuses on achieving higher density development on lots zoned for residential and mixed use within 400 metres of lots zoned for business. These residential lots are located close to services and amenities that are typically within business zones. Having more people living closer to services is a common planning goal, based on the idea that this is a more efficient use of resources (whether public or private).

Figure 86 shows the 400 metre buffers and the lots included in the analysis. Lots vary in their distribution, with some adjacent to business zoned lots while others are in clear residential zones towards the edge of the buffer.

Figure 86 Bendigo: activity centre land supply

400 metre buffer from business zones

Activity centre parcel supply

0 0.5 1   2   3   4
Kilometers
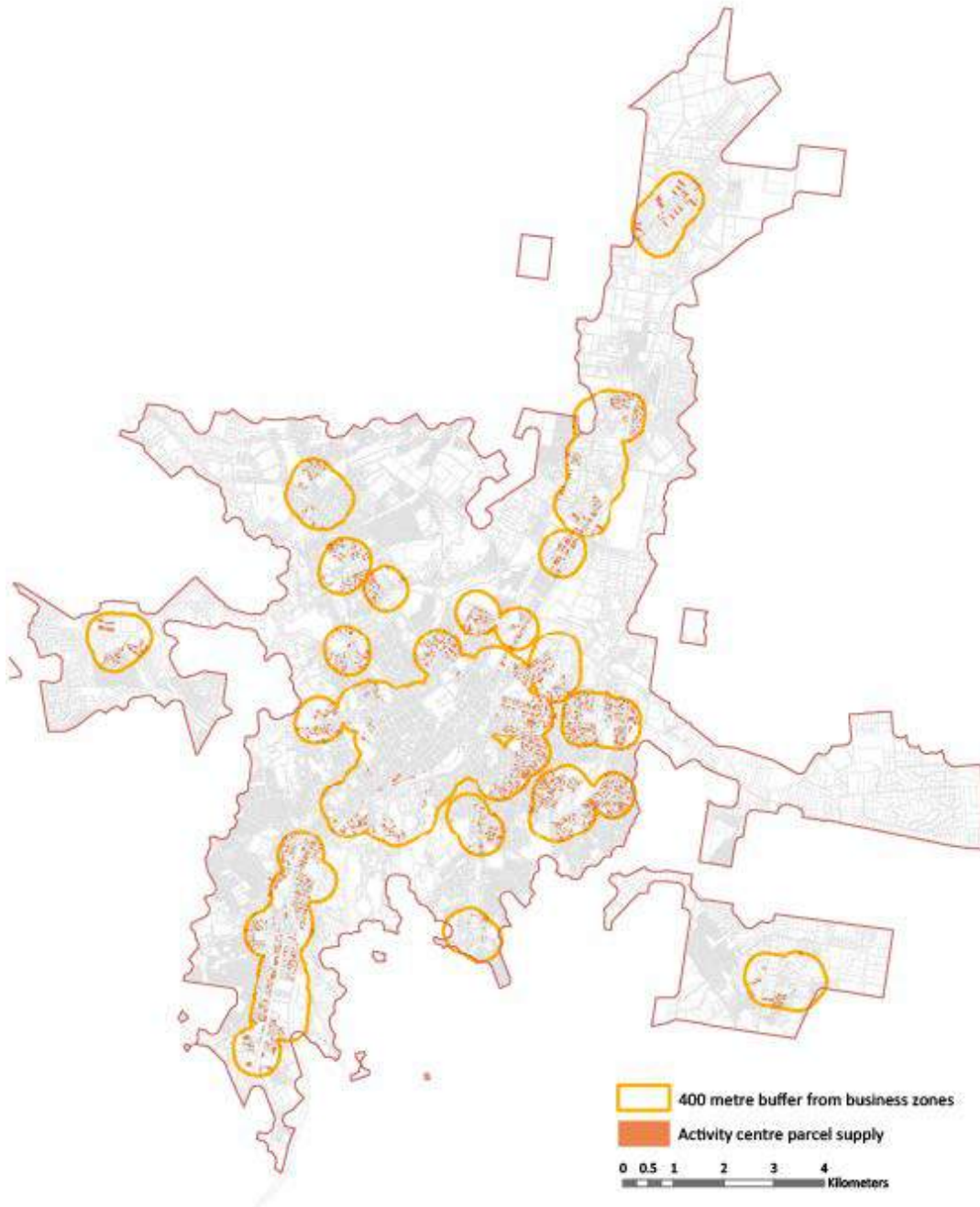
Source: Victorian Government 2013

This scenario has approximately 4,000 eligible lots for analysis. This is a land supply of 322 hectares within the activity centres. Assuming a density of 35 dwellings per hectare, 11,270 dwellings could be accommodated in those parts of Bendigo.

As the density assumption is the same as for townhouses in the *Regional Housing Futures* model, direct comparison with its scenarios is possible (Groenhart et al 2013). Table 63 shows the calculated demand for new townhouses and separate homes. This scenario more than adequately meets the projected demand for townhouses in Bendigo: demand to 2041 is only 500 while supply could be over 11,000 dwellings only within these defined activity centres.

Table 63 *Regional Housing Futures* projected demand

|	2016	2021	2026	2031	2036	2041	Total to 2041
Townhouse	83	86	83	81	88	88	*509*
Separate houses	3,027	3,249	3,208	3,121	3,533	3,533	*19,672*

Source: Groenhart et al 2013

Bendigo has the potential to accommodate increases in medium density development in well serviced locations that would more than adequately meet likely demand for townhouses. Given that these areas have the potential to supply so many more dwellings than projected demand, prioritising these places for this type of development may assist in shifting demand from detached dwellings to townhouses, consistent with the theory of supply-led demand. If demand for medium density development increased, these activity centre locations would be sensible places to focus this type of housing.

This approach could also help in accommodating the demand transferred from rural areas (2,456 dwellings in Rural preservation scenario and 872 in Tenement control scenario. See Table 60). This demand is most likely to be for separate houses so the previous analysis of the ability of Bendigo's broadhectare supply to meet unmet or transferred rural demand applies in this case as well (see Figure 84 Demand for and supply of separate dwellings in Bendigo in relation to rural scenarios). However if that demand could be shifted to another dwelling type, such as townhouses, the additional rural demand could be easily met in activity centres. With an overall supply of 11,270 homes at 35 dwellings per hectare to meet a projected demand of 509, activity centres could accommodate these households transferred from rural areas in townhouses.

Further analysis of each of Bendigo's activity centres is needed as the example of Strathdale demonstrates in Figure 87. This area of business zones (dark red on the following image) and its 400 metre buffer (red ring) is about 3 kilometres east of Bendigo's Town Hall. The business zones are sited on both sides of McIvor Highway which makes them easily accessible to surrounding residential areas (pale yellow with this scenario's lots highlighted in blue). Comparing the cadastre with Google maps reveals one of the weaknesses of this scenario's definition of the 400 metre buffer from business zones. Very few of the buildings in this example's Business Zones contain local retail or services but rather reflect the proximity to the growing Strathfieldsaye area: project home builders are tenants in one of the southern lots. The large lot to the northwest is Bendigo Quality Resort.

Figure 87 Strathdale activity centre
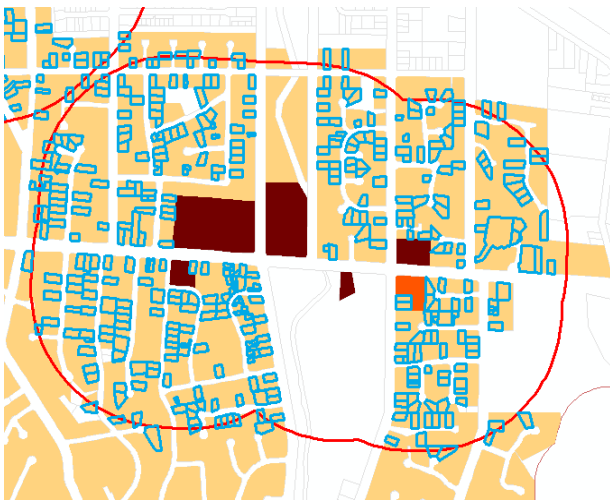
Strathdale: cadastre (source: Vicmap)
Source: Victorian Government 2013

Strathdale aerial image
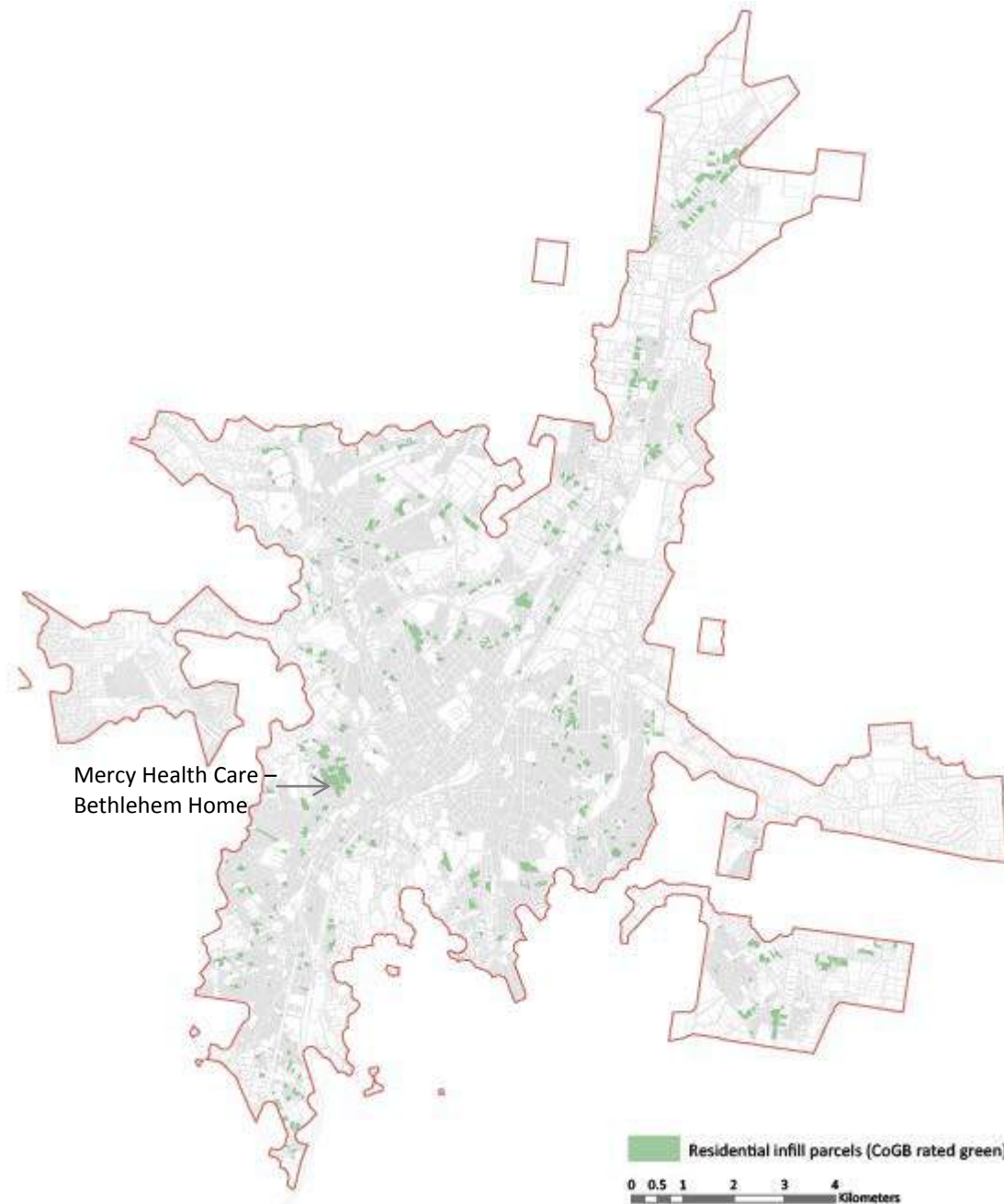**Source:** Google maps, accessed 9 September 2013

Another Business Zone refinement for this scenario could be to assume some residential development occurs within those zones. Residential use is allowed in the new commercial zones. Including a small proportion of the lots in those zones would further increase this scenario's potential yield. A policy aimed at increasing residential uses in traditional retail centres benefits commercial uses and retailing from the proximity and increased intensity of residential accommodation. Commercial 1 Zone (previously B1, 2, and 5 zones) includes the option to identify specific centres where new forms of housing can be encouraged (DTPLI 2013a). Housing development will continue to require planning permission in those locations.

The next scenario also looks at infill development opportunities on sites that the City of Greater Bendigo has already identified as well suited for housing.

6.5.2.5 Residential infill

This scenario evaluates the potential yield of infill lots identified by the City of Greater Bendigo as appropriate for future residential development. Given the COGB's assumption of one hectare as the minimum lot size for inclusion, this scenario includes the larger sites currently zoned for residential use. Just over 1,000 lots are analysed in this scenario. Their average size is around 3,000 square metres, and the largest is eight hectares. Figure 88 shows the location of the relevant lots.

Figure 88 Bendigo: residential infill land supply

Mercy Health Care –
Bethlehem Home

Residential infill parcels (CoGB rated green)

0 0.5 1   2   3   4
                                 Kilometers

Source: Victorian Government 2013

The Mercy Health Care – Bethlehem Home for the Aged currently occupies this largest site. As Mercy Health has recently upgraded their facility and given the increasing number and proportion of elderly people in regional Victoria, demand is likely to remain high for this current use (Mercy Health 2013). Mercy Health's future redevelopment plans could possibly include applying the density modelled in this scenario.

The lots in this scenario total to 344 hectares and at a redevelopment density of 35 dwellings per hectare, this land supply could ultimately accommodate approximately 12,000 homes.

As this density assumption of 35 dwellings per hectare is consistent with the *Regional Housing Futures'* townhouse density, and this scenario provides a total land supply

unconstrained by lot configuration, a comparison of results is possible (Groenhart et al 2013). Demand for townhouses and separate houses and the proportions for dwelling types in the three scenarios remain as previously defined (see Table 54 Bendigo – total demand by dwelling type for all SLAs).

Figure 89 illustrates the yield for each scenario and dwelling type. Only the Business as usual scenario will not produce an overall total number of dwellings to satisfy projected demand when using these Residential infill and the previously calculated Broadhectare scenario sites. The infill sites easily meet the demand for 500 townhouses but do not have enough land supply to meet the demand for separate dwellings. Only the Fringe density scenario has sufficient yield to meet demand for separate houses (the total of BAU detached and Compact detached)

Figure 89 Bendigo: *Regional Housing Futures* and Residential infill scenarios
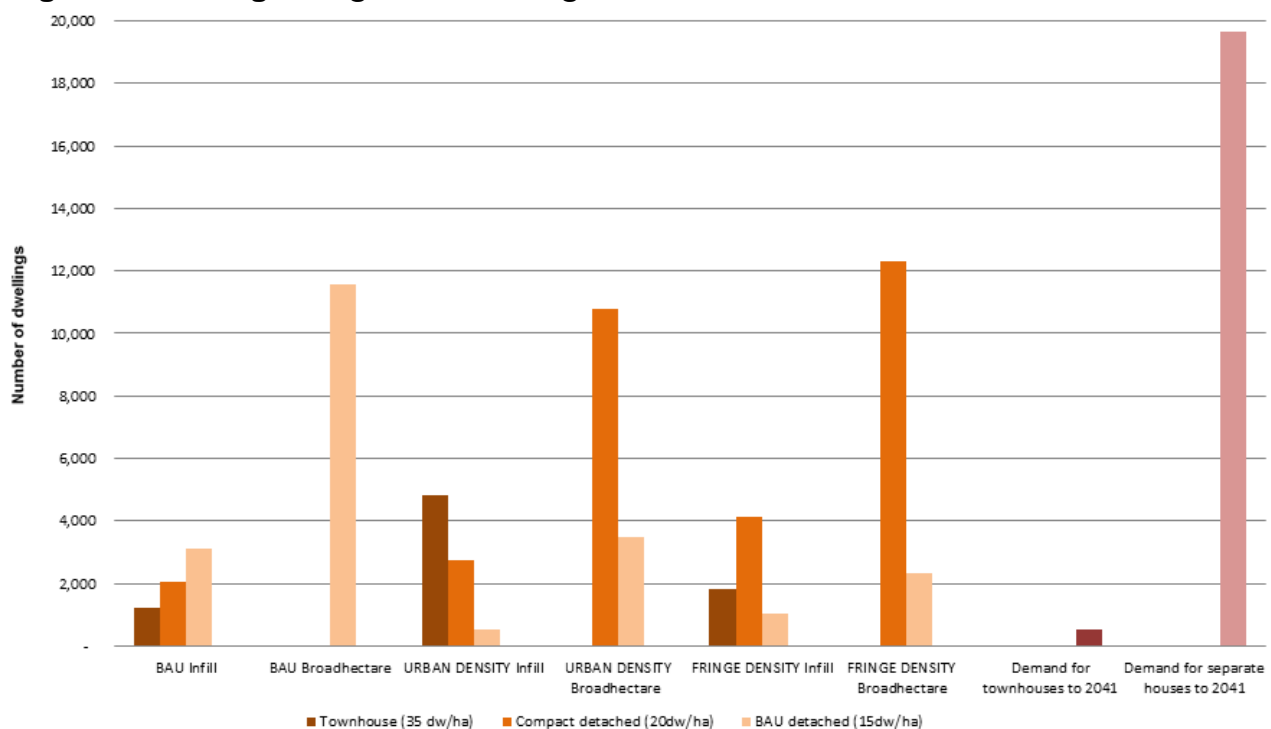
This scenario demonstrates the large yield possible for medium density dwellings but requires more separate houses built at higher densities to meet the *Regional Housing Futures'* projected demand (Groenhart et al 2013). This suggests that the land supply for this scenario could also be combined with the options explored in the other Bendigo scenarios. Individual sites need further analysis which would assist in determining possible timing of redevelopment (possibly as an update to the data collected under the *Urban Development Program* (DPCD 2011)).

This combined approach would also be necessary to accommodate the additional demand which cannot be met in the rural parts of Bendigo's SLAs. As in the previous Bendigo scenarios, if that rural demand is for separate houses by 2041, the Bendigo broadhectare supply at either 12 or 25 dwellings per hectare will be insufficient to meet this demand from the rural areas. Encouraging or requiring higher densities and a mix of housing types may help ensure that enough homes are built for households who otherwise would have lived outside Bendigo's urban area.

The next scenario also uses the City of Greater Bendigo's identified lots for residential development but on lots which are currently zoned for non-residential uses.
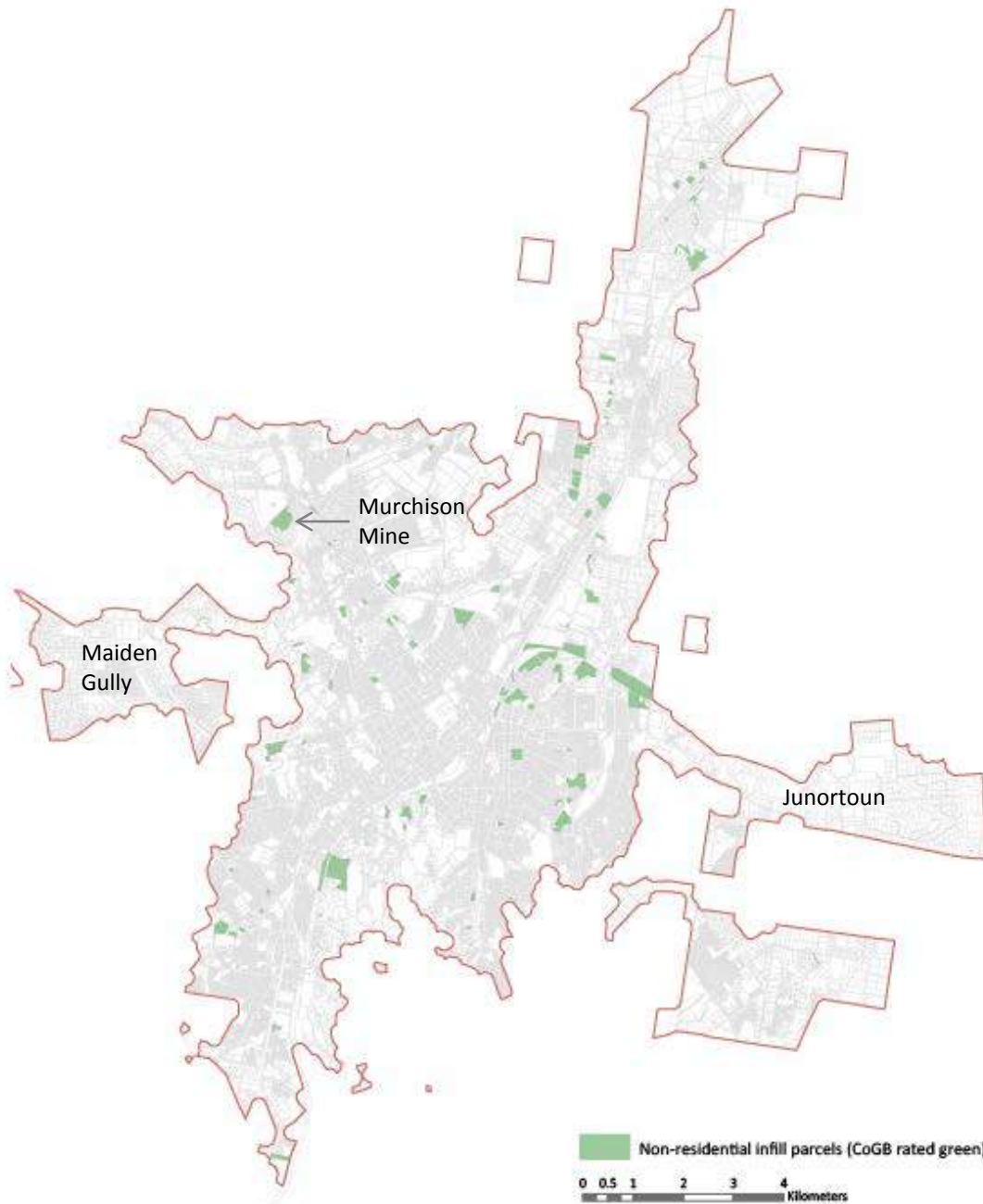
6.5.2.6 Other infill redevelopment

Where the previous scenarios have used land zoned for residential uses, this scenario evaluates potential dwelling yield on non-residential sites identified by the COGB as having development potential. As with the Residential infill scenario, sites are all over one hectare and are distributed throughout the city, except in the suburb of Junortoun to the east and Maiden Gully to the west (see Figure 90). This reflects Bendigo's historical urban development pattern, with the city expanding out to meet these two low density residential areas which do not have large lots zoned for non-residential uses.

The largest site included in this scenario and identified for inclusion by COGB is the Murchison Mine in Eaglehawk (see Figure 90 for location). A 2007 report on Bendigo's former mine land noted that the site has potential for residential use even though it has some constraints such as 44 mine shafts and a water and a sewer pipeline (SKM 2007). The whole site is 21 hectares although the COGB database only includes 11 hectares. This may reflect the previous difficulty experienced with subdividing the whole site for residential development in 1990 when the Department of Sustainability and Environment declared it surplus to its needs. Contamination and mine tailings made subdivision too difficult (SKM 2007).

This site highlights the complexity of redeveloping former industrial land. However this project proposes that re-using these types of sites is a better approach than re-zoning farm land for residential development. If overall land supply is constrained, such as through zoning, sites such as those in this scenario should eventually have sufficient market value to make remediation and redevelopment financially viable. This outcome relies on other factors such as the proximity to infrastructure, services and amenities. The council has an opportunity to indicate to the property development industry as to whether it is committed to this type of approach through its zoning decisions and infrastructure spending.

This scenario calculates that the COGB has rated 209 lots of non-residential land as appropriate for redevelopment. The sites are indicated in Figure 90.

Figure 90 Bendigo: non-residential infill land supply

Murchison Mine

Maiden Gully

Junortoun

Non-residential infill parcels (CoGB rated green)

0 0.5 1   2   3   4
   Kilometers

Source: Victorian Government 2013

These sites have a total area of 275 hectares. Using the 35 dwellings per hectare assumption, they could potentially yield 9,625 homes. As with the Residential infill scenario, this density assumption is consistent with the *Regional Housing Futures'* townhouse density (Groenhart et al 2013). This scenario also has a total land supply unconstrained by lot configuration. This allows comparison of results with the *Regional Housing Futures'* work (Groenhart et al 2013).

Figure 91 illustrates the yields for each of the *Regional Housing Futures* scenarios' mix of housing types and densities using the non-residential and broadhectare lots available in this and the Business as usual broadhectare development scenarios (Groenhart et al 2013).

Figure 91 Bendigo: *Regional Housing Futures* and Non-residential infill scenarios
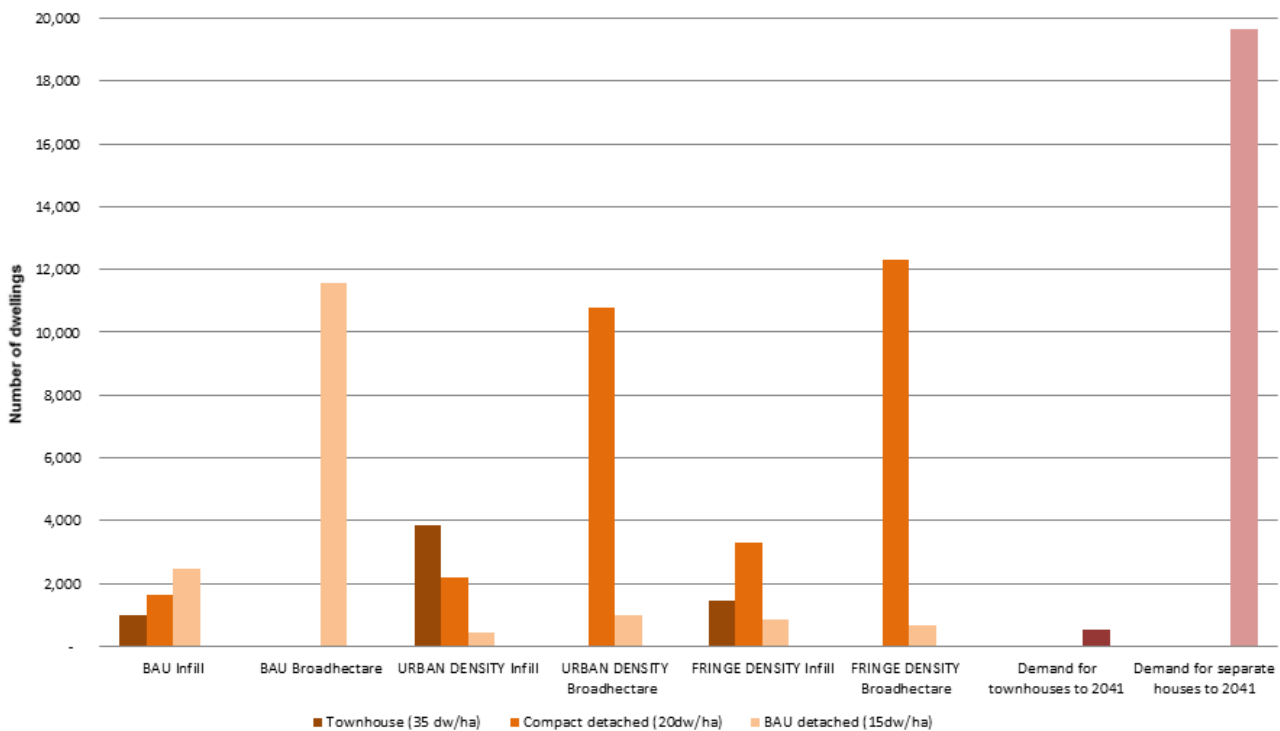
The non-residential and previously calculated Business as usual broadhectare land supply are not sufficient for Bendigo's projected dwelling demand, and particularly for separate houses. This scenario's infill sites could accommodate at least twice as many townhouses for which demand is likely to exist but they do not have space for separate houses. Again required densities for those homes could be higher or land supplies in the other scenarios could accommodate more separate houses. This would also help to meet the demand for separate houses as a result of the rural scenarios which are either unable to be met in the rural landscape due to a lack of land supply or through the transfer of rural demand in the Rural preservation and Tenement control scenarios. Alternatively, that demand could be met through higher density dwellings such as by the large oversupply in this scenario to meet the projected demand for 500 townhouses.

The next scenario shifts to from this medium density approach to the highest density model of apartment development within Bendigo's central business district.

6.5.2.7 Central Bendigo redevelopment

Central Bendigo is different in character to the rest of the city. It contains exemplary examples of Victorian architecture, a strong retail core and a number of public institutions. It does not contain many dwellings, except for serviced apartments. This scenario explores the possibility of adding a large number of new residences through redeveloping specific sites. Any site or building with a heritage overlay is excluded as one approach to protecting Bendigo's heritage buildings. Identifying other redevelopment opportunities may also assist in removing pressure for demolition or radical alterations to that valued heritage building stock.

This scenario examines individual sites rather than taking the gross land supply approach of the previous scenarios. Figure 92 shows the eligible lots after the assumptions are applied (two CBD overlays, minimum size of 150 square metres, etc.). It also indicates the number of storeys to which they could be developed under the *CBD Strategy* (2005).

Figure 92 CBD sites available for residential redevelopment
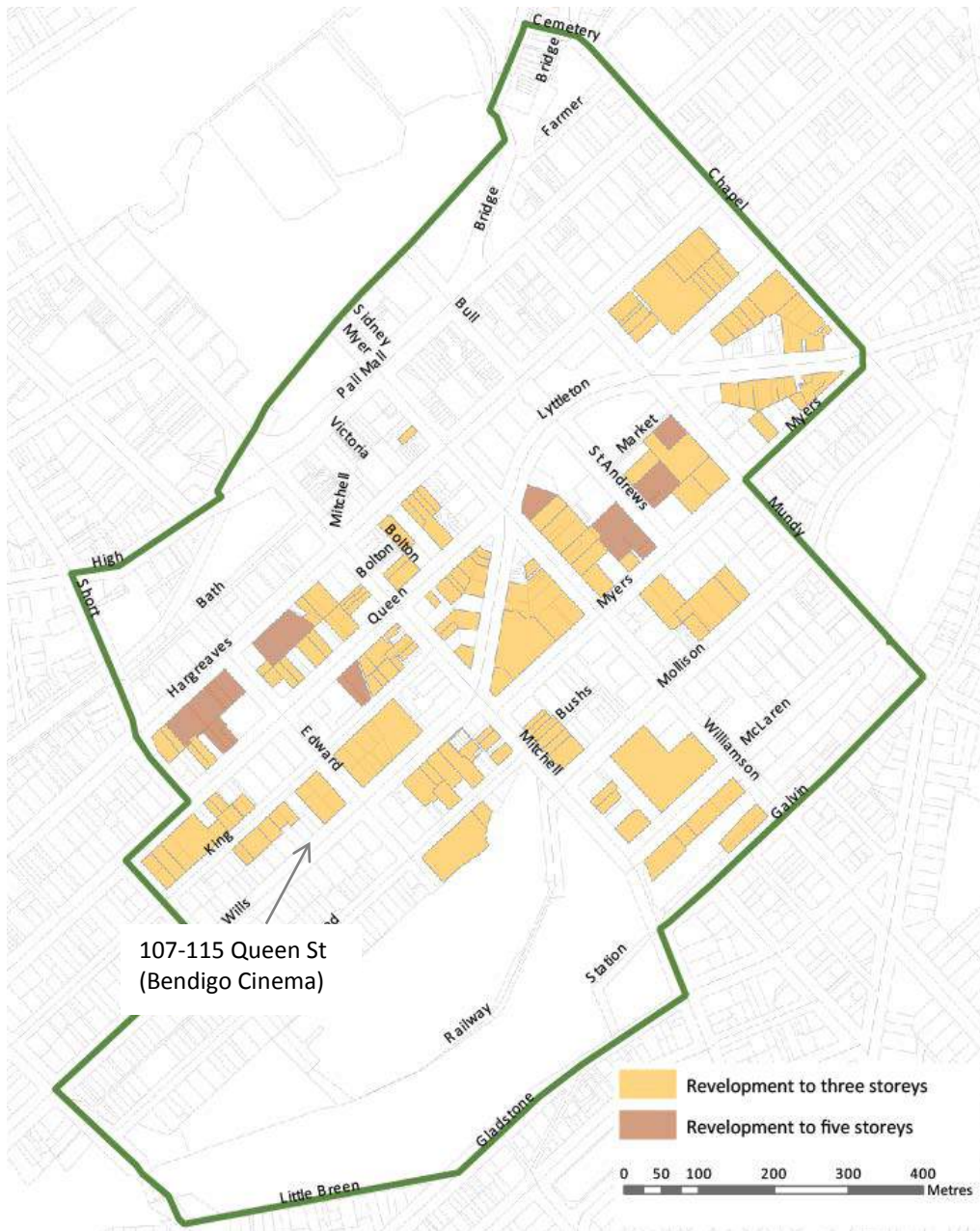
Source: Victorian Government 2013; Planisphere et al 2005

This approach produces about 2,000 dwellings on 140 lots which total approximately 14 hectares of land. This results in an average net density of 140 dwellings across the selected sites. The *Regional Housing Futures* work defines an average net density of 70 dwellings per hectare for apartments. This scenario has twice this density but also produces almost twice the number of flats as the *Regional Housing Futures* projects for Bendigo to 2041 (see Table 64 below). This suggests that projected demand could be satisfied at lower densities than assumed in this scenario if all identified sites are redeveloped.

Table 64 Regional Housing Futures projected demand for flats in Bendigo

	2016	2021	2026	2031	2036	2041	Total to 2041
Flat, unit or apartment	165	174	170	165	182	182	*1,037*

Source: Groenhart et al 2013

This scenario's dwelling yield is also influenced by the size of individual lots and the number of apartments per floor. Table 65 shows some the characteristics and results for a range of sites. Alternative configurations could produce different results: larger apartment sizes will reduce the overall yield as will introducing, for example, two floors of office space with residential above.

Figure 94 illustrates an example of how the Bendigo cinema site could be redeveloped using a three storey mixed use development's floor plan and street elevation.

Table 65 CBD sites and possible redevelopment characteristics

Address	Area sqm	Storeys	Future use	Total dwells	Notes about building	Dwells per ha
108 KING STREET	188.2	3	Retail ground, residential above	3	1.5 apartments per floor	159
57 MYERS STREET	338.7	3	Office ground, residential above	4	2 apartments per floor	118
23 HOPETOUN STREET	458.8	3	Office ground, residential above	6	3 apartments per floor	131
23 WILLS STREET	1,310.1	3	Retail ground, residential above	17	8.5 apartments per floor	130
162-164 LYTTLETON TERRACE	2,953.3	3	Retail ground, residential above	38	19 apartments per floor	129

Figure 93 illustrates an example of how the Bendigo cinema site could be redeveloped using a three storey mixed use development's floor plan and street elevation.

Figure 93 Example of redevelopment
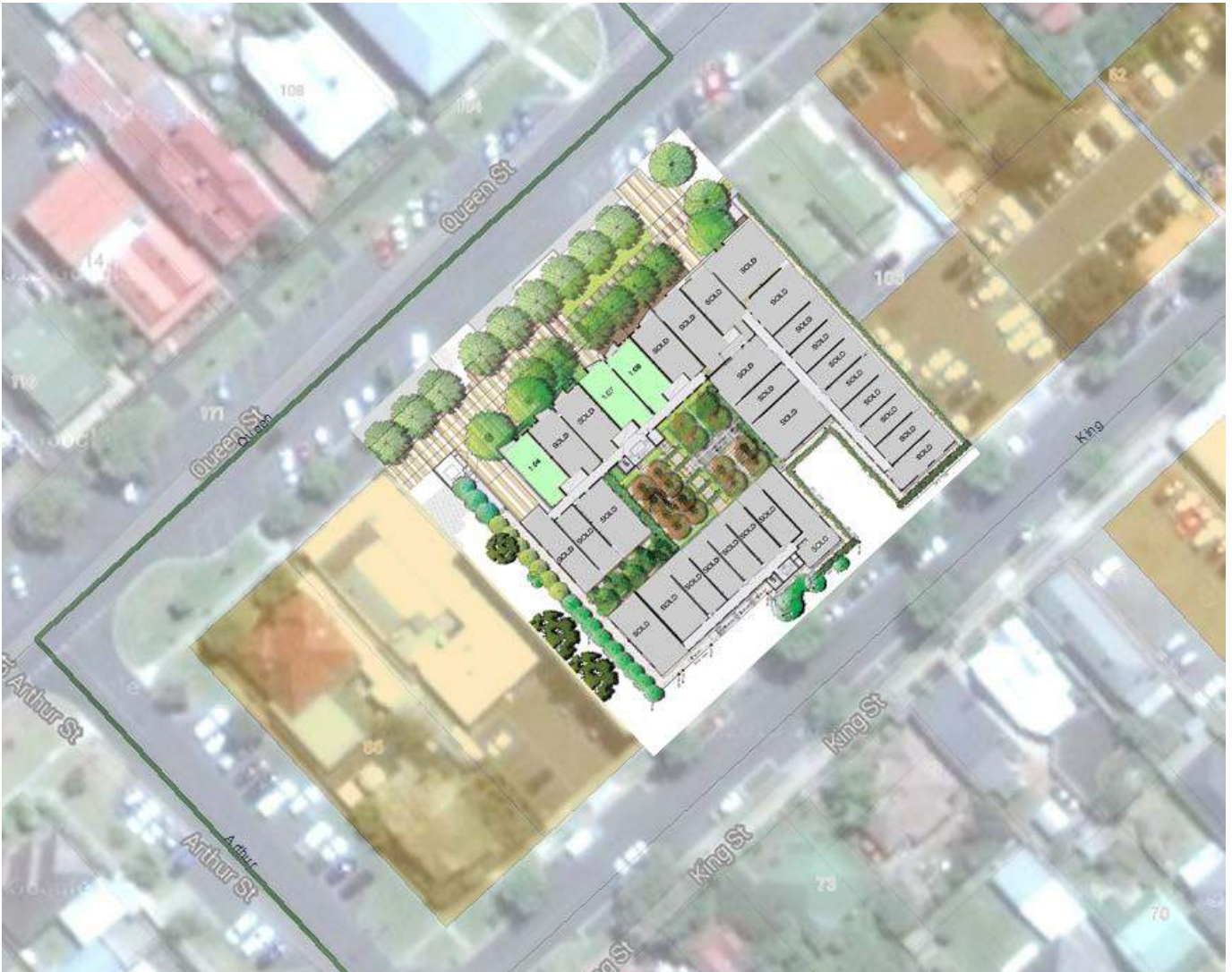
Source: Victorian Government 2013; Google Maps and gardenresidences.com.au, accessed 1 August, 2013

Existing streetscape
Source: Google Streetview, accessed 1 August, 2013

Three storey mixed use redevelopment
Source: Google Streetview, gardenresidences.com.au, accessed 1 August, 2013

Given the *Regional Housing Futures* analysis of past propensities for different dwelling types, the demand in rural areas that is not met or that is transferred to urban areas may be unlikely to be satisfied by the apartments produced in this scenario (Groenhart et al 2013). However given demographic changes, strong population growth and rising house

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prices, some households may choose to shift their preferences to these higher density dwellings. This shift may also occur among households from within Bendigo, which may open up opportunities in broadhectare areas or in separate houses across Bendigo for households who would have otherwise settled in rural areas.

The following section summarises all the Bendigo scenarios and suggests how a combination approach might be taken to meeting demand for new dwellings without rezoning land on the city's fringes.

6.5.2.8 Summary of Bendigo's residential development scenarios

Figure 94 illustrates Bendigo's land supply for each scenario. These are then divided into the number of lots and the total dwelling yield from those sites as shown on Figure 95. These yields are determined by density assumptions which are in Figure 96. Figure 97 combines data for scenarios then Table 66, Table 67and Table 68 provide detailed summaries of each of the Bendigo scenarios.

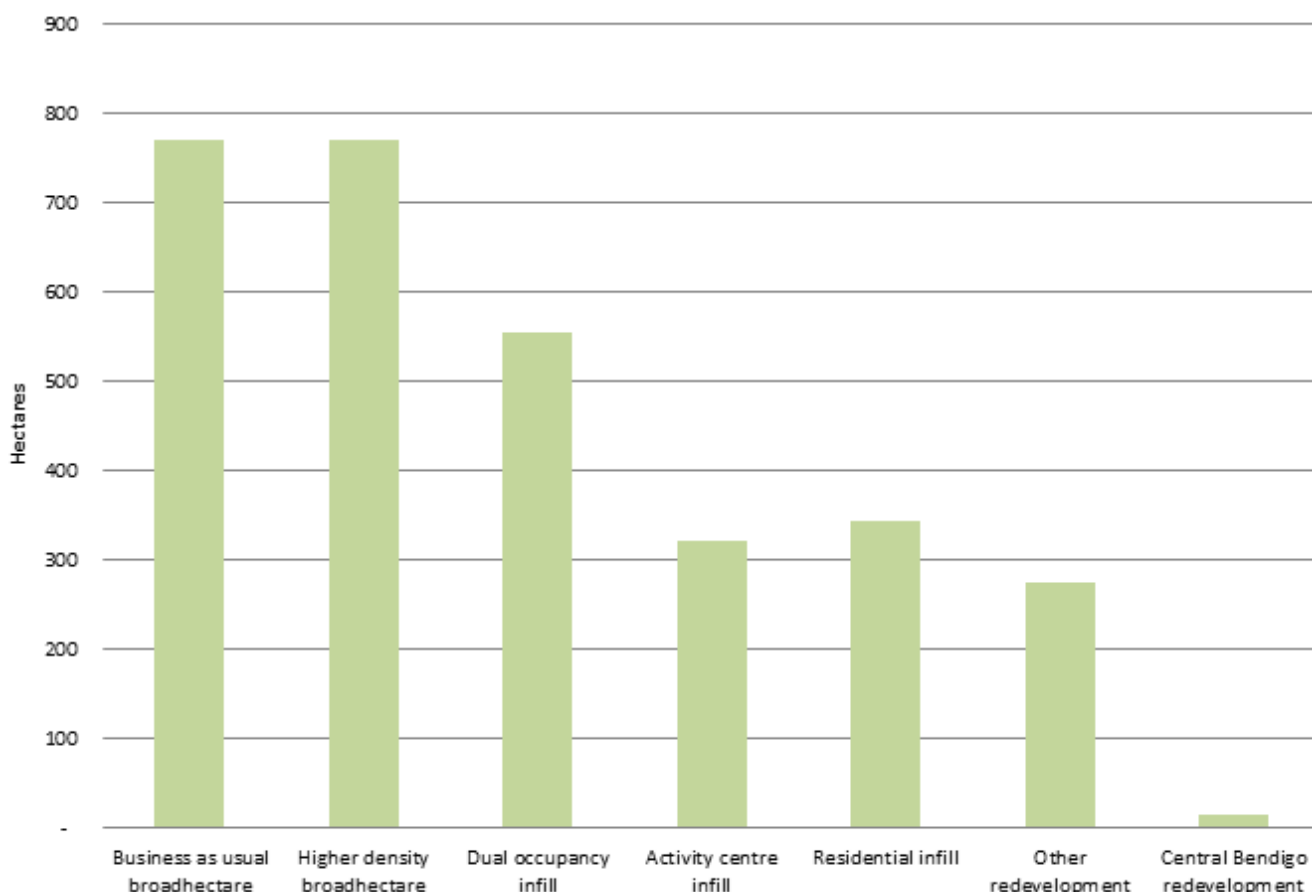**Figure 94 Bendigo: land supply for each scenario**

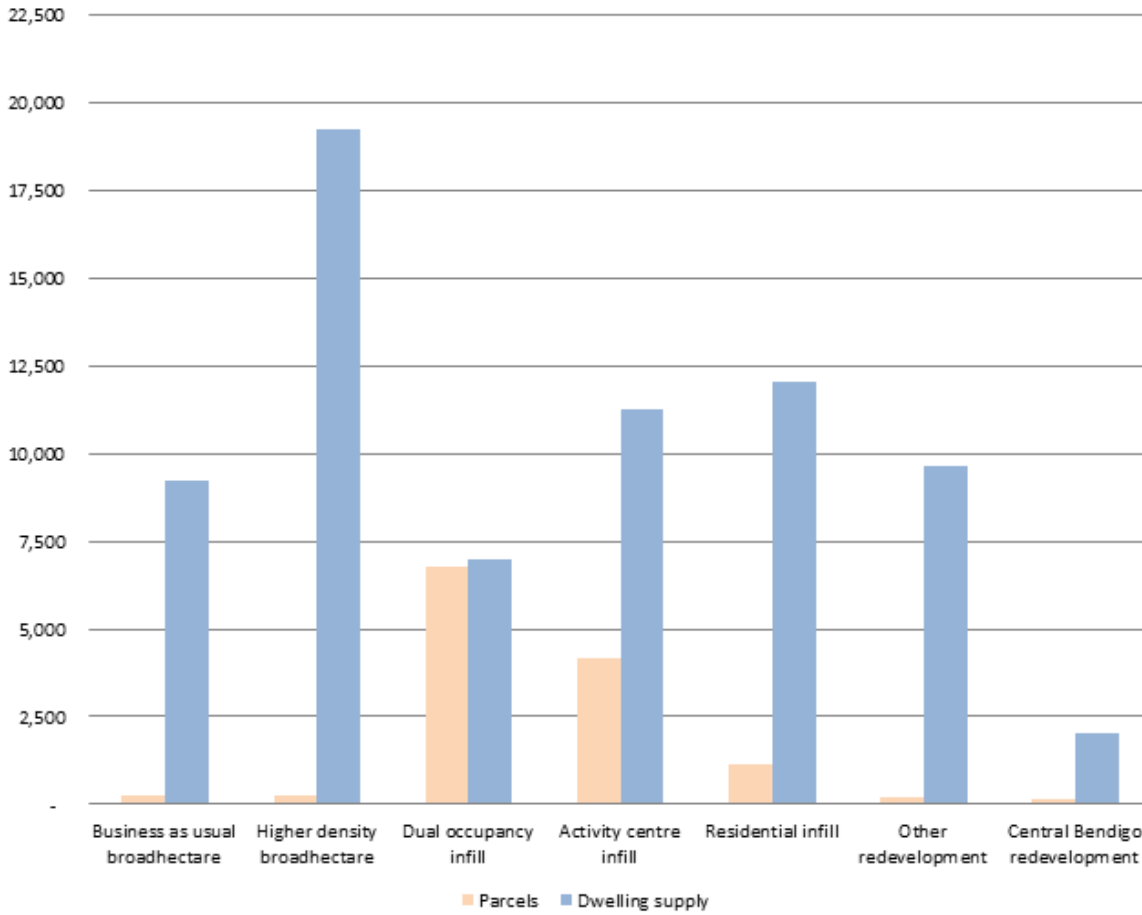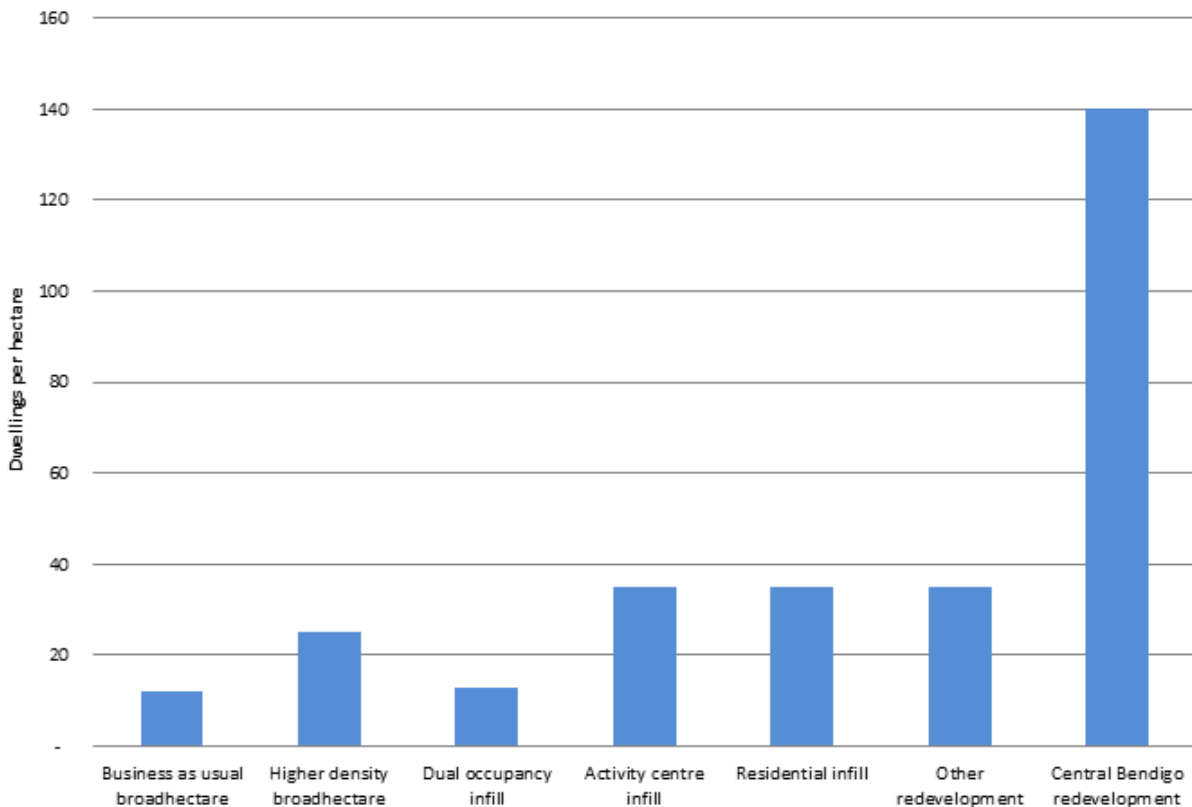**Figure 95 Bendigo: lot and dwelling yield in each scenario**

Figure 96 Bendigo: densities in each scenario

Increasing densities has a clear and dramatic impact on the number of new dwellings which could be built on Bendigo's existing land supply as Figure 94 demonstrates. This is particularly evident in the greenfield scenarios when the 25 dwellings per hectare assumption is applied to the 770 hectares of land supply as compared to the Business as usual 12 dwellings per hectare. Opportunistic infill development could also provide many additional new dwellings.

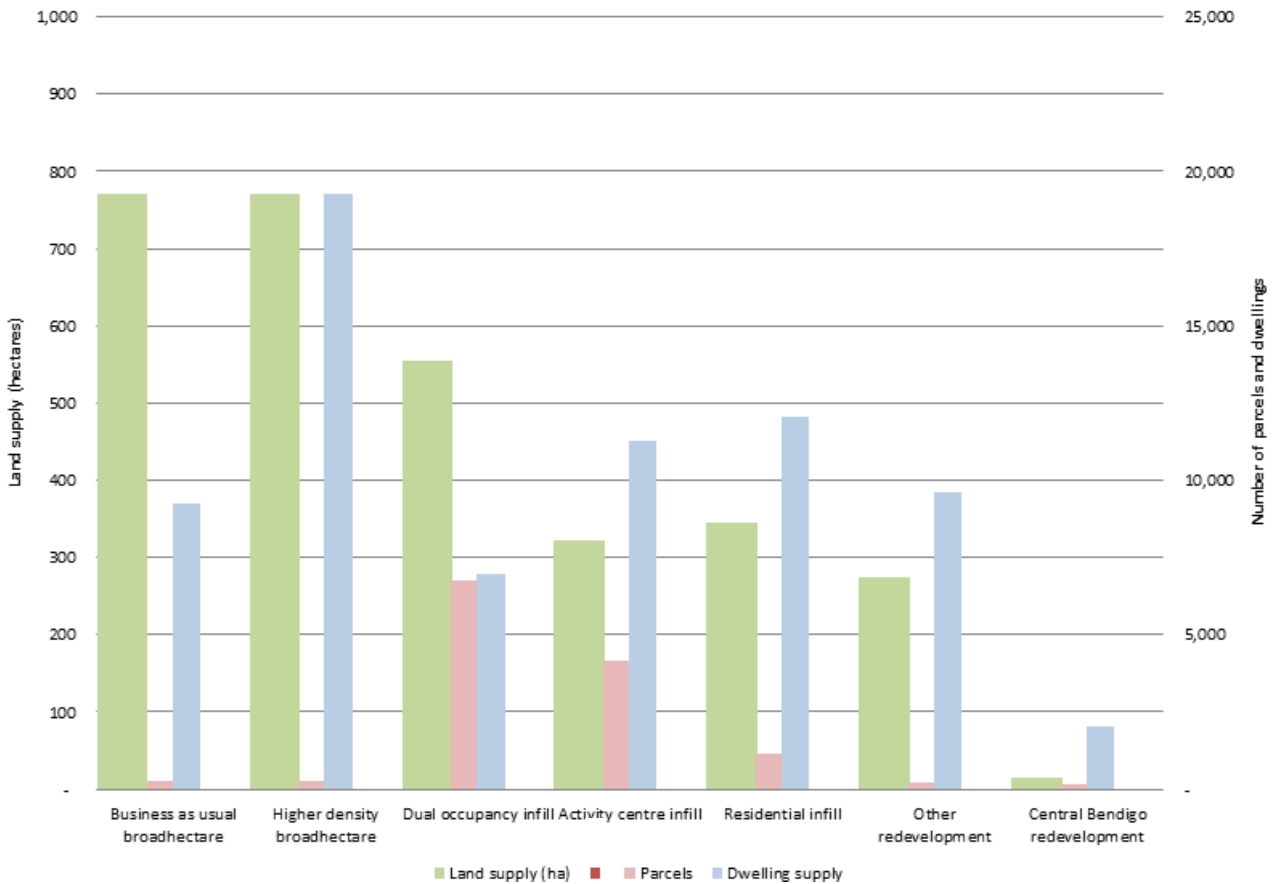**Figure 97 Bendigo scenarios: land supply, lot and dwelling yield**

Table 66 Summary of Bendigo scenarios: assumptions

SCENARIO	BUSINESS AS USUAL GREENFIELD	FUTURE GREENFIELD DEVELOPMENT	DUAL OCCUPANCY INFILL	ACTIVITY CENTRE INFILL	RESIDENTIAL INFILL	OTHER REDEVELOPMENT	CBD REDEVELOPMENT
	Development at current trend densities	*Maximum yield of lots over one hectare*	*Two lot development on existing occupied and vacant residential lots*	*Development occurs on sites within 400m radius of BZs*	*Development occurs on R1Z sites identified as green by COGB*	*Residential development occurs on infill sites outside CBD zoned Business and Industrial and identified as green by COGB*	*Development on sites determined as appropriate, to heights defined by CBD Strategy*
ASSUMPTIONS							
Location of lots	Beyond 3km buffer from Town Hall	Beyond 3km buffer from Town Hall	Outside *CBD Strategy* boundary	Within 400m radius of BZs, outside CBD	Outside *CBD Strategy* boundary	Outside *CBD Strategy* boundary	Within *CBD Strategy* boundary
Minimum lot size	One hectare*	One hectare*	Between 700 and 1,000sqm	150sqm	1,000sqm	1,000sqm	150sqm
Zoning	- R1Z - LDRZ	- R1Z - LDRZ	R1Z	- R1Z - MUZ	R1Z	- BZ1, 2, 3, 4, 5 - INZ1, 3	- BUZs - MUZ - R1
Overlays **	- DDO7, 10 - DPO3, 4, 15, 21, 23, 25, 26	- DDO7, 10 - DPO3, 4, 15, 21, 23, 25, 26	- DPO2, 10	- DDO10 - DPO2, 10, 14, 23	Nil	Nil	- DPO20 - DDO5
Average density assumptions	Average BAU trend: approx. 12 dwellings per hectare (from 2010-2013 COGB Planning Register)	25 dwellings per hectare (400sqm per lot)	Calculated based on yields – see results below	35 dwellings per hectare	35 dwellings per hectare	35 dwellings per hectare	Calculated based on yields – see results below

* One hectare as broadhectare definition consistent with UDP
**Exclude lots that have EAO, ESO, HO,LSIO, NCO, SMO, VPO, WMO

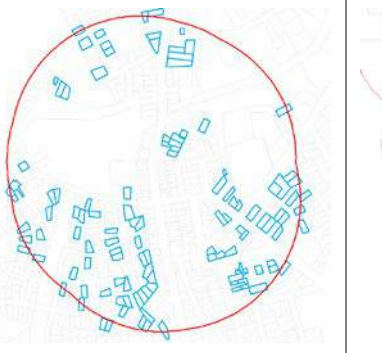**Table 67 Summary of Bendigo scenarios: land and dwelling supply**

SCENARIO	BUSINESS AS USUAL GREENFIELD	FUTURE GREENFIELD DEVELOPMENT	DUAL OCCUPANCY INFILL	ACTIVITY CENTRE INFILL	RESIDENTIAL INFILL	OTHER REDEVELOPMENT	CBD REDEVELOPMENT
	Development at current trend densities	*Maximum yield of lots over one hectare*	*Two lot development on existing occupied and vacant residential lots*	*Development occurs on sites within 400m radius of BZs*	*Development occurs on R1Z sites identified as green by COGB*	*Residential development occurs on infill sites outside CBD zoned Business and Industrial and identified as green by COGB*	*Development on sites determined as appropriate, to heights defined by CBD Strategy*
SUPPLY							
Land supply	770 hectares from 279 lots	770 hectares	555 hectares from 6,756 lots (220 vacant)	322 hectares from 4,154 lots	344 hectares from 1,129 lots	275 hectares from 209 lots	14.4 hectares from 138 lots
Dwelling density	**12** dwellings per hectare	**25** dwellings per hectare	**13** dwellings per hectare	**35** dwellings per hectare	**35** dwellings per hectare	**35** dwellings per hectare	average **140** dwellings per hectare
Dwelling yields	**Detached dwelling supply:** 9,240	**Detached dwelling supply:** 19,250	**Detached dwelling supply:** 6,536 + 440 = 6,976	**Townhouse dwelling supply:** 11,270	**Townhouse dwelling supply:** 12,040	**Townhouse dwelling supply:** 9,625	**Apartment dwelling supply:** 2,000+
Sample of lots available							

Table 68 Summary of Bendigo scenarios: dwelling demand

SCENARIO	BUSINESS AS USUAL GREENFIELD	FUTURE GREENFIELD DEVELOPMENT	DUAL OCCUPANCY INFILL	ACTIVITY CENTRE INFILL	RESIDENTIAL INFILL	OTHER REDEVELOPMENT	CBD REDEVELOPMENT
	Development at current trend densities	*Maximum yield of lots over one hectare*	*Two lot development on existing occupied and vacant residential lots*	*Development occurs on sites within 400m radius of BZs*	*Development occurs on R1Z sites identified as green by COGB*	*Residential development occurs on infill sites outside CBD zoned Business and Industrial and identified as green by COGB*	*Development on sites determined as appropriate, to heights defined by CBD Strategy*
DEMAND	**Detached dwellings** Proportion of total demand: 92.7%	**Detached dwellings** Proportion of total demand: 92.7%	**Detached dwellings** Proportion of total demand: 92.7%	**Townhouses** Proportion of total demand: 2.4%	**Townhouses** Proportion of total demand: 2.4%	**Townhouses** Proportion of total demand: 2.4%	**Apartments** Proportion of total demand: 4.9%
Regional Housing Futures demand by dwelling type	**Detached dwellings:** 19,672 (93%)	**Detached dwellings:** 19,672 (93%)	**Detached dwellings:** 19,672 (93%)	**Townhouses:** 509 (2%)	**Townhouses:** 509 (2%)	**Townhouses:** 509 (2%)	**Apartments:** 1,037 (5%)
Rural preservation scenario demand for urban dwellings*	**Detached dwellings:** 24,318	**Detached dwellings:** 24,318	**Detached dwellings:** 24,318	**Townhouses:** 523	**Townhouses:** 523	**Townhouses:** 523	**Apartments:** 1,307
Tenement control scenario demand for urban dwellings*	**Detached dwellings:** 21,921	**Detached dwellings:** 21,921	**Detached dwellings:** 21,850	**Townhouses:** 471	**Townhouses:** 471	**Townhouses:** 471	**Apartments:** 1,179

*Includes transferred and unmet rural demand, dwelling types calculated using same proportions used in *Regional Housing Futures*

As none of the modelled scenarios for Bendigo are adequate on their own to meet projected detached dwelling demand of 19,672 homes as calculated in the *Regional Housing Scenarios* work, or the additional transferred rural demand (2,456 dwellings under Rural preservation and 872 under Tenement control), a combination of scenarios are necessary. The townhouse and apartment supply calculated in the Bendigo scenarios more than adequately meet the *Regional Housing Scenarios* projections for those dwelling types (Groenhart et al 2013).

The Future greenfield development scenario has a shortfall of 422 detached houses in comparison to the *Regional Housing Scenarios* projected demand for 19,672 detached dwellings: this amount could easily be achieved through a second dwelling being built on an existing lot as in the Dual occupancy scenario (Groenhart et al 2013). This approach would both increase fringe densities (to 25 dwellings per hectare from 12) while only incrementally adding to and changing established neighbourhoods through dual occupancy development.

If demand for dwellings increases in urban settlements as modelled under the Rural preservation and Tenement control scenarios where demand is transferred from rural to urban areas, do the Bendigo scenarios produce sufficient yield to meet that demand? The table above shows the *Regional Housing Futures* proportions of dwelling types for detached houses, townhouses and apartments applied to the total demand for urban dwellings under the Rural preservation and Tenement control scenarios (Groenhart et al 2013). Bendigo is only unable to meet the demand for detached dwellings if all are built on the fringe ie. under the Business as usual greenfield or the Future greenfield development.

However if the Future greenfield development and Dual occupancy scenarios are combined, Bendigo could have almost 2,000 detached houses more than is projected to be needed under the Rural preservation scenario, and over 4,000 under the Tenement control scenario.

This demonstrates that while none of the Bendigo individual scenarios are sufficient to meet the 22,128 (Rural preservation scenario) or 20,544 (Tenement control scenario) projected and additional rural transferred demand for particular dwelling types to 2041 on existing lots, using a combination of scenarios for detached houses could produce more than enough separate homes in the future. No single solution exists in a single location but rather attention needs to be given to fringe residential densities and infill opportunities in existing urban areas.

No demonstrated need exists for rezoning fringe land.

Similarly, requiring increased residential densities cannot be the only approach taken by councils in planning to meet projected future demand for houses. Residents also need to have easy access to a wide range of services and amenities, preferably within walking or biking distance of their homes. Higher density development both provides more demand for and efficient use of existing services and places more stress on facilities and amenities. Councils need to also plan for growing demand for land uses other than housing. A cross-sectoral approach should be central to any housing policy or planning work.

The next section explores an alternative approach: growth which is projected for Ballarat and Bendigo is transferred into the study region's district towns and towns which currently have a rail service. This models redirecting growth pressures from the largest regional centres and the implications for these smaller settlements.

6.6 Meeting urban demand across the study region

The previous rural scenarios show that the study region has excess capacity for residential development in comparison to projected rural demand of 72,185 dwellings in Business-as-usual, 108,066 dwellings in the Rural preservation and 30,399 dwellings in the Tenement control scenarios (see Table 69). The *Regional Housing Futures* work demonstrates that some urban settlements in the study region will struggle to accommodate projected demand, especially for detached houses unless residential densities increase (Groenhart et al 2013). The Bendigo case study reinforces the role of increased densities in extending land supplies to meet projected demand, including that transferred from rural areas under the two rural scenarios.

Table 69 Study region supply and demand

	Business as usual	Rural preservation	Tenement control (25 ha)
Supply	87,195	111,994	41,162
Demand	15,010	3,928	10,763
Excess supply	*72,185*	*108,066*	*30,399*

This section presents another approach to dealing with demand. Its basic assumption is that Ballarat and Bendigo will not grow in the future. Instead, all projected future demand for dwellings in those regional centres will have to be met within the current boundaries of smaller urban settlements which have rail services.

If district towns were to grow in place of Ballarat and Bendigo, they need around twice as many houses than currently projected to 2041 (DPCD 2012b). Adding the additional demand transferred to urban settlements under the rural scenarios would require Gisborne to triple its new housing stock to meet the revised demand. If no new land supply is identified, all district towns would have to increase their residential densities, although all would remain under 20 dwellings per hectare on average except for Bacchus Marsh.

The first sub-scenario analyses the implications of shifting Ballarat and Bendigo's projected growth to 2041 to district towns as defined by the Victorian government settlement hierarchy. The second examines how that growth can be accommodated in towns. In both sub-scenarios, the urban settlements must have existing train services to be eligible for analysis. The relevant towns are listed in Table 70 and each of the sub-scenarios is discussed in the next sections.

Table 70 District towns and towns in study region

Hierarchy	Settlement	LGA
Regional Centre	Ballarat	City of Ballarat
	Bendigo	City of Greater Bendigo
District Town	Maryborough	Central Goldfields Shire
	Gisborne	Macedon Ranges Shire
	Kyneton	Macedon Ranges Shire
	Bacchus Marsh	Moorabool Shire
	Castlemaine	Mount Alexander Shire
Town	Creswick	City of Greater Bendigo
	Clunes	City of Greater Bendigo
	Woodend	Macedon Ranges Shire
	Riddells Creek	Macedon Ranges Shire
	Macedon	Macedon Ranges Shire
	Malmsbury	Macedon Ranges Shire
	Ballan	Moorabool Shire

Source: Planisphere 2009

6.6.1 Transferring demand from regional centres to district towns

The study region has five district towns which currently have rail services. Daylesford is also classified as a district town but only has a VLINE bus service. The towns vary in size: in 2011 Kyneton comprised around 1,600 dwellings and Bacchus Marsh, 5,700. Using the rural scenarios' urban ratios applied to *Victoria in Future* and as shown in Table 71 below*,* the study region's district towns are projected to have additional demand for 2,191 (Kyneton) to 12,271 (Bacchus Marsh) new dwellings by 2041 (DPCD 2012b). This scenario then takes the demand for 42,000 new dwellings total in Ballarat and Bendigo and allocates it to the district towns.

The scenario assumes no new residential land is made available in the district towns between 2011 and 2041 so that additional demand from the regional centres must be located on land that is currently zoned for residential uses. These zones include Residential Zone 1, Township Zone and Low Density Residential Zone. The following table shows the total area of these residential zones for each district town on which future housing development could occur. The proportion of the regional centres' projected growth is allocated to each district town based on the current area under residential zones.

Table 71 District towns' residential areas

| District town	Area of lots zoned residential (ha)	Proportion of total area in district towns
Maryborough	454	0.13
Gisborne	931	0.27
Kyneton	385	0.11
Bacchus Marsh	1,108	0.32
Castlemaine	547	0.16

Source: Victorian Government 2013

Bacchus Marsh is both the largest in area and has the most dwellings of the five towns. It therefore is able to accommodate the largest proportion of the regional centres' projected growth. Table 72 shows both the Business-as-usual and additional dwelling numbers required in district towns as a result of re-allocating Ballarat and Bendigo's projected growth based on those areas and proportions. The last column shows the revised projected additional demand for dwellings to 2041 in district towns after Ballarat and Bendigo's demand has been apportioned.

Table 72 Projected dwelling demand in district towns

District town	2011 dwellings	Projected dwelling demand to 2041 (*VIF*)	Projected additional demand from Ballarat and Bendigo, to 2041	Total projected additional demand to 2041
	A	B	C	(B-A) + C
Maryborough	3,490	4,242	5,613	6,365
Gisborne	2,645	4,749	11,505	13,609
Kyneton	1,609	2,191	4,762	5,344
Bacchus Marsh	5,712	12,271	13,692	20,251
Castlemaine	3,162	4,045	6,753	7,636

To put these dwelling demand numbers into a built environment context, density can again indicate the scale of change required to accommodate the additional demand in the district towns. Figure 98 shows densities for 2011 (proxy for current densities), 2041 under *Victoria in Future* using this project's urban ratio apportionment and that required by 2041 with the regional centres' growth proportionately distributed to the district towns (DPCD 2012b).

Figure 98 District town densities A
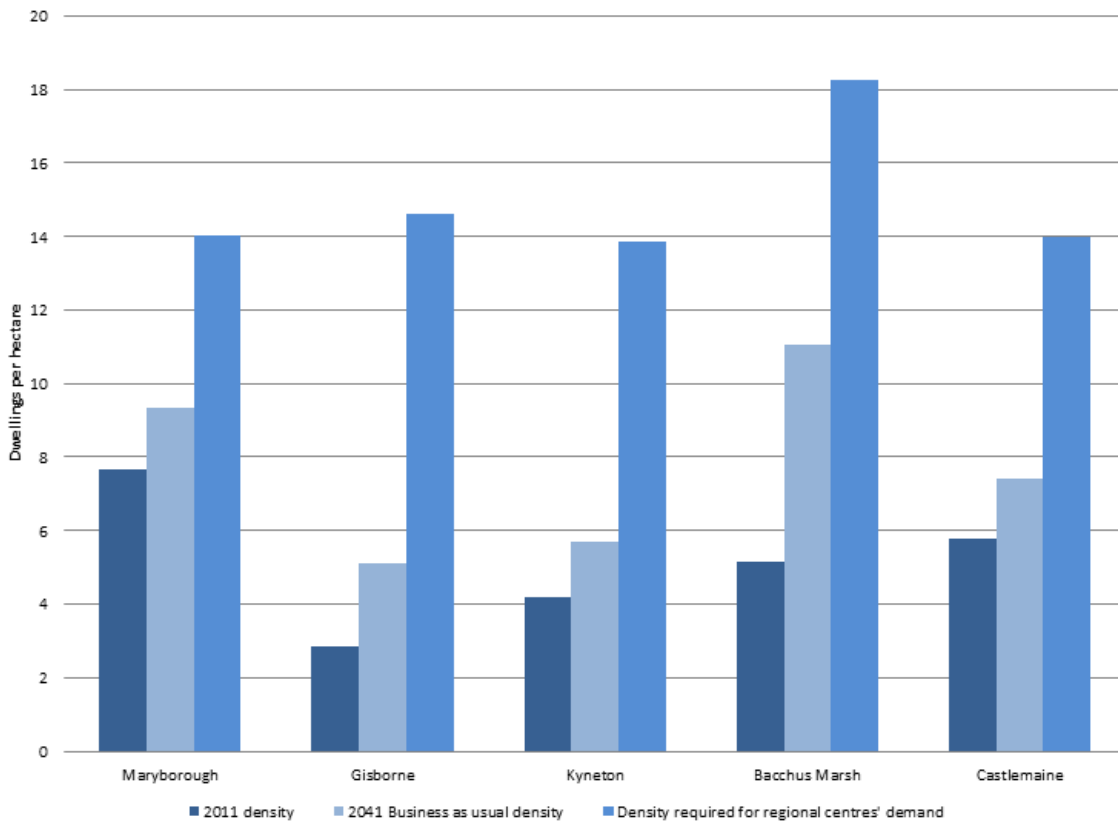
As discussed previously, current residential densities are very low in district towns. By 2041, they will need to increase to accommodate projected growth and only Bacchus Marsh will need to achieve more than ten dwellings per hectare. Transferring Ballarat and Bendigo's projected growth pushes those required densities higher again, with all near 14 dwellings per hectare except for Bacchus Marsh which is approaching 20 dwellings per hectare.

Melbourne's Growth Area Authority recommends that greenfield Precinct Structure Plans "should achieve an average of 15 dwellings per net residential hectare." (GAA 2013, p.21[42]) They also define Conventional Density Housing as "Housing with an average density of 10 to 15 dwellings per net developable hectare." (GAA 2013, p.53) While the densities required under this scenario are high compared to 2011 densities, they are comparable with an industry standard for low density fringe development.

Adding the transferred rural demand in the Rural preservation and Tenement control scenarios further increases required densities, although all still remain under 20 dwellings per hectare except for Bacchus Marsh. Table 73 shows demand in the district towns where Ballarat and Bendigo's demand has been reallocated to these places (final column in Table 72 above), and the higher demand numbers where the district towns take on the rural transferred demand calculated in the Rural preservation and Tenement control scenarios.

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[42] Note that the October 2013 draft *Plan Melbourne* (DTPLI 2013) had revised this goal to 18 dwellings per hectare. However It was not included in the final document released in 2014.

Table 73 Demand in district towns, including tranferred rural demand

District town	Demand including Ballarat and Bendigo's demand	Demand including Rural preservation transferred demand	Demand including Tenement control transferred demand
Maryborough	6,365	7,106	6,737
Gisborne	13,609	15,713	15,137
Kyneton	5,344	6,613	5,759
Bacchus Marsh	20,251	22,642	21,234
Castlemaine	7,636	8,745	8,355

Figure 99 illustrates these densities, with the highest under Rural preservation (RP) because this scenario shifts more demand into urban settlements than Tenement control (TC) in the rural modelling. It also includes the demand that cannot be met in rural SLAs. This result again illustrates how the two rural scenarios do not have a very large impact on urban settlements as rural growth is relatively small when compared to that projected for towns.

Figure 99 District town densities B
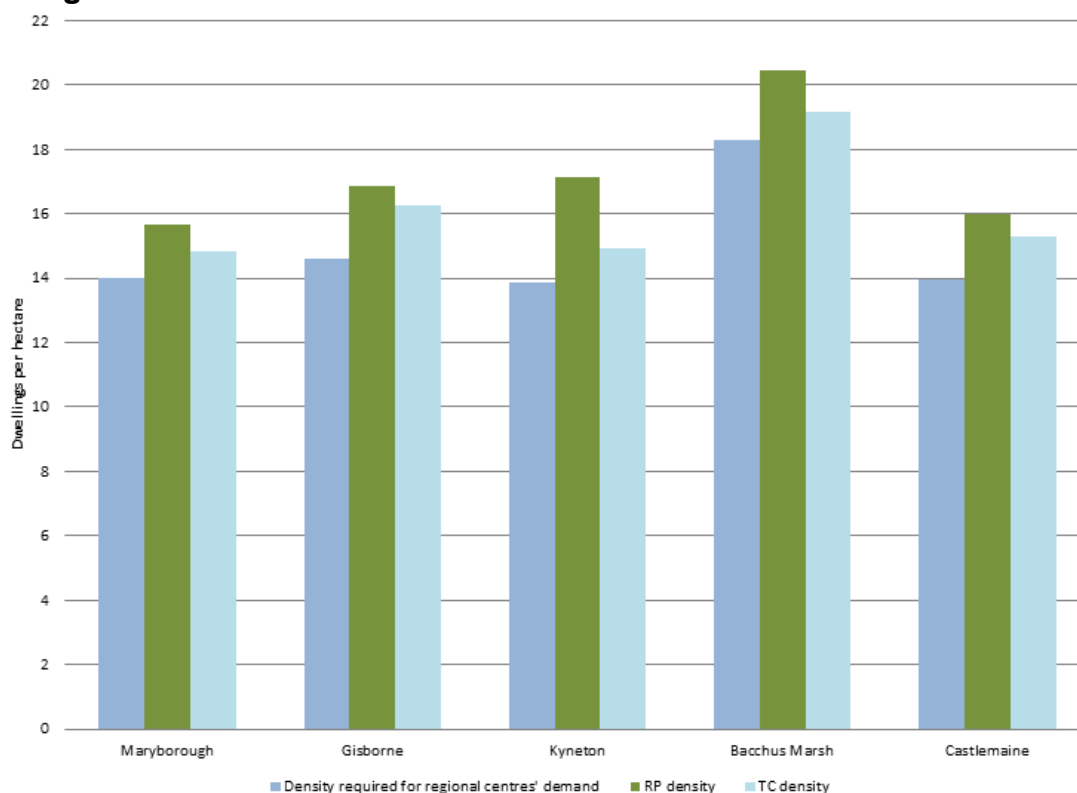
These figures do not take into account local variation or character, nor do they give any indication of a diversity of dwelling types. However they are useful to demonstrate one aspect of the impact of shifting growth. The next sub-section briefly looks at Kyneton, using project work from La Trobe University, to start to address a local context.

6.6.1.1 Kyneton case study

In their course *Planning Practice* (Semester One 2013), La Trobe University (Bendigo) undergraduate planning students analysed Kyneton's land supply and dwelling demand to

2031 (Jefferies et al 2013). The project brief asked the students to identify lots and densities to accommodate an additional 8,500 residents within the existing town boundaries. Kyneton's population would then be 15,000 compared to 6,500 in 2011 (Budge et al 2013). The report focused on a future population rather than projected dwelling demand: both are used in the following analysis (Jefferies et al 2013).

This project's scenario of transferring growth from Ballarat to Bendigo to district towns directs some of that regional centre demand for new dwellings to Kyneton. When Ballarat and Bendigo's projected dwelling demand to 2041 is proportionally allocated to Kyneton, it will have demand for an additional 5,344 new homes as shown in Table 73 in the previous section. Using the La Trobe University study's census-based assumption of 2.45 people per household, this scenario of transferred regional centre growth requires housing for an additional 13,000 Kyneton residents (Jefferies et al 2013).

The La Trobe University study calculated approximate resident numbers for individual existing lots in Kyneton which they determined are vacant, underutilised or suited to redevelopment. In total those sites could house around 10,000 residents. The team also identified three larger sites suited to redevelopment with four to six storey buildings which could house between 1,000 and 2,000 people: the Kyneton recreation reserve (showgrounds), the former pool and velodrome, and the caravan park. The report argues that these three sites are appropriate because of their location close to the major retail area (Piper and Mollison Streets) and the train station to the south. In total these sites could also meet the projected demand for this project's scenario (Jefferies et al 2013).
Figure 100 shows the land suited to new residential development, including the three major redevelopment sites.

Figure 100 Kyneton land suited for redevelopment (green)
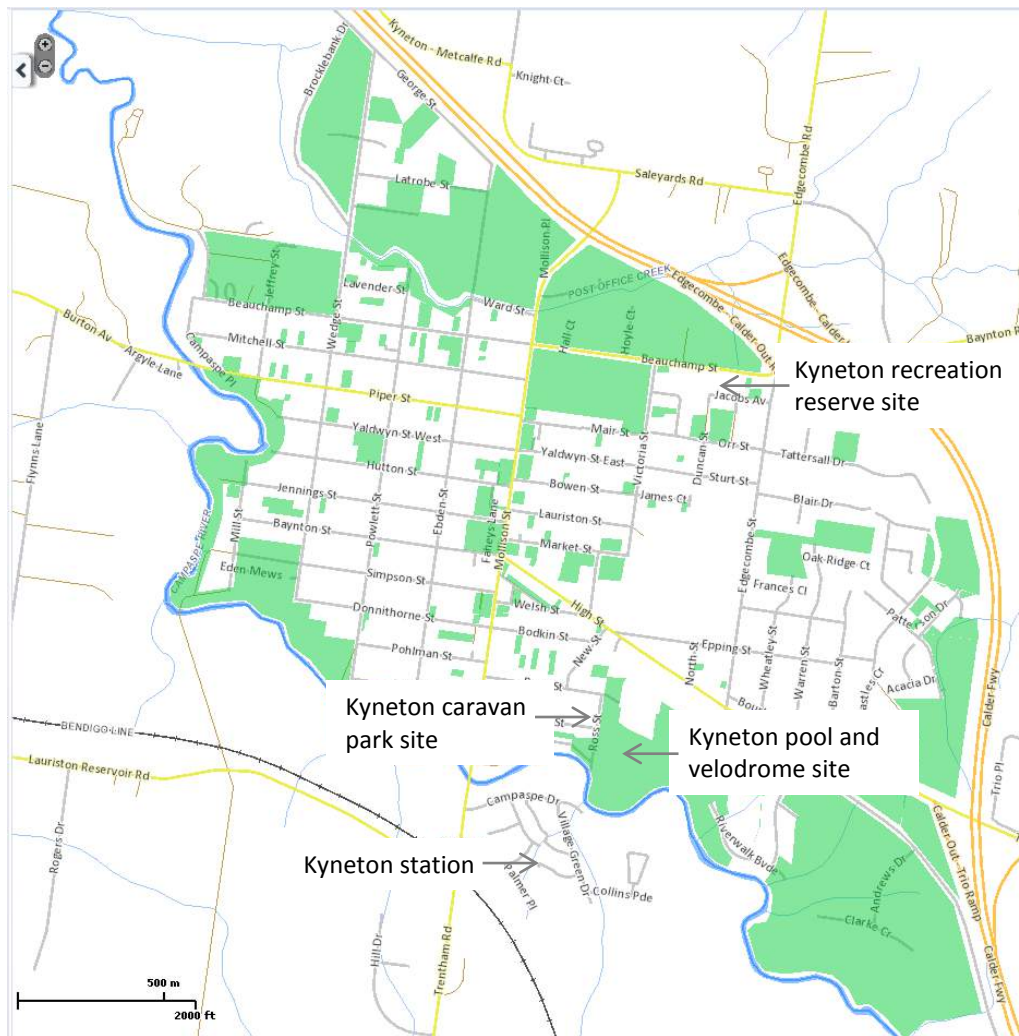
Source: Jefferies et al 2013

The study concluded that Kyneton would need housing at much higher densities for a future population of 15,000. It calculated that the current gross residential density is slightly over three dwellings per hectare and that this would need to increase to an average of 17 dwellings per hectare but closer to 25 dwellings to house their projected population. These are generally higher than the densities calculated for this project's scenario where Kyneton takes a proportion of Ballarat and Bendigo's growth. The study strongly argued for the town to accept this higher density approach over time rather than allowing further greenfield subdivision which would detract from the town's "centrality, its lifestyle and its overall rural character." (Jefferies et al 2013, p.32) These sentiments are notably stronger than in the existing town structure plan which proposes new residential development be contained and intensified within existing land zoned for residential uses in the short to medium term. In the longer term, the structure plan suggests an investigation area to the south of the station for future residential growth, which should have regard to consolidation of development (AECOM 2013).

The next section looks at shifting the regional centres' demand to smaller places: towns in the study region which currently have train services.

6.6.2 Transferring demand from regional centres to towns

Half of the study region's towns currently have train services although Creswick and Clunes only have two trains per day. Other towns have more regular hourly services on

both the Ballarat and Bendigo lines. These towns are small places, with between 300 homes in Malmsbury and 1,400 in Woodend in 2011. This scenario looks at how much dwelling growth these places would need to accommodate within their existing boundaries if Ballarat and Bendigo's demand for 42,000 new dwellings is met in those towns instead.

Table 74 shows the total area of the current residential zones for each town on which future housing development could occur. This scenario assumes that no new land is available for development. The table also includes the proportion of the regional centres' projected growth that is allocated to each town based on their areas' zoned residential.

Table 74 Towns' residential areas

	Area of lots zoned residential (ha)	Proportion of total area in towns
Creswick	301	0.10
Clunes	1,004	0.34
Woodend	323	0.11
Riddells Creek	912	0.31
Macedon	133	0.04
Malmsbury	67	0.02
Ballan	224	0.08

Source: Victorian Government 2013

Table 75 shows the number of dwellings in each town in 2011 and projected future demand including the reallocated demand from Ballarat and Bendigo. This highlights the influence of the area of land zoned for residential use on the proportion of growth redistributed to individual towns from the regional centres.

**Table 75 Projected dwelling demand in towns**

	2011 dwellings	Projected dwelling demand to 2041 (*VIF*)	Projected additional demand from Ballarat and Bendigo, to 2041	Total projected additional demand to 2041
	A	B	C	(B-A) + C
Creswick	870	1,234	4,463	4,826
Clunes	755	1,070	14,878	15,193
Woodend	1,400	2,514	4,785	5,898
Riddells Creek	958	1,691	13,508	14,241
Macedon	411	737	1,966	2,292
Malmsbury	283	386	998	1,101
Ballan	800	1,290	3,325	3,815

Source: ABS 2012; DPCD 2012b

While Woodend is the largest town, its land supply is relatively constrained. The town could only accommodate around 11 per cent of Ballarat and Bendigo's forecast dwelling demand. This contrasts with a smaller town such as Clunes which had 755 houses in 2011 compared to Woodend's 1,400 but it contains three times as much residential land within its current (project) urban boundary. Almost 900 of Clunes' 1,004 hectares of residential

land was zoned in 2013 either Rural Living or Low Density Residential. The average size of those lots is 1.7 hectares. This indicates that Clunes has large areas of very low density housing and its overall dwelling density is only one house per hectare. Figure 101 shows Clunes' residential zoned lots.

Figure 101 Town of Clunes, residential zoned lots
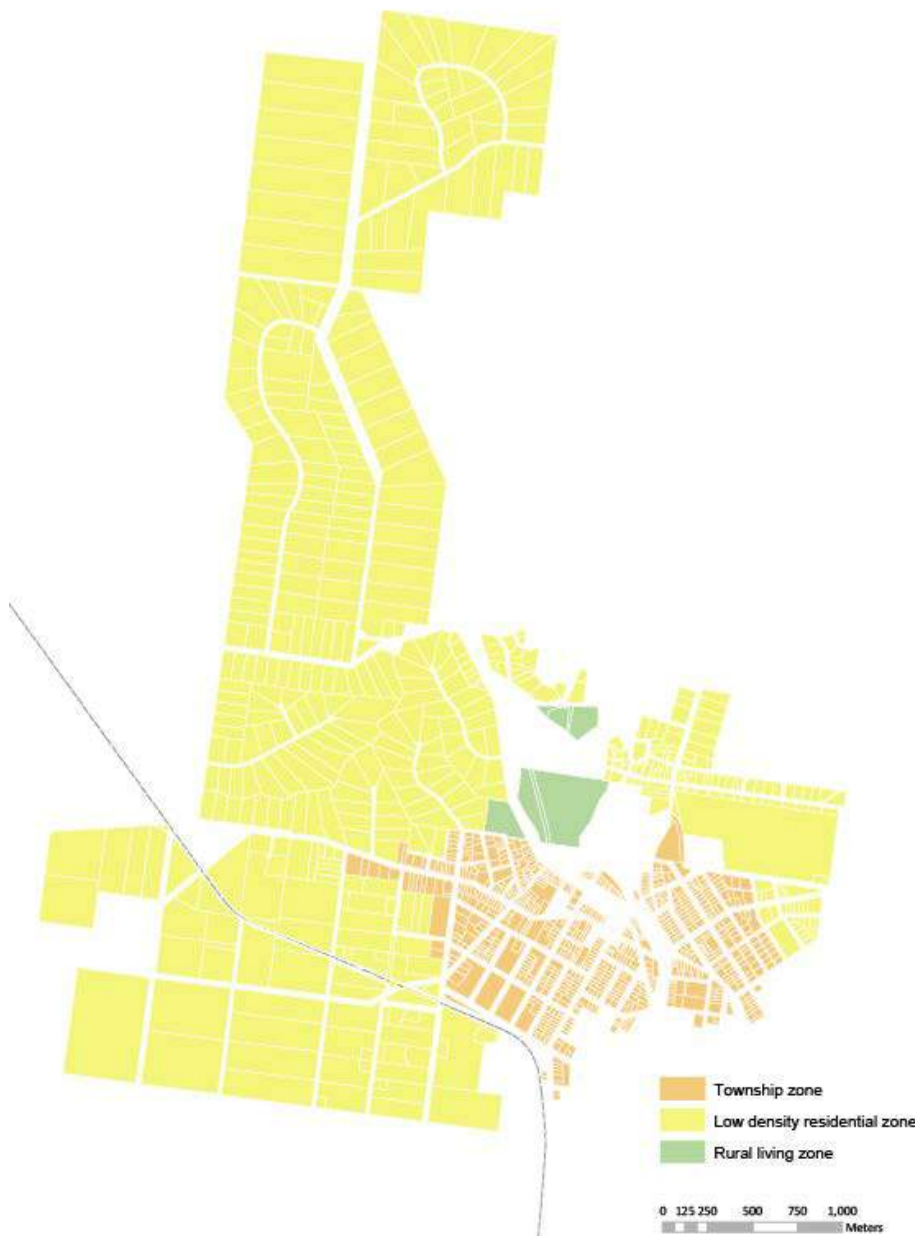
Source: Victorian Government 2013

Projected Business-as-usual growth in towns to 2041 will require some increase in residential densities but at much smaller levels than those needed if Ballarat and Bendigo's growth were to shift to these places. With densities approaching those of Melbourne's middle suburbs, the towns might find it challenging to try to maintain their valued rural, small town character. This could be protected by designating certain areas for redevelopment and higher densities, while applying protection through planning zones in areas which councils and residents decide should remain relatively unchanged. Pressure might be expected to be placed on councils to continue to rezone farmland rather than support these types of residential densities. Figure 102 illustrates the average densities required to accommodate the different projected demand amounts for each town.

Figure 102 Town densities A
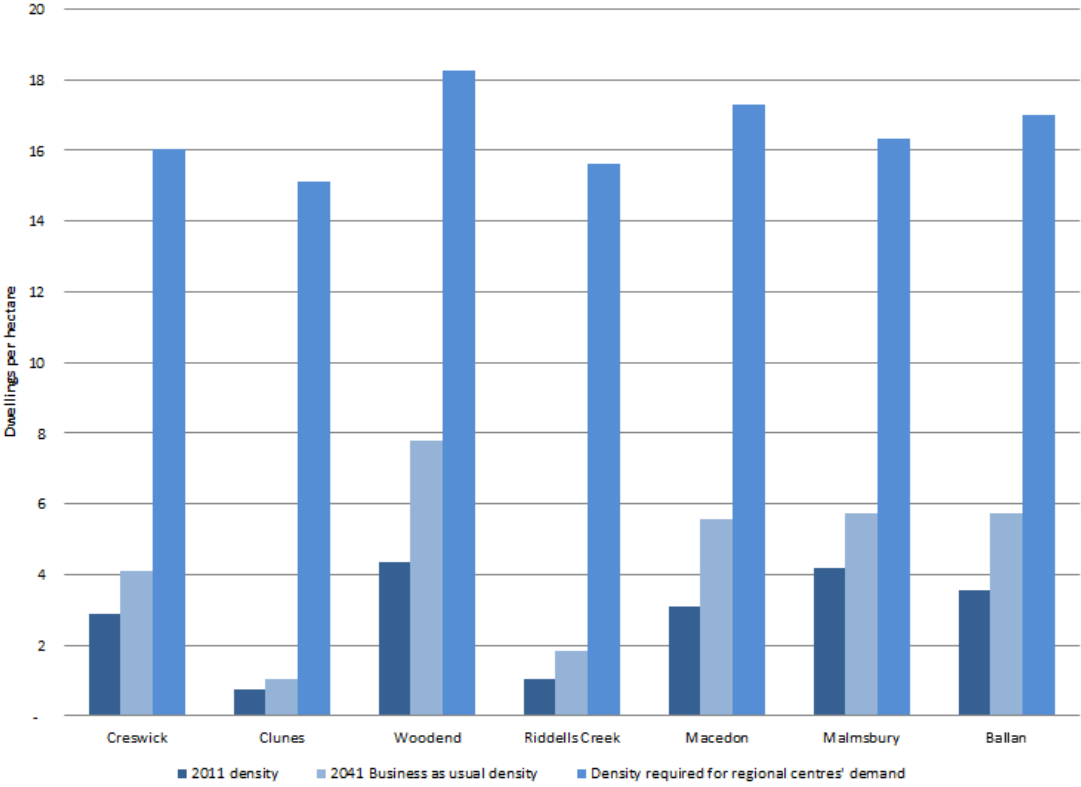
As discussed in the previous section on district towns, towns would need further slightly increased densities to accommodate the Rural preservation (RP) scenario's transferred and unmet demand from rural areas. This is illustrated in Figure 103. The Tenement control scenario is not relevant to the towns because it only transfers growth to the regional centres and district towns, not to these small towns.

Figure 103 Town densities B
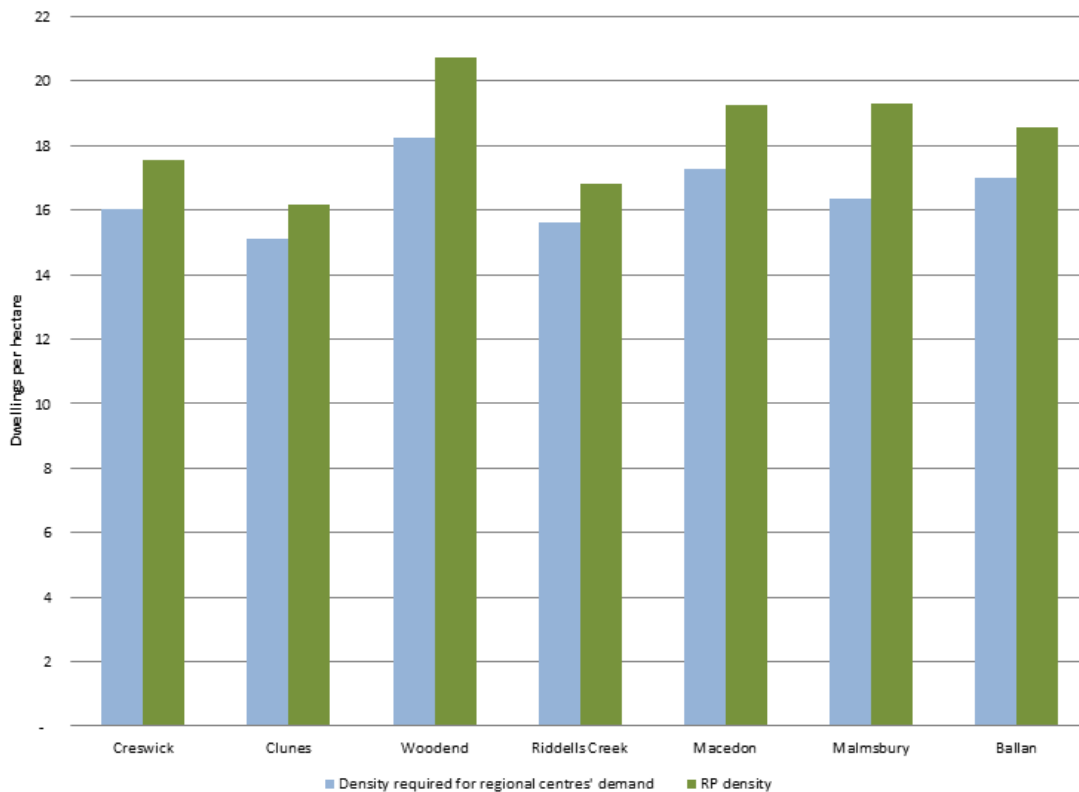
Average densities are just one indicator of the impact of shifting growth from large to smaller places. Analysis of the infrastructure implications is included in the following section focusing on Kyneton as an example. But more work is needed to look at the current and possible future distribution and detailed density of residential development and the social impacts of such a dramatic shift in the amount of growth to either district towns or towns.

Nonetheless these two sub-scenarios clearly demonstrate that each district town or town currently has enough residential land to accommodate future growth at relatively low average residential densities. With their existing train services, these are logical places for more growth. This evidence should be a useful rebuttal to pressure to rezone farm or rural conservation land for new houses in these places.

6.6.2.1 Infrastructure implications for Kyneton to 2041

Essential Economics (2009, 2012) have published two reports on the infrastructure implications of growth in Victoria's regional cities under three population projection scenarios. The consultants focused on regional cities and aggregated their findings for the ten centres, with a focus on the additional likely costs associated with the three scenarios. These documents also include useful per capita measures for projecting future infrastructure requirements. The following analysis applies those measures to a range of infrastructure and services which Kyneton may need where:

a. Business as usual projects dwelling demand,
b. Ballarat and Bendigo's projected demand for dwellings is transferred to the study region towns, and
c. Kyneton receives both transferred demand from Ballarat and Bendigo and from rural areas under the Rural preservation and Tenement control scenarios.

Table 76 summarises Kyneton's projected dwelling demand in these three scenarios. It

also includes population information as Essential Economics' reports focuses on people rather than households.

As shown previously, transferring dwelling demand from Ballarat and Bendigo more than doubles Kyneton's 2041 demand for dwellings, and this increases again with the transfer of rural demand to urban settlements under the two rural scenarios. Including each of these scenarios can provide an indication of the magnitude of the impact of these types of increases in dwelling demand on future infrastructure and service needs. The age cohorts are calculated by multiplying the proportion of that age group of the total VIF 2031 Kyneton SLA population by the population totals for the four growth scenarios.

Table 76 Kyneton's projected households and population

	BAU projection to 2041 (*VIF*)	Total projection including transfer from Ballarat and Bendigo, to 2041	Total projection including rural transfer under RP, to 2041	Total projection including rural transfer under TC, to 2041
	BAU	BAU+B+B	BAU+B+B+RP	BAU+B+B+TC
Dwellings	2,191	5,344	6,153	5,579
Population*	5,083	12,398	14,275	12,943
0 to 4 years (11% VIF 2031)	-	1,364	1,570	1,424
3 and 4 years (10% VIF 2031)	-	1,240	1,427	1,294
5 to 12 years (13% VIF 2031)	-	1,612	1,856	1,683
13 to 18 years (12% VIF 2031)	-	1,488	1,713	1,553
Over 70 years (19% VIF 2031)	966	2,356	2,712	2,459

* uses VIF 2031 average household size for Kyneton SLA = 2.32
Source: DPCD 2012b

Where the Essential Economics 2012 report takes an aggregated approach to regional Victoria and uses 2031 data, the following data only looks at one specific town. The following data in Table 77 should be interpreted as indicative rather than as very specific projections of future demand.

Table 77 Additional infrastructure and services required by 2041 in Kyneton

	Current	Additional future demand			
		BAU	BAU+B+B	BAU+B+B+RP	BAU+B+B+TC
Transport					
Daily bus services	26	1	3	3	3
Weekly rail services to and from Melbourne	93	10	25	29	26
Health					
Hospital beds (public and private)	15	30	72	83	75
Emergency department presentations	33	9	23	26	24
General practitioners	11	7	16	19	17
Education					
Childcare places	75	Nil	186	214	194
Kindergarten places	66	Nil	1,240	1,427	1,294
Primary school places	285	Nil	1,612	1,856	1,683
Secondary school places	622	Nil	1,488	1,713	1,553
Council facilities					
Library floor space (sqm)	2,000	139	340	391	355
Arts and cultural facilities	-	0	1	1	1
Recreational facilities	1	0	1	1	1
Other					
Aged care places	168	95	232	268	243

Source: Essential Economics 2012

Transport

Kyneton's main local bus services only run from Wednesday to Friday, with one additional on school days and another on Thursdays which travels to Malmsbury. These are new services and Dyson's is currently investigating expanding them to run every week day and into the evening (personal conversation, 13 November 2013). This is particularly pertinent for residents seeking access to the train station without having to drive and park (in a well-patronised car park). Projected population growth would demand one extra service under Business as usual, and three additional services under the higher growth scenarios.

Health

Kyneton currently has a small public hospital with 15 beds for both acute and non-acute care (personal conversation, 13 November 2013). Business as usual projected growth for the town will potentially require twice as many beds by 2041, and up to six times as many under the highest projected growth scenario. This is indicative only as other health services exist in the study region and other facilities may be better suited to this scale of expansion than Kyneton's district health centre.

Between July 2011 and June 2013 the hospital had 33 emergency department presentations (My Hospital 2013). The hospital does serve a wider region than just the town of Kyneton however this analysis assumes that these figures do apply to Kyneton. The Essential Economics 2012 report calculated a per capita presentation rate of 0.5 which produces very high numbers for Kyneton's 2041 scenarios. If the most recent and local data is applied (while noting that it is only one year of data and may be anomalous) the emergency department presentations will increase by nine per year under the Business as usual scenario and by around 25 in the higher growth scenarios. The latter will certainly place the Kyneton emergency department under pressure.

Education

The *Victoria in Future* population projections show a decline in the number of zero to four, five to twelve and 13 to 18 year olds to 2031 in the ten regional cities considered in the Essential Economics study (DPCD 2012b; Essential Economics 2012). This then prevents the calculation of a per capita measure for the zero to four year old cohort even though the report predicts 1,490 extra childcare places will be needed in the ten centre by 2031. Demand for public primary and secondary school places are assumed to be one place per school aged child.

Kyneton is also projected to have no growth in these age groups under Business as usual. The current 75 childcare and school places should then be sufficient for this scenario. However with higher growth coming from the transfer of dwelling demand from Ballart, Bendigo and the rural parts of this area under the Rural preservation and Tenement control scenarios, these age groups will increase rather than decline. Table 78converts the population numbers into approximate numbers of additional facilities. General assumptions about the size of those facilities are also included as a guide.

Table 78 Additional educational facilities required in Kyneton

		Additional institutions required			
	Assumed size of institution	**BAU**	**BAU+B+B**	**BAU+B+B+ RP**	**BAU+B+B+ TC**
Childcare centres	75	0	2	3	3
Kindergartens	66	0	19	22	20
Primary schools	500	0	3	4	3
Secondary schools	1,000	0	1	2	2

Source: My Child 2013; MRSC 2013; My School 2013

This is a very simple approach to a complex projection exercise. Decisions about new schools are never based only on population projections but must take many other factors into account. Nonetheless these figures provide an indication of Kyneton's possible future educational needs under the different growth scenarios.

Council facilities

The Shire of Macedon Ranges built the new Kyneton library in 2005. Its footprint is approximately 1,000sqm and the building is two storeys with a total area of approximately 2,000sqm. This facility will need to expand to be able to serve the larger total population under Business as usual growth and the three higher growth scenarios for Kyneton.

Kyneton has a small museum and other facilities for hire for cultural events (MRSC 2013). These are likely to be sufficient under currently projected growth but the town may need one additional facility under the higher growth scenarios.

This is also the case with recreational facilities. The town has a variety of playgrounds, reserves and the showgrounds, along with sport-specific facilities such as the tennis courts, equestrian centre and rifle range. It only has one major sports and aquatic centre and demand will exist for an additional facility under the higher growth scenarios (MRSC 2013).

Aged care

Kyneton Health has closed its 24 bed aged care facility this year and plans to provide increased services to the elderly in their homes and at the hospital. This is in recognition of a wider shift by public hospitals away from institutional care and the rise of service provision by the not-for-profit and private sectors (Kyneton Health 2013). Kyneton currently has 168 high and low care, respite and dementia beds (DPS Publishing 2013). If Kyneton does grow as projected, it will need at least one more facility with approximately 80 beds. Under the higher growth scenarios, the town could need up to three more facilities to cater for the larger number of people aged over 70 years by 2041.

Given that these scenarios for higher growth in Kyneton are based on redistributing projected demand from other parts of the study region, these calculations for additional infrastructure should also be considered for the region as a whole. If the demand does not eventuate in Kyneton, it will have to be met elsewhere. This is the reality of a growing population and demand for new dwellings, services and infrastructure.

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