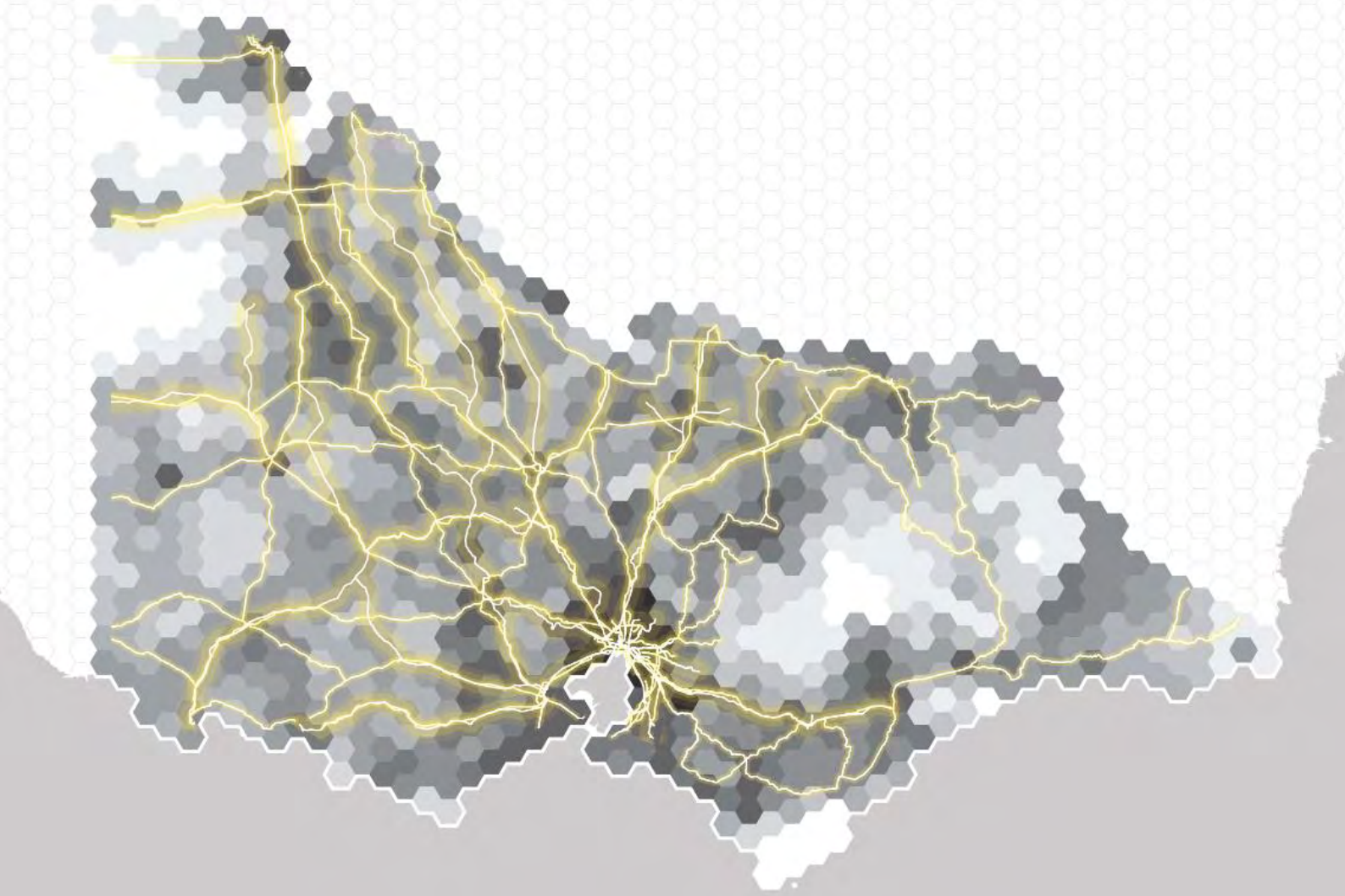
The Current and Future State of Victoria: a spatial perspective

Advice to Infrastructure Victoria



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ACKNOWLEDGEMENT

SGS Economics & Planning acknowledges and pays respect to the Ancestors that walked and managed the lands of Victoria for many generations and recognises all Aboriginal people, Traditional Owners and Aboriginal community members that have come from near and far and now call these lands their home.

While many regions across Victoria have been inhabited for millennia by a host of Aboriginal communities, historical analysis in this report focuses on the post-colonisation development of towns and cities.

EXECUTIVE SUMMARY

The quality of people's lives - their incomes, their work-life balance, their health, the environment in which they live, and their access to opportunities, can be broadly categorised into economic, social and environmental dimensions. Of course these aspects are intertwined and are not separate silos. There are broad trends and influences which shape the economic, social and environmental outcomes for Victoria. Some are global, other national and others can be shaped and influenced by decisions made within Victoria. One of the most powerful ways to influence these trends is via the provision and management of infrastructure.

Environmental, social and economic issues influence demand for infrastructure. It is also true that infrastructure can shape and influence environmental, social and economic outcomes. This means that infrastructure initiatives need to be conceptualised both within the context of a 'creating the sort of Victoria we want' and following the more conventional 'predict and provide' philosophy where infrastructure simply responds to demonstrated demand.

In this context, we must have a strong understanding of how the various economic, social and environmental trends have impacted on different parts of Victoria and what the future infrastructure implications are. Frameworks to understand these three areas have been developed, and indicators to represent the various issues have been selected to assess outcomes across Victoria. From analysis of these indicators there are some very clear trends which are impacting on different parts of Victoria.

The ageing population is reducing the number of available workers, changing consumption patterns and increasing the demand on health and aged care infrastructure. The relative shrinking of the labour force is requiring more and more jobs to be filled by migrants and in particular international migrants. This is increasing our stock of human capital and our links into the global economy. However, a rapidly growing population is placing pressure on Victoria's infrastructure, in particular, Melbourne's. Adding to this issue is the declining population in many rural areas, presenting challenges for servicing the remaining population.

The economy is increasingly services based and globalised. Once a manufacturing powerhouse, Victoria's main income is now generated from the provision of knowledge intensive services (professional, financial, education). This has reshaped Melbourne, as more and more jobs are generated by the agglomeration economies in the Central Subregion. The housing market has not been able to react quickly enough to this rapid jobs growth, placing pressure on the transport network as the disconnect between the location of jobs and houses grows. This has had a role in worsening housing affordability, particularly in highly accessible locations.

This divide between the location of jobs growth and population growth is also creating increased areas of socioeconomic disadvantage, low social capital and human capital development. Disadvantaged areas have higher rates of social issues like crime, domestic violence, chronic disease, mental health issues, and lower levels of educational attainment, all of which have clear social, health and economic implications.

Victorian food production will remain a key source of export income with a growing middle class in Asia. However, less and less is being produced within Melbourne, as prime agricultural land is consumed for housing. The environmental systems (soils, rivers and their catchments) which food production is so dependent on are under extreme pressure. This pressure has been created by competing uses for land and climate change, and will continue to rise with the increased risk of more severe weather events.

The future presents a great deal of uncertainty. Predicting our environmental, social and economic landscape 30 years into the future is tremendously challenging. In addition, there is uncertainty regarding the trends which may emerge, and those which will continue to affect the way we live.

To better understand this uncertainty, a matrix of nine possible population and employment outcomes have been generated for Melbourne and Regional Victoria. These are a combination of low, middle and high population and economic growth scenarios, and three development patterns (consolidated growth, business as usual and increased expansion). Each potential population and employment outcome for a location can exacerbate existing issues, or alleviate pressure. Increased expansion in Melbourne is likely to worsen the divide between the location of jobs and people. Lower rates of growth in rural locations may reduce infrastructure needs, but present a service provision challenge as key workers migrate to places with a stronger economy and more employment opportunity.

Scenarios are one way to understand what the future may hold for particular places, what 'pressure points' may exist and what role infrastructure can play.

In understanding the impact of infrastructure in particular places, it must be acknowledged that infrastructure has different impacts. SGS Economics and Planning describes infrastructure in the following categories.

Strategic infrastructure which comprises a relatively limited number of investments, almost exclusively in the transport domain (CityLink, Melbourne Underground Rail Loop, Melbourne Port, Melbourne Airport, Regional Rail Link, Avalon Airport, and so on), which have the power to drive the location decisions of households and firms to create new agglomeration economies thereby boosting productivity and taxation revenues.

Structural infrastructure represents the higher order or 'trunk' facilities and networks that provide the skeletal framework for urban regions. These include arterial roads, sub-regional sewers and water mains, major water storages, hospitals and principal university campuses. These items are distinguished by their Subregional service catchments.

Follower infrastructure comprises assets whose catchments are more localised. These items are vital to place making, business and community wellbeing. They provide services into a suburb or neighbourhood once the development of these areas has been enabled by investment in higher order infrastructure initiatives.

With a range of possible growth outcomes and an understanding of how infrastructure can service/shape that growth the analysis highlighted a number of key findings.

Under the various scenarios the growth path for many of our Regional Cities are fairly consistent. That is, while they will be larger in the future, their local economic social and infrastructure dynamics will remain similar. Bendigo, Ballarat and in particular Geelong are open to greater variation as they have more existing infrastructure. The level to which they grow is somewhat dependent on the way they deal with current economic challenges/opportunities and the future investments decisions which are made to help shape this growth.

All Subregions of Melbourne will see considerable levels of population and economic growth. The North, West and Central Subregions are likely to see the most significant level of change. Given a greater proportion of the North and West Subregions are greenfield, their urban development will be shaped by infrastructure decisions which can help to leverage higher growth, more productive economies and

improved social inclusion. The fringe areas of the West, North and the South Subregions already have infrastructure deficits or 'backlogs' which present challenges for future growth.

There are a wider range of possibilities for the Central Subregion's future. The Central Business District (CBD) is at the heart of the Central Subregion and how that evolves will determine the growth story of the Subregion, Melbourne, and Victoria as a whole. The boundary of Melbourne's CBD is not a fixed line: It has expanded over time in response to structural economic change, infrastructure investments, planning policies and decisions, and evolving property market dynamics.

Melbourne is in a unique position in Australia and even globally, with the benefit of having vast tracts of developable land (Arden Macaulay, Fisherman's Bend, City North) adjacent to the CBD which have the potential to be developed. These are in addition to Docklands, Southbank and the Hoddle Grid which still have considerable capacity for development. Future infrastructure decisions could shape the size of the Melbourne's CBD and its contribution to Melbourne and the state.

Climate change will continue to have broad environmental, social and economic impacts on Victoria. There are potential effects on coastal infrastructure through sea level rise and coastal erosion. The threat of inundation due to sea level rise is another significant risk for infrastructure. The risk of extreme fire events, combined with increasing population in high risk areas will impact on infrastructure (housing, communication, powerlines destroyed by fire), burnt catchments resulting in water quality reduction, and emergency services systems.

Our capacity to manage future environmental risks will in part rely on our ability to mitigate and adapt to a changing environment. Mitigation measures, such as moving towards renewable power sources and reducing our carbon emissions, will affect the structure of our economy and its industries and social and wellbeing outcomes in locations undergoing change. A long term view of infrastructure planning and the many variables affecting economic, environmental and social outcomes is required to avoid 'path dependency' and an incremental approach to policy formation.

PART 1. PROJECT APPROACH

INTRODUCTION

1.1 Project context

Environmental, social and economic issues influence demand for infrastructure. Some of these issues are global in scale and can be outside the influence of government. However, some factors are within the control of, or can be influenced by, government actions. Climate change, population growth and migration and globalisation are some of the big picture issues which can drive demand for infrastructure and affect community outcomes.

State and regional trends also have an influence on our need for and use of infrastructure. Crime rates, education attainment levels, household income and life expectancy are just some of the factors which affect people's lives. Access to job opportunities and services in particular is a key driver of prosperity.

These trends and issues affect places differently. The resilience of communities, economies and the environment varies in each city, region and town.

Infrastructure has a significant role in shaping the economy, people's lives and the nature of communities and the environment. Significant investment in infrastructure in the past has generated benefits which are often not understood until decades later. Infrastructure, by its very nature, is location-based. For this reason, this report takes a spatial perspective to understand how current and future trends will influence infrastructure planning.

1.2 Project purpose

Prioritising Victoria's infrastructure for the next 30 years requires comprehensive understanding of the State's strategic context.

This *Current and Future State Analysis* has been prepared to support the development of a 30 year Infrastructure Strategy for Victoria.

Infrastructure Victoria is an independent advisory body, which began operating on 1 October 2015 under the Infrastructure Victoria Act 2015. It has three main functions:

- Preparing a 30-year infrastructure strategy for Victoria, to be refreshed every 3-5 years.
- Providing written advice to government on specific infrastructure matters.
- Publishing original research on infrastructure related issues.

Infrastructure Victoria will also support the development of sectoral infrastructure plans by government departments and agencies. The aim of Infrastructure Victoria is to take a long term, evidence-based view of infrastructure planning and raise the level of community debate about infrastructure provision. Infrastructure Victoria will not directly oversee or fund infrastructure projects.

This report helps to address the first function of Infrastructure Victoria, and provides:

- A comprehensive understanding of current environmental, social and economic issues across Melbourne, Regional Victoria and Victoria as a whole.
- Likely future environmental, social and economic outcomes
- How outcomes may change with varied population and employment forecasts, and
- The implication of these on infrastructure need.

2 METHODOLOGY, DESIGN AND DATA

The current and future story of Victoria can be told from a triple bottom line perspective. A framework of social, environmental and economic indicators allows historic patterns and future trends to be understood, with implications emerging for different locations. The impact on and potential need for infrastructure is spatial in nature. The condition of places and the risks and opportunities facing them influences the way infrastructure is used and required.

This section outlines the rationale for the geographies and indicators and trends used in this analysis.

2.1 Report structure and geography

Data that can be used to profile the current and future state of society, the environment and the economy is available at a global, national, regional and/or local level. Global trends, such as climate change, have effects at multiple levels. In contrast, issues such as the decline or closure of a major employment provider have particularly localised effects, even if they are driven by national or international forces such as globalisation.

The analysis in this report has been framed spatially to reflect the complex interaction between social, environmental and economic trends and how they relate to Victoria, its regions and its cities. Spatial presentation of current and future trends assists in understanding future infrastructure needs.

This report has been structured as follows:

- Broader influences and challenges (Section 3) describes global, national and state-wide influences affecting Victoria.
- Metropolitan Melbourne (Section 4) focuses on city-wide trends and drivers before delving into Subregions[1].
- Regional Victoria (Section 5) considers the factors affecting the regions and regional cities.

Figure 1 shows the reporting geographies used for metropolitan Melbourne, highlighting key employment clusters and activity areas[2], and Figure 2 highlights the regions and regional cities which are reported on.

[1] The Subregions used align to Plan Melbourne Subregions and the Melbourne Statistical Division as a whole. However, Victoria in Future Projections align with the Greater Melbourne boundary.

[2] As classified in *Plan Melbourne* (2014). Available via http://www.planmelbourne.vic.gov.au/Plan-Melbourne

FIGURE 1. REPORTING GEOGRAPHIES – METROPOLITAN MELBOURNE

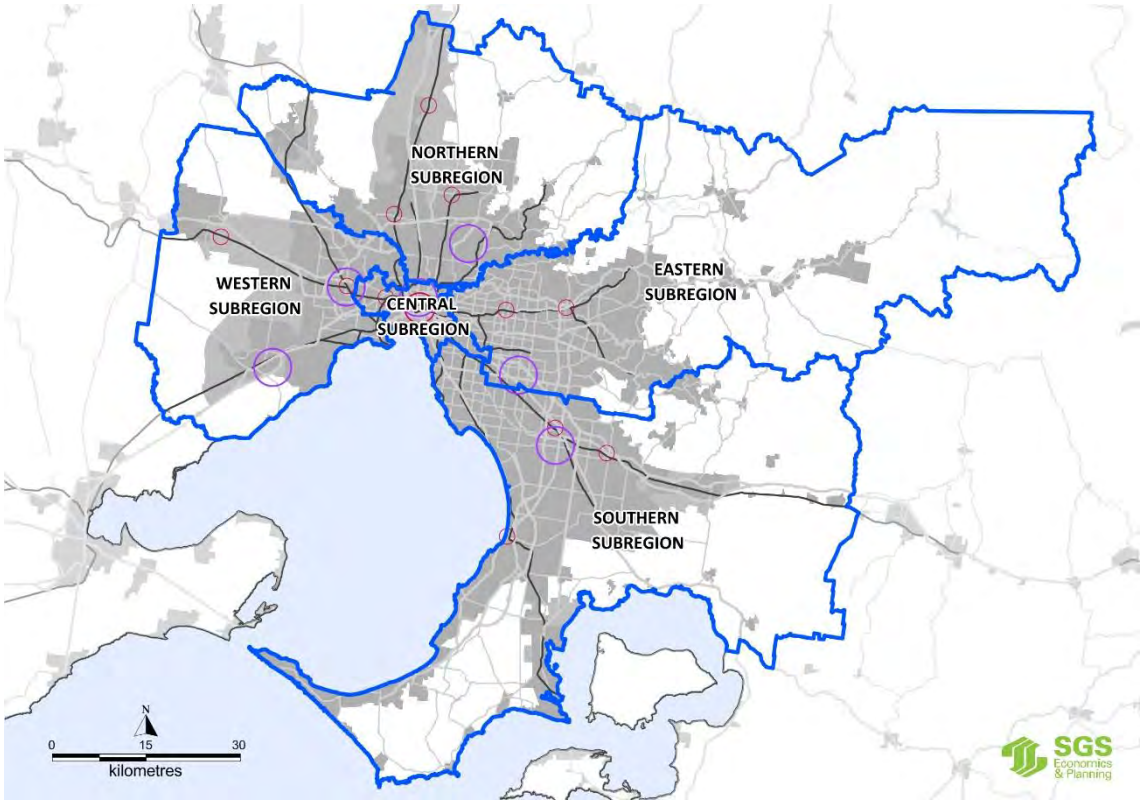
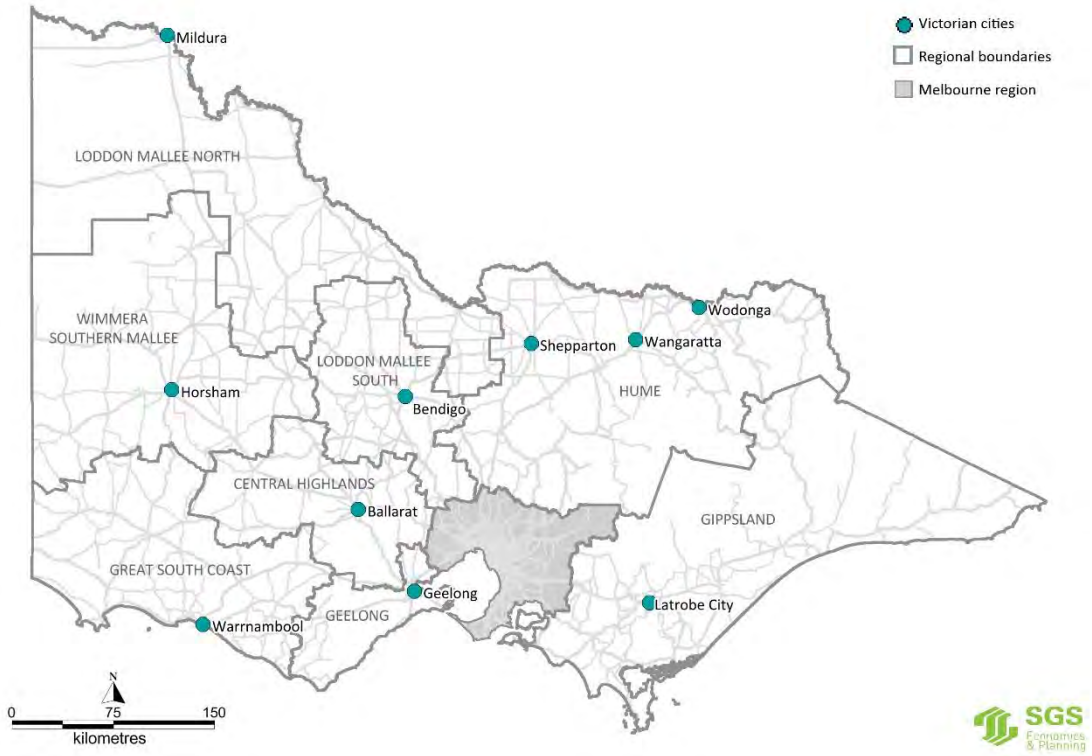


FIGURE 2. REPORTING GEOGRAPHIES – REGIONAL VICTORIA



The level of detail in which environmental, economic and social indicators are discussed by geography varies.

In some cases, the geography of data used does not exactly align with reporting geographies. However, relevant parallels are drawn. For example, environmental variation is often by water catchment area. The relevant catchments somewhat align with regional cities and their surrounding region. For this reason, this report purposely has a focus on narrative rather than simple presentation of data by location.

Each region section ends with scenario analysis which alters two factors (level and distribution of population/employment growth) to consider potential infrastructure implications.

2.2 How indicators were selected

Indicators were selected for environmental, social and economic themes on the basis of data availability and their linkage to infrastructure. This section provides the rationale for indicator selection by theme.

2.2.1 Social indicators

Social 'theme' areas were developed for 'output' and 'impact' indicators.

Demographic Indicators provide the population, age and distribution characteristics of each region. *Social Output indicators* measure the quantity and quality of infrastructure provision, while *Social Impact indicators* were used as indirect measures of the quality and quantity of social outcomes that may in part be linked to infrastructure provision.

TABLE 1. SOCIAL INDICATORS

Demographic indicators	
	Age and sex profile
	Population level and growth
Social output themes	**Social output indicators**
Access to adequate housing	Rental affordability
	Purchase affordability
	Household size: Include growth rates & total figures.
	Tenure type
	Social housing provision
	Homelessness:
Access to education	Early Childhood Development: Measured as proportion of children 'On Track' on all five AEDI Domains and proportion of Children 'Developmentally Vulnerable' on 2 or more AEDI domains.
	Literacy and numeracy: Proportion of children in Year 5 who meet or exceed literacy and numeracy standards
	Training: Degree/post-school qualification
	School Retention Rates
Access to social services	Hospitals and hospital beds
Access to leisure and cultural facilities	Number of workers in arts and culture sector
Public and active transport infrastructure	Method of travel to work
Social impact themes	**Social impact indicators**
Health and well-being	Life expectancy
	Land transport accidents
	Chronic diseases
	Self-assessed health and life satisfaction
	Mental conditions
Employment	Unemployment
Crime and safety	Offences
	Family related crimes

	Perceptions of safety
Community belonging	Community belonging

2.2.2 Environmental indicators

A significant challenge in environmental measurement is the lack of consistent indicators over time. As such, the indicators selected tend to present information about current condition.

Four types of environmental indicators were selected:

- *Environmental condition:* indicate whether the environment is in a good or poor condition.
- *Environmental services:* the environment supports the delivery of a range of services which are important for Victoria.
- *Human impacts on the environment:* provide an indication of the relative risk / minimisation of risk to environmental condition and services.
- *Climate change*: indicators which signify what climatic changes could have on infrastructure.

TABLE 2. ENVIRONMENTAL INDICATORS

Indicator type	Environmental indicator
Environmental Condition	Number of threatened species
	Amount of original vegetation
	Percentage of fragmented landscapes
	Air quality
	River quality
	Bay and estuary quality
	Soil health
	Soil acidification
	Carbon dioxide land holding
Environmental Services	Agricultural production value
	Nature based tourism visitation
	Available water for consumption
	Change of land use to residential use in growth areas
	Amount of open public space
Human impacts on the environment	Greenhouse gas emissions
	Waste generation total/per capita
	Rates of recycling
	Renewable energy production
Climate change	Temperature change
	Rainfall change
	Sea level change
	Sea surface temperature change
	Acidification of ocean

2.2.3 Economic indicators

Economic indicators are grouped into three overall areas:

- *Macroeconomic indicators:* indicators describing the state of the economy, most of which are driven by global and national trends and policy.
- *Demographic indicators:* indicators describing characteristics of the population (working age educational levels). These are typically affected by global and national trends.
- *Local economic indicators:* indicators which describe localised economic conditions, but are linked to macroeconomic conditions.

The Australian Bureau of Statistics' (ABS) National Accounts is a long established and widely recognised statistical framework for summarising and analysing economic events, the wealth of an economy, and its components. Historically, the principal economic events recorded in the National Accounts have been

production, consumption, and accumulation of wealth. Gross Domestic Product (GDP) [3], which measures the value of the goods and services produced in an economic region over a given time period, is the headline measure of production within this framework.

Estimates of Gross Regional Product (GRP), published by Regional Development Victoria, provide estimates of the value of the goods and services produced across local (LGA) regions that are internally consistent with broader measures of GDP at a state and national level. At this more localised level, GRP is not disaggregated by key industry sectors. Hence, in order to assess changes in industry trends, this data was supplemented with official estimates of employment and the number of businesses by industry produced by the ABS.

TABLE 3. ECONOMIC INDICATORS

Indicator type	Economic indicators
Macroeconomic	Real Gross Domestic Product (GDP) growth
	Employment & Labour force
	Unemployment Rate
	Participation Rate
	Employment by Industry
Demographic	Age and sex profile
	Population level and growth
Local economic conditions	Worker inflows and outflows
	Access to jobs
	Number of businesses

2.3 Understanding infrastructure needs

Planning for Victoria's infrastructure needs for the next 30 years requires a comprehensive understanding of the State's strategic context and the broad environmental, social and economic trends and issues facing Victoria and where the key pressure points on infrastructure are across the state.

Environmental, social and economic issues influence demand for infrastructure. It is also true that infrastructure (the provision of new infrastructure and regulation of existing infrastructure) can shape and influence environmental, social and economic outcomes. This means that infrastructure initiatives need to be conceptualised within the context of a 'creating the sort of Victoria we want' and following the more conventional 'predict and provide' philosophy where infrastructure simply responds to demonstrated demand.

As the future of Victoria is open to considerable uncertainty, developing scenarios can help understand the possible pathways towards the future and the role of infrastructure. Scenarios help to provide insights into the range of possible outcomes and the implications for infrastructure.

Not all infrastructure is equal, so it is important to understand the different types of infrastructure investment. SGS has devised a typology of infrastructure projects or assets comprising the following categories as show in the text box below. This typology specifically relates to built infrastructure, however demand management such as pricing is another way of addressing infrastructure need.

[3] GDP (Gross Domestic Product) refers to Australia, GSP (Gross State Product) refers to a State, while GRP (Gross Regional Product) refers to a region.

TEXT BOX 1. INFRASTRUCTURE TYPOLOGIES

Strategic infrastructure
Strategic infrastructure comprises a relatively limited number of investments, almost exclusively in the transport domain (CityLink, Melbourne Underground Rail Loop, Melbourne Airport, etc.) which leverage the existing transport network and have the power to shift relative accessibility across the metropolis. These investments drive the location decisions of households and investment decisions of private businesses and can create new agglomeration economies thereby boosting productivity and taxation revenues.

Strategic transport infrastructure is likely to encompass a relatively small number of projects, as few projects have the capacity to significantly shift accessibility profiles across a metropolitan area.

Structural infrastructure
Structural infrastructure represents the higher order or 'trunk' facilities and networks that provide the skeletal framework for the urban region in question. These include arterial roads, sub-regional sewers and water mains, major water storages, full service and research hospitals, principal university campuses and the like. These items are distinguished by their Subregional service catchments and their cost.

Follower infrastructure
The third category of infrastructure – 'follower' services and facilities – comprises assets whose service catchments tend to be more localised. These items are vital to place making, community wellbeing and business efficiency, but they neither shape the pattern of development nor provide an overarching structure for settlement and industry development. Rather they provide services into a suburb or neighbourhood once the development of these areas has been enabled by investment in higher order infrastructure initiatives.

Source: SGS Economics & Planning

2.4 How the scenarios were developed

A range of scenarios were developed to provide a framework for understanding potential infrastructure implications in different locations throughout Victoria. In constructing the scenarios there were two factors which were considered:

- Firstly, the level of aggregate population and employment growth Melbourne and Regional Victoria is likely to experience.
- Secondly, the distribution of this aggregate level of population and employment growth.

By assuming a range of fertility, mortality, interstate and international migration growth rates, 100 different population scenarios were generated. The labour force related to each population scenario was used to create industry employment projections.

The Victorian in Future population is assumed to the 50th percentile (Middle Growth) of all of the possible scenarios. That is, half of the scenarios are higher than the Victorian in Future and half are lower than Victorian in Future population projection. The Victoria industry employment projections are drawn from the Current and Future State of Victoria: a macro perspective. Advice to Infrastructure Victoria (Deloitte 2016).

The 95th percentile was selected as the Higher Growth scenario. Only 5 per cent of the scenarios are higher than the Higher Growth. The Lower Growth scenario was selected at the 25th percentile. That is,

25 per cent of the scenarios are lower than the Lower Growth and 75 per cent of scenarios are higher. This was done for both Melbourne and Regional Victoria.

The Business as Usual distribution is based on unpublished Victorian Government data for each Local Government Area. For the Lower Growth and Higher Growth this same spatial distribution of population and employment was used. For the Higher Growth, the Business as Usual distribution was considered to be less likely (it would not be achieved in 75 of the 100 scenarios) as a much larger population would change the urban development patterns away from what has been seen over the past decade.

The Consolidated Growth assumed a 70:30 split in new dwellings within established Melbourne compared with fringe greenfield development. Under the Lower Growth scenario the Consolidated Growth outcome is considered less likely (75 percentile) as with lower growth population, there will be less demand for medium and high density housing. The Expansion Scenarios assumed that growth was a 40:60 split between greenfield and established parts of Melbourne.

A similar approach was taken for Regional Victoria. Although for the Consolidated Growth a 65:35 spilt between Regional Cities and the rest of Regional Victoria was assumed and 40:60 for the Expansion.

TEXT BOX 2. WHAT IS A PERCENTILE?

A percentile is a statistical term used to describe where an outcome lies in a group of observations. For example, if an outcome is at the 50th percentile, then half of possible outcomes are lower and half of possible outcomes are higher. If an outcome is the 95 percentile then 95 percent of outcomes are lower and only five percent are higher.

2.5 Future possible scenarios

The scenarios provide a framework for understanding potential infrastructure implications in different locations throughout Victoria under different possible outcomes. These scenarios consider low, medium and high levels of population and employment growth across three distribution types:

1. Consolidated distribution
2. Business as usual (historic) distribution, and
3. Expansion distribution.

These distributions are further explained in the matrix overleaf and subsequent text.

The scenarios are illustrations of the change in the employment and population that would occur if our expectations of various trends were to prevail into the future. They provide a range of potential outcomes.

The Middle growth - Business as usual distribution is based on the generally accepted projection of future growth which is used across government for planning purposes.

Scenarios based on alternative combinations of expectations have been provided in recognition of the uncertainty of making these kind of projections over such as long period of time. Appendix 2 provides further information on the accuracy of forecasting approaches.

Each scenario would generate a whole host of costs (e.g. infrastructure and services provision) and benefits (e.g. incomes and taxation revenues) for Victoria. A cost benefit analysis framework could be used to consider which of the scenarios might be the most desirable for Victoria to purse. However, this would require a great deal of data collection and detailed modelling to assess all the costs and benefits across the whole of Victoria. Following the cost benefit analysis, even if a particular scenario was seen as the most desirable, achieving that scenario may require changes to factors outside of the control of Victoria to be altered and hence may not be achievable.

TABLE 4. SCENARIO TYPES – POPULATION AND ECONOMIC GROWTH AND SPATIAL DISTRIBUTION

	Consolidated	Business as Usual (based on historic patterns)	Expansion
Lower Growth 25th percentile 2046: Victoria 8.2 million Melbourne 6.1 million Regional Victoria 1.9 million	**75th percentile** Victoria's low growth rates from the 80s and 90s projected in the future. Focus on key centres and corridors.	**50th percentile** Victoria's low growth rates from the 80s and 90s projected in the future. Recent trends (2001-2014) to distribute the growth.	**40th percentile** Victoria's low growth rates from the 80s and 90s projected in the future. Recent greenfield growth trend to increase. No change in UGB.
Middle Growth -50th percentile 2046: Victoria 9.4 million Melbourne 7.4 million Regional Victoria 2.0 million	**65th percentile** Focus on key centres and corridors.	**50th percentile** Business as Usual based growth patterns.	**75th percentile** Recent greenfield growth trend to increase. No change in UGB.
Higher Growth – 95th Percentile 2046: Victoria 10.4 million Melbourne 8.6 million Regional Victoria 2.2 million	**50th percentile** Peak growth rates of recent years projected into the future. Focus on key centre and corridors.	**75th percentile** Peak growth rates of recent years projected into the future. Recent trends (2007-2014) to distribute the growth.	**Dispersed 95th percentile** Recent greenfield growth trend to increase. No change in UGB.

2.5.1 Lower growth scenario

Under this scenario, Victoria's economy is less nationally and globally competitive. While Victoria's economy is still growing, it grows at a slower rate. Food production is adversely impacted by climate change. The departure of the car industry in the late 2010s has a dramatic impact on the supply chain and broader manufacturing sector. Professional and financial services lose out to other competing hubs such as Sydney, Singapore and Hong Kong. Education exports plateau and decline as key education markets (China and India) develop their own higher education system which retain local students.

Without these key export industries, attracting new workers to the state, population serving industries grow at slower rates. Sydney, Brisbane and Perth's economies grow at a faster rate than Melbourne, drawing population away from Victoria. The key regional cities of Bendigo, Geelong and Ballarat lose population to other cities such as Canberra, Newcastle, Gold Coast and Adelaide. Adverse effects of climate change impact on the liveability of Victoria, affecting its capacity to grow.

The lower economic growth impacts on delivery of government services, resulting in a need for higher taxes, and reduces the provision of infrastructure which further lowers economic growth. This adversely impacts on business activity and liveability.

2.5.2 Middle growth scenario

Under this scenario, Victoria's economy continues to expand along the same trajectory observed over the past decade. The impacts of climate change are managed and food production is not adversely impacted. Manufacturing continues to evolve towards higher value adding activities and remains a larger employer in terms of overall employees in the industry. Professional and financial services remain a key economic strength of the Victorian economy. Education exports continue to grow in line with recent trends.

These key export industries attract new workers to the state and population serving industries continue to grow. This level of economic growth allows the delivery of government services to continue at the current standard and taxes remain unchanged. There is on-going provision of new infrastructure which underpins business activity and liveability.

The scenario is based on the generally accepted projection of future population growth which is used across government for planning purposes.

2.5.3 High growth scenario

Under this scenario, Victorian manufacturing undergoes a renaissance leveraging off new technologies to produce bespoke products for local consumption and export. It grows in line with the broader economy. The impacts of climate change are managed and food production continues to increase. Mitigation and adaption to climate technologies, in particular around water management, become a key service export for the Victoria. There is increased food manufacturing undertaken in regional areas. This helps regional towns to increase in size and attract people from other parts of Regional Australia.

The Melbourne cluster of professional and financial services overtakes Sydney as the main global hub in Australia. This opens up Victoria to direct investment from a range of international firms. Education exports continue to expand as new markets in Europe and North America in addition to the established markets of China and India.

The higher economic growth allows improved delivery of government services, lower taxes and provision of more infrastructure which further increases economic growth. Improved business conditions and liveability in Melbourne helps to attract population away from Sydney, Brisbane, Singapore, Hong Kong and Perth. The key regional cities of Bendigo, Geelong and Ballarat attract population from other cities such as Canberra, Newcastle, Gold Coast and Adelaide. Population serving industries grow at very rapid rates further boosting economic growth.

The high growth scenario would be underpinned by increased international migration which would increase the numbers of people from diverse backgrounds. Increased ethnic diversity may place strain on the capacity of existing social infrastructure, and may require culturally specific interventions. For example, diverse cemetery and burial needs or new places of worship.

2.5.4 Consolidated distribution

The Consolidated distribution is based on this policy-led approach. Plan Melbourne[4] identifies that residential growth cannot continue to expand outwards indefinitely and, as such, proposes the development of higher density housing in select locations near services, jobs and public transport. Urban renewal and redevelopment precincts are also identified as locations for higher density growth. National Employment and Innovation Clusters and other employment hubs attract increasing amount of employment.

[4] Plan Melbourne is currently being reviewed. A 'refresh' of the document is expected in 2016. http://refresh.planmelbourne.vic.gov.au/plan-melbourne-refresh-discussion-paper

2.5.5 Business as usual distribution

Under this distribution, the development trends and patterns currently observed continue into the future. There is ongoing high rise development in Central Subregion Melbourne, medium density in middle ring suburbs and ongoing (although at increasing densities) greenfield development in the growth areas. Employment continues to grow in line with recent trends with large centres (commercial and industrial) growing strongly, although population serving jobs increase in growth areas.

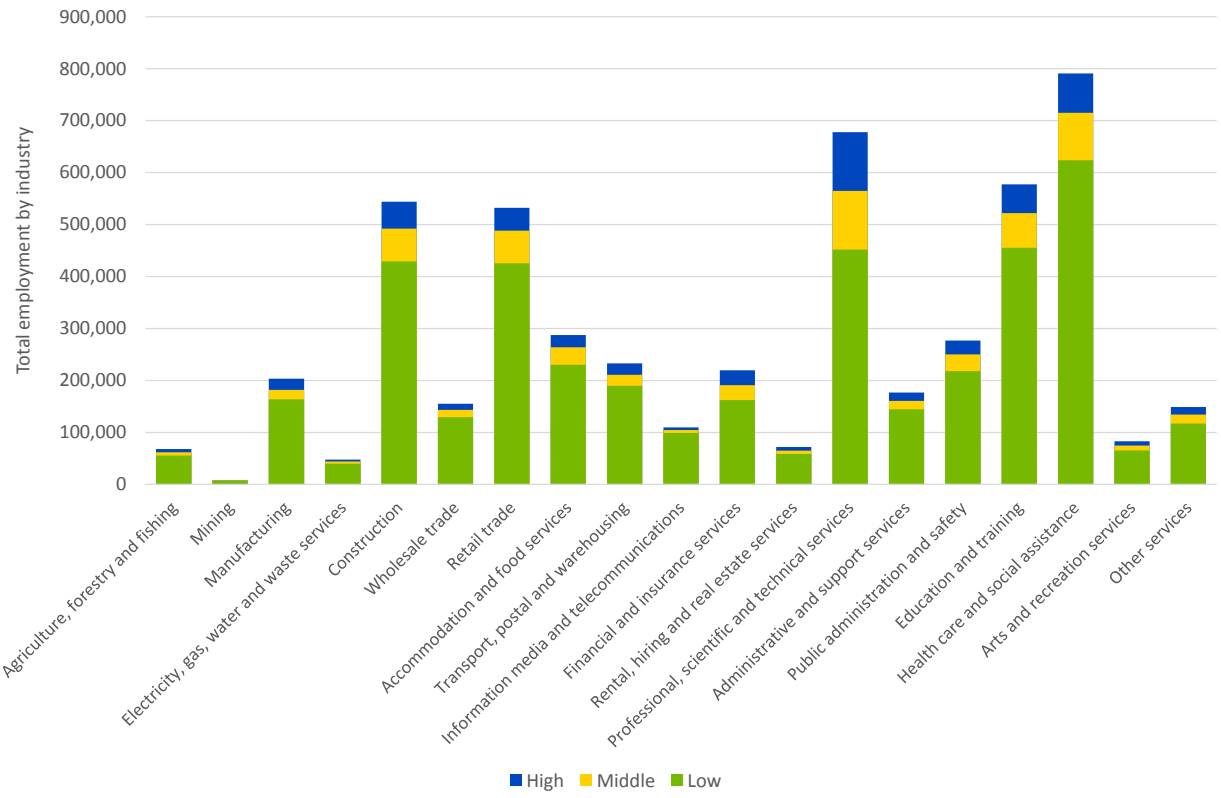
The Business as usual distribution is based on the generally accepted projection of future growth which is used across government for planning purposes.

2.5.6 Expansion distribution

Under this distribution, Growth is primarily driven by low density out-of-centre employment and residential development. Under this scenario, Melbourne maintains its current urban growth boundary but growth continues northwards along the Hume Freeway, well beyond Craigieburn, to the west towards Melton and Werribee, and into the south east. Residential growth is spurred by rapid employment growth west of the Western Ring Road, in and around Melbourne Airport and the neighbouring Campbellfield employment precinct and into the South Eastern growth area.

For each growth scenario, a varied industry structure is in place. Figure 3 below illustrates employment by industry in 2046 for the low, business as usual and high scenarios. Under a high scenario, increased employment in professional and financial services is expected.

FIGURE 3. EMPLOYMENT BY INDUSTRY – LOW, MIDDLE AND HIGH GROWTH (2046)



Source: SGS Economics & Planning, Deloitte Access Economics (2015)

2.6 Appendices

Two appendices were prepared during the course of this project:

- Appendix A: Climate Change Detail Appendix
- Appendix B: Scenarios Technical Appendix.

PART 2. CURRENT AND FUTURE STATE ANALYSIS

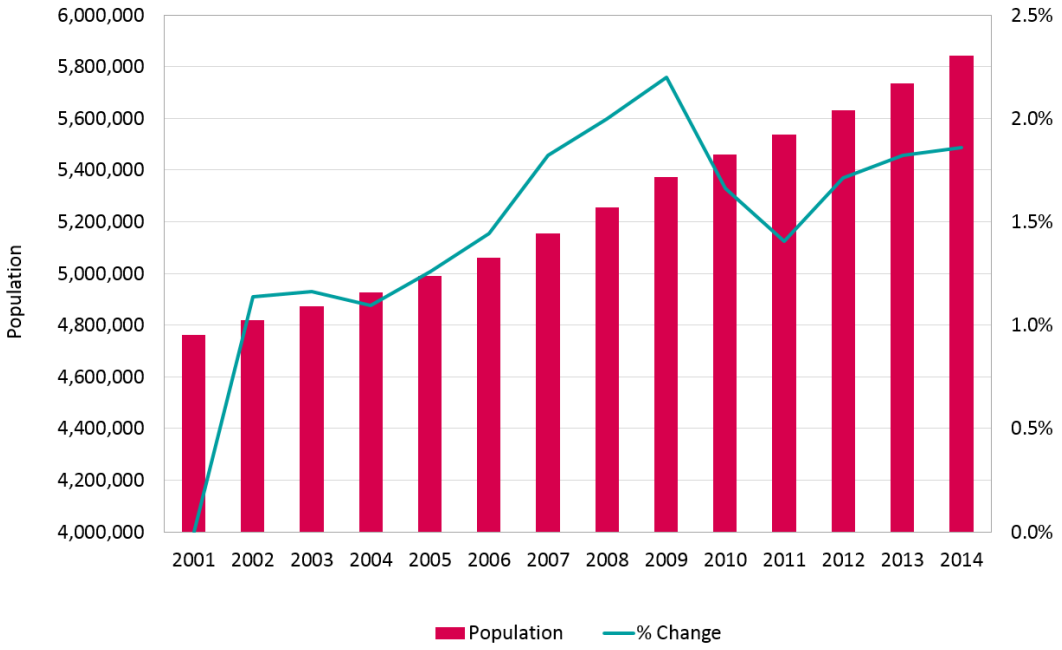
3 BROADER INFLUENCES AND TRENDS

Global and national trends affect Victoria, its regions and its cities and towns. These trends can influence how we use infrastructure, and in turn, infrastructure can shape how communities respond to these trends.

3.1 A growing, more ethnically diverse and ageing population

As Figure 4 shows, Victoria's population grew by 1.1 million people between 2001 and 2014 - an average annual growth rate of around 1.6 per cent (ABS 2015a). The 2016 estimated resident population (ERP) of Victoria is around 6.1 million persons and this population is forecast to grow to 7.2 million by 2026, and to 9.4 million by 2046 (Victoria in Future 2015).

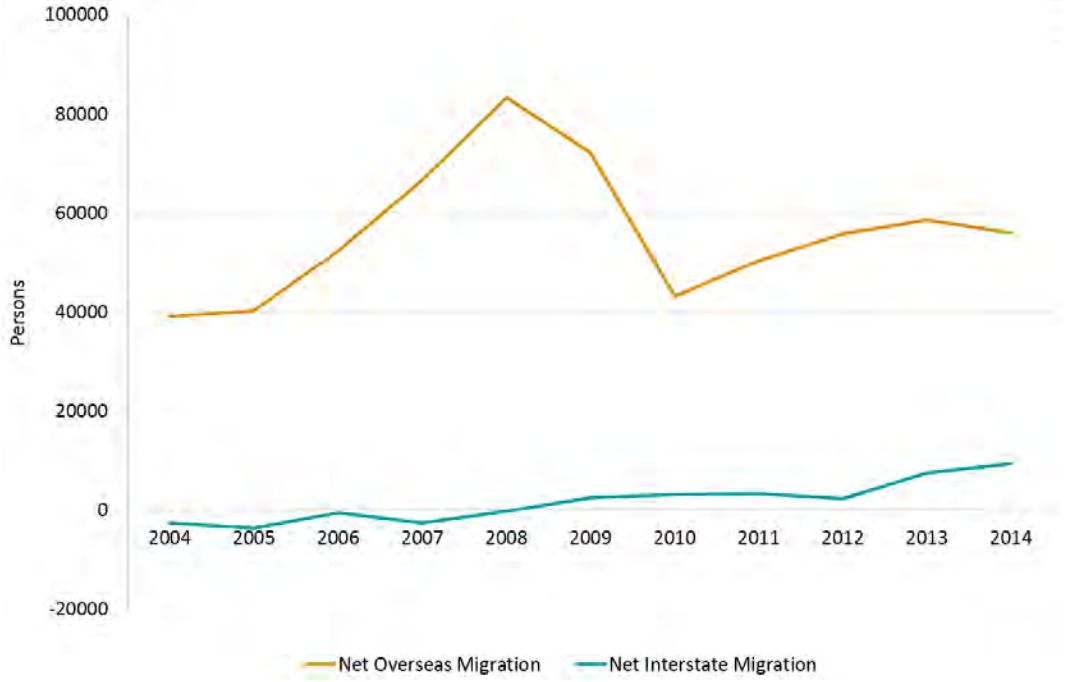
FIGURE 4. POPULATION 2001 TO 2014, VICTORIA



Source: ABS cat no. 3218.0

Victoria is one of Australia's fastest growing states with relatively strong overseas migration and natural population increase. Victoria has absorbed an increasing proportion of interstate migration over recent years, though this is a relatively smaller component (approximately 10 per cent) of overall growth (ABS 2015b). In recent years, the growth rate of Victoria has slowed somewhat following a drop in net overseas migration in 2010 (Figure 5). However, growth remains strong.

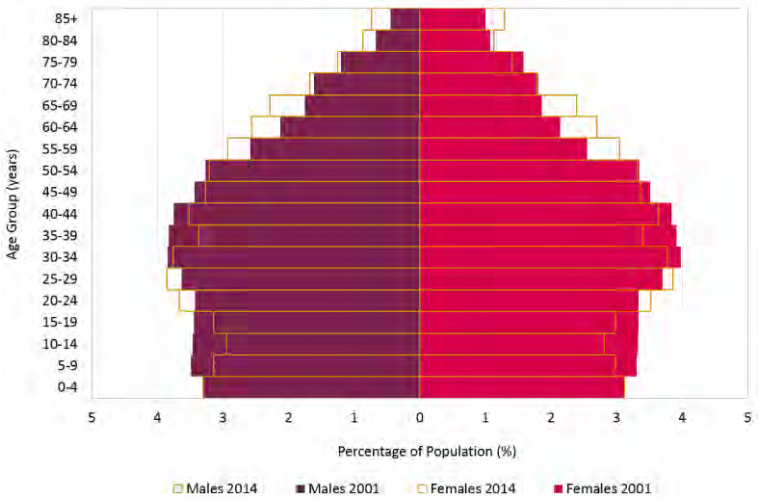
FIGURE 5. OVERSEAS AND INTERSTATE MIGRATION, 2004 TO 2014, VICTORIA



Source: ABS cat no. 3412.0

Ageing is a clear trend in Victoria. This is driven by reduced mortality, lower fertility, immigration and increased life expectancy. The proportion of those aged 65 and over has increased from 13 per cent in 2001 to 15 per cent in 2014 (see Figure 6 below) (ABS 2015c). This population group will increase by around 630,000 between 2016 and 2036 and the dependency ratio – the proportion of those in the labour force versus those outside of the labour force - will decline.

FIGURE 6. POPULATION BY AGE AND GENDER, 2001 AND 2014, VICTORIA

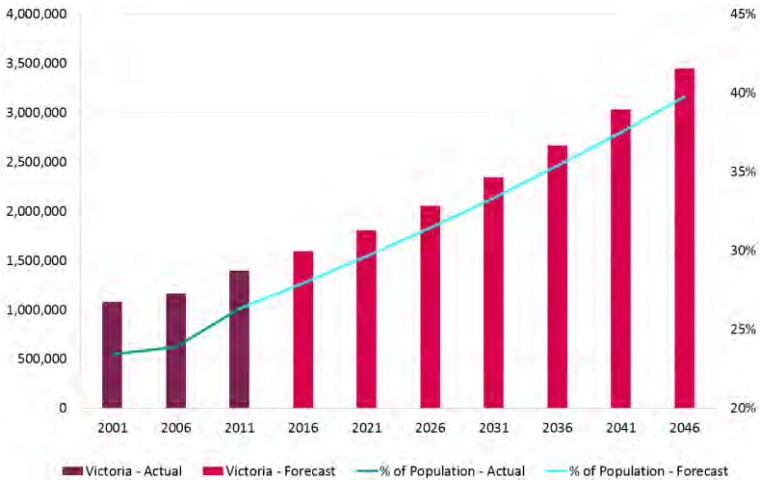


Source: ABS cat no. 3101.0

The number of people born overseas living in Victoria has increased from 1,080,000 to 1,398,000 between 2001 and 2011 (ABS 2012). The percentage of overseas born Victorians steadily increased from 23 per cent in 2001 to 26 per cent in 2011 (see Figure 7 below).

Should immigration patterns remain similar, by 2016 28 per cent of the Victorian population will be born overseas 2016 and 35 per cent in 2036 (ABS 2013b). By 2016, it is expected that around 30 per cent of Victorians will have a non-English speaking background (NESB).

FIGURE 7. NUMBER AND PERCENTAGE OF OVERSEAS BORN POPULATION, VICTORIA



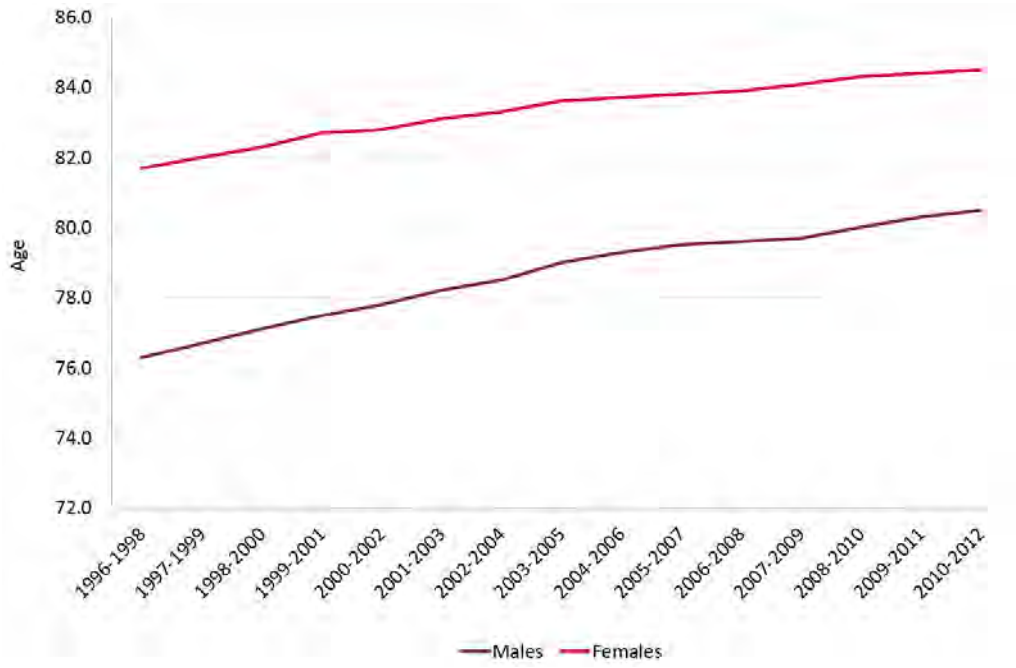
Source: SGS Economics & Planning 2015, based on ABS cat no. 2003.0

Research into the economic contribution of migration suggests that once immigrants settle in Australia, their contribution to economic growth increases. This is particularly evident in the second generation of migrants, who typically have higher educational attainment and employment rates than children of Australian-born parents (Community Relations Commission 2011). Workforce participation is higher for skilled migrants, however refugees, humanitarian entrants and those entering Australia through family reunion can face barriers in obtaining employment.

3.2 Victorians are living longer but health outcomes vary

Life expectancy in Victoria at birth has steadily improved, from 76.3 years of age for males and 81.7 years of age for females in 1996-98 to 80.5 and 84.5 years of age respectively in 2010-12 (Figure 8) (ABS 2014a). This upward trend is projected to continue. Similarly, infant mortality rates have improved and remain low. Life expectancy at birth in Victoria is one of the highest nationally.

FIGURE 8. LIFE EXPECTANCY AT BIRTH BY SEX, VICTORIA



Source: ABS Cat no. 3105.0

Despite high life expectancy rates, both life expectancy and infant mortality rates vary among regions and population sub-groups.

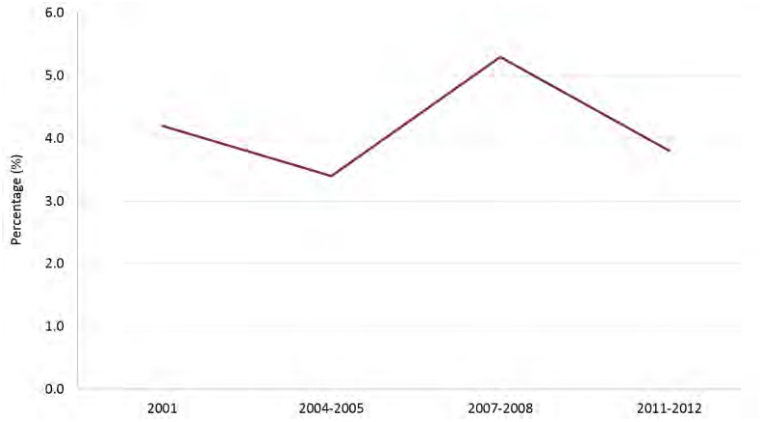
TEXT BOX 3. ABORIGINAL HEALTH IN AUSTRALIA

The greatest differences in health between peoples within a country anywhere in the world exists in Australia (CSDH 2008). 'Indigenous people are generally less healthy than other Australians, die at much younger ages, have more disability and a lower quality of life' (AIHW 2008a, p. 62, in VicHealth 2011). The gap in health status between Aboriginal and non-Aboriginal people in Australia is demonstrated by a significantly lower life expectancy for Aboriginal men and women. New methods now indicate a life expectancy gap between Aboriginal and non-Aboriginal Australians of 11.8 years for men and 10 years for women (ABS 2006), however there is currently not enough information to produce reliable estimates in Victoria (VicHealth 2009). The life expectancy gap is largely the result of unequal access to resources and opportunities necessary for good health (VicHealth 2009). Other factors include disparities in income, quality housing, education and participation in community activities (VicHealth 2009).

Incidences of some chronic diseases in Victoria have increased over recent years, reflecting an ageing population and increases in some risk factors, like obesity and physical inactivity. Analysis of data reported by the Australian Institute of Health and Welfare (AIHW) highlights that incidences of cardiovascular disease and Type-2 diabetes are increasing.

Presently, around 7 per cent of Victorians (8.7 per cent males and 5.5 per cent females) are affected by heart disease and 5 per cent of Victorians are affected by diabetes. The AIHW shows there are higher rates of chronic disease in outer-urban and regional areas which experience socio-economic disadvantage relative to urban populations (AIHW 2014). Figure 9 below shows that the prevalence of self reported heart, stroke and vascular disease peaked in 2007- 2008.

FIGURE 9. PREVALENCE OF SELF-REPORTED HEART, STROKE AND VASCULAR DISEASE, VICTORIA



Source: Heart Foundation 2014

Based on current trends, Australians will continue to become more overweight and obese. It is suggested that 73 per cent of the population will be overweight or obese by 2025, including one third of children and three quarters of adults (National Health and Medical Research Council (NHMRC) 2015). Linked to this is the projected increase of two to threefold in the prevalence of diabetes which is expected to be a key driver of disability in the elderly (NHMRC 2015).

It is worth noting that in the OECD's 2010 report the prevalence of overweight and obesity in Australia was projected to reach 60% by 2014, and 64% by 2019, placing Australia third amongst OECD countries by 2020, behind only the USA and England (OECD 2010 in Obesity Australia 2014). Considering the 2011-2012 ABS Health Survey showed a prevalence of overweight and obesity in Australia of 63%, with 28% obese, Australia has likely surpassed the OECD estimates. A more recent projection suggested that by 2025, the prevalence of overweight and obesity in Australia will increase to 72%, with 34% obese (Haby et al 2012 in Obesity Australia 2014).

The prevalence of obesity in adult Victorians is low compared to national trends. Overseas born and non-English speaking Victorians are less likely to be overweight. There are higher rates of obesity in regional areas and in disadvantaged places (AIHW 2014).

Four preventable chronic conditions are among the biggest direct contributors to the life expectancy gap between Aboriginal and non-Aboriginal Victorians (Victorian Government Department of Human Services 2009 in VicHealth2009). These are cardiovascular disease, diabetes, cancer and mental illness. More than two-thirds of Aboriginal people living in non-remote areas suffer from at least one chronic condition (ABS 2006) and this is increasing (Griew, Tilton et al. 2008, in VicHealth 2009).

The ABS National Health Survey indicates that incidences of mental health conditions, like depressive episodes and anxiety disorders, have remained relatively stable in Victoria. Research highlights a link between psychological distress and difficult life circumstances, like experiences of homelessness, financial stress, living in disadvantaged areas and lower levels of perceived quality of life (National Sustainability Council 2013).

Mental illness is estimated to contribute 15 per cent of the burden of disease for Aboriginal Australians. This is second only to cardiovascular disease (Vos, Barker et al. 2007 in VicHealth 2009). Twice as many Aboriginal Australians (21.4 per cent) suffer high or very high levels of psychological distress compared to non-Aboriginal Australians (10 per cent) (Victorian Government Department of Human Services 2009, in VicHealth 2009).

3.3 Our access to health services has remained stable

The number of beds is used as a broad proxy to estimate the capacity of facilities to provide services and treat patients. Access to hospitals and hospital beds has remained stable over the past five years (Table 5). The number of available beds per 1,000 persons has remained at around 2.4 since 2008/9, indicating that health services have responded to increases in population levels. However, these metrics do not detail whether service levels or funding has increased proportionally to longer lifespans or higher incidences of lifestyle-linked disease.

TABLE 5. HOSPITALS AND HOSPITAL BEDS, VICTORIA

	2008-09	2009-10	2010-11	2011-12	2012-13
Number of hospitals	149	150	151	151	150
Total available beds	12,896	13,198	13,474	13,495	13,449
Available beds per 1,000 population	2.4	2.5	2.5	2.4	2.4

Source: Australian Institute of Health and Welfare and Australian Hospital Statistics, 2013-14.

A more recent study investigated the number of 'points of care' available to Victorian patients, with 'points of care' including the number of beds, operating theatres and other key patient facilities.

The Travis Review (2015) found that from December 2014 to March 2015 there were 13,981 total inpatient 'points of care' across 164 hospital sites in the total Victorian Health Service (Travis 2015). Of these points of care, 12,545 (or 90 per cent) were generally available for use (Travis 2015). These different types of care are disaggregated in the table below.

TABLE 6. EXISTING TOTAL AND GENERALLY AVAILABLE CAPACITY IN VICTORIAN HEALTH SERVICES (VIC)

Capacity Types	Total POC	Generally available POC
Acute same- day only		
- Renal dialysis	696	646
- Surgery	841	803
- Other	779	702
Acute multiday/ overnight		
- Adult	7,198	6,310
- Emergency department short-stay	325	308
- Paediatric	547	472
Critical care		
- Neonatal (NICU and SCN)	477	396
- Adult and paediatric intensive care (including combined ICU/CCU/HDU)	400	322
- CCU (stand-alone)	185	175
Subacute	2,533	2,411
Total inpatient POC	**13,981**	**12,545**
Emergency department, urgent care and primary care patient treatment spaces	1,284	1,190
Specialist suites and facilities		
- Operating theatres	290	237.1
- Procedures/ endoscopy	61	52
- Other	1,075	974

Source: Travis 2015. Note that, as described above, all data is as collected from the survey and verified, other than the generally available operating theatres, which were calculated from theatre schedules. CCU = coronary care unit; HDU = high dependency unit

Continuing to collect this data over time will enable Victoria to better evaluate levels of available capacity in Victorian health services overall, thereby informing infrastructure decisions. Indeed, it will help to address issue of lack of data in this area as noted by the OECD: 'A surprising lack of data on the quality and outcomes of care marks out Australia from its peers' (2015, p.19). The Productivity Commission recognises trends in estimating health care costs among other expected budget pressures over the next 50 years. The following table highlights that health care is expected to rise, as a share of National GDP, from 4.1 per cent to 7.0 per cent in 2059-60. At a State and territory government level, health care expenditure is expected to increase from 2.4 per cent to 3.8 per cent of GDP.

TABLE 7. EXPECTED BUDGET PRESSURES OVER THE NEXT 50 YEARS, AUSTRALIA

	2011-12 Share of GDP	2059-60 Share of GDP
	Australian Government	
Health care	4.1	7.0
Age Pension	2.7	3.7
Age care	0.8	2.6
Education	1.9	1.7
Other	11.2	10.2
Total	**20.7**	**25.1**
	State and territory governments	
Health care	2.4	3.8
Education	3.5	3.2
Disability	0.2	0.5
Total	**6.1**	**7.5**

Source: Productivity Commission 2013.

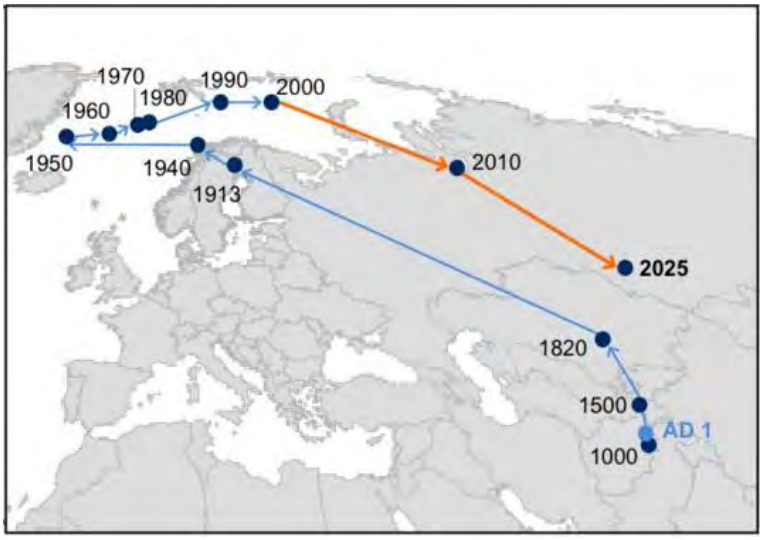
3.4 A changing global and national economy

The global, Australian and Victorian economies have undergone significant changes over the past thirty years. The process and impact of globalisation on Victorian industries has been widely documented. Greater efficiencies of technology and mechanisation are changing the way that traditional industrial businesses operate. The global economy today consists of sophisticated linkages between businesses, which are designed to enable the efficient sharing of information and the delivery of goods through a global supply chain. Supply-chains have become more fragmented and business components are often scattered across wide areas – sometimes internationally. It is commonplace for the design of a product to take place in one country, while the actual production of components and assembly take place in several others.

The emergence of East Asian economies as major producers of manufactured goods over the past 50 years has had a significant effect on the structure of the world economy. East Asia's share of global manufacturing more than doubled from 1970 to 2008, reflecting the region's comparative advantage owing to relatively low labour costs. This process was led by Japan from the 1960s, followed by the newly industrialising economies of East Asia, and most recently China. The rising share of manufacturing in East Asia has been mirrored by a decline in the share of the United States and Europe, as well as in Australia's share[5]. Figure 10 highlights the reorientation of the centre of the global economy to Asia.

The strong growth in Asia's demand for commodities to supply an expanding manufacturing sector has significantly boosted the share of resources in Australian export income and the economy more generally, reflecting Australia's resource endowment and proximity to Asian markets.

FIGURE 10. CENTRE OF GLOBAL ECONOMY



Source: McKinsey Global Institute using Angus Maddison data

Furthermore, looking into the future, a growing middle-class population within Asia will demand a growing number of consumer and professional services.

While Victoria has minimal energy and resource projects planned, these developments are likely to have a significant impact on segments of Victoria's business population from:

- increases in food manufacturing exports to Asia,
- increases in service exports to Asia, and
- Victorian businesses providing professional services to mining and transport related businesses operating in Queensland and Western Australia.

The Commonwealth's 'micro economic reform agenda', initiated under the auspices of the Hawke/Keating Government of the 1980s and carried on with the fiscal/taxation initiatives of the early Howard years, had a significant positive long term[6] impact on Victoria.

[5] For more information, see: http://www.rba.gov.au/publications/bulletin/2010/sep/1.html

[6] Although it may have aggravated the 1991-92 recession for the State.

These reforms provoked an 'internationalisation' of the Victorian economy, with the floating of the exchange rate and the decision to allow foreign banks to operate in Australia.

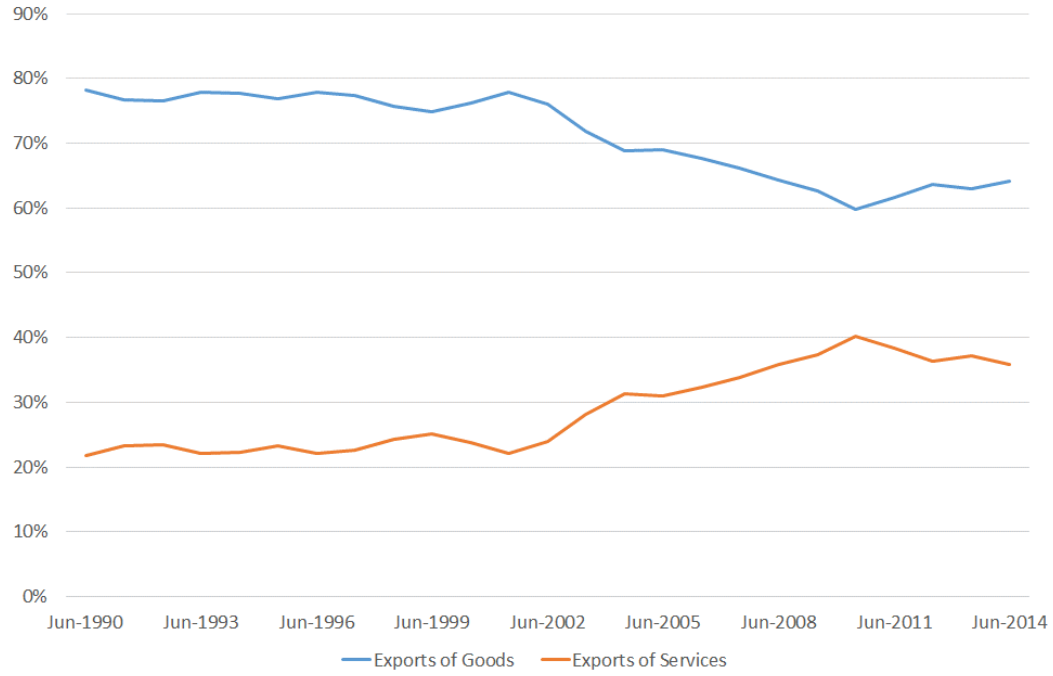
In harness with National Competition Policy, the Kennett Government's move to commercialise, corporatise and even privatise certain infrastructure and State owned businesses injected a fluidity and dynamism into the Victorian economy. Labour market reforms under the Hawke/Keating Government, which focussed on enterprise bargaining, rendered the Victorian (and other Australian economies) fundamentally more flexible in the face of exogenous shocks.

A positive outcome of these international and domestic factors has been the evolution of the knowledge intensive services (education, financial and professional services) as a key element of Victorian competitiveness, an earner of export income and a driver of economic growth.

A negative outcome has been the decline of the manufacturing sector (starting with the textile sector in the 1980s through to the departure of the automotive sector in 2010s) in Victoria.

Figure 11 highlights how Victoria's export earnings have shifted away from goods towards services.

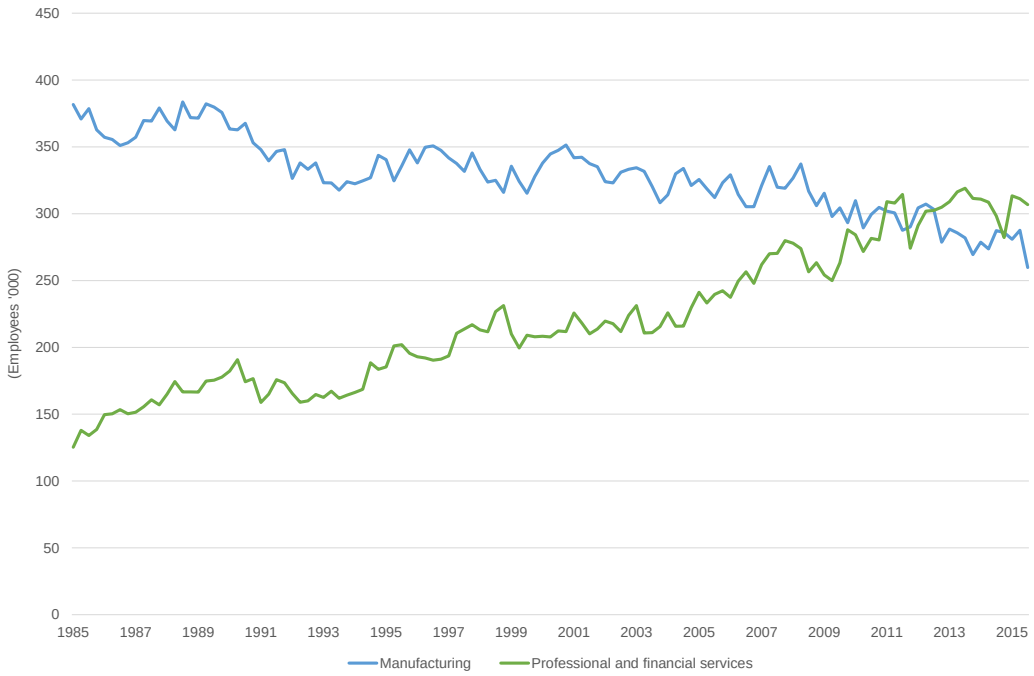
FIGURE 11. SHARE OF VICTORIA INTERNATIONAL EXPORTS



Source: ABS State Accounts cat. no. 5220.0

Figure 12 shows the decline in manufacturing employment in Victoria, and simultaneous rise in professional services (ABS 2015d).

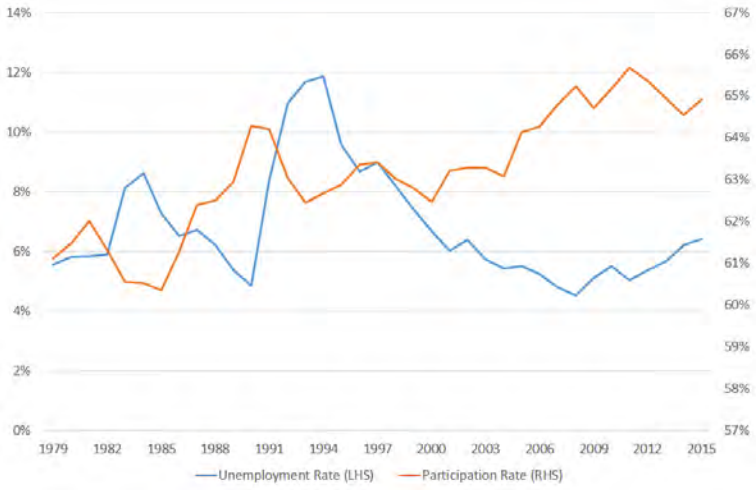
FIGURE 12. EMPLOYMENT (MANUFACTURING AND PROFESSIONAL SERVICES), VICTORIA



Source: ABS State Accounts cat. no. 5220.0

From 2013 to 2015, domestic online retail turnover doubled in Australia. The continued growth of the online economy will be affected by the growth of the sharing economy (for example, Uber, Airbnb, and GoGet) and 'disrupters' such as Netflix. Some of these firms will capture domestic expenditure which would have been previous gone directly to local firms (e.g. a movie purchased from an international firm rather than a local firm).

FIGURE 13. UNEMPLOYMENT AND PARTICIPATION RATE, VICTORIA



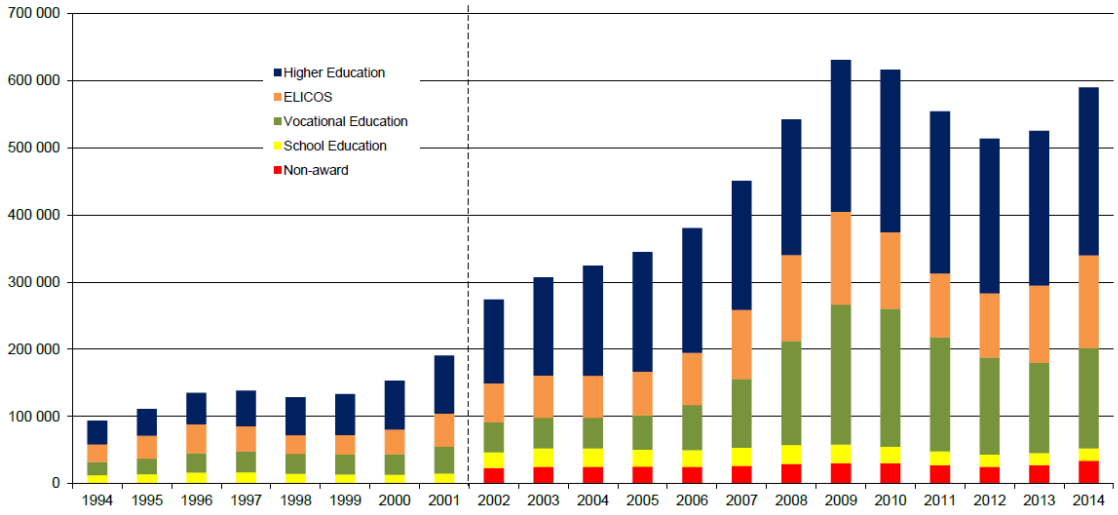
Source: ABS cat no. 6202.0

Macroeconomic trends have impacted on Victoria's employment market (Figure 13). Unemployment rates have generally increased in the 10 years following the Global Financial Crisis. Participation in the labour force has remained relatively steady over the past five years. Unemployment rates are highest among young people, women, people with a disability and some ethnic minorities.

Aboriginal Victorians are less likely to participate in the labour force (63.7 per cent) compared to non-Aboriginal Victorians (73.7 per cent) (AIHW 2008, in VicHealth 2009). Of Aboriginal Australians who were unemployed, 91 per cent report having trouble finding work. The main reason reported for this is due to insufficient education, training and skills (AIHW 2008 in VicHealth 2009).

Unemployment rates vary between regions in Victoria and are vulnerable to changes in local industry sectors. The past decade has also seen strong growth in the export education market. Across Australia, there were around 600,000 international students in 2014 (Figure 14). This has supported the creation of population-serving industries in close proximity to student residential locations – in and around universities.

FIGURE 14. INTERNATIONAL STUDENT ENROLMENTS - AUSTRALIA



Source: Department of Education and Training 2014

There has also been a spatial shift in across the domestic economy. During the 1990s Victoria and New South Wales contributed over half of the GDP growth (Table 8). During the 2010s, this fell to around 40 per cent. Queensland and in particular Western Australia contributed more growth than Victoria and New South Wales. While the mining states now face challenges from slowing commodity markets there has been a spatial economic rebalancing across the country. During the 2010's Melbourne contributed 27 per cent of GDP growth and regional Victoria detracted (the economy shrunk) 7.6 per cent. A reduction in agricultural production in regional Victoria was the main driver of this fall in economic activity.

TABLE 8. CONTRIBUTION TO GDP GROWTH – VOLUME MEASURE

Region	1990s (%)	2000s (%)	2010s (%)	1989-90 2013-14 (%)
Victoria	21.70	21.50	19.40	21.00
Melbourne	16.60	18.50	27.00	18.20
Regional Victoria	5.10	3.00	-7.60	2.80
New South Wales	34.20	21.40	22.40	26.90
Sydney	23.10	19.60	27.30	21.60
Regional New South Wales	11.10	1.80	-4.90	5.30
Queensland	20.30	25.50	22.80	22.60
Western Australia	15.30	20.50	28.60	20.90
South Australia	4.50	5.80	2.30	4.90
Rest of Australia	4.10	5.20	4.20	4.60
Australia	100	100	100	100

Source: ABS cat. no. 5220.0, adapted by SGS Economics & Planning 2015.

There are a range of factors which contribute to the growth of labour productivity.

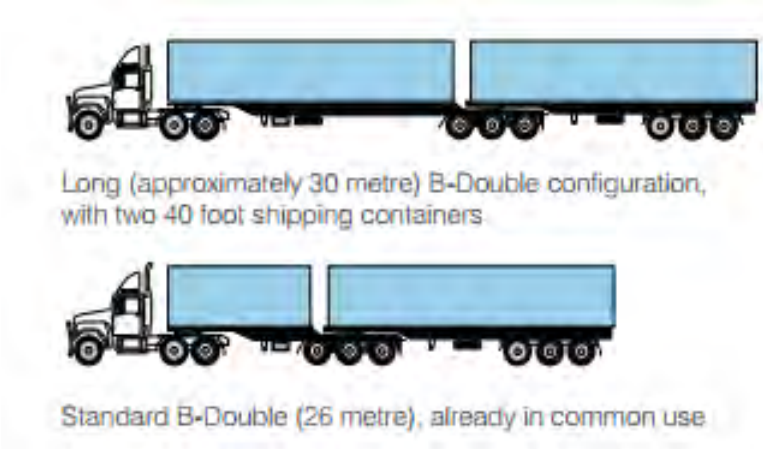
Capital deepening means that, on average, each worker has more capital to work with to generate income (ABS 2015j). Capital deepening is an important driver of labour productivity growth and the provision of new infrastructure plays a role by increasing the stock of capital available. For example, the provision of a freeway can allow higher productivity vehicles to be used to transport freight[7].

Human capital is the skills and experience of our workers that contribute to their income generation capability (ABS 2005). Human capital is a resource in which investments can be made. Infrastructure investments such as schools and universities, that improve the worker's skill and hence productivity, are considered investments in human capital. Improving people's access to education and employment opportunities can also contribute to human capital development.

TEXT BOX 4. EVOLVING FREIGHT REQUIREMENTS

It is possible that broader structural change in the economy will change the relative demand on the freight transport infrastructure such as rail and road. Improved freight productivity requires investment to strengthen the load carrying capacity of the road network. There could be a growing demand for rail freight with development of intermodal terminals in both Melbourne and Sydney. High productivity vehicles (such as those pictured in Figure 15) may become more common on certain routes, while small vans may become important in distributing goods purchased online. Online purchase and more common ecommerce will increase demand on ICT infrastructure.

FIGURE 15. HIGH PRODUCTIVITY VEHICLES



Urbanisation and localisation drive productivity in large urban areas. Urbanisation relates to the size of a markets for business (SGS Economics & Planning 2012). That is, larger cities generate larger economies of scale and scope (see text box below) which boost labour productivity. Localisation relates to the spatial organisation of the city (the ease at which firms can interact with each other). A well organised city will produce productivity benefits via agglomeration economies. Land use and transport infrastructure has a clear role in increasing agglomeration economies.

Research and development is key to developing new products and opening up new markets, further contributing to increased labour productivity. The development of computer software can also increase the productivity of existing capital and workers.

There are a whole range of other factors which can impact on labour productivity, including changes in processes and/or management practices, reallocation of inputs between firms and industries changes in capacity utilisation and natural resources exploitation.

[7] The provision of a freeway can also assist freight productivity by enabling increased hours of operation given some areas are subject to truck curfews, and by enhancing freight reliability (just in time operations rely on adhering to delivery time slots).

TEXT BOX 5. KEY PRODUCTIVITY DEFINITIONS

Economies of scale describe the falling per unit (marginal) cost of production as output increases. Internal economies of scale relate to a firm regardless of industry, market or environment. External economies of scale relate to a benefit to a firm from industrial organisation.

Economies of scope relate to factors that make it cheaper for a range of products to be produced together rather than produced individually, via cheaper centralised functions (management, finance, IT, marketing) or from links elsewhere in the business process.

Agglomeration economies describes the benefits which flow to firms and workers from locating in areas which have a higher density of economic activity.

In Victoria there has been a shift of economy mass toward Melbourne. Since 1990, Melbourne's GDP has been growing at an average annual rate of 3.2 per cent compared with 1.8 per cent in Regional Victoria (Table 8). This shift towards Melbourne aligns with the broader global importance of cities and increasing urbanisation. Urbanisation is central to economic growth, as workers move from rural to urban locations to take advantage of the availability of higher paying and more productive jobs in cities. A key driver of urbanisation is the rise of the 'knowledge worker' and the premium placed on skills as opposed to routine manual labour, and the emergence of lifestyle and liveability as a primary element of investment location decision making criteria.

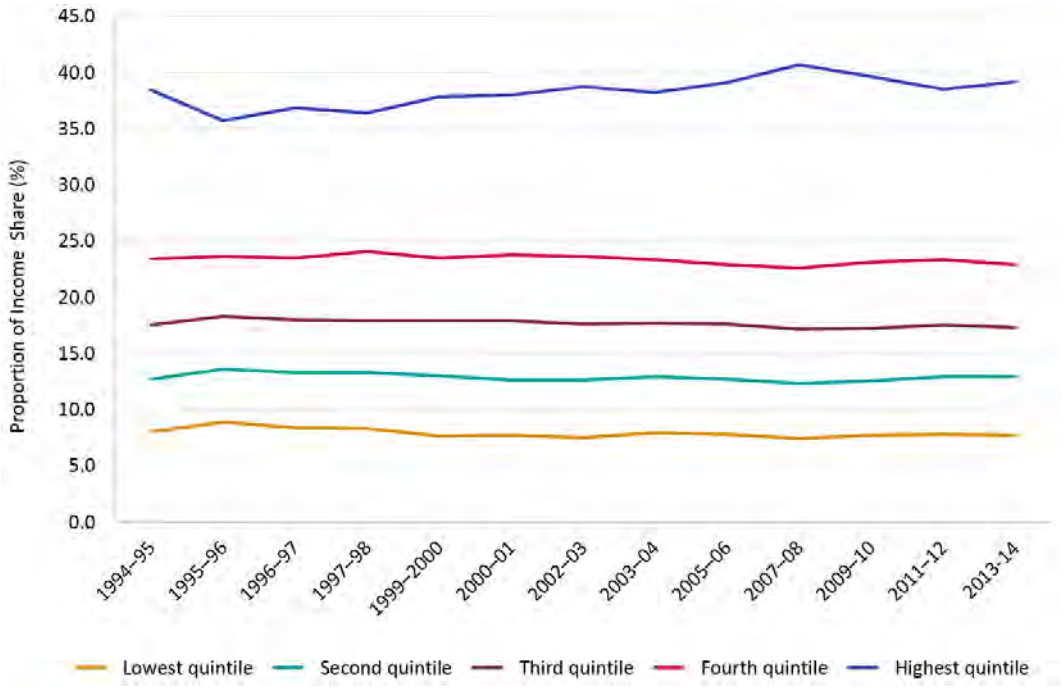
Globally, 54 per cent of the world's population lives in urban areas (UN 2014). As of 2013, 66 per cent of Australians lived in cities and this is projected to grow to 72 per cent by 2053 (ABS 2015a). In 2015, 76 per cent of Victorians live in Melbourne and this is expected to rise to 78 per cent by 2046 (Victoria in Future 2015).

3.5 Rising wealth, but increasing inequality

Household income has increased in Victoria over recent decades across the income distribution scale. However, income distribution has become slightly more unequal since the 1990s. This is reflected in the marginally upwards trend in income share held by the highest income groups and in the rising Gini coefficient from 1994-95 to 2002-03 and from 2003-04 to 2013-14 (Figure 16and Figure 17 respectively). A Gini coefficient is a common measure of inequality.

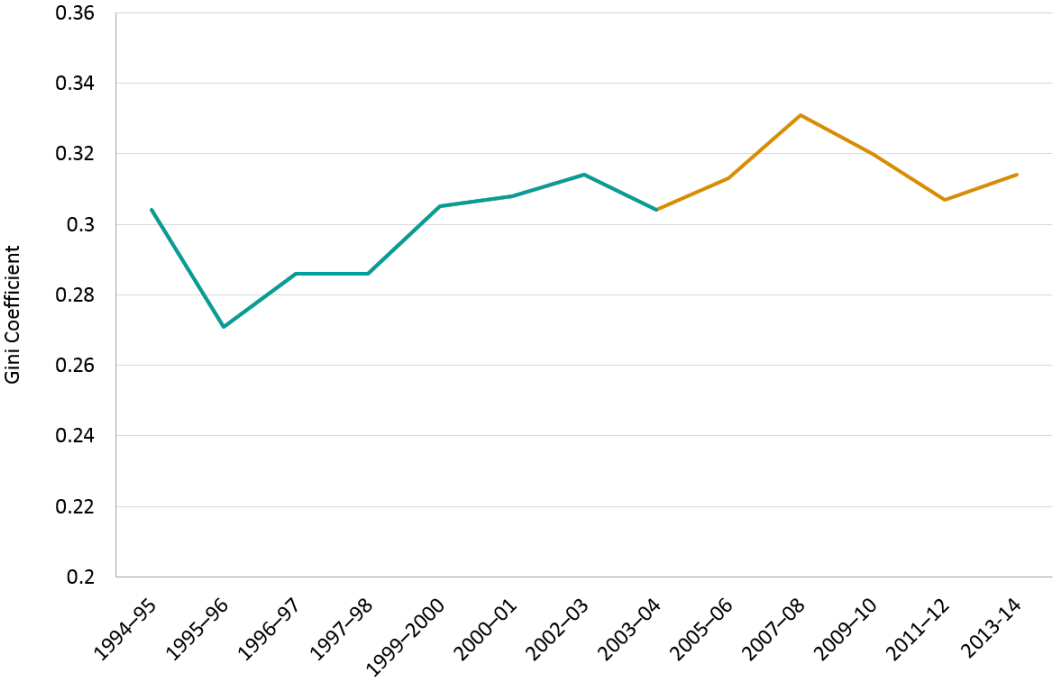
It measures the range of income distribution of residents. To this end, a higher Gini coefficient suggests a larger distribution between incomes – that is, a larger gap between society's richest and poorest.

FIGURE 16. INCOME SHARE BY QUINTILES, VICTORIA



Source: ABS cat no. 6523.0

FIGURE 17. GINI COEFFICIENT, EQUIVALISED DISPOSABLE HOUSEHOLD INCOME (WEEKLY), VICTORIA



Source: ABS cat no. 6523.0.

Aboriginal Australians are more likely to have lower incomes than non-Aboriginal Australians (AIHW 2008, in VicHealth 2009). In 2009, the average weekly income for Aboriginal Australian families was $395

compared to $665 for non-Aboriginal families (VACKH 2009, in VicHealth 2009). In 2002, only 7 per cent of Aboriginal Australian adults were in the highest individual income bracket compared to 20 per cent of non-Aboriginal Australians (AIHW 2008, p. 768, in VicHealth 2009).

3.6 Households are getting smaller and affordability is a continuing challenge

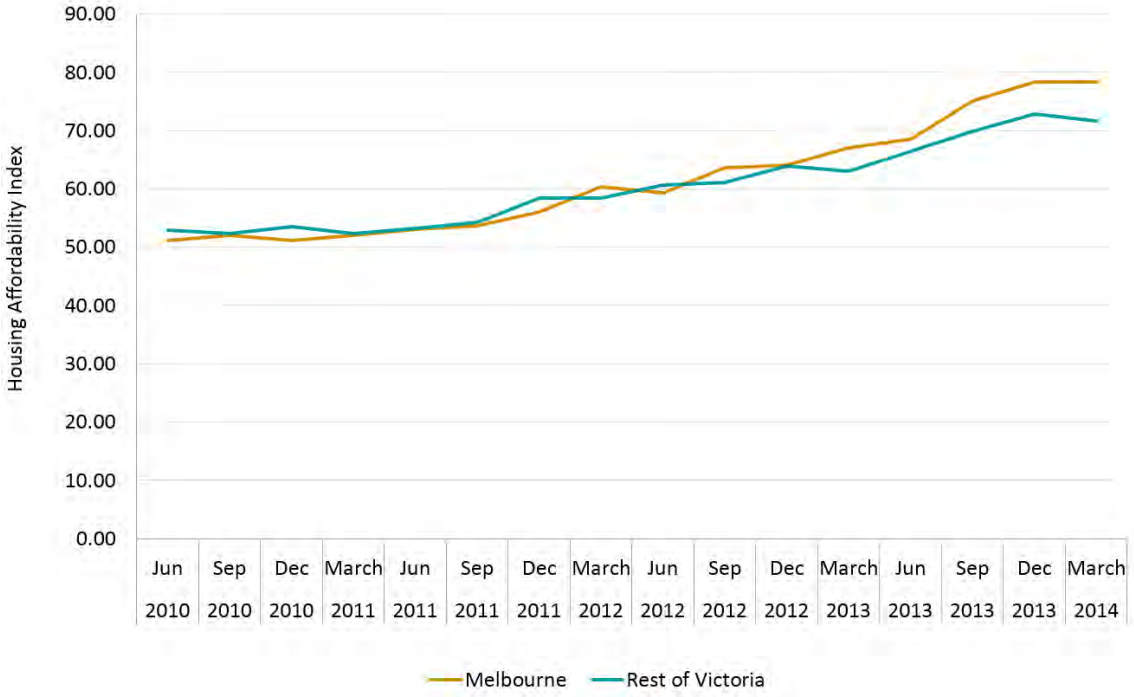
Household size and composition has shifted over recent decades in Victoria from a predominance of family households to more lone-person households. One in 5 households in Victoria is a lone-person household (ABS 2012). This reflects trends in population ageing and other social trends, like increased rates of separation and lifestyle choices in younger population cohorts. In Victoria, the proportion of non-family households (predominantly lone person households) increased from 30.3 per cent in 2001 to 31.8 per cent in 2011. This trend is projected to reach around 33 per cent in 2036 and reaching 34 per cent in 2046 (VIF 2015).

The composition of lone-person households in Australia differs significantly. For example older women are more likely to live alone and people of Greek or Chinese origin are less likely to live alone in older age (Australian Institute of Family Studies 2015). Young people are more likely to live alone in rental housing compared to older Australians. Furthermore, 'living alone appears to be linked with social advantage among younger women but with social disadvantage among middle-aged men' (Australian Institute of Family Studies 2015).

Whilst the proportion of lone person households has increased over time, this rate of growth may have been higher if housing affordability was not as large an issue over the past decade. Home ownership was increasingly more difficult to attain between 2003 and 2007, however since the global financial crisis, trends in home purchase affordability have improved (Housing Affordability Index 2015).

The Housing Affordability Index shows a gradual increase in housing affordability in both metropolitan Melbourne and Regional Victoria over the 2010 to 2014 period, increasing from around 50 index points at June 2010 to around 80 index points for Metropolitan Melbourne, and increasing from around 50-index points to around 70 index points for Regional Victoria (as shown in Figure 18). Even though affordability is increasing, these figures are all still below the index value of 100, indicating a lack of affordability and that mortgage repayments absorb more than 30 per cent of earnings.

FIGURE 18. HOUSING AFFORDABILITY INDEX, MELBOURNE AND REGIONAL VICTORIA



Source: SGS Economics & Planning, based on Housing Industry Association Limited.

Rental housing in Victoria is generally affordable to households on average incomes, however it is critically inaccessible for low income households in both metropolitan Melbourne and Regional Victoria. There is also a trend away from home ownership, with increasingly more households renting in Victoria as a proportion of total households.

Social housing (both public and community housing) in Victoria provides housing solutions to disadvantaged households based on discount-to-market or social rents. Provision of social housing as a percentage of all households has decreased over recent years, declining from 2.9 per cent in 2006 to 2.7 per cent in 2011 (ABS 2006, 2011). At the same time, homelessness increased from a rate of 39 homeless persons per 10,000 in 2001 up to around 43 in 2011 (ABS 2006, 2011).

Access to adequate housing impacts on health. Issues around inadequate housing are particularly important for Aboriginal Australians due to the association between shelter and dispossession from land (Carson, Dunbar et al. 2007, in VicHealth 2009).

Housing data from 2008 indicates that of Aboriginal Victorian households, 54 per cent were living in rented dwellings, while 40 per cent are living in dwellings that were owned, either with or without a mortgage (ABS 2008, in VicHealth 2009). Aboriginal people are more likely to move house than non-Aboriginal people; 65.1 per cent of Aboriginal Australians were at a different address five years before the Census compared to 42.6 per cent of non-Aboriginal Australians (Hall 2009, in VicHealth 2009). Of Aboriginal households, 9.1 per cent are classified as overcrowded, compared to 3.1 per cent of all households in Victoria (Hall 2009, in VicHealth 2009).

3.7 Education outcomes are varied, but generally improving

Early childhood development trends have shown improvement in Victoria, with most children being consistently 'on track' between 2009 and 2012 (Table 9). In comparison to other states, Victoria has a lower percentage of developmentally vulnerable children (
Table 10). However, despite improvements from 2009, 19.5 per cent of children were still considered developmentally vulnerable in 2012. Areas of relative disadvantage were more likely to have developmentally vulnerable children.

TABLE 9. PROPORTION OF CHILDREN 'ON TRACK' ON AEDI DOMAINS, VICTORIA

	2009		2012	
	Victoria (per cent)	Australia (per cent)	Victoria (per cent)	Australia (per cent)
Physical	80.6	77.7	81.1	77.3
Social	77.6	75.4	78.6	76.5
Emotional	77.3	75.6	79.3	78.1
Language	84	77.1	84	82.6
Communication	76.7	75	77.4	74.7

Source: Australian Early Development Census (AEDC)

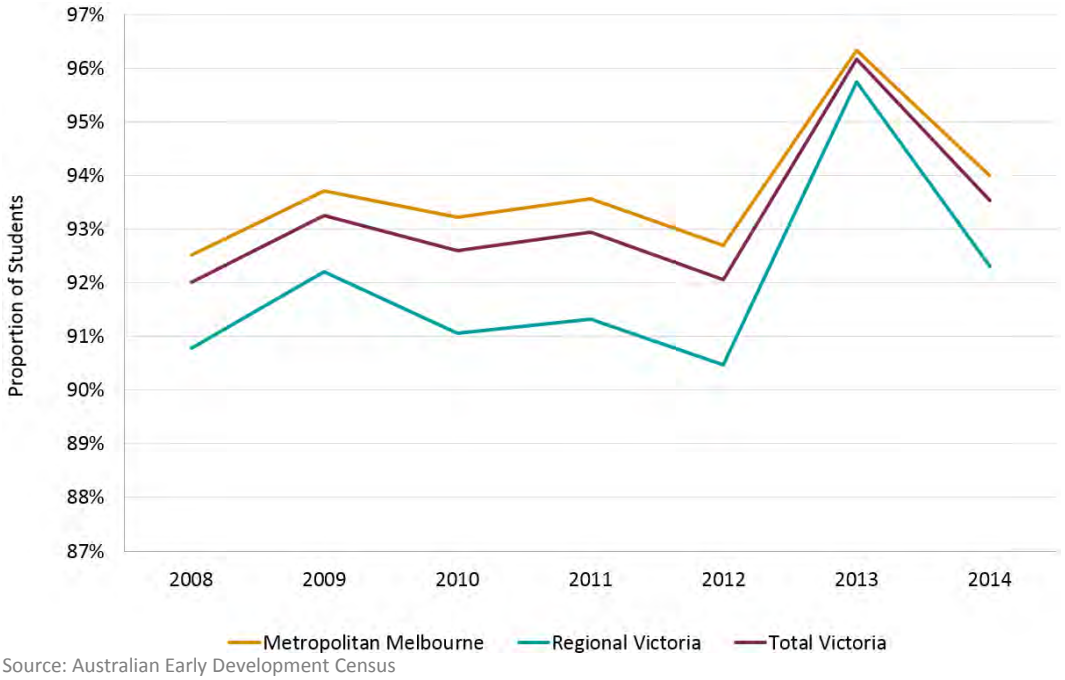
TABLE 10. PROPORTION OF DEVELOPMENTALLY VULNERABLE CHILDREN, VICTORIA

	2009		2012	
	Victoria (per cent)	Australia (per cent)	Victoria (per cent)	Australia (per cent)
Vulnerable on one or more domains of the AEDC	20.3	23.6	19.5	22
Vulnerable on two or more domains of the AEDC	10	11.8	9.5	10.8

Source: SGS Economics & Planning, based on Australian Early Development Census (AEDC)

Figure 19 shows that between 2008 and 2014, the proportion of children in year five who met or exceeded literacy standards in Victoria improved from 92.5 per cent to 94.0 per cent.

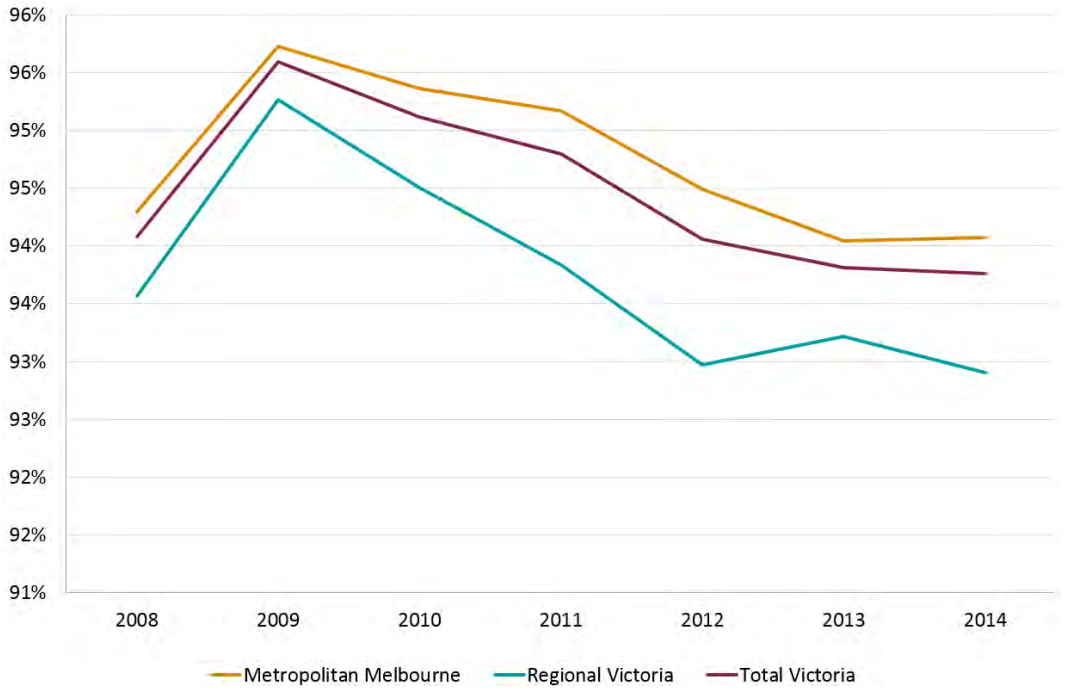
FIGURE 19. PROPORTION OF CHILDREN IN YEAR 5 WHO MEET OR EXCEED LITERACY STANDARDS



Source: Australian Early Development Census

Figure 20 below depicts that trends have fluctuated in numeracy and have not demonstrated improvement recently, dropping from 94.1 per cent to 93.8 per cent between 2008 and 2014. There are variations between regions, with metropolitan Melbourne attaining higher levels of literacy and numeracy standards compared to the Victorian average.

FIGURE 20. PROPORTION OF CHILDREN IN YEAR 5 WHO MEET OR EXCEED NUMERACY STANDARDS



Source: Australian Early Development Census

There is a positive trend in apparent retention rates across both government and non-government schools in Victoria. Overall, it has improved from approximately 84 per cent in 2006 to over 90 per cent in 2015 (Table 11). The upwards trend in retention rates is projected to continue.

TABLE 11. YEARS 7-12 APPARENT[8] RETENTION RATE BY SECTOR, FEBRUARY 2006-2015, VICTORIA

	Government	Non-Government			Total
		Catholic	Independent	Total	
2006	78.8%	93.0%	82.4%	107.6%	84.4%
2007	79.9%	91.1%	81.1%	105.1%	84.4%
2008	78.2%	93.2%	82.1%	108.3%	84.2%
2009	79.3%	93.9%	81.6%	110.3%	85.1%
2010	81.0%	92.4%	82.9%	104.9%	85.6%
2011	82.6%	91.3%	82.6%	102.8%	86.2%
2012	83.0%	90.6%	83.2%	100.3%	86.2%
2013	85.9%	89.9%	84.0%	97.7%	87.6%
2014	88.4%	90.0%	85.3%	96.1%	89.1%
2015	91.0%	90.1%	84.9%	97.0%	90.6%

Source: SGS Economics & Planning, based on Summary Statistics Victorian Schools 2015, Department of Education and Training.

The proportion of government versus non-government schools in Victoria has changed over time. The number of government schools has fallen by 315 or 4.5 per cent (Table 12), driven by the closure and consolidation of public schools. At the same time, Catholic schools have grown by 1.5 percent, and Independent schools have grown by 8.3 per cent. As of 2014, approximately 30 per cent of Victoria's schools were non-government. Hence, the provision of educational services has moved from government to non-government providers.

TABLE 12. GOVERNMENT AND NON GOVERNMENT SCHOOLS, 2000 AND 2014, VICTORIA

	2000	2014	% change
Government	6,966	6,651	-4.5%
Non-Government			
Catholic	1,696	1,722	1.5%
Independent	938	1,016	8.3%

Source: ABS cat. no. 4221.0

Levels of post-school qualifications are high in Victoria compared to other states. 67.7 per cent of Victorians aged 25-64 had a non-school qualification in 2014, up from 56.6 per cent in 2006 (ABS 2015h).

The number of people aged 25-64 with non-school qualifications at Certificate III level or above rose from 1,284,200 people to 1,868,500 people across these two years (ABS 2015h). Similarly, the number of people aged 25-64 with non-school qualifications at Bachelor degree level or above rose from 636,500 to 1,013,100 people across 2004 to 2014 (ABS 2015h). Nevertheless, there is an uneven geographic spread

[8] The term "apparent" retention rate reflects that retention rates are influenced by factors not taken into account by this measure such as: students repeating year levels; interstate and overseas migration; transfer of students between education sectors or schools; and students who have left school previously, returning to continue their school education. This is the reason why figures can be greater than 100%.

of improvements in the proportion of the population with a non-school qualification. Gains have been greatest in major cities across Australia.

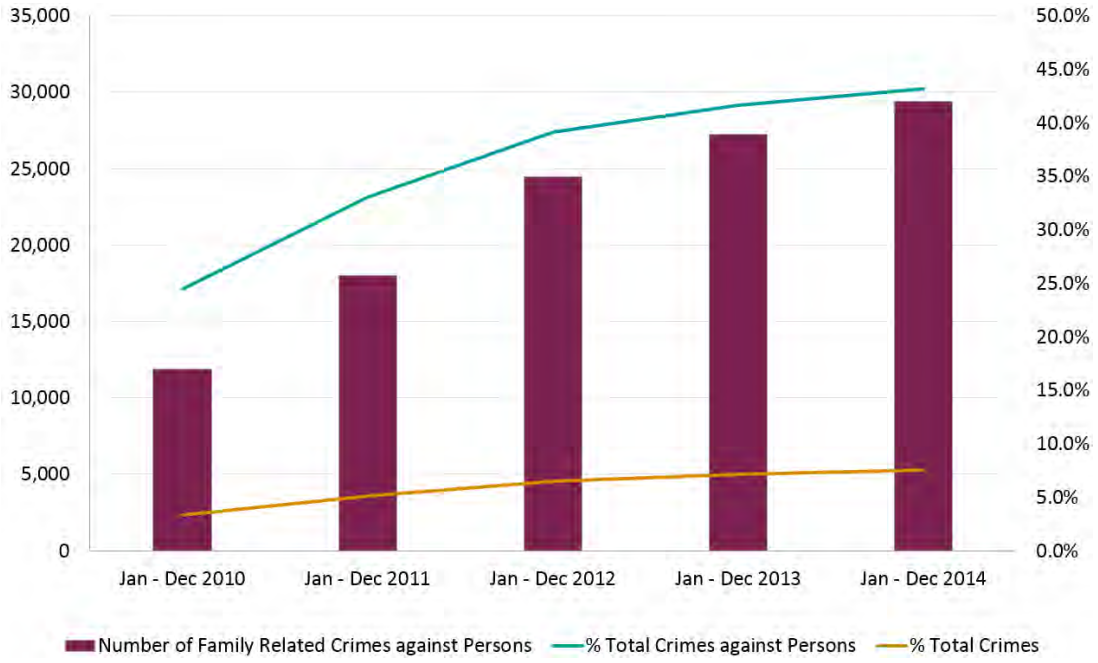
Poor health reduces the educational attainment of Aboriginal Australians (Carson, Dunbar et al. 2007, in VicHealth 2009). It is not clear 'whether higher levels of educational attainment lead to better health, or better health leads to higher educational attainment' (Carson, Dunbar et al. 2007, p. 148, in VicHealth 2009). Mainstream education can have a detrimental impact on the emotional and social wellbeing of Aboriginal Australians. Education is usually delivered to an Aboriginal minority and can be culturally and linguistically alienating with significant implications for the wellbeing of Aboriginal young people (Carson, Dunbar et al. 2007, in VicHealth 2009).

Victorian statistics indicate that for 22.8 per cent of Aboriginal Victorians, year 12 or equivalent is the highest year of school completed, compared to 44 per cent of non-Aboriginal Victorians (ABS 2007, in VicHealth 2009). Young Aboriginal Australians are about 15 times less likely to have a Bachelor degree or above and around 23 per cent less likely to have a certificate or diploma (AIHW 2008, in VicHealth 2009).

3.8 Crime has increased

As Figure 21 shows, the overall crime rate in Victoria has increased over the period 2010 to 2014, with the rate of recorded offences per 100,000 population increasing from 6,921 to 7,808. The number of family related crimes has increased faster that the total rate of crimes. Overall however, crime rates remain low compared to international trends.

FIGURE 21. FAMILY RELATED CRIMES AGAINST PERSONS, VICTORIA



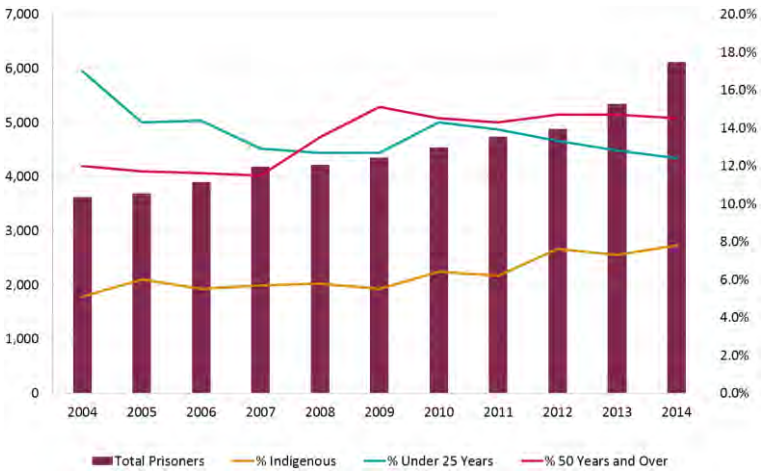
Source: Crime Statistics Agency (CSA), SGS Economics & Planning.

Reported crime in Victoria is only half the picture. There are many crimes that go unreported, which surveys often attempt to capture. In the 2013-14 period, an estimated 2.9 per cent of the Australian population were threatened with assault and 2.3 per cent reported experiencing physical assault (ABS 2015g)[9]. Results indicate that people on low-incomes were more likely to experience both physical and threatened assault. Of those people who experienced physical assault, 47 per cent reported that they did not tell police usually because they thought it was too unimportant or because it was a personal matter. Offenders were typically intimate partners or family members.

[9] Statistics based on results from the Crime Victimisation Survey 2013-14, which comprised a sample of 27,327 fully responding households across Australia.

Most people who experienced face-to-face threatened assault did not tell police (64.9 per cent). The difference between police recorded offences and survey reported victimisation is likely to be highest in relation to sexual assault. However, national and state-based data in relation to sexual assault is considered too unreliable for general use. The Victorian Crime Statistics Agency reported that 7,024 sexual offences were recorded by police in 2010 and 10,738 sexual offences were recorded by police in 2014. As a percentage of all crimes against people in Victoria, the rate of recorded sexual offences has increased from 15 per cent in 2010 to 16 per cent in 2014.

FIGURE 22. HISTORICAL TRENDS OF PRISONERS[10]

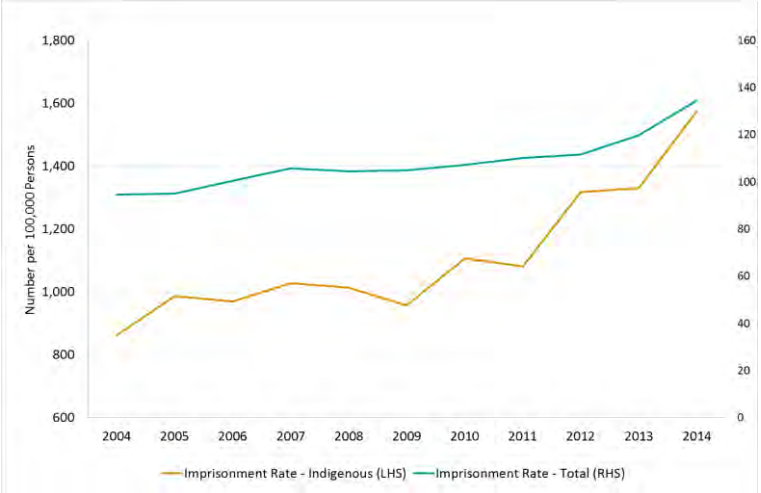


Source: Department of Justice & Regulation

Some community groups, such as young people and Aboriginal and Torres Strait Islander people, have a higher representation in Victorian prisons. Since 2004, the number of Indigenous prisoners as a proportion of all prisoners has increased to 8 per cent, while the proportion of those under 25 years has declined (Figure 22).

Overall imprisonment rates have increased to about 140 per 100,000 people, or almost 1,400 per 100,000 of the Indigenous population (shown in Figure 23 below).

FIGURE 23. IMPRISONMENT RATE PER 100,000 PEOPLE



Source: Crime Statistics Agency 2015

[10] Perceptions of safety can also capture concerns around global events rather than just local factors.

3.9 Conserving and celebrating Victorian Aboriginal heritage is a priority

At the 2011 census, there were 37,990 Aboriginal and Torres Strait Islander people living in Victoria (Census 2011).

The Victorian Aboriginal Heritage Register (VAHR), holds the records of many of the known Aboriginal cultural heritage places and objects within Victoria. Aboriginal heritage places and objects are irreplaceable, non-renewable resources which also include traditional and spiritual sites of significance. There are over 30,000 Aboriginal places and objects that have been recorded on the VAHR, with many these places and objects located on private property. It is important to note that there are still many Aboriginal places and objects yet to be discovered. The Register is not publicly accessible due to the culturally sensitive information within it (Office of Aboriginal Affairs, Victoria 2015).

The Victorian Aboriginal Corporation for Languages (VACL) has identified 38 languages and 11 language families in Victoria, as shown on Figure 24 (2015). Many of these languages are further divided according to clan groups and their corresponding traditional lands.

FIGURE 24. ABORIGINAL LANGUAGES OF VICTORIA, 2015

Source: VACL 2015.

Many of these languages are no longer in everyday use. This loss of Victoria's Aboriginal linguistic heritage is a direct result of colonisation. Language displacement and loss has particularly affected Victoria and Tasmania. Recently, Victorian Aboriginal people, together with linguists are attempting to revive and protect Aboriginal language through an array of educational programs (VALC 2015).

Protection and preservation of the Victorian environment is inextricably linked to the preservation of Aboriginal Heritage sites. Land is fundamental to the wellbeing of Aboriginal people (Australian Government, 2015). The land is not just soil or rocks or minerals, but a whole environment that sustains and is sustained by people and culture. For many Indigenous Australians, the land is the core of spirituality. This relationship and the spirit of 'country' is central to many of the issues that are important to Indigenous people today. National parks can contain sites of significance for Aboriginal communities,

such as rock engravings and artwork. National parks can be significant for Aboriginal people because of Dreaming stories associated with those sites (Australian Government 2015).

3.10 Historical land use has degraded the Victorian Landscape

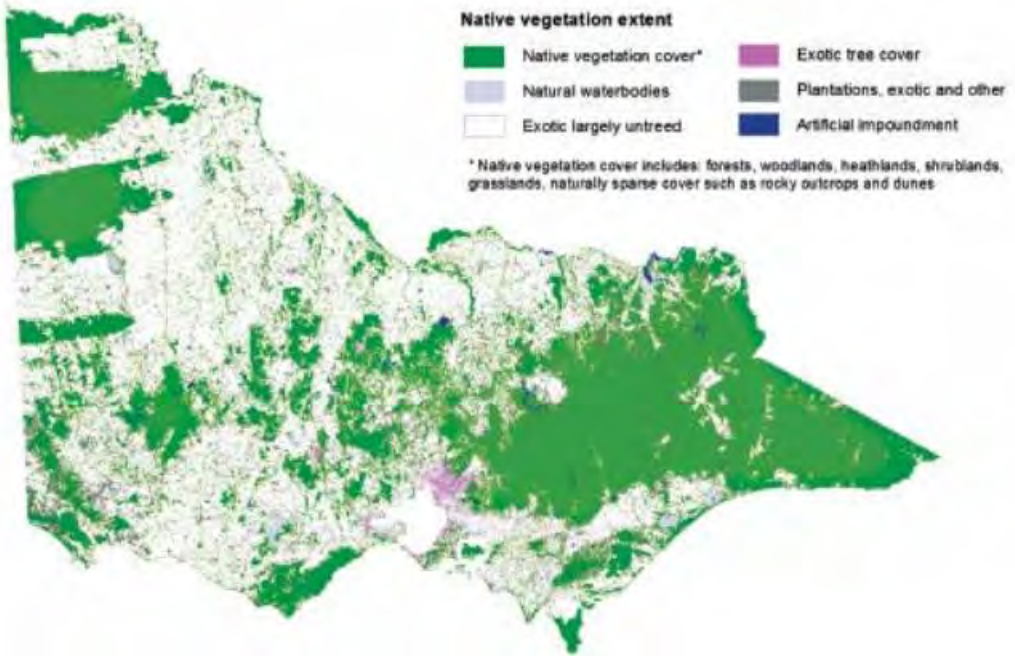
Victoria is the most cleared state in Australia. Nearly two thirds of Victoria is now used for agriculture and urban settlement. The historic clearing of native vegetation in many locations in Victoria has resulted in loss of habitat and a resulting decline in native species (Commissioner for Environmental Sustainability Victoria 2013).

At 2010, native vegetation covered around 10.9 million hectares of Victoria. While private land covers around two-thirds of Victoria, it has only retained 20 per cent original vegetation. The quality of this remaining vegetation is likely to be declining, particularly in fragmented landscapes. Landscape fragmentation involves the alteration of land resulting in spatial separation of habitat units from a previous state of greater continuity. It occurs naturally on a geologic time-scale or by unusual and catastrophic events, and by human activity. Human activity has dramatically altered landscapes throughout Australia, resulting in a level of habitat fragmentation that has reduced both biodiversity and yields of natural resources.

Vegetation quality is generally stable on public land, which has retained 80 per cent of its original vegetation. Roadside reserves provide for large areas of native vegetation (over one million hectares), performing an important role of being a habitat corridor for wildlife across fragmented landscapes (Victorian Environmental Assessment Council 2011).

The primary source of native vegetation loss is chronic degradation of habitats, predominantly in fragmented landscapes. The extended drought in Victoria is likely to have impacted heavily on vegetation quality, as have the large bushfires in recent years (Commissioner for Environmental Sustainability Victoria 2013). Figure 25 depicts the extent of native vegetation as at 2010.

FIGURE 25. NATIVE VEGETATION EXTENT IN VICTORIA, 2010



Source: DELWP 2010.

Loss of vegetation has occurred most significantly in three types of ecosystems; native grasslands, grassy woodlands and ironbox forest. The North, North West and Western areas of Victoria (which are relatively

flat and agriculturally productive) are amongst the most cleared areas. Less than a quarter of native vegetation remains in the Victorian Volcanic Plain, Victorian Riverina, Warrnambool Plain and Wimmera.

Less than one-third of the Gippsland Plain, Dundas Tablelands and Murray Mallee retains any native vegetation. Those areas that have retained the most native vegetation are either in mountainous areas, desert (Lowan Mallee), or floodplain (Murray Scroll Belt, Robinvale Plains). The most heavily cleared areas have correspondingly lost the highest number of species (Commissioner for Environmental Sustainability Victoria 2013).

Fragmented landscapes cover 79 per cent of Victoria but account for 54 per cent of the current extent of native vegetation. At 2010, of the 22,698,620 hectares of land across Victoria, 4,866,321 hectares (22 per cent) were largely intact and 17,832,299 hectares (79 per cent) contained fragmented landscapes. The incremental loss of small patches of native vegetation adds to the loss of habitat. DSE estimates around 1,600 hectares of woody native vegetation and 3,000 hectares of grassy native vegetation are lost annually, mostly on private land. Gains in native vegetation total about 400 hectares of woody vegetation per year (Victorian Environmental Assessment Panel 2010).

3.11 Air quality has improved

The air quality in Victoria has improved over the decades, and now rates well against international standards. At present fires and dust storms are responsible for the majority of air pollution events in Victoria. Localised pollution does occur from urban sources, including from industrial pollution, wood heaters and transport exhaust. Air quality monitoring is undertaken regularly in Melbourne, however Regional Victoria monitoring is limited (Commissioner for Environmental Sustainability Victoria 2013).

The Environmental Protection Authority (EPA) measured air quality at 16 sites around Victoria in 2013. On average there was good air quality in the Port Phillip (Melbourne and Geelong area) and Latrobe Valley regions in 2013. Some areas however experienced poorer air quality due to local sources (in particular, Brooklyn in the West). In 2013, PM10 particles was the pollutant most frequently measured above the Ambient Air Quality National Environment Protection Measure (AAQ NEPM) air quality standard. The goal of not exceeding the air quality objective for PM10 particles on more than five days at one monitoring site was met at all general air quality stations in Melbourne. More than five exceedances occurred at Geelong South and Morwell East in the Latrobe Valley (EPA 2013). Since 2002 the major changes in air quality were due to major bushfires, planned burns, and windblown dust due to the effects of drought in Victoria (Commissioner for Environmental Sustainability Victoria 2013).

3.12 Water management will increase in importance in the future

The supply of water is essential in urban and regional settings and all aspects of its supply should be considered in an infrastructure setting. It is likely that demand for water will increase through rising population notwithstanding potential increases in water efficiency. If at the same time, there is increased likelihood of unusual weather patterns, such as longer droughts and higher temperatures, this will both reduce the supply (at some periods of time) and increase demand – e.g. high loss of soil moisture through evaporation requiring additional irrigation.

These effects will be regionally specific depending on both the condition of the water catchment and the extent of demand for water within the catchment. Looking forward, particular focus should be on understanding potential growth in population relative to water availability. For example, urban expansion in the western areas of Melbourne which currently accesses water from the eastern ranges may generate significant costs and risks in water supply, limiting expansion.

It is now clear that without our water catchments being in good condition there are risks to the delivery of water of suitable quality since the environment provides the necessary infrastructure to regulate water flows and purify/filter water. Without this infrastructure it will be necessary to develop alternative water sources such as additional filtration or desalination plants. More generally, the effects of climate change mean that there is uncertainty in forecasting likely impacts on water supply and providing sufficient capacity to cater for this uncertainty will be an important infrastructure issue.

The total available volume of Victoria's water (including groundwater and recycled water) was 21,310,000 ML in 2013-2014. Of this, 21 per cent was taken for consumptive purposes in 2013–14. This is slightly less than in 2012-13, which is likely to be a result of higher rainfall, resulting in less demand for irrigated water. Annual rainfall in 2013–14 was generally average and above-average, compared with widespread below-average rainfall in 2012–13. Dry catchment conditions remained however, which reduced annual streamflow volumes to most rivers. (Department of Environment, Land, Water and Planning 2014).

Water availability during 2013–14 was below-average in most parts of Victoria, but remained well above the low volumes recorded in the mid-2000s. The total volume of water within Victoria's major reservoirs reduced, which started the year at 72 per cent capacity and ended at 68 per cent. This is a much healthier result than 2008–09, when storage levels were 17 per cent (Department of Environment, Land, Water and Planning 2014).

Groundwater levels in June 2014 were generally stable or rising. Declining levels were observed in areas including Moe and Stratford near Gippsland, and Gellibrand and Jan Juc near the Otway Coast. (Department of Environment, Land, Water and Planning 2014).

3.13 Climate change will impact Victoria in many ways

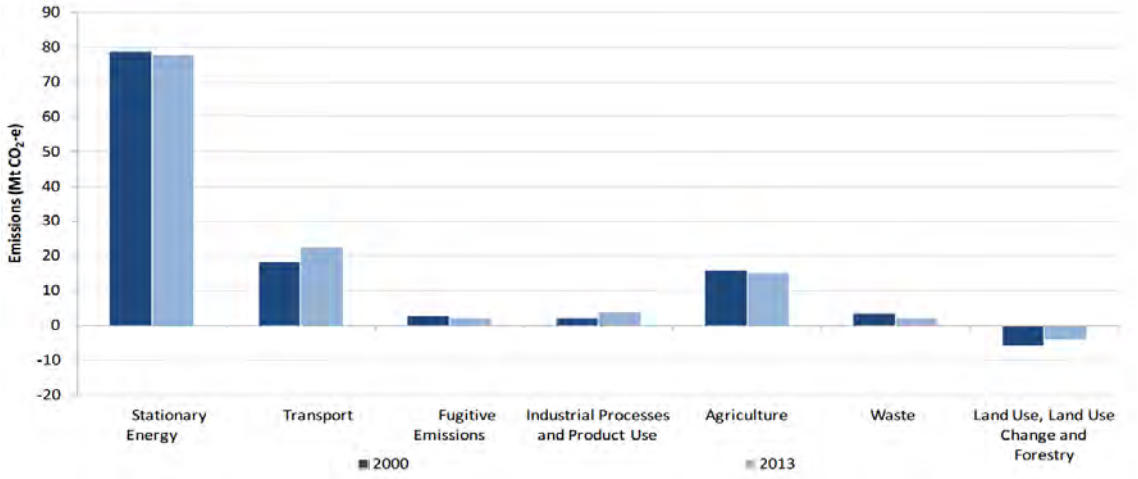
Climate change is set to continue over the coming decades, with major consequences globally. Climate change and the associated impacts may occur non- linearly or abruptly which could see thresholds of coping capacity exceeded in short time periods. A significant warming trend is expected across Australia into the future.

In addition to rising average temperatures, climate change is expected to generate a range of other impacts including:

- change in rainfall patterns,
- greater variability and unpredictability in weather patterns,
- more extreme hot, wet and dry events,
- more frequent and more severe disasters such as fires, floods and storms,
- rising sea levels, and
- acidification of oceans.

Between 2000 and 2013, Victoria's total net greenhouse gas emissions per year grew by 3.1 per cent, from 116.1 mega tonnes CO_2 –e in 2000 to 119.7 mega tonnes CO_2 –e in 2013 (Department of the Environment 2013). The sectoral composition of these emissions are shown below.

FIGURE 26. VICTORIAN GREENHOUSE GAS EMISSIONS BY SECTOR, 2000/2013

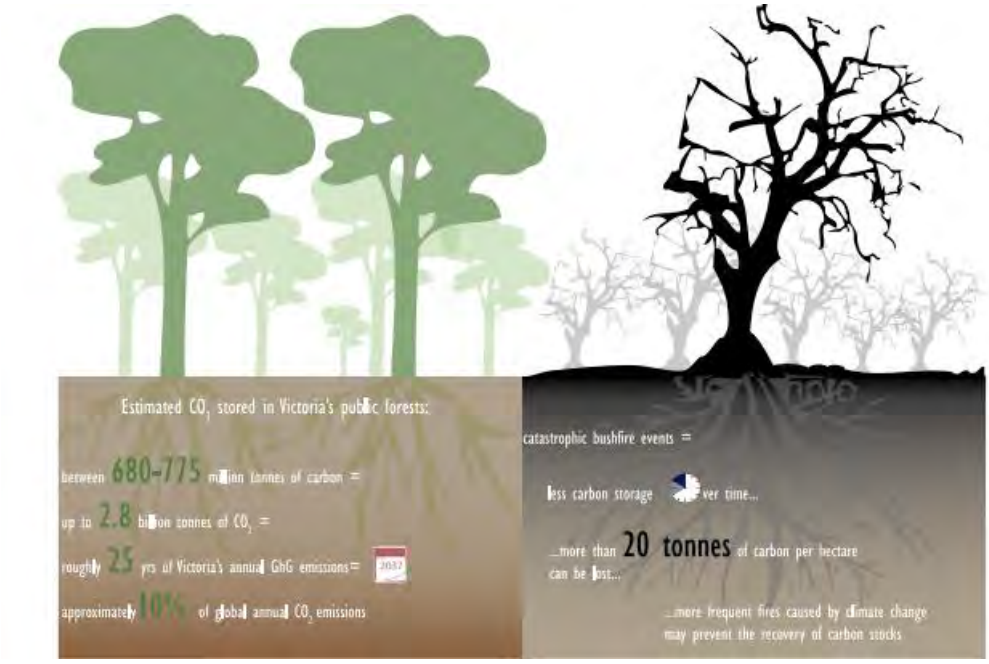


Source: Department of the Environment 2013.

The complexity of ecosystems and the uncertainty of projected climatic changes will make it difficult to understand precisely how Victoria's natural environment will respond to climate change. It is clear that climate change will affect the basic physical and chemical environment underpinning all life.

Victoria's public land holds the equivalent of 680-775 million tonnes of carbon dioxide. The recent bushfires have decreased holdings in Central Highlands and Alpine areas compared to the largely unburnt areas in East Gippsland and the Strzelecki Ranges (Commissioner for Environmental Sustainability Victoria 2013). This has implications for the amount of carbon dioxide that is able to be stored within our environment (Figure 27).

FIGURE 27. IMPACTS OF BUSHFIRE ON CARBON STORAGE IN VICTORIAN FORESTS



Source: Commissioner for Environmental Sustainability 2013.

While ecosystems are dynamic and in a constant state of flux, the historically unprecedented rate at which the climate is changing may drive ecological imbalances and major structural shifts that could undermine critical ecosystem services as well as the cultural values we attach to biodiversity.

Increasing incidence and severity of natural disaster, as well as climatic extremes, will have financial, social and health implications for our communities and a disproportionate impact on some of our most vulnerable people (Commissioner for Environmental Sustainability Victoria 2013, National Sustainability Council 2013).

Climate change presents risks to economic activity in Victoria. For example, the availability of fertile soil and water underpins agricultural production and the natural environment provides the base for tourism and recreation and hence support economic activity.

Increased risk of higher temperatures and lower rain fall will impact on agricultural production. This will reduce income from food production and will also have impacts in communities which provide services to the agriculture. For example, falling wheat production will reduce demand for new harvesters and fuel to power equipment. Earlier flowering and planting times, changes in the distribution of pests and reduced water security may create additional costs for producers.

It may also require new infrastructure to be built to service new areas of production as certain crops become viable in new areas. Existing infrastructure may also be stranded by crops no longer being viable in existing areas. Both of these come with costs to the Victorian economy.

Extreme heat events can impact on major events. For example, in recent years extreme heat has impacted on the Australia Open. These heat events discourage locals and tourists from attending the event on certain days and creates challenges and costs for the operation of the event.

Basic infrastructure is also impacted on extreme heat events. In recent years the rail network has been disrupted by very high temperatures impacting on business operations. Increased bushfire activity has also destroyed public and private infrastructure which has had to be reconstructed at significant costs and with the burden of higher insurance premiums.

3.14 We are better at managing our impact on the environment

Victoria continues to rely on coal for power generation. However, the use of renewable energy is increasing. Since 2000, Victoria's installed capacity of renewable energy has increased from 668 megawatts to more than 1,860 megawatts in 2012. Victoria's total renewable energy generation in gigawatt hours was 3,825 in 2013, nearly 30 per cent more than the amount of generation in 2011. In 2012, renewable energy generation produced from Victoria met around 7.7 per cent of the state's total electricity demand (Clean Energy Council 2013).

Victoria generated an estimated 12,176,000 tonnes of waste in 2011–12 (Sustainability Victoria 2015). Of this, around 4,162,000 tonnes was sent to landfill (Sustainability Victoria 2015).

The amount of waste generated decreased by around 321,000 tonnes in this time period (three per cent) compared to 2010–11. This is likely to reflect a decrease of an estimated 622,000 tonnes (13 per cent) in material from the construction and demolition sector generated over the same period. The following table (Table 13) shows the 2011-2012 breakdown of main materials generated, recovered and landfilled.

TABLE 13. MAIN MATERIALS GENERATED, RECOVERED AND LANDFILLED IN 2011- 12 (TONNES)

Materials		Generated*	Recovered	Landfilled	Materials Recovered (%)
Organics	Food waste	929,000	31,000	898,000	3
	Garden waste	760,000	500,000	260,000	66
	Wood/ timber	415,000	112,000	303,000	27
	Other organics **	335,000	335,000	<1,000	n/a
Commingled recyclables	Paper/ cardboard	2,143,000	1,665,000	478,000	78
	Glass	276,000	195,000	81,000	71
	Plastics	570,000	149,000	421,000	26
Tyres and rubber***		55,000	49,000	6,000	89
Metals		1,540,000	1,470,000	70,000	95
Concrete/ bricks/ asphalt		4,415,000	3,502,000	913,000	79
Textiles		160,000	5,000	155,000	3
Other		576,000	0	576,000	n/a
Totals		12,176,000	8,014,000	4,162,000	66

Source: Sustainability Victoria 2015. * Modelled data. ** Includes agricultural waste, sawdust, bark and woodchips. *** Data for tyre and rubber streams is incomplete and should not be considered as a true representation of the current state for this stream.

Victorians are increasing their recycling. Victoria's resource recovery was 70 per cent in 2013-2014; a 19 per cent improvement since 2002-03. The recovery of metal waste increased by 11 per cent against 2012-13, however the recovery of aggregates, masonry and soil decreased by 10 per cent during the same period (of which typically accounts for around half of all material recovered in Victoria). Recovery of organic waste decreased by five per cent, the lowest amount of organic material recovered since 2009-10.

Victoria's success in its recycling achievements is largely attributable to increased efficiencies in waste and resource recovery infrastructure and processes (Sustainability Victoria 2014). It can also be attributed to the recovery of construction and demolition material (which is slowly gaining recognition as a good replacement for virgin construction materials) (Sustainability Victoria 2011).

3.15 Conclusion

A range of global and national trends will affect Victoria, its regions and its cities and towns. Our population is growing, both in size and in diversity. We are an ageing population and are living longer, however health outcomes vary. Access to health services has remained stable, and improving our data collection methods will help us understand this further in the future. There is a changing global and national economy, which has ongoing implications for Victoria and its industries. Wealth is rising, but so is inequality. Households are changing in their structure and size, with housing affordability a continued challenge for many Victorians. Education outcomes are generally improving, but remain varied across the state. Crime has increased, yet crime rates remain low compared to international standards.

Conserving and celebrating Victorian Aboriginal heritage, including language and areas of cultural significance, is a priority. Poor land use management in the past has degraded the Victorian landscape, including our soil, water and native species. Air quality has improved and now rates well against international standards, however periodic air pollution events do still occur. The importance of water management will increase in the future as demand increases and supply may decline. Climate change is set to continue over the coming decades, with major consequences globally. We are better at managing our impact on the environment, in particular waste generation and management and the use of renewable energy. However Victoria continues to rely on coal for power generation at present.


CUT
OFF

4 METROPOLITAN MELBOURNE

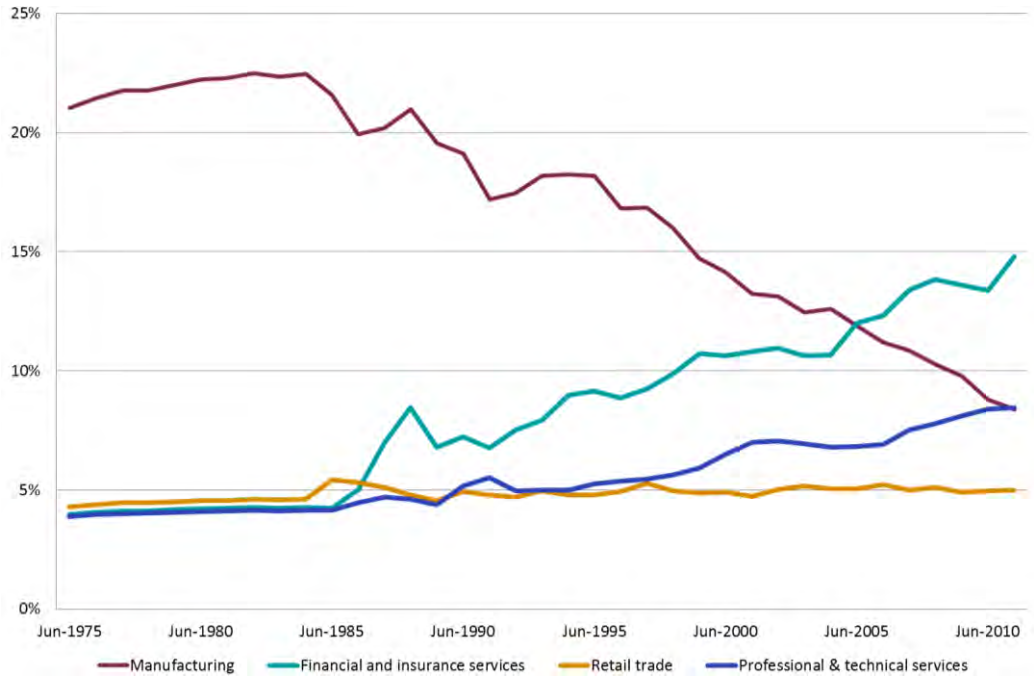
4.1 The forces reshaping Melbourne

4.1.1 The structural change of Melbourne's economy

The Victorian, and in particular, the Melbourne economy is undergoing significant structural change, with substantial implications for the growth of the city. The former manufacturing-based economy, reliant on long standing protectionist policies, has transformed into a diversified post-industrial economy spurred by growth in knowledge intensive services. This has led to a reshaping of the city.

This structural shift in the economy is illustrated in the changing share of GDP generated by key industries (Figure 28)[11]. Prior to the mid-1980s, manufacturing contributed around a quarter of Melbourne's GDP. Today its contribution is closer to 8 per cent. Melbourne's GDP is increasingly generated by financial and insurance services, and professional and technical services.

FIGURE 28. MELBOURNE GDP INDUSTRY CONTRIBUTIONS



Source: SGS Economics & Planning, using ABS

This change is also spatially evident. Figure 29 and Figure 30 depict change in employment over 1996 to 2011 Census periods for manufacturing and professional services.

[11] The ABS provides estimates of industry gross value added (the income generated by each industry) from 1974-75 to the most recent completed financial year. This gross value added (GVA) data, and information from the State Accounts and other industry specific auxiliary data sources has been used to estimate historical industry GVA for Melbourne. This excludes ownership of dwellings. It should be noted that gross value added shares differ from employment shares as jobs in different industries tend to produce different levels of income. For example, an hour worked in financial services will produce around $150 of value add, while an hour worked in retail trade will generate around $50 of value add.

FIGURE 29. CHANGE IN MANUFACTURING EMPLOYMENT, 1996-2011

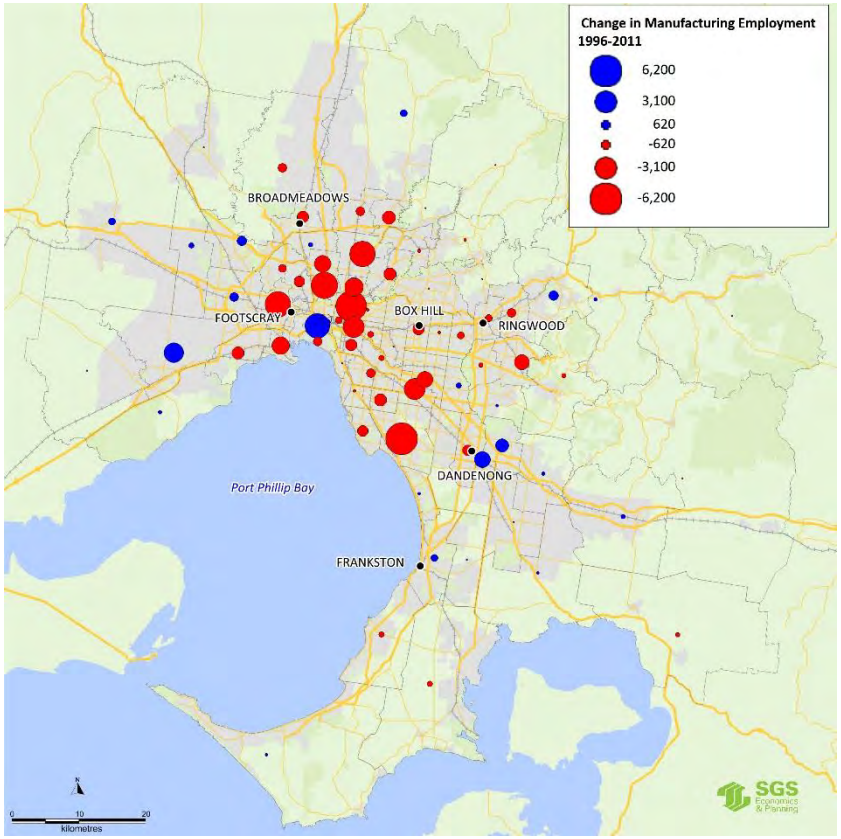


FIGURE 30. CHANGE IN PROFESSIONAL SERVICES EMPLOYMENT, 1996-2011

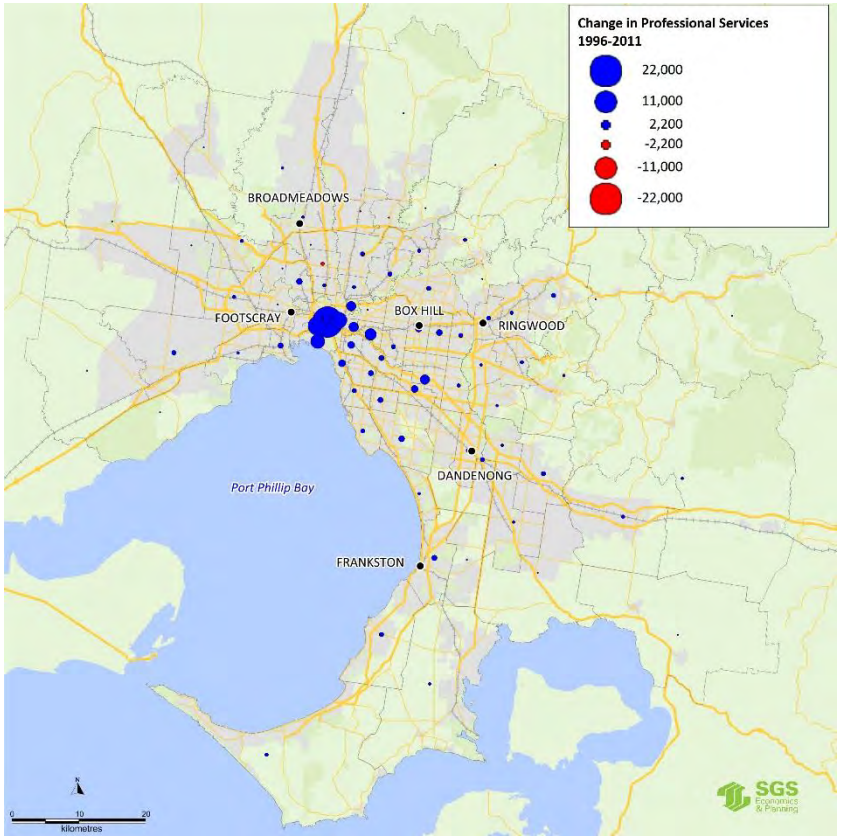
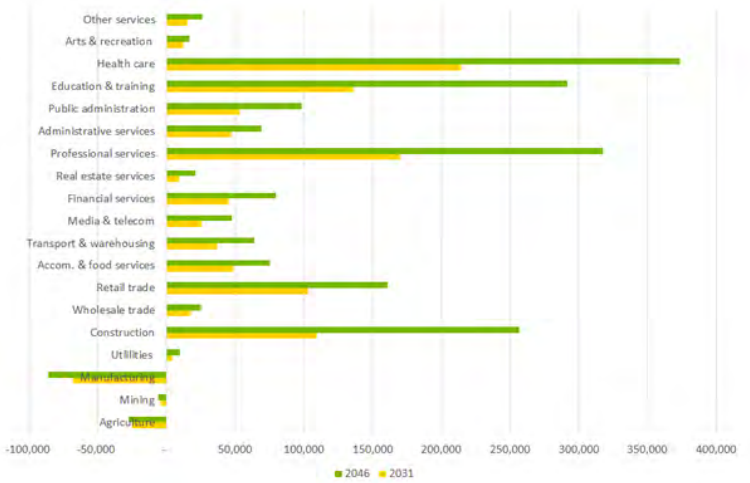
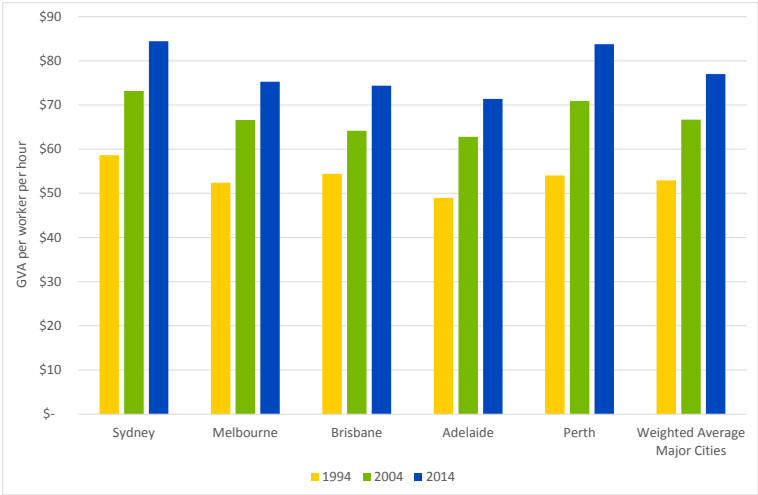


FIGURE 31. FORECAST CHANGE IN EMPLOYMENT 2014 – 2031-46 (VICTORIA)



Source: Deloitte Access Economics 2015

FIGURE 32. LABOUR PRODUCTIVITY (INCOME PER HOUR WORK) FOR MAJOR CAPITAL CITIES



Source: SGS Economics & Planning 2015

Structural change of the economy is expected to continue. As Figure 31 shows, the healthcare industry is set to add over 350,000 jobs by 2046, followed by professional services (over 300,000), education and training (over 250,000) and construction (over 250,000). The projected growth in professional services is a signal of continued change in the structure of the Victorian economy.

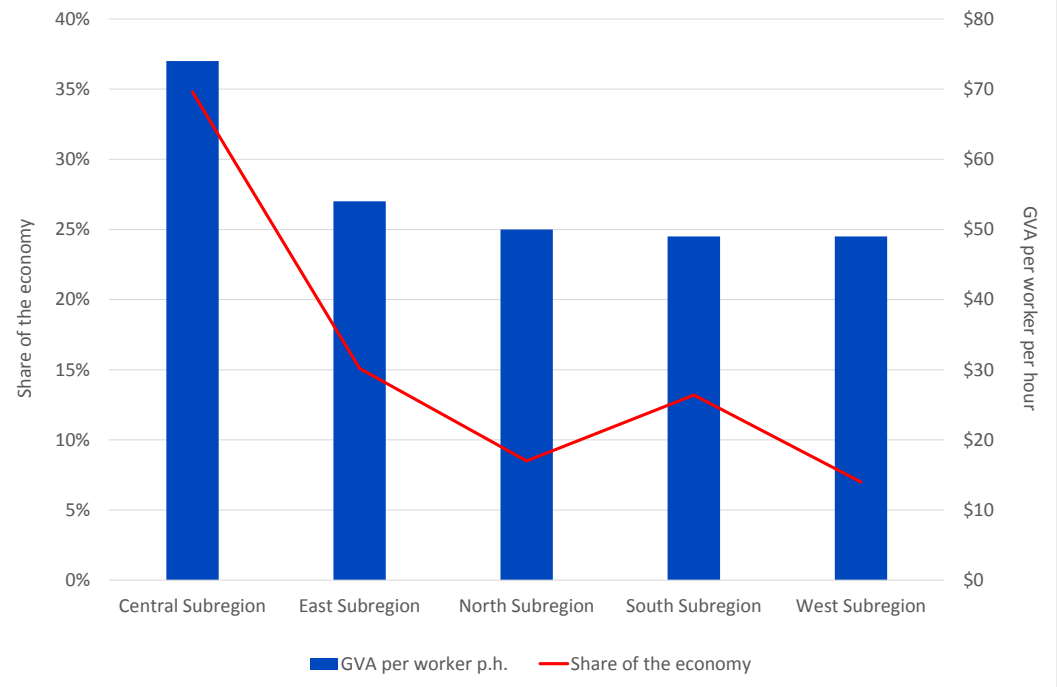
Over the past two decades, labour productivity has improved across Australia's capital cities (Figure 32). Income generated per hour worked in Melbourne has increased from $52 to $75. As of 2014, Melbourne's labour productivity was lower than Sydney and Perth's (each city has $84 per hour worked).

Overall, Melbourne's share of the Victorian economy in labour productivity terms is 78.5 per cent, with Regional Victoria contributing 21.5 per cent. Within Melbourne, this contribution varies.

As shown in Figure 33, the Central Subregion has the largest share of the economy at 35 per cent, and the highest GVA per worker per hour, at $74. The East and South Subregions represent the next largest shares of the economy, at 15 and 13 per cent respectively.

The North and West Subregions contribute similar shares to Melbourne's economy – 8.5 and 7 per cent each. Outside of the Central Subregion, GVA per worker per hour is around $50.

FIGURE 33. LABOUR PRODUCTIVITY (INCOME PER HOUR WORK) FOR MELBOURNE SUBREGIONS



Source: SGS Economics & Planning 2015

Employment and participation rates across Melbourne are telling. Participation rates have grown and unemployment rates decreased in all locations except the East Subregion since 2001.

However, between regions, variations exist (see Table 14 below). Participation rates are highest in the Central Subregion, whilst unemployment rates are highest in the West Subregion.

TABLE 14. EMPLOYMENT AND PARTICIPATION RATES, METROPOLITAN REGIONS

	2001		2006		2011	
	Unemployment Rate	Participation Rate	Unemployment Rate	Participation Rate	Unemployment Rate	Participation Rate
Central	7.5	68.1	5.7	70.3	5.6	72.1
East	5.1	65.7	4.4	65.8	4.9	65.7
South	6.4	63.8	5.3	64.6	5.5	65.3
West	8.2	63.7	6.5	64.6	6.4	66.0
North	7.3	62.5	5.6	63.6	5.6	65.0

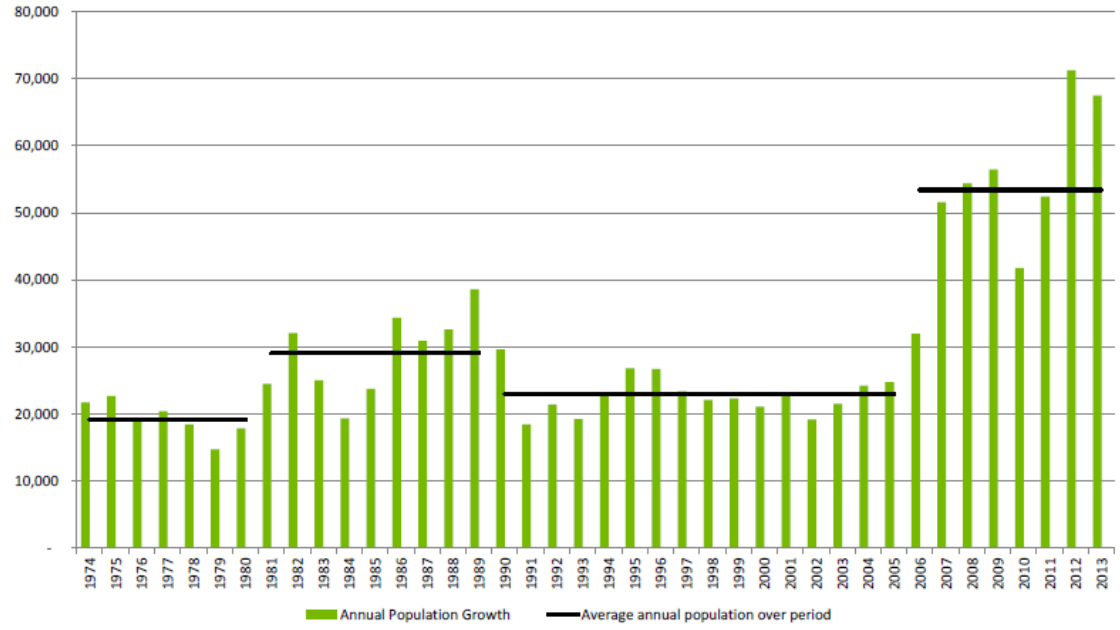
Source: ABS cat. no. 6202.0 – Labour Force, SGS Economics & Planning

4.1.2 The escalation and redistribution of population growth

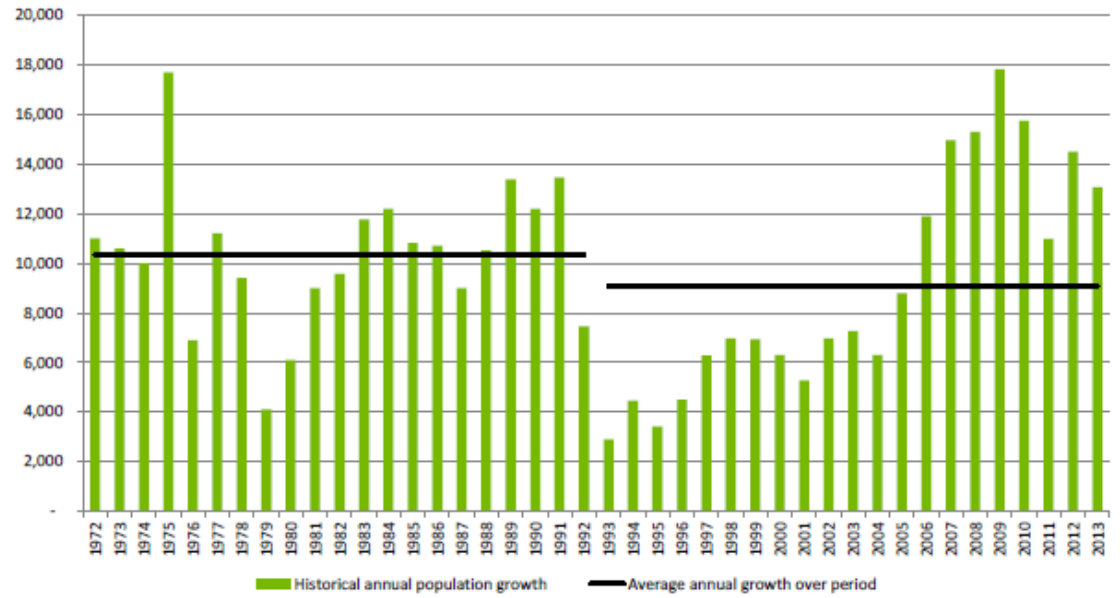
This changing economic structure has resulted in increasing demand for skilled labour. Since the mid-1990s Melbourne has experienced a sustained period of population growth. From the mid-2000s, growth has been particularly high, with an average of over 70,000 people moving to Melbourne year on year, more than any other Australian city (Figure 34).

FIGURE 34. POPULATION GROWTH COMPARISON – PERTH AND ADELAIDE

PERTH



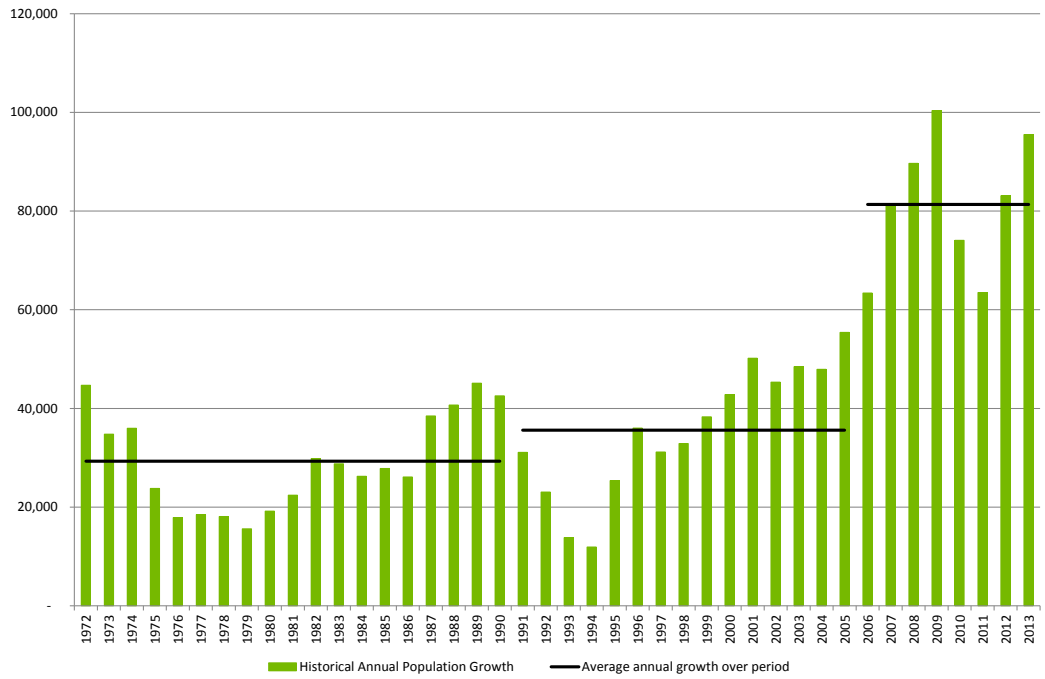
ADELAIDE



Source: ABS Catalogue 3105.0

The average annual growth rate (AAGR) over the past five years was 2.0 per cent (see Figure 35), meaning Melbourne is the third fastest growing Australian city, in terms of population, behind only the resource boom cities of Perth and Darwin. The number of people born overseas living in Victoria has increased from 1,080,000 to 1,398,000 between 2001 and 2011 – an increase from 23 per cent to 26 per cent.

FIGURE 35. ANNUAL POPULATION GROWTH IN MELBOURNE



Source: ABS Regional Population Growth 2013

In comparison to Sydney, Melbourne's population growth has focused more in growth areas and the CBD, with less growth occurring in the middle ring (Figure 36 and Figure 37).

FIGURE 36. POPULATION CHANGE MELBOURNE 1996-2011

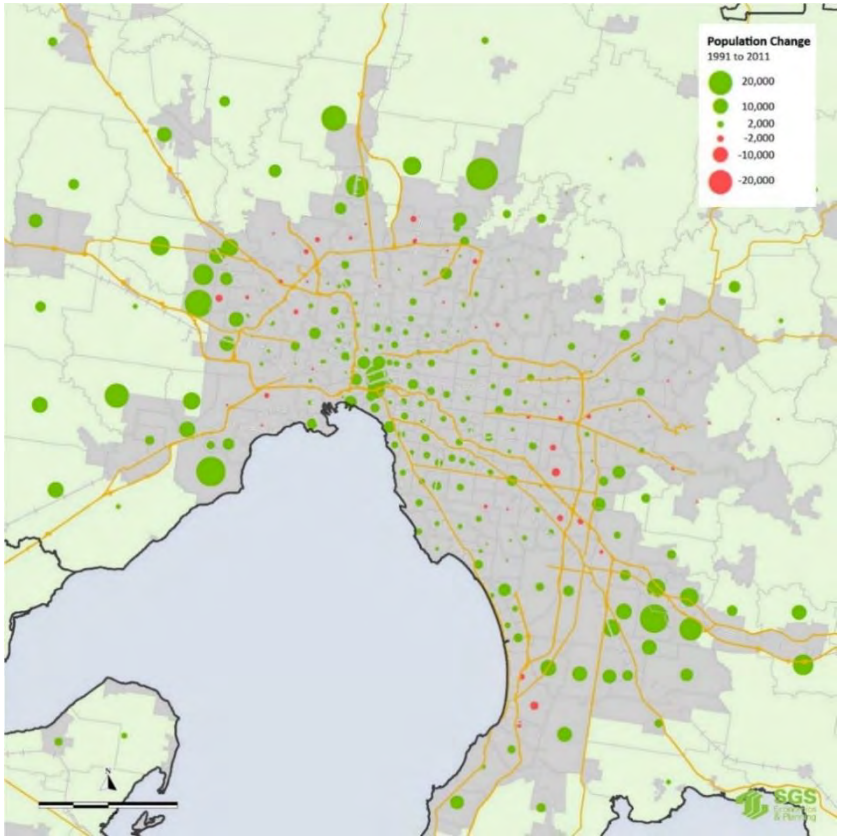
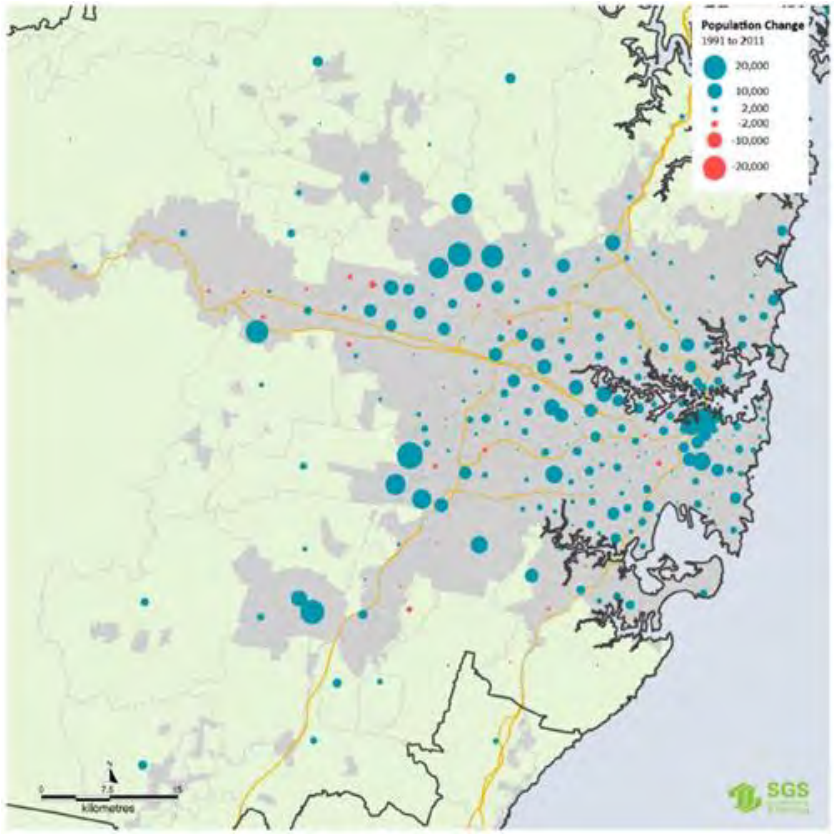


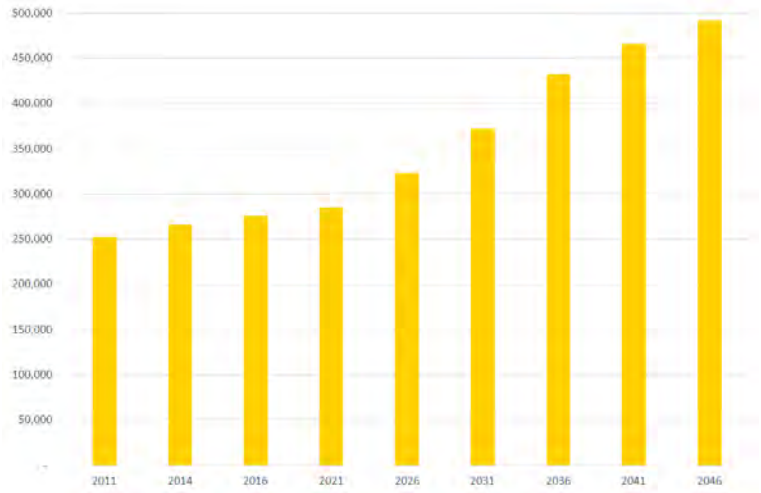
FIGURE 37. POPULATION CHANGE SYDNEY 1996-2011



The proportion of Victorians living in metropolitan Melbourne has steadily increased over recent years. Metropolitan Melbourne's population is projected to increase to 7,212,000 by 2046, which will account for 77 per cent of all Victorians (Victoria in Future 2015).

Whilst Melbourne's population growth has been focused in its growth areas and CBD, there has been a strong movement towards growth in the inner core in recent years (Figure 30).

FIGURE 38. ENROLLED UNIVERSITY STUDENTS IN MELBOURNE



Source: SGS Economics & Planning

One factor that will continue to drive population growth and the location of this growth will be the university student population - international and domestic (Figure 38). The number of students is expected to grow from 250,000 in 2011 to nearly half a million by 2046. These students will seek affordable accommodation near to universities, most of which are located in the inner and middle suburbs of Melbourne.

However, many of Melbourne's middle ring suburbs have experienced very little growth or even population decline.

The location of future population growth, and residential development, may have implications for agricultural land. The consumption of productive agricultural land on Melbourne fringe has impacted on local food production[12]. Melbourne's 'foodbowl', can currently provide enough food to meet 41 per cent of the Melbourne's food needs (Foodprint 2015). This increases the burden on the transport network to transport food into Melbourne. There are also economic implications of this - the gross value of agricultural commodities produced in Victoria between 2013 and 2014 was $12.7 billion (ABS, 2015). This is an increase of 2.3 billion, or 23 per cent since 2009-10 value of $10.3 billion.

4.1.3 The city-shaping role of infrastructure

Melbourne's economic and spatial transformation did not happen by accident. Infrastructure investment by the Victorian State Government complemented national reforms and accelerated Melbourne's transition to a knowledge based economy. Arguably, the Kennett Government followed an inspired strategy in 'trading in' 'old economy' assets, like the power industry, to invest in the key attributes sought by a knowledge economy; being connectivity and a vibrant city centre.

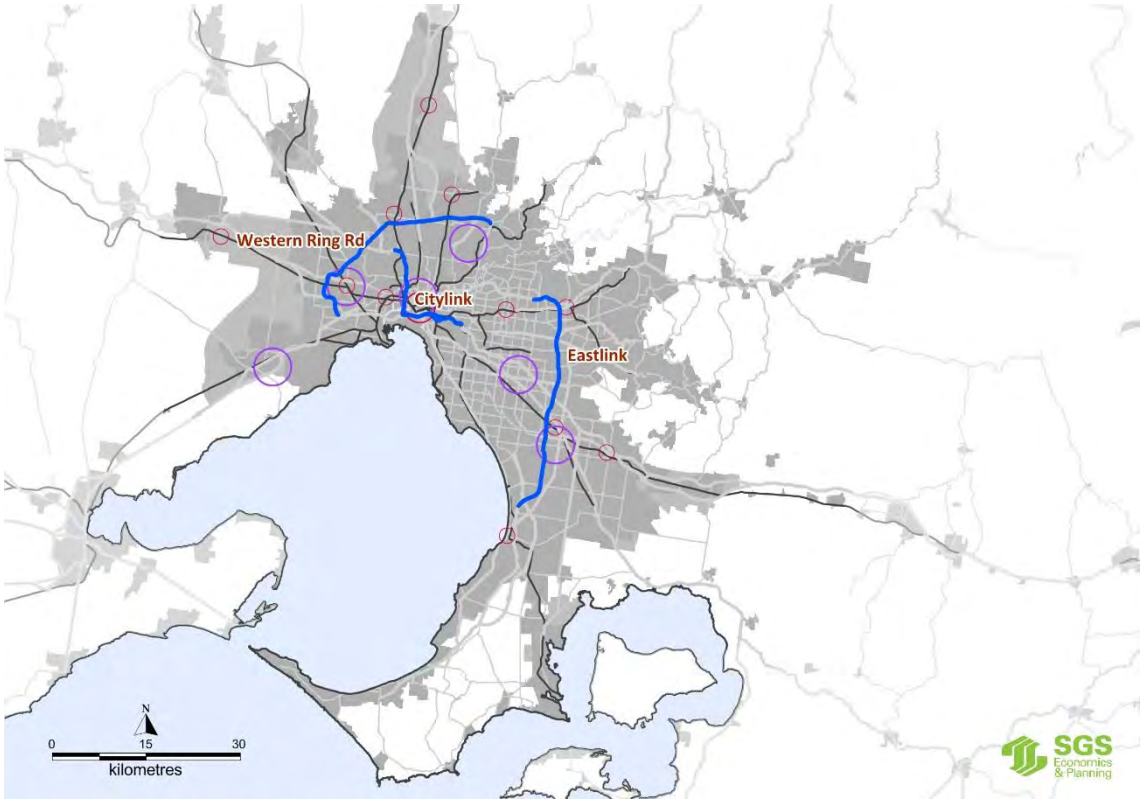
Several 'settlement pattern shaping' infrastructure projects played a major part in repositioning Melbourne and Victoria. CityLink in conjunction with the existing West Gate Freeway was vital in connecting Melbourne's western industrial businesses with the 'Monash corridor' of skilled workers. The road infrastructure increased the competiveness of the west in attracting higher value adding businesses. This gave a great productivity boost to these manufacturing and logistics areas which, in turn, helped to promote residential growth in a part of Melbourne that had lagged behind for decades. The Western Ring Road further improved the accessibility of Western Melbourne and reinforced the shift in Melbourne's hitherto 'unbalanced growth' towards the east. In the late 1980s the suitability of the wharves (that now house the 'Docklands') for port functions were being investigated. The decision was

[12] In 1960, 21 per cent of agricultural businesses were based in Melbourne. Today, this figure is roughly 12 per cent.

made to not rebuild the wharves, and hence the slow birth of Docklands began. The construction of the Western Ring Road in the 1990s allowed the existing industries of the Docklands to relocate to cheap industrial land with good access to the port. This relocation freed up the Docklands area for residential and commercial redevelopment. During this same period, industrial businesses from the gentrifying areas of Southbank, Richmond and Collingwood also often relocated to new premises along the Western Ring Road.

More recently, the commissioning of EastLink in June 2008 has given a similar, though more modest, accessibility advantage to the key centres of Ringwood and Dandenong. Metropolitan Melbourne's major road infrastructure is shown in Figure 39 below.

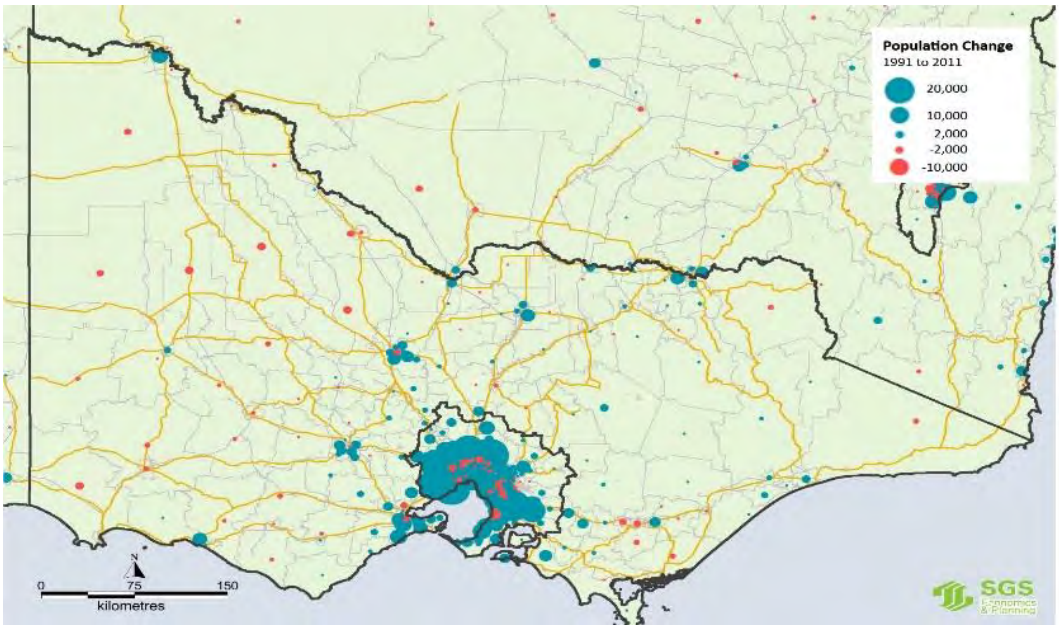
FIGURE 39. MAJOR ROAD INFRASTRUCTURE



Several infrastructure investments paved the way for a growing Central City. The construction of the Arts Centre in the early 1980s was the first significant investment for Southbank. Docklands (which gave Melbourne a 'waterfront address' and the potential to lure finance and other business service houses requiring large floorplate offices), Federation Square and the Melbourne Exhibition and Convention Centre (which enabled the city to successfully challenge for the mantle as Australia's premier destination for business tourism).

Meanwhile, at the Victoria wide level, the State Government's investments in the regional fast rail project took an important step towards greater integration between the labour market of Melbourne and those of Ballarat, Geelong and Bendigo (see Figure 40). This permitted Victoria to project a 'European style' settlement pattern and aesthetic which also contributed to its reputation as a design based, knowledge economy.

FIGURE 40. POPULATION CHANGE, VICTORIA, 1991-2011



Source: ABS Regional Population Growth 2013

Other pieces of infrastructure provide capacity for future growth. The Desalination Plant and North–South Pipeline combined with a range of smaller infrastructure investments and behaviour change programs have ensured the water supply for Victoria's growing population.

The new Women's Hospital, Royal Children's and Box Hill Hospitals all provide health care capacity for a growing state.

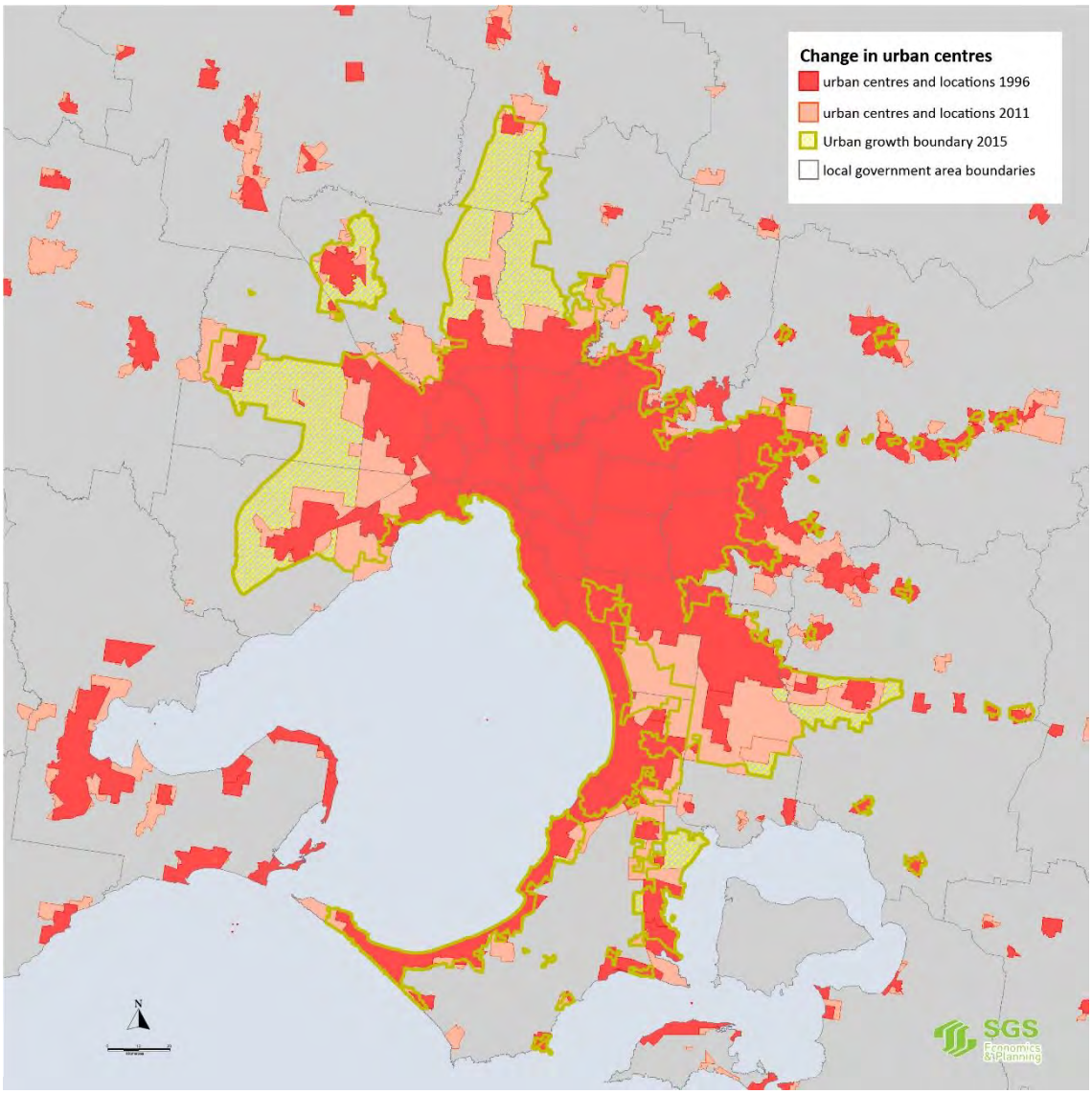
4.1.4 Environmental challenges remain

Metropolitan Melbourne generally falls within the Port Phillip and Westernport water catchments (the wider catchment consisting of 13 per cent urban land, 45 per cent rural farmland and 42 per cent forest). Land use changes around the urban-rural fringe of Melbourne are where catchment management issues tend to be emphasised (Figure 41).

Only 23 per cent of waterways are in good or excellent condition. However, many of these waterways are located in closed water supply catchments and forested areas.

Nearly two thirds of the region's natural wetlands have been lost due to draining, filling and other modification. The extent of the region's deep-water marshes has decreased significantly due to the draining of the Koo Wee Rup Swamp.

FIGURE 41. URBAN LAND USE CHANGE 1996-2011



Threats to groundwater include overuse, poor recharge due to lack of rain, and pollution. Pollution to groundwater may come from sources such as pesticides, leaking septic tanks, excessive application of fertiliser or from sources such as petrol stations or landfill.

The Port Phillip and Western Port Region is one of the most biologically diverse regions in the state, with more than 1,860 species of native flora and 600 species of native vertebrate fauna. Of these, 358 flora and 179 fauna are listed as threatened (as at 2005). There is much pressure placed on the conservation of biodiversity within this region, especially given the expanding population of Melbourne. The greatest threats include vegetation clearing (leading to the loss of habitat), competition with pest plants and animals, salinity and inappropriate land and waterway management.

Threats to our bays and ports include algal blooms from increased nutrient loading, sedimentation, and changes in fresh water quality, clearing of native habitat, impacts from agriculture, introduction of exotic marine organisms and impacts from climate change.

Melbourne currently produces and manages about 10.3 million tonnes of waste each year, which is nearly 80 per cent of Victoria's waste (Melbourne Waste and Resource Recovery Group 2015). The three main waste sources in Metropolitan Melbourne are Municipal Solid Waste (24 per cent of waste production), Construction and Demolition (44 per cent) and Commercial and Industrial waste (32 per

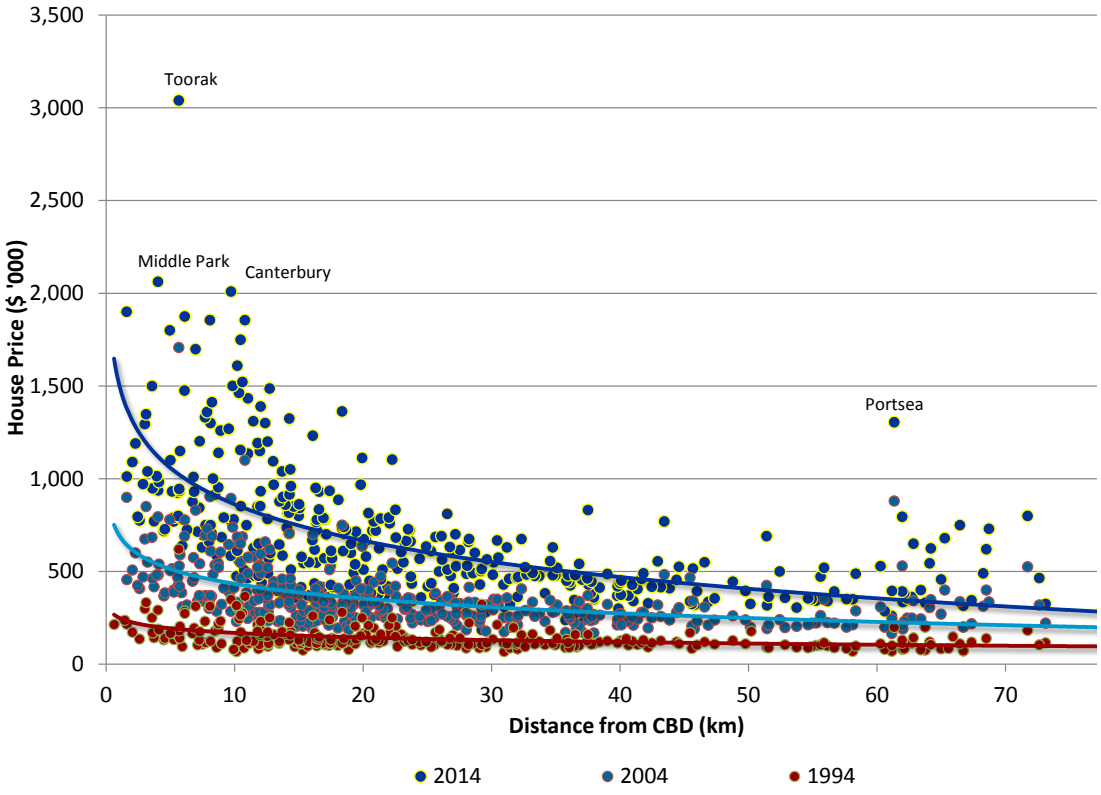
cent) (Melbourne Waste and Resource Recovery Group 2015). Currently, 73 per cent of the waste generated in Melbourne is recycled (Melbourne Waste and Resource Recovery Group 2015).

4.1.5 Access to affordable housing

The increased appeal of the job and transport rich inner suburbs of Melbourne have contributed to rapidly changing profile of house prices. This appeal has grown due to a myriad of factors including increased traffic congestion, growth of knowledge worker jobs in the CBD and surrounds and gentrification which have brought a night-time economy to many inner suburban locations.

Figure 42 illustrates the differences in median house prices depending on the distance of that suburb from the CBD. Each suburb has been plotted for 1994, 2004 and 2014. In the 20 years to 2014, house prices grew much faster in absolute terms in the inner and middle suburbs located closer to the CBD. There is now a pronounced gradient of increasing prices with reducing distance to the CBD.

FIGURE 42. MEDIAN HOUSE PRICES AND DISTANCE FROM CBD, 1994, 2004 AND 2014

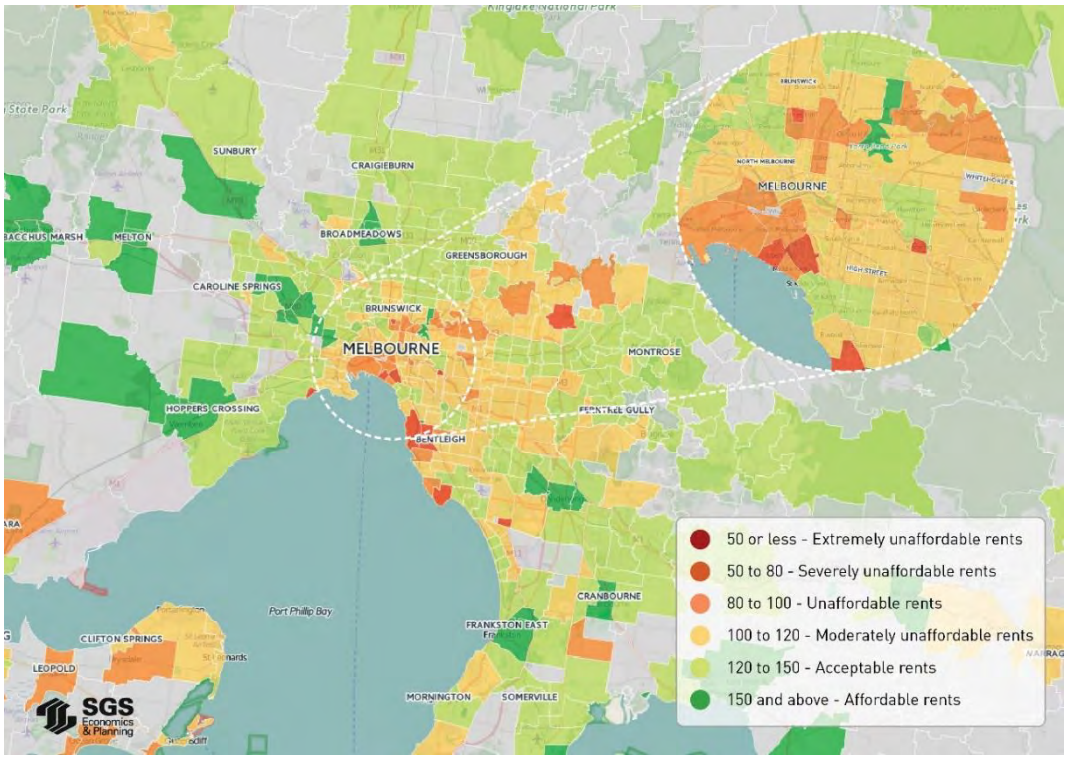


Source: SGS Economics & Planning

Historically lower interest rates, changing household size and composition, and availability of finance and land and infrastructure (both private and public) provision have also contributed. Higher house prices combined with changing social norms have also lead to an increase (almost 20 per cent between 1996 and 2011) in the number of households renting. At the same time, rental affordability has fluctuated but is expected to improve.

Rental affordability is strong for the average household in Melbourne with households paying about 24 per cent of income on rent and the general trend is towards improving rental affordability. There are some suburbs that are severely unaffordable to household on average rents (See Figure 43 below).

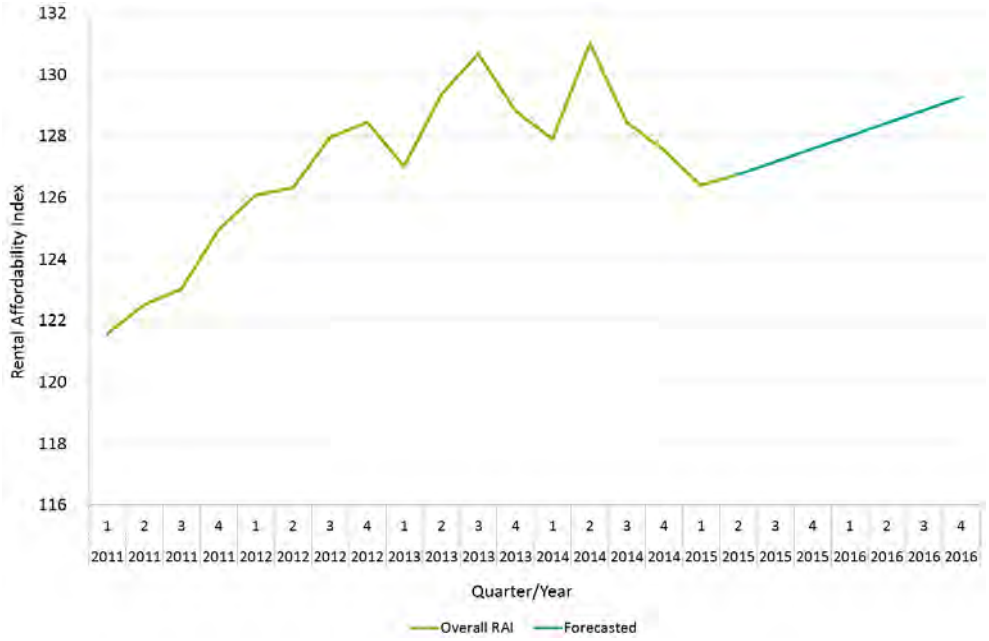
FIGURE 43. SPATIAL DISTRIBUTION OF THE RENTAL AFFORDABILITY INDEX, MELBOURNE



Source: SGS Economics & Planning 2015

Furthermore, rental affordability is very low for households in the first income quintile (Q1), with non-family households most affected (see Figure 44 below). The Rental Affordability Index (RAI) for Q1 family households was 43 and 21 for non-family households in the same income group. The RAI for low income (Q2) family households was 93 compared to 53 for non-family households.

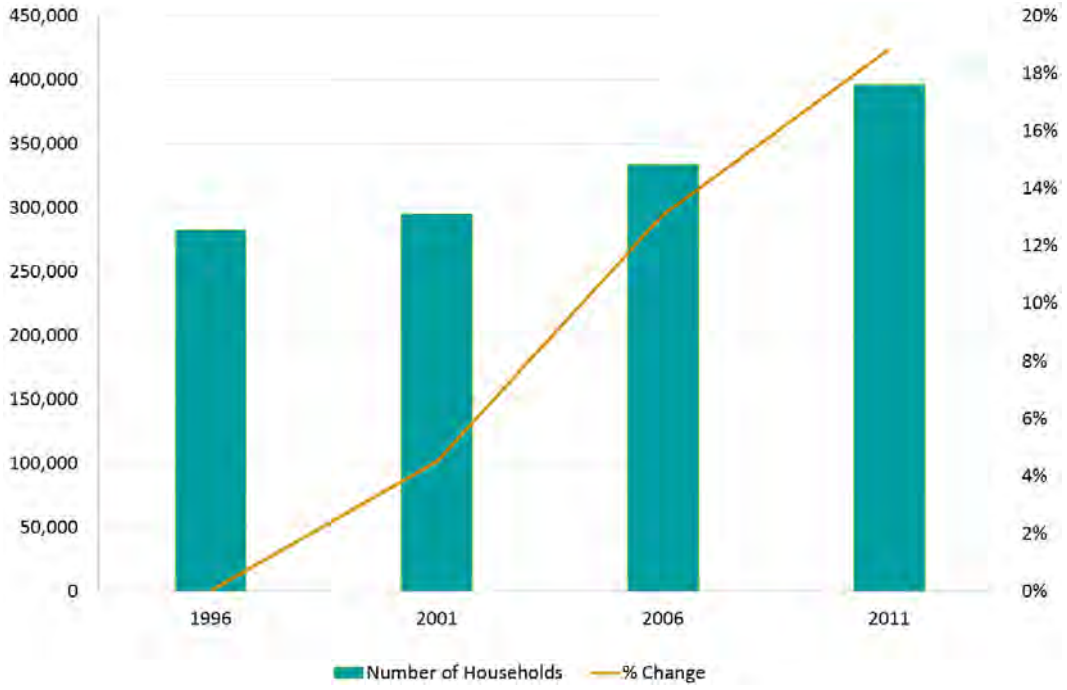
FIGURE 44. RENTAL AFFORDABILITY INDEX, MELBOURNE



Source: SGS Economics & Planning 2015

As shown in Figure 45, the trend towards more lone-person households in metropolitan Melbourne is relatively modest, with the proportion of non-family households rising from 30.1 per cent in 2001 to 31.1 per cent in 2011. This trend is forecast to reach around 34 per cent by 2036, driven by factors such as population ageing, rates of marital separation and lifestyle choices for younger people (Australian Institute of Family Studies 2015).

FIGURE 45. NUMBER OF RENTAL HOUSEHOLDS & RATE OF CHANGE, METROPOLITAN MELBOURNE



Source: ABS Census

These factors affect where younger people are able to choose to live, which can affect their access to opportunity. At present, young people's access to jobs continues to be a challenge in metropolitan Melbourne, with the job rich inner Melbourne contrasting to the predominantly middle and outer metropolitan location of people aged 18-25 (see Figure 46 and Figure 47).

FIGURE 46. PEOPLE AGED 18-25 AND ACCESS TO JOBS BY CAR, 2011

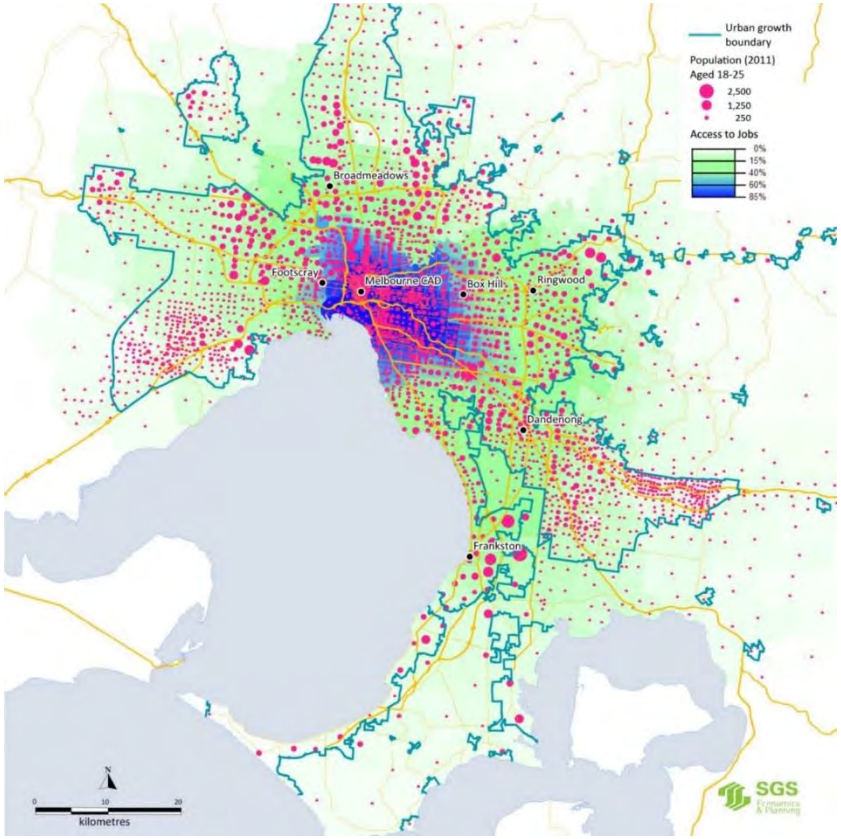
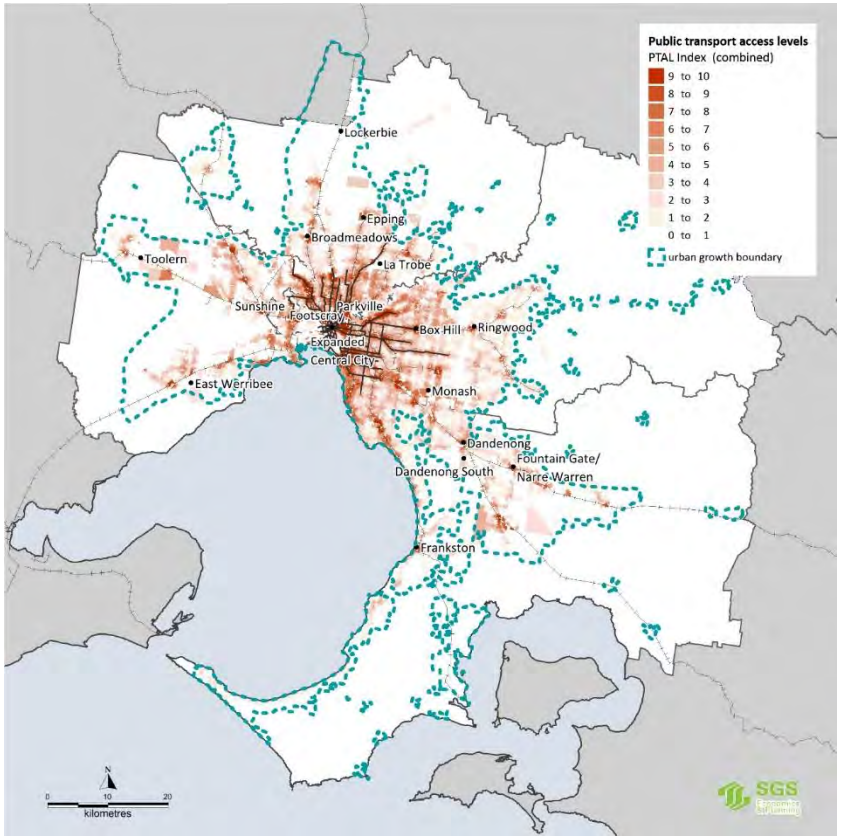


FIGURE 47. PUBLIC TRANSPORT ACCESS LEVELS, 2011



A mismatch between job and population growth has been a continued challenge for Melbourne. Whilst the Central Subregion has accommodated 48 per cent of jobs growth over 1981 to 2011, it has contributed to 8 per cent of population growth (Table 15). In contrast, while the West Subregion contributed to 9 per cent of jobs growth, it contributed to almost a quarter of population growth.

TABLE 15. POPULATION AND EMPLOYMENT GROWTH BY MELBOURNE SUBREGION 1981-2011

	1981	1991	2001	2011	1981-2011 CTG
Employment					
Central	315,000	390,000	565,000	740,000	48%
Western	140,000	155,000	155,000	220,000	9%
Northern	215,000	250,000	240,000	300,000	10%
Eastern	340,000	395,000	400,000	465,000	14%
Southern	265,000	325,000	350,000	440,000	20%
Total	1,275,000	1,515,000	1,710,000	2,165,000	100%
Population					
Central	335,000	320,000	355,000	455,000	8%
Western	330,000	425,000	495,000	675,000	24%
Northern	555,000	645,000	700,000	820,000	19%
Eastern	815,000	930,000	970,000	1,040,000	16%
Southern	685,000	835,000	950,000	1,145,000	33%
Total	2,720,000	3,155,000	3,470,000	4,135,000	100%

Source: SGS Economics & Planning

Table 16 shows that while uptake of public transport is increasing in Victoria, the motor vehicle (car, motorbike, taxi, truck) is still the preferred form of transport. Over 80 per cent of people travelled to work by motor vehicle in 2006 (83.1 per cent) and 2011 (81.3 per cent). Over the same period, the proportion of people commuting by public transport increased across Victoria, while the proportion of people using active transport (walking or cycling) decreased – mainly as a result of a decline in active transport modes in Regional Victoria.

TABLE 16. MODE OF TRAVEL TO WORK

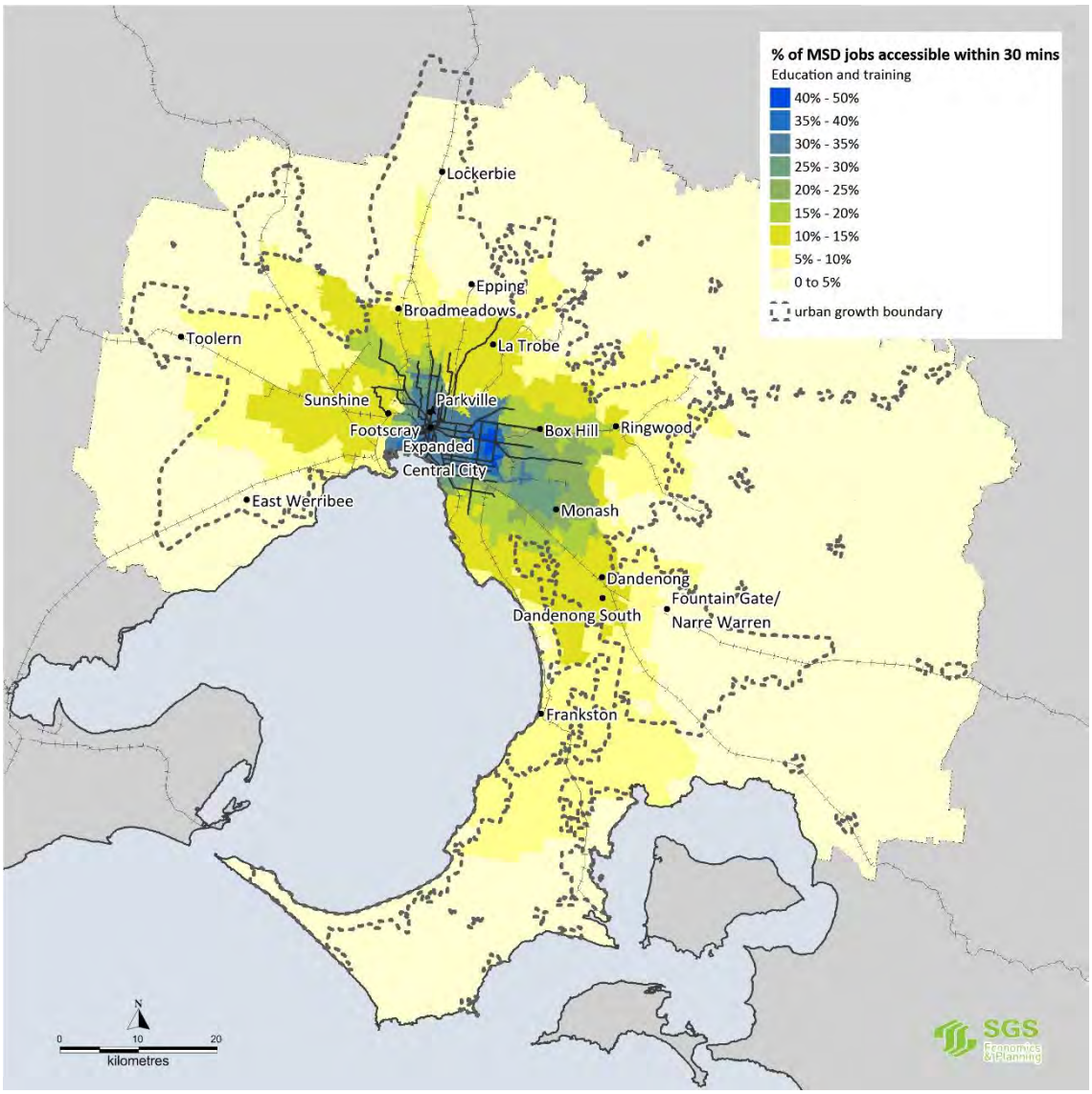
	2006			2011		
	Active	Public Transport	Private Transport	Active	Public Transport	Private Transport
Metropolitan Melbourne	5.0%	14.2%	80.8%	5.0%	16.4%	78.6%
Regional Victoria	7.8%	2.1%	90.1%	6.7%	2.7%	90.6%
Total Victoria	5.7%	11.2%	83.1%	5.4%	13.3%	81.3%

Source: ABS Census 2006, 2011

4.1.6 Accessibility to services is strongest in the core

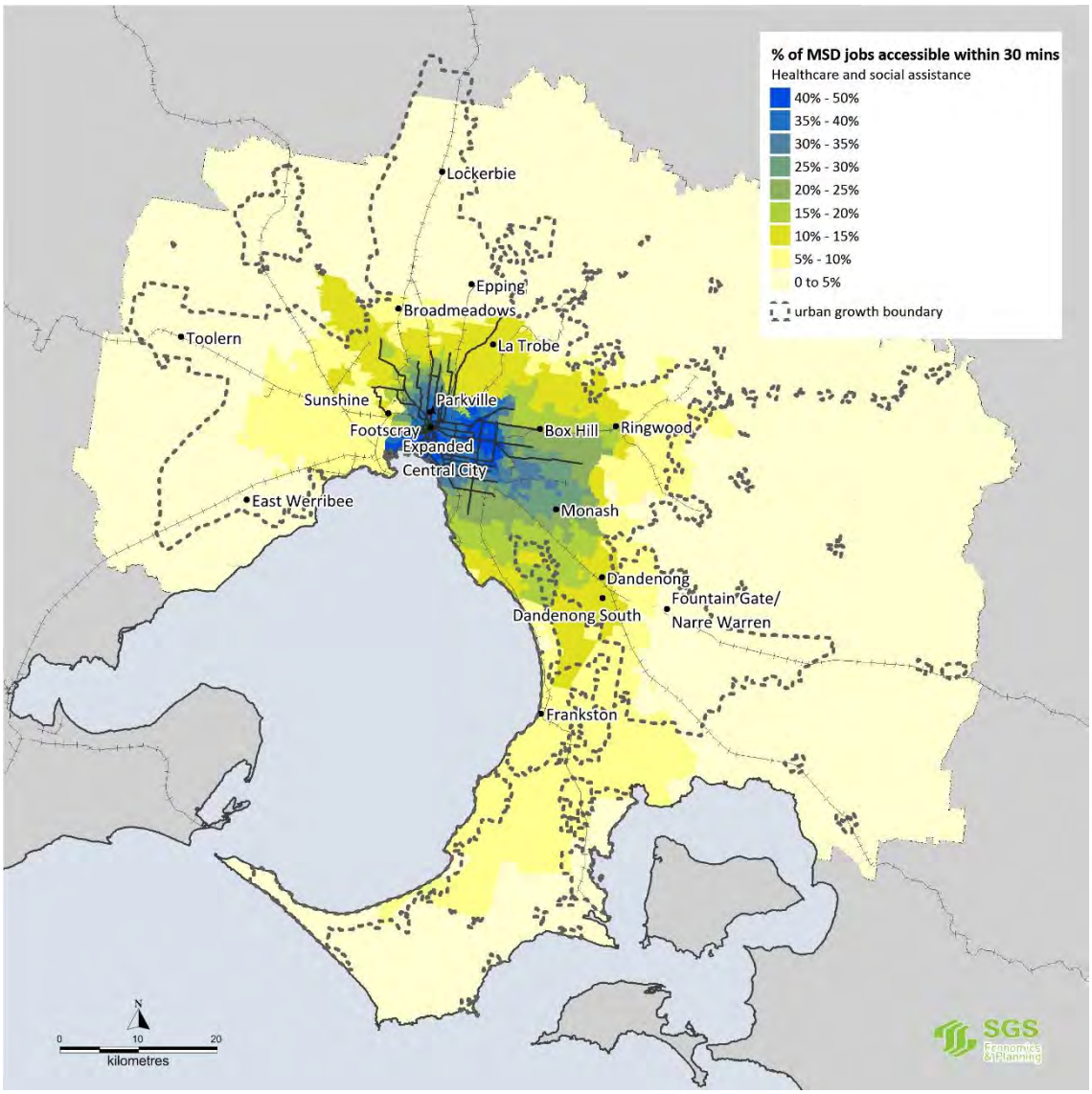
Access to education jobs (as a proxy for access to education facilities) is highest in inner Melbourne (Figure 48). Areas of recent population growth, such as the northern, western and south-eastern growth corridors, have lower access levels than the transport and facility-rich inner and middle suburbs.

FIGURE 48. ACCESS TO EDUCATION AND TRAINING JOBS, 2011



A similar story of accessibility is shown for healthcare and social assistance jobs (as a proxy for access to health and social care facilities) remains strongest in Melbourne's inner and middle suburbs. As shown in Figure 49, access to healthcare and social assistance is lowest in Melbourne's growth areas and fringe. This contrasts to the location of socio-economically disadvantaged populations (discussed by Subregion), and where growth in older age cohorts (65 years plus) is at its highest.

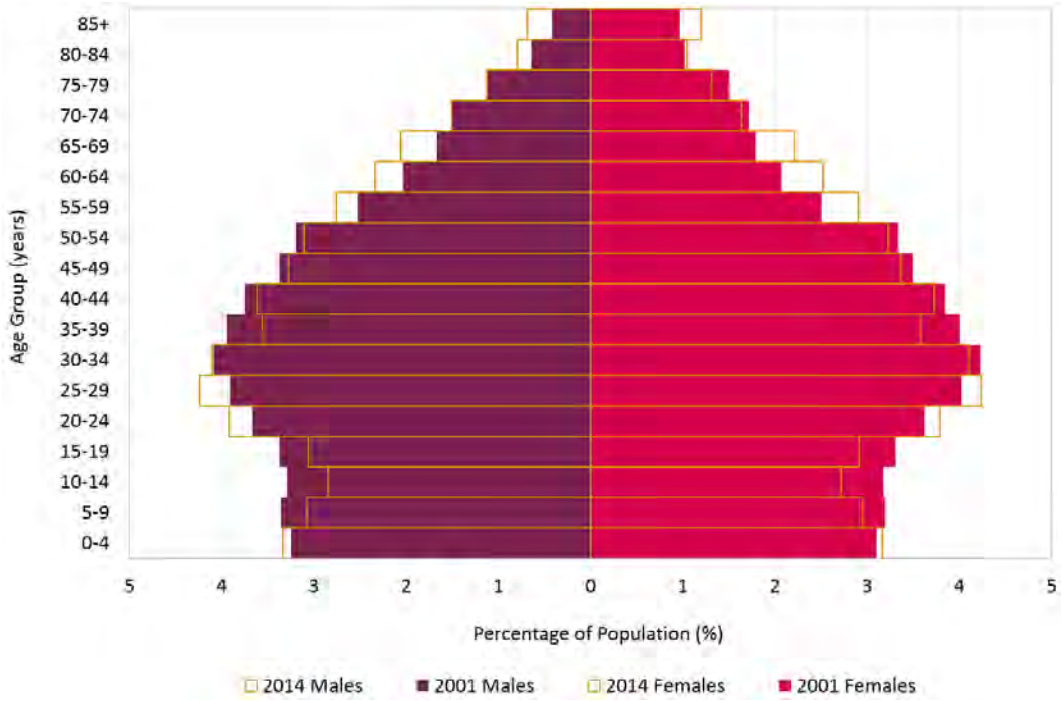
FIGURE 49. ACCESS TO HEALTHCARE AND SOCIAL ASSISTANCE JOBS, 2011



4.1.7 An older, but changing population

As Figure 50 shows, the proportion of the population aged 20-29 is higher in 2014 than it was in 2001, as is the population of people aged 50 through to 69 and those aged over 80 years. In contrast, the proportion of people aged under 19 is generally remained the same. While these proportions have shifted, the overall population within each age cohort has increased.

FIGURE 50. METROPOLITAN MELBOURNE POPULATION BY AGE AND GENDER, 2001 AND 2014



Source: ABS cat. no. 3201.0

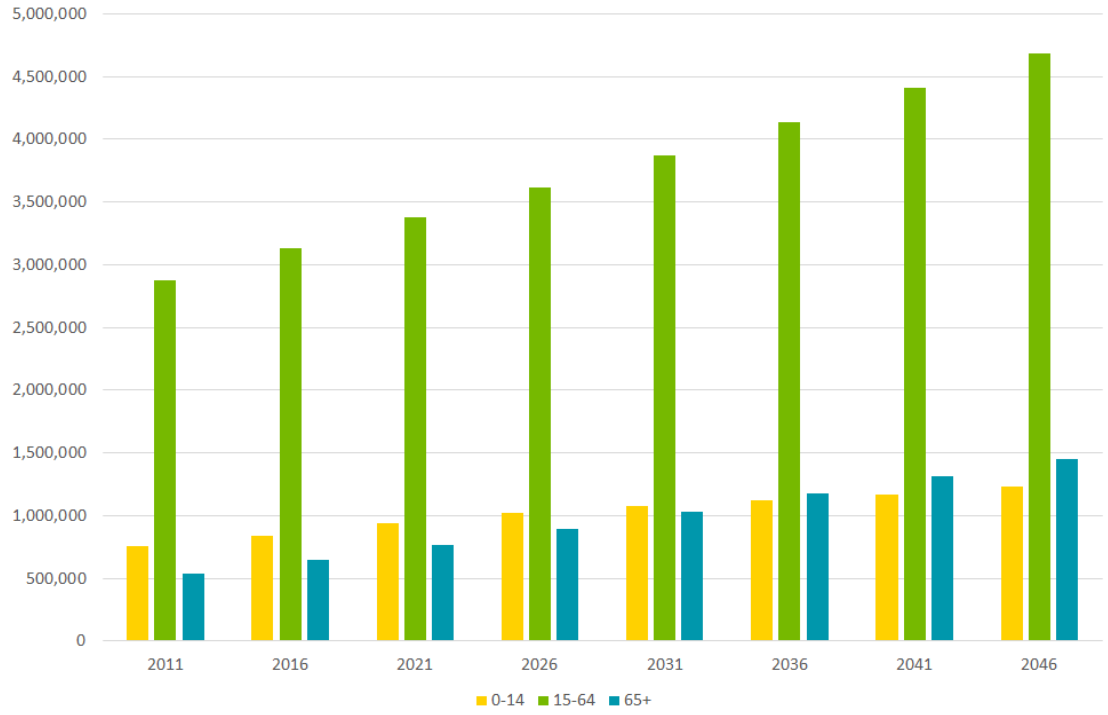
Life expectancy is marginally higher in metropolitan Melbourne at 80.8 years of age for males and 84.7 years of age for females in 2007 compared to the Victorian average of 80.3 years of age for males and 84.4 years of age for females. Similarly, infant mortality is slightly lower. There has been a favourable trend for these indicators over recent years and forecasts predict a positive future trajectory.

However, variations exist between LGAs within metropolitan Melbourne for life expectancy. For example, for men in Maribyrnong (77.4) compared to Melbourne (82.8)) and for women in Melton (82.3) and Melbourne (88.9)).

The proportion of the population aged over 65 years is set to be higher than those aged under 14 years by 2036 (Figure 51).

By 2046, the proportion of the working age population (15 to 64 years) will be lower, relative to those aged under 14 or over 65. Even with people working to a later age, this will result in an increased dependency ratio.

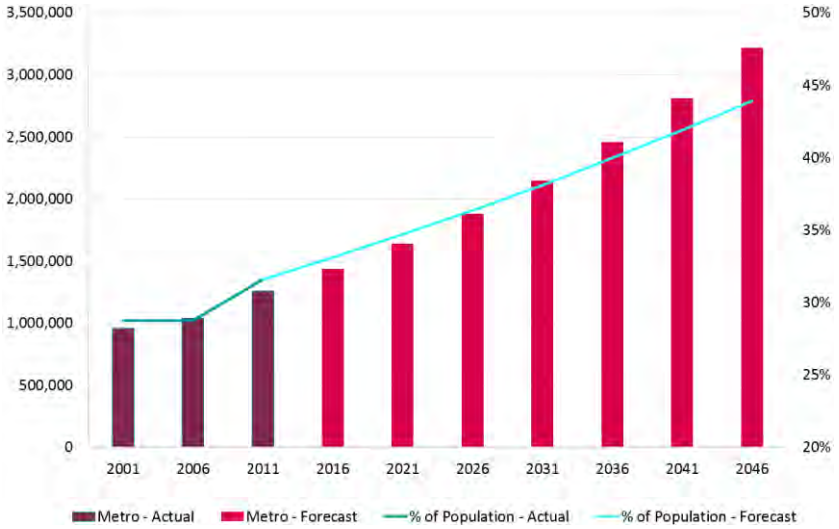
FIGURE 51. PROJECTED POPULATION OF MELBOURNE BY AGE GROUP



Source: Victoria in Future 2015

The proportion of Melbourne residents born overseas is set to continue growing. In 2011, around 34 per cent of the population was born overseas, and this is expected to increase to over 46 per cent by 2046 (Figure 52). By 2046 there will be over 3 million Melburnian residents born outside of Australia. In 2011, 25 per cent of the population in Melbourne was of a non-English speaking background, which is projected to increase to 27 per cent in 2016 (ABS 2012).

FIGURE 52. NUMBER AND PERCENTAGE OF OVERSEAS BORN POPULATION, METROPOLITAN MELBOURNE



Source: ABS 2011 Census of Population and Housing, cat. no. 2003.0.

Prevalence of some chronic diseases is gradually increasing in metropolitan Melbourne. This reflects population ageing and increasing risk factors in some areas and population sub-groups. In particular, incidences of cardiovascular disease and Type-2 diabetes are increasing (Table 17). Presently, 7.0 per cent (8.7 per cent males and 5.4 per cent females) in Melbourne are affected by heart disease and 5.1 per cent are affected by

diabetes. There are higher rates of chronic diseases in outer-urban areas experiencing relative socio-economic disadvantage.

Obesity is less common in metropolitan Melbourne compared to the Victorian average, however the proportion of obese adults has increased from 15.7 per cent in 2008 to 16.5 per cent in 2011-12. Obesity is more prevalent and physical activity rates are lower in outer urban areas.

Satisfaction of living for Metropolitan Melbourne is currently in line with the state average, whereas subjective health status is slightly lower than the state average.

TABLE 17. HEALTH AND WELLBEING INDICATORS, MELBOURNE AND VICTORIA

	Metropolitan Melbourne		State of Victoria	
	2000s	**Present**	**2000s**	**Present**
Life expectancy males	76 - 79	>80	76 - 79	>80
Life expectancy females	82 - 84	>84	82 - 84	>84
Cardiovascular disease % males	8.2% (2008)	8.7% (2011-12)	8.4% (2003)	8.7% (2011-12)
Cardiovascular disease % females	5.0% (2008)	5.4% (2011-12)	4.8% (2003)	5.5% (2011-12)
Type 2 diabetes %	4.8% (2008)	5.1% (2011-12)	3.9% (2005)	5.0% (2011-12)
Land transport accidents %	n/a	n/a	32,522 (2004)	35,916 (2013)
Obesity %	15.7% (2008)	16.5% (2011-12)	13.9% (2003) 16.7% (2008)	17.5% (2011-12)
Subjective health status	74.9 (2001)	75.3 (2014)	75.0 (2001)	76.2 (2014)
Standard of living	76.9 (2001)	79.2 (2014)	76.3 (2001)	79.4 (2014)

Source: Victorian Population Health Survey 2008 & 2011-12.

Most children living in metropolitan Melbourne have been consistently 'on track' in early childhood development between 2009 and 2012 (Table 18). The Australian Early Development Index (AEDI) for children on track rose for most domains over 2009 to 2012, and the proportion of children considered developmentally vulnerable reduced from 20.0 per cent in 2009 to 18.7 per cent in 2012. Areas of relative socio-economic disadvantage within Melbourne were more likely to have children identified as developmentally vulnerable.

Between 2008 and 2014, the proportion of children in year five who met or exceeded literacy standards in metropolitan Melbourne has improved from 92.5 per cent to 94 per cent. Trends in numeracy have remained relatively stable at around 95 per cent from 2008 to 2014. There are variations between regions however, with some local areas particularly in outer Melbourne attaining lower levels of literacy and numeracy compared to the whole metropolitan area.

There is a positive trend in apparent retention rates across both government and non-government schools in metropolitan Melbourne. Overall, it has improved from approximately 86 per cent in 2006 to 89 per cent in 2015. This trend is projected to continue. However, retention rates vary, with the highest levels of participation recorded in the inner city and lowest levels in outer metropolitan Melbourne. There is a correlation between areas of socio-economic advantage or disadvantage and apparent retention rates.

Levels of post-school qualifications are higher in metropolitan Melbourne compared to Victoria. 63.0 per cent of people living in Melbourne aged 25-64 had a non-school qualification in 2011, up from 56.7 per cent in 2009. The most significant increase was in the population cohort with a Bachelor degree or above, rising from 28 per cent in 2006 to 33 per cent in 2011.

TABLE 18. EDUCATION INDICATORS, MELBOURNE AND VICTORIA

	Metropolitan Melbourne		State of Victoria	
	2000s	**Present**	**2000s**	**Present**
Percentage of children vulnerable on one or more domains of the AEDC	20.0% (2009)	18.7% (2012)	20.3% (2009)	19.5% (2012)
Percentage of children vulnerable on two or more domains of the AEDC	9.6% (2009)	8.9% (2012)	10.0% (2009)	9.5% (2012)
Proportion of students in Years 5 who meet or exceed the benchmarks for Literacy	92.5% (2008)	94.0% (2014)	92.0% (2008)	93.5% (2014)
Proportion of students in Years 5 who meet or exceed the benchmarks for Numeracy	94.3% (2008)	94.1% (2014)	94.1% (2008)	93.8% (2014)
School retention rate (Yr 7-12)	84.4% (2006)	90.0% (2012)	78.8% (2006)	83.0% (2012)
Proportion of those with non-school qualification	56.7% (2006)	63.0% (2011)	56.6% (2006)	61.2% (2011)
Percentage of children vulnerable on one or more domains of the AEDC	20.0% (2009)	18.7% (2012)	20.3% (2009)	19.5% (2012)

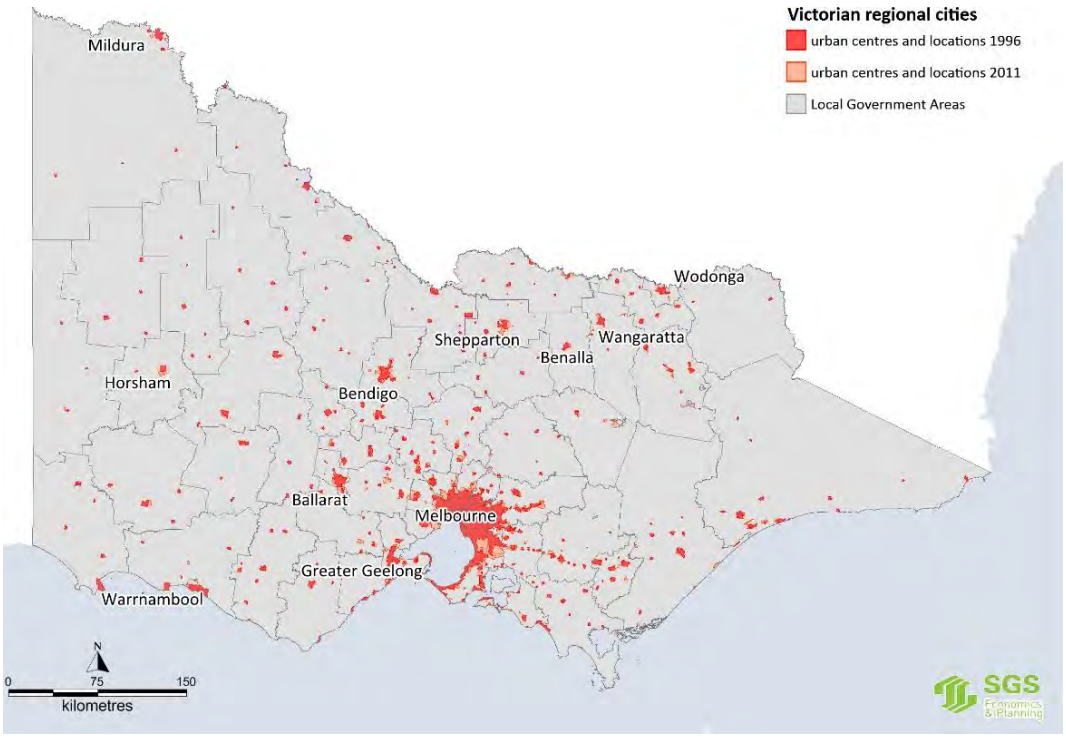
Source: Australian Early Development Census (AEDC), Summary Statistics Victorian Schools, Department of Education and Early Childhood Development

4.1.8 Ongoing urbanisation

Urban areas have increased, with population growth driving urban expansion in Melbourne and regional centres, and at times into agriculturally productive areas (Commissioner for Environmental Sustainability Victoria 2013). Reducing the amount of agricultural land reduces the ability for Victoria to grow the produce required to feed its population without relying heavily on imports.

Urban Centres and Localities (UCLs) are a geographical unit that statistically describe Australian population centres with populations exceeding 200 persons. Population clusters with an urban population of 1,000 persons or more are considered to be Urban Centres, whilst population concentrations of 200 persons or more and a core urban population below 1,000 persons are considered to be Localities (ABS 2015). As shown in Figure 53, the total land classified within an UCL in Victoria increased from 4,038 square kilometres in 1996 to 5,161 square kilometres in 2011, an increase of 27.3 per cent (ABS 2011). This expansion of population is almost certainly affecting the type of use occurring on that land (for example previous agricultural land now being used for housing).

FIGURE 53. VICTORIA UCL CHANGE 1996 - 2011



In 2013- 14, of the 4,449 permits issued in growth areas, 1,488 included a change of land use. This is lower than the 2011- 2012 number of 1,703, however there were more permits issued in this year (4,958). In 2013- 2014, 51 per cent of permits issued resulted in a change to residential use, where 62 per cent resulted in a change to residential use in 2011- 2012 (Department of Transport, Planning, and Local Infrastructure 2014). It is unknown the extent to which these permit changes resulted in a loss of agricultural land to housing.

Continued urbanisation has not yet placed pressure on open space, but this may change in the future. Public open space is a key contributor to Melbourne's liveability and is highly valued by the community. For example, open space contributes to physical and mental health by providing opportunities for physical and social activities. Public open space also plays an important role both in terms of remnant vegetation (and thus habitat) preservation.

In 2010, there was 67,000 hectares of public open space within the urban growth boundary of Melbourne in 2010 (Victorian Environmental Assessment Council 2011, in Commissioner for Environmental Sustainability Victoria 2013). This varied greatly by Local Government Area, with residents in the growth areas of Melbourne having higher levels of public open space per capita. However despite having less open space per capita, the quality of open space in the inner areas of Metropolitan Melbourne is high.

Ongoing urbanisation may put greater risk on cultural heritage sites. More than 4,000 sites and places of cultural heritage significance in the region are registered with Aboriginal Affairs Victoria. These sites, and others that are not yet registered, are valuable to the community as a record of the region's heritage. Eight properties in the region, covering around 200 hectares, are owned and managed by Indigenous communities.

4.1.9 Population and employment scenarios

Melbourne is a global city with many strengths in terms of liveability, economic structure and capacity for ongoing housing and employment growth. There is little doubt the metropolis will grow into the future, the key question is the scale of future growth.

Under a middle growth scenario, Melbourne's average annual population growth over the next 30 years is projected to be close to 1.4 per cent, which is broadly in line with the average growth rate recorded over the past decade. At 2046, this annual growth rate corresponds to a population of 7.1 million people (Table 19).

In a low growth scenario, Melbourne's population would reach over 6 million by 2046, increasing to over 8 million in a high growth scenario. The impact of this change would be most apparent after 2021, when starker differences emerge between the scenarios. While the overall quantum of population growth would impact on the demand for and use of infrastructure, the distribution would have a pronounced impact. The variations in distribution between the Business as Usual, Consolidated and Expansion scenarios are discussed separately for each Subregion.

TABLE 19. POPULATION SCENARIOS ('000) – METROPOLITAN MELBOURNE

		Low Growth	Middle Growth	High Growth
2016	BAU	4,550	4,550	4,550
	Consolidated	4,550	4,550	4,550
	Expansion	4,550	4,550	4,550
2021	BAU	4,815	4,990	4,875
	Consolidated	4,820	4,990	4,900
	Expansion	4,820	5,000	4,880
2031	BAU	5,310	5,830	7,120
	Consolidated	5,310	5,830	7,130
	Expansion	5,320	5,830	7,110
2046	BAU	6,100	7,115	8,100
	Consolidated	6,100	7,115	8,100
	Expansion	6,110	7,120	8,110

Over the next 30 years, Melbourne is expected to continue attracting a growing share of Victoria's employment under the scenarios examined. Under the Business as Usual scenario, for example, the share of jobs located in Melbourne is expected to rise gradually from 76 per cent to 78 per cent by 2046. This is consistent with the structural change occurring in the Victorian economy that is seeing a growing share of service-based businesses locating centrally within Melbourne.

The rate of employment (i.e. the proportion of Melbourne's population that is employed) is expected to remain broadly unchanged over the forecast horizon at close to 52 per cent. Given the ageing demographic profile of Melbourne, this implicitly assumes that the retirement age continues its steady rise over time. Under these assumptions, the number of jobs within Melbourne is expected to reach just over 3.8 million by 2046 (Table 20).

The outcome of varied employment growth scenarios is less marked, in absolute terms, than for population. The difference between the low growth and high growth scenarios by 2046 is just over one million – still significant enough to affect how Melbourne functions. The location of employment, and its interaction to current transport infrastructure and where workers reside will affect the infrastructure challenges Melbourne will face. This is further distilled for each Subregion in following sections.

TABLE 20. EMPLOYMENT SCENARIOS ('000) – METROPOLITAN MELBOURNE

		Low Growth	Middle Growth	High Growth
2016	BAU	2,320	2,320	2,320
	Consolidated	2,320	2,320	2,320
	Expansion	2,320	2,320	2,320
2021	BAU	2,530	2,570	2,580
	Consolidated	2,530	2,570	2,580
	Expansion	2,530	2,580	2,590
2031	BAU	2,660	3,075	3,560
	Consolidated	2,660	3,075	3,560
	Expansion	2,660	3,080	3,570
2046	BAU	3,320	3,875	4,410
	Consolidated	3,320	3,875	4,420
	Expansion	3,330	3,875	4,420

4.2 What does this mean for Melbourne's infrastructure?

4.2.1 A growing, ageing and ethnically diversifying population

Under all scenarios, Melbourne will experience significant growth. Population growth will have significant impact on demand for infrastructure across Victoria, particularly in areas of high population growth. Trend analysis highlights that growth will primarily be concentrated in metropolitan Melbourne. Furthermore, the 'Plan Melbourne refresh' (Victorian Government 2015, p.46) indicates that 70 per cent of new dwellings in metropolitan Melbourne will be developed in existing urban areas.

This growth will be underpinned by a range of major projects (see the text box below).

TEXT BOX 6. PLANNED AND POTENTIAL INFRASTRUCTURE PROJECTS

A range of infrastructure projects are currently being constructed, planned or investigated:

- The relocation of Melbourne Market
- The Western Distributor
- The Victorian Comprehensive Cancer Centre
- The Melbourne Park Redevelopment
- Redevelopment of the State Library of Victoria
- The Melbourne Metro Rail Project includes new stations to generate new land use and interchange opportunities, particularly around Arden and Parkville
- The removal of 50 metropolitan level crossings
- The Cranbourne Pakenham Rail Upgrade, which includes removing all level crossings between Dandenong and Caulfield allowing more frequent services and relieving congestion. The enhanced network will better support the Monash National Employment Cluster and land development along the rail corridor
- The Mernda Rail Extension to integrate the new station into the town centre
- The Tullamarine Freeway widening
- Potential road initiatives such as connecting the Eastern Freeway and Metropolitan Ring Road in the north-east will remain as options that require further assessment

Source: https://s3-ap-southeast-2.amazonaws.com/ehq-production-australia/e52734979c7b0e602ca12736935998db9594965f/documents/attachments/000/028/222/original/Plan_Melbourne_refresh_Discussion_paper and Major Projects Victoria http://www.majorprojects.vic.gov.au/projects/status/current/

While most Victorians will continue to live in metropolitan Melbourne – where infrastructure costs are relatively high and economies of scale are also high with greater population density – greenfield

development and regional areas will also have substantial infrastructure needs and costs. Various studies have indicated infrastructure deficits or 'backlogs' present challenges for future planning, particularly in high growth areas (Infrastructure Australia 2015, Victorian Auditor General 2013).

The impact of this greenfield infrastructure shortfall would be heightened under the high growth scenario where many of the 8.1 million residents would be living in new suburbs on Melbourne's fringe. An ageing population would continue to have a significant impact on the economy and may increase demand for aged care services and infrastructure provision, such as aged care facilities and appropriate age-friendly housing. Costs of health services are expected to rise (ABS 2014b) with increased risk of chronic disease, such as diabetes, in older people. This impact would be felt more strongly under the low growth scenario where there would be a higher proportion of older people and less net overseas migration.

Victoria has a very diverse population and Melbourne is one of Australia's most diverse cities. Enabling culturally diverse communities to gain equitable access to culturally appropriate infrastructure and services is an important aspect of building social cohesion and cultural connections, which in turn plays a part in stimulating knowledge exchange and innovation. The high growth scenario would be underpinned by increased international migration which would increase the numbers of people from diverse backgrounds. Increased ethnic diversity may place strain on the capacity of existing social infrastructure, and may require culturally specific interventions. For example, diverse cemetery and burial needs or new places of worship.

4.2.2 Land use change

Increasing populations will likely mean that a larger share of Victoria's land would be devoted to housing. Depending on how this is managed there would be implications from an environmental perspective. For example, under the expansion scenario there could be a loss of high quality agricultural land as Melbourne's footprint gets larger.

Further, increased housing density as implied under the consolidated growth scenario may lead to a loss of green space or reduced accessibility of green space with consequent reductions in amenity and implications for social capital and health.

Growth municipalities are projected to retain higher per capita levels of open space than most other municipalities. It is anticipated that new open space would be provided in these areas through the planning process and, in some cases, new regional parks. Public open space per capita in the City of Melbourne is projected to decrease significantly given its anticipated strong population growth. Reduced green space may also contribute to reduced air quality, increased costs of cooling and other environmental services obtained from green areas within cities.

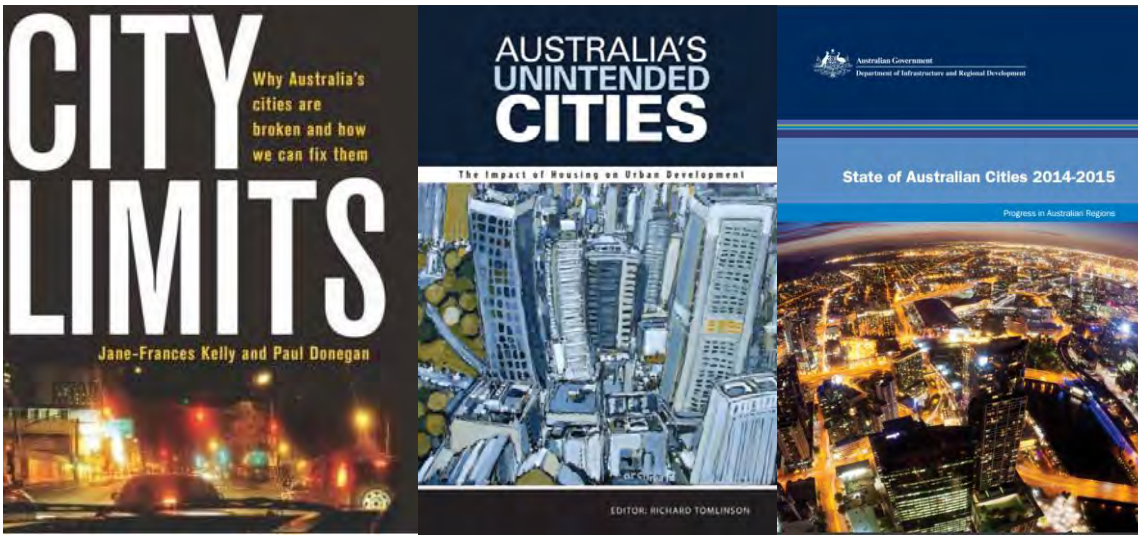
Higher population density may increase the flow of wastewater into the river system thus contributing to higher costs of treatment or the need for additional infrastructure.

4.2.3 Socio-economic disadvantage

Combating inequality and socio-economic disadvantage remains a core challenge for infrastructure provision. Breaking down barriers for disadvantaged Victorians through improving access to infrastructure is one pathway to reducing inequality, for example in quality education, affordable child care, public transport and health services. A report published by the World Bank (2014) highlighted that:

> *infrastructure can have an impact on income inequality…infrastructure facilitates the poor's access to productive opportunities, raising the value of their assets. It can also improve their health and education outcomes, thus enhancing their human capital. More broadly, access to and use of infrastructure services —including telecommunications, electricity, roads, safe water and sanitation— play a key role in the integration of individuals and households into social and economic life (p.2).*

Below are some recent publications that have examined in some detail the relationship between disadvantage and infrastructure.



One way to frame the link between socio-economic disadvantage, and infrastructure is via access to opportunities to build human capital. Infrastructure provision can support skills development and population wellbeing to enhance employment opportunities, for example through education, community and health facilities. Communities equipped with access to a full gamut of social infrastructure have greater opportunities to access employment and support for wellbeing.

Spatialised indicators used to measure inequality, like the Index of Relative Socio Economic-Disadvantage (ABS), can be used to determine areas that require infrastructure and service funding. Analysis highlights that some infrastructure requirements, like public transport or public school provision, are most acute in areas of high relative socio-economic disadvantage. Communities with high disadvantage do not enjoy the same possibilities to raise private investment to address higher needs and require targeted public intervention.

Addressing socio-economic disadvantage and inequality will be a challenge in all scenarios. However, the low growth scenario has lower economic growth which would decrease opportunities for those from areas with high socio-economic disadvantage. By the same token, the high growth scenario would create challenges as there would be more people living in areas of high socio-economic disadvantage.

Future health service needs are likely to require modernisation and retrofitting of ageing infrastructure. Similarly, future planning for healthy communities should contemplate built environment outcomes that promote physical activity. For example by planning growth areas to support higher minimum densities, expanding well-designed bike paths, and supporting social connection, for example through adequate community facilities and public spaces.

Within the range of indicators used to study population health in this analysis, there is also a clear statistical association between geographic areas of socio-economic disadvantage and poorer health outcomes. In this regard, there are five interrelated considerations for infrastructure planning:

1) How to improve local provision of adequate infrastructure in areas that are currently service poor and exhibit high levels of socio-economic disadvantage;
2) How to plan residential development and infrastructure in urban areas that enable healthy lifestyles and help diminish the prevalence of risk factors, like isolation and physical inactivity;
3) How to improve accessibility to existing health infrastructure by road and rail infrastructure for multiple travel modes, including by ambulance, private motor vehicle and public transport;

4) How to diversify the offer of adequate housing in service rich areas to capitalise on existing services and support equitable access to a range of infrastructure; and
5) How to ensure that infrastructure is designed in all areas to support safety (i.e. safe driving, improved access to public transport).

Certain forms of infrastructure can encourage people to share spaces and experiences and potentially develop lasting connections, for example community facilities, open spaces, recreation facilities, libraries, neighbourhood houses and schools. Residents of some disadvantaged areas do not enjoy the same access to services and infrastructure compared to areas of relative advantage in Victoria. In other regions, there are barriers to access existing community infrastructure for some social groups.

Infrastructure planning can provide a focus on delivering equitable access to services and opportunities, but also to address the particular needs of disadvantaged areas where there are higher rates of social issues like domestic violence, chronic disease, lower levels of educational attainment and mental health issues. Infrastructure planning that supports community belonging and the development of social capital may focus on the following considerations:

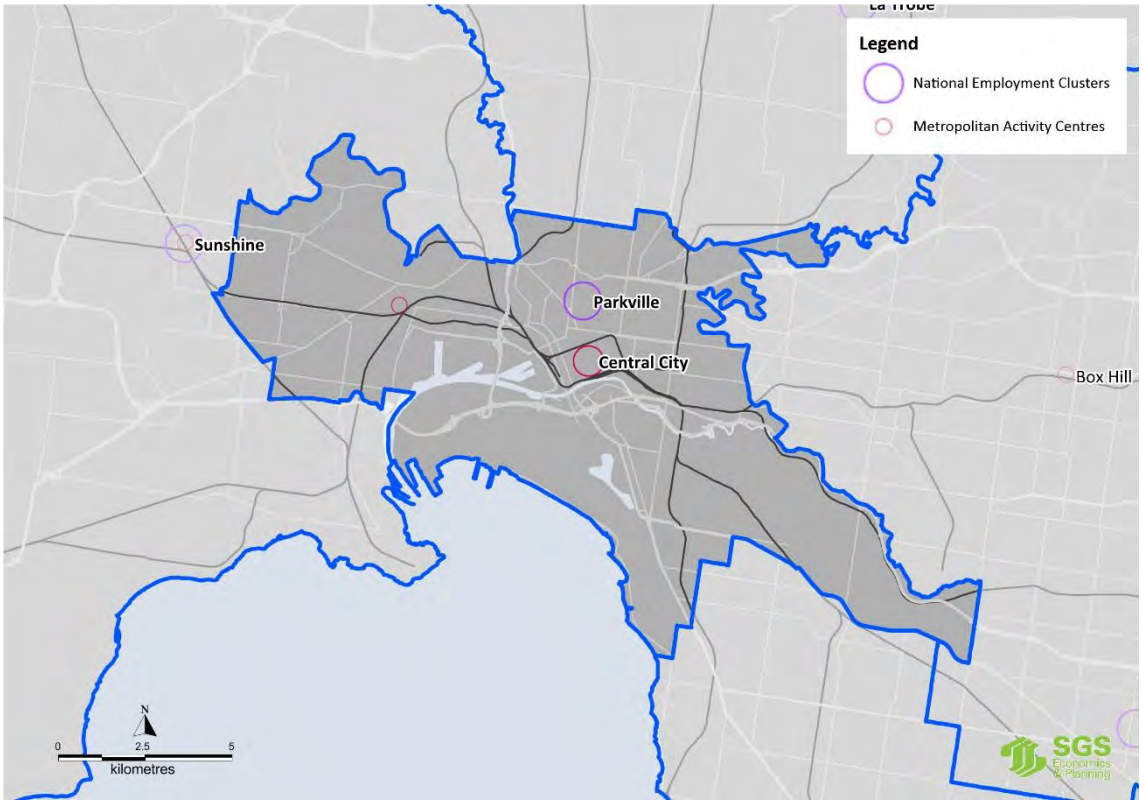
- How to ensure equitable access by public transport to services and opportunities;
- How to design places that encourage the activation of spaces and building social connections by diverse users, including ethno-specific and culturally appropriate infrastructure; and
- How to ensure the provision of a range of community infrastructure locally where demand exists and to reduce disparities in access to infrastructure between regions.

It should be noted that rising net wealth has some positive implications for infrastructure planning and provision. Accompanied by changes in investment approaches, for example in superannuation, there has been a rise in institutional investors assigning assets to infrastructure and new opportunities for private financing. In some cases, contributions to some infrastructure like cultural and sporting facilities can be gained from private sources to leverage public investment.

4.3 Central Subregion

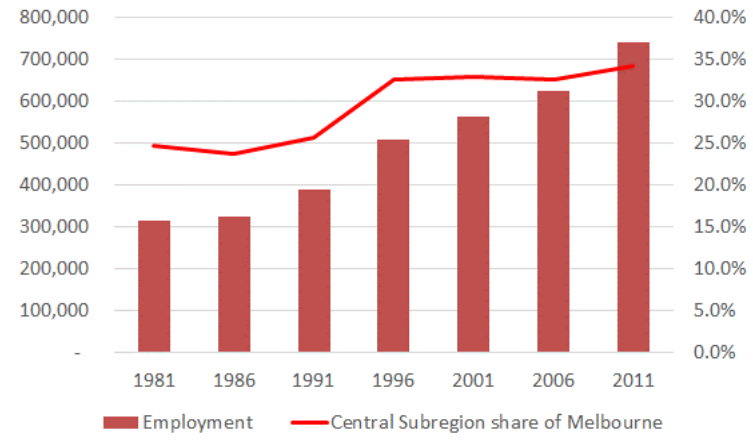
The past 30 years have seen Central Melbourne's economy undergo significant structural change, with substantial implications for the growth of the city.

FIGURE 54. THE CENTRAL SUBREGION



As shown in Figure 55, after 30 years of stagnation, employment in the Central Subregion of Melbourne almost doubled between 1991 and 2011. Much of this growth has been focused in the City of Melbourne. The former manufacturing-based economy, reliant on long standing protectionist policies, has transformed into a diversified post-industrial economy spurred by growth in knowledge intensive services.

FIGURE 55. EMPLOYMENT IN THE CENTRAL SUBREGION



Source: SGS Economics & Planning

In 1996, manufacturing was the third largest employer with 45,000 jobs. By 2011 this had reduced to 33,000 jobs. The reduction in the scale and nature of the manufacturing in Central Subregion reduced pollution in the Yarra River (although heavy metals level remain high today) and air quality. This resulted in increasing residential population growth in the Central Subregion

with an opening up of land and improved local amenity.

The continued growth of Central Melbourne has been enabled by the availability of land close to the centre for urban renewal. The redevelopment of these areas has supported the development of highly successful, specialised inner city precincts.

Beginning in the 1960s, commercial development spread from the Hoddle Grid down St Kilda Road, followed by the redevelopment of Southbank, the emergence of an education and health precinct in Carlton and Parkville and the redevelopment of Docklands in subsequent decades.

Urban renewal has also helped to reconnect with some of Victoria's Indigenous cultural locations. The Birrarung Marr is an inner-city park opened in 2002. The name means 'river of mists' and 'river bank' in the Woiwurrung language of the Wurundjeri people, the Indigenous inhabitants at the time of European settlement of the Melbourne area.

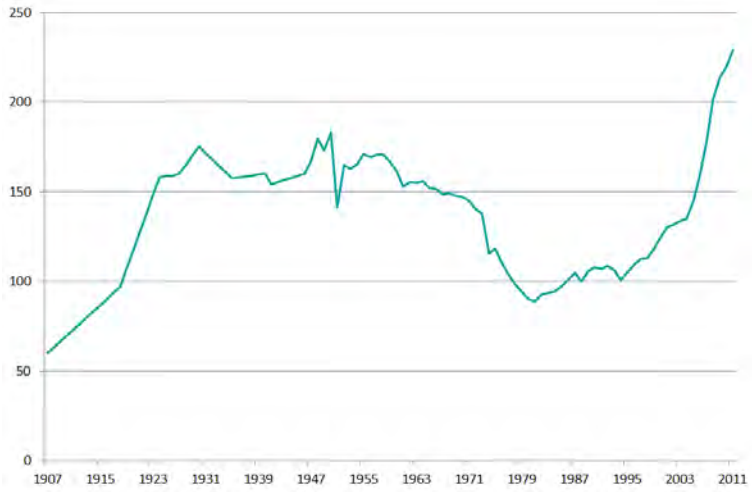
The Wurundjeri people, an Indigenous Australian Nation of the Kulin alliance's territory, extended from north of the Great Dividing Range, east to Mount Baw Baw, south to Mordialloc Creek and west to Werribee River. Their lands bordered the Gunai/Kurnai people to the east in Gippsland, the Bunurong people to the south on the Mornington Peninsula, and the Dja Dja Wurrung and Taungurong to the north. The Wurundjeri, Gunai/ Kurnai, Bunurong, Dja Dja Wurrung and Taungurong people have an enduring connection to Country.

The City Loop's impact on the metropolitan rail network has helped transform the Central Subregion and in particular the northern section of the Hoddle Grid. The Hoddle Grid north of Bourke Street prior to the construction of the City Loop was relatively undeveloped, featuring two to three storey factories and warehouses, with the State Library and RMIT University being the only major attractors.

The construction of the City Loop and the subsequent redevelopment of the land above the new railway stations of Flagstaff, Parliament and Museum (now Melbourne Central), combined with a range of policies to revitalise the CBD. For example, Postcode 3000 helped transformed the northern end of the CBD, allowing suburban residents to directly access inner city jobs, retail and other services by rail.

As shown in Figure 56, the increase in rail patronage after the opening of the City Loop has been dramatic. This has reduced the level of growth in car travel that may have otherwise occurred - a positive impact on Victoria's greenhouse gas emissions.

FIGURE 56. RAIL PASSENGER JOURNEYS (MILLIONS)



Source: Historical ABS Year Books, Grattan Institute 2012 'Can we afford to get our cities back on the rails' and PTV Patronage data. The time series is not complete so data has been interpolated and estimated in certain periods.

During the 1990s the Kennett Liberal government made several reforms to the planning system, primarily linked to economic prosperity and job creation. Major projects and large site redevelopments, notably CityLink, the Western Ring Road, and the opening up former industrial land for residential and commercial redevelopment in Southbank (see Figure 57 and Figure 58) for *before* and *after* redevelopment).

Southbank has been the focus of renewal since the late 1980s and has developed

as a hub for arts and entertainment, as well as a location for high rise office buildings. The Arts Centre was opened in the first half of the 1980s on what was previously industrial land. This was followed by the development of the Southbank Promenade in the 1990s. Critically, the improved urban amenity was a catalyst for further development in the area which is now dominated by high-rise residential and commercial buildings.

During the 2000s, the CBD expanded again with the redevelopment of redundant port land in Docklands. Etihad Stadium was the first project undertaken at Docklands. High-density commercial and residential buildings were subsequently developed, primarily via large lot subdivision leading to very large floor plates. This spurred on the relocation of a number of businesses from the CBD to Docklands.

FIGURE 57. MELBOURNE (1981)

Source: Melbourne Metropolitan Board of Works 1981

FIGURE 58. SOUTHBANK (1996)

Source: Walking Melbourne

The development of Docklands retained parts of Melbourne's industrial heritage with a range of former woolsheds redeveloped and repurposed into commercial use. Whilst Docklands directly abuts the CBD, it is separated by a number of railway lines, Etihad Stadium and a lack of built form integration. This has meant that realising the benefits of close proximity has required considerable investment in local level transport accessibility. This has included major pedestrian bridges over the railway facilities, as well as the extension of the trams (the City Circle route, Route 30, Route 70, Route 86, Route 48, Route 11) into Docklands. The most significant of which was the Collins Street tram extension.

The rise of the professional services and financial services sectors has provided job opportunities located in Central Melbourne, driven partly by large-scale urban renewal, transport accessibility and subsequent availability of commercial floor space. These two industries added almost 80,000 jobs between 1996 and 2011. This, along with the Postcode 3000 initiative, helped to attract a residential population to Melbourne's CBD.

4.3.1 Current and future state analysis

Melbourne's Central Subregion is second only to Central Sydney as the most economically vibrant and valuable area in Australia. It is the hub for industries which stretch out across the state and the globe, and a destination for tourists and residents of Victoria alike. Continued growth of the knowledge-based economy and location preferences of firms to agglomerate in access-rich parts of the city will see the Central Subregion's economic importance grow over time.

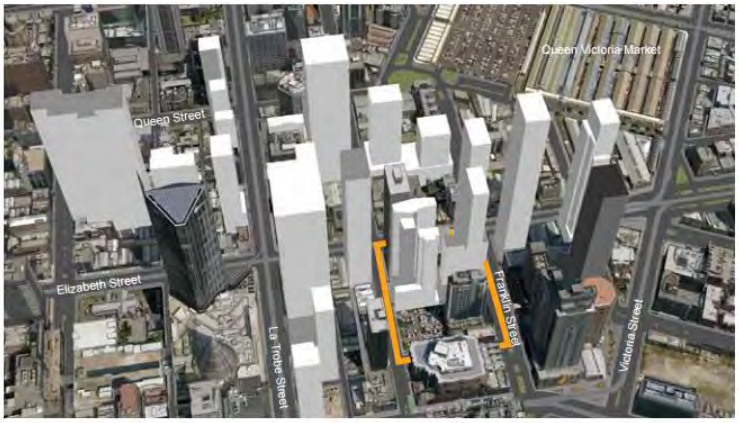
The Central Subregion is a key location for high-value professional services, health services and education. It is home, for example, to Melbourne University, RMIT, the Royal Melbourne Hospital and Royal Children's Hospital, and the headquarters for major global businesses including BHP Billiton, the world's largest miner. There is also a strong insurance, superannuation and financial services sector.

Melbourne's Central Subregion is growing. It is becoming younger and richer on average than the rest of the city and the rest of the state. Younger people are especially attracted to the Central Subregion. This trend is likely driven by access to education and to service sector jobs, both of which are concentrated closer to the city centre (see Figure 56 and 58). The prevalence of Type 2 diabetes has grown in the Central Subregion, but remains lower than the metropolitan average (3.7 per cent versus 5.1 per cent). Obesity has increased to over 11.5 per cent for males, and decreased from 9.9 per cent to 7.8 per cent for females.

The dominant age group for persons in the Central Subregion are young adults aged between 25-29, followed by those aged 30-34 and 20-24. One driver of this is the strong international student market, and the population of domestic students choosing to locate in the Central Subregion near to RMIT University, the University of Melbourne and other inner urban tertiary education providers. The continuation of this trend is dependent on Australia's attractiveness to the international student market – which is highly driven by reputation of facilities and the cost of living, and the ability of suburban and regional universities and colleges to attract students.

Over the period 1991 to 2011, the Hoddle Grid and the City of Melbourne in particular, more generally have seen major growth in the number of residential dwellings. Growth in the international student population has driven development of student accommodation. Planning regulations, availability of finance and the attractiveness of capital growth in Melbourne's property market has also driven a rapid increase in higher density development. Figure 59 provides an indicative scale of recently approved (as at December 2014) residential tower developments in the north part of the CBD.

FIGURE 59. POTENTIAL DEVELOPMENT SCALE ELIZABETH STREET/LA TROBE STREET



Source : https://www.churchilltrust.com.au/media/fellows/Hodyl_L_2014_Social_outcomes_in_hyper-dense_high-rise_residential_environments_1.pdf

Growth occurred at a rapid rate, especially when compared to the rate of growth across Greater Melbourne (see Table 21). Contributing to this growth is the appeal of access to services (retail, food services, and entertainment) which is unique to the CBD.

TABLE 21. OCCUPIED PRIVATE DWELLINGS, 1991-2011

						2011-1991	
Region	**1991**	**1996**	**2001**	**2006**	**2011**	**#**	**AAGR**
Hoddle Grid[13]	396	872	4,628	8,146	11,132	10,736	18.2%
City of Melbourne	12,260	16,066	23,948	31,516	39,976	27,716	6.0 %
Greater Melbourne	1,049,047	1,137,336	1,243,373	1,370,069	1,494,663	445,616	1.8 %

Source: ABS Census

[13] Melbourne CBD region based on old ABS geography classification for years 1991 and 1996 (Melbourne (C) – Inner). From 2001 onwards, Melbourne CBD region based on current ABS geography (Melbourne SA2).

The increased demand has created housing affordability issues for existing residents and population who previously called the Central Subregion home.

This growing population has also placed pressure on community facilities within the Central Subregion. Additional libraries, child care, schools, public open space, bike and pedestrian infrastructure and other community needs have been required to be constructed. In the case of schools, many residents of the inner city have to travel long distances to access a primary school for their children. The rapid growth in the population and the lack of existing social capital has presented a growing risk for social exclusion for some population groups.

Figure 60 below shows the change in GDP in the Central Subregion between 1998 and 2014. The economy continues to expand although at a slowing rate. This is due to a range of macroeconomic factors, including the ongoing economic adjustment post the Global Financial Crisis and capacity constraints within the domestic economy.

FIGURE 60. GROSS REGIONAL PRODUCT – CENTRAL SUBREGION

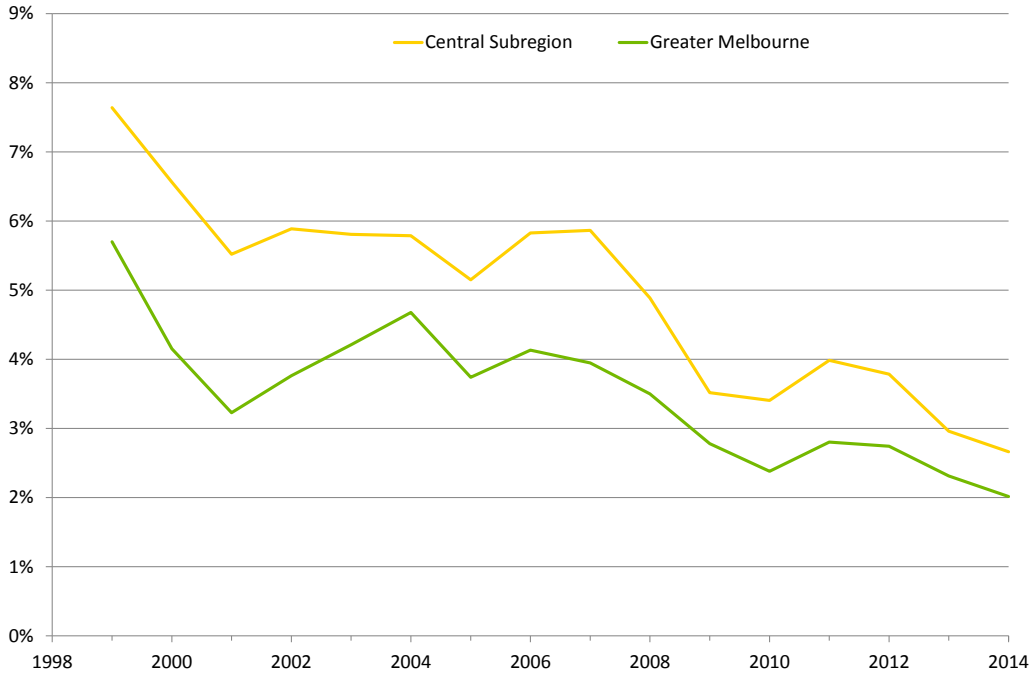
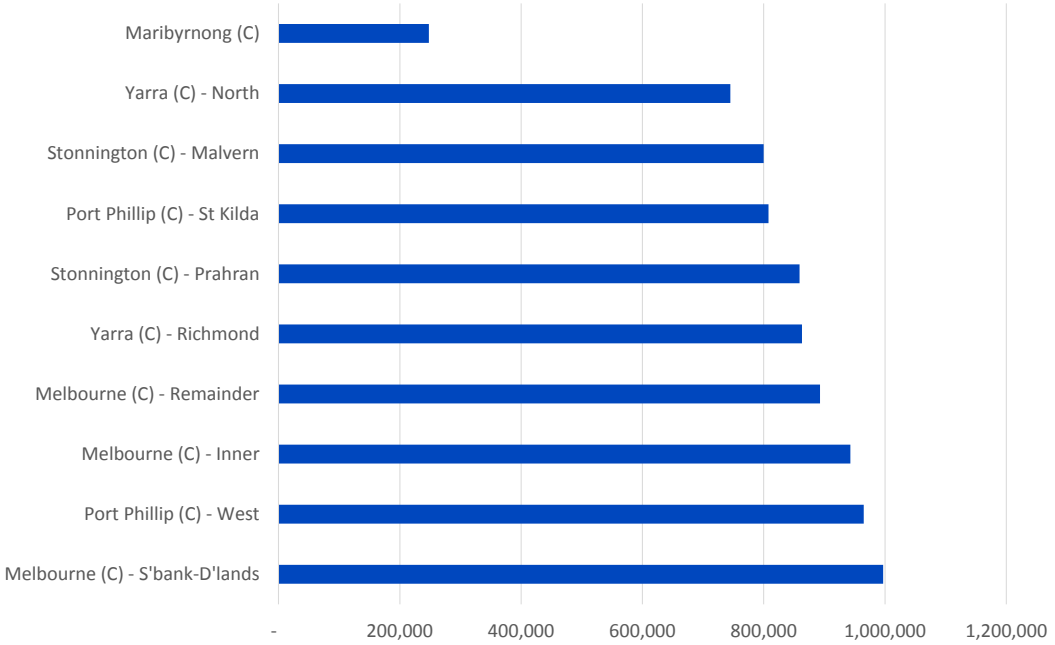


Figure 61 shows the number of jobs accessible within a 30 minute travel time for Central Subregion suburbs (and corresponding municipalities).

FIGURE 61. JOBS ACCESS WITHIN 30MIN – CENTRAL SUBREGION (2011)



Source: SGS Economics & Planning

Consistent with the rise in young people, the labour force participation rate of the Central Subregion has increased, going from 68.1 per cent in 2001, 70.3 per cent in 2006, and 72.1 per cent in 2011. These young, childless, wealthy residents tend to work locally and commute by a mode other than car. The proportion of workers travelling to work by car is the lowest in the state and decreased the most (4.5 per cent) of all metropolitan regions, going from 55.4 per cent to 50.9 per cent over the period 2006 to 2011.

Some of the growth in population in the Central Subregion is overseas students. This correlates with an increase in the share of people born overseas. The city overall has been the target of a significant inward migration. There was a 0.5 per cent increase in the number of people born overseas, but interestingly, no increase in the number of people with non-English speaking backgrounds. Household sizes are the lowest in the state, at just over 2 persons per household, consistent with the smaller average house size and higher share of high-density living.

Despite this, pockets of relative disadvantage remain in the west of the Subregion (Footscray and Braybrook) and around the inner northern suburbs of Carlton, Fitzroy and Collingwood, correlating to public housing estates and to a lesser degree, higher student populations. This is demonstrated by lower SEIFA indices in these locations (Figure 62). Public transport accessibility is high throughout most of the Subregion, declining to the west and areas around the Port of Melbourne (Figure 63).

FIGURE 62. SEIFA INDEX – CENTRAL SUBREGION

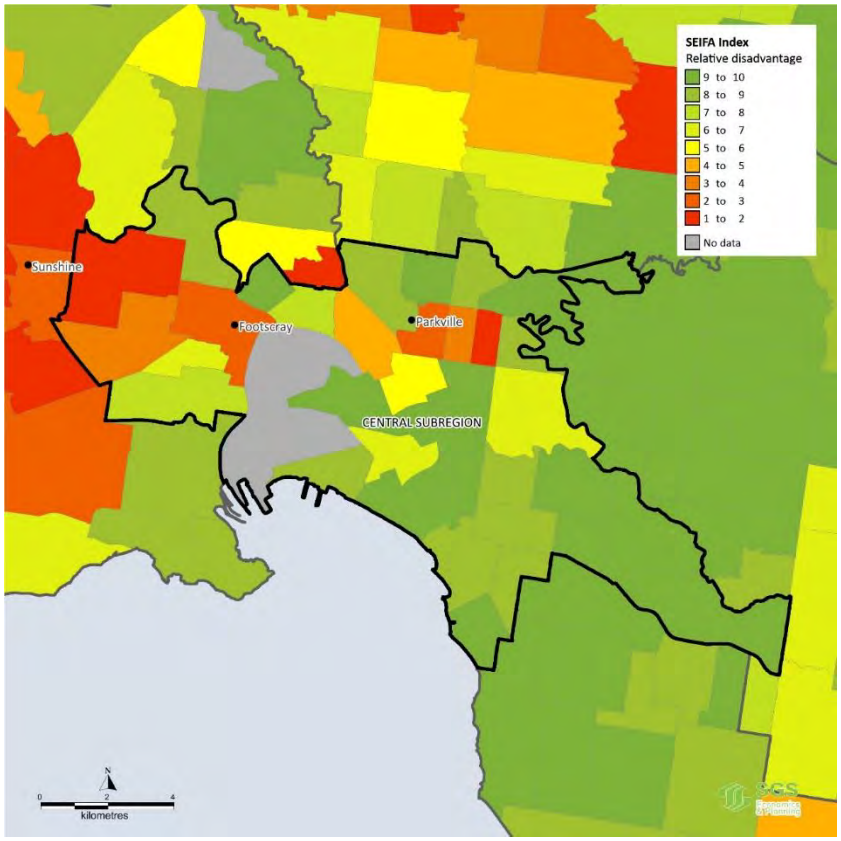
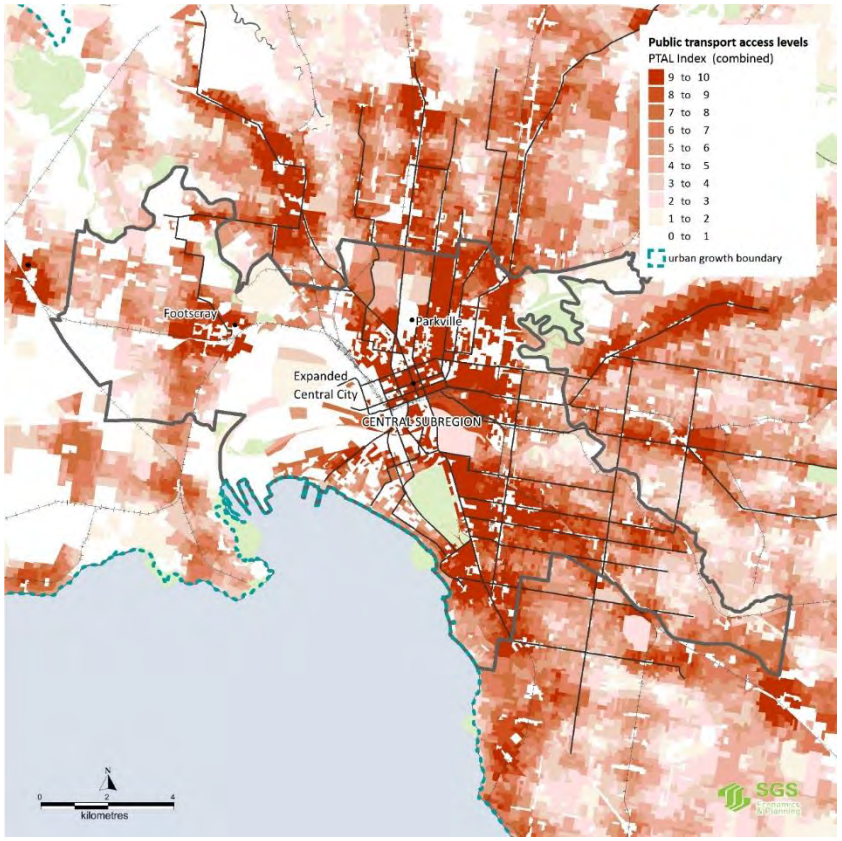


FIGURE 63. PUBLIC TRANSPORT ACCESSIBILITY LEVEL – CENTRAL SUBREGION



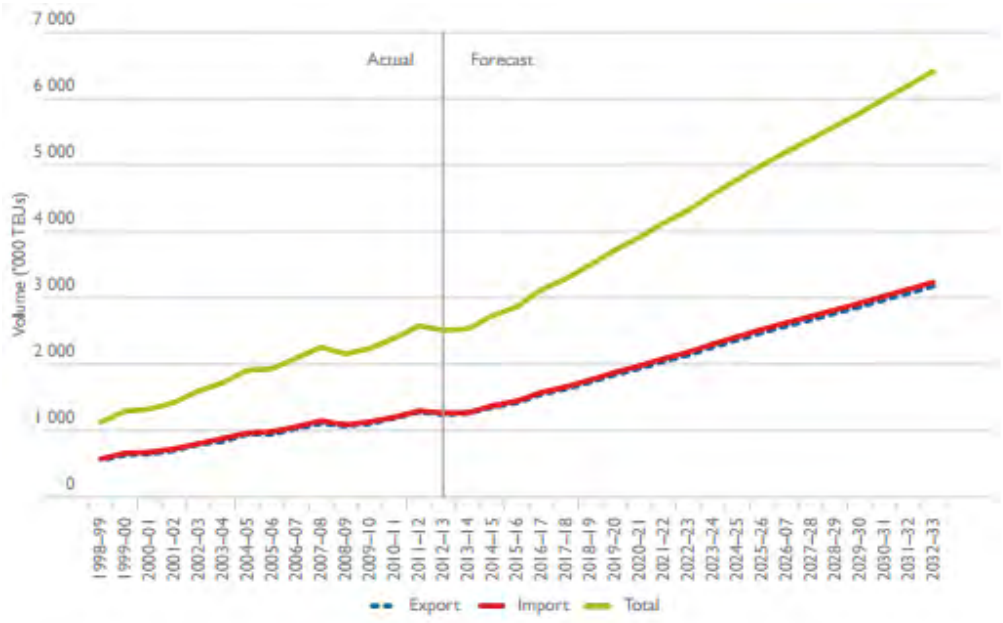
Overall, the Central Subregion's population has been growing at 2.7 per cent per annum from 2004 to 2014, climbing from around 383,000 people in 2004, to around 501,000 in 2014 (ABS 2015c). Under a business as usual scenario, the population could grow to almost 1 million by 2046.

All those people are attracted by and contributing to a strong economy. The Central Subregion has enjoyed good economic growth in recent years. Individual income grew 4.6 per cent over the 2006 to 2011 period, and unemployment fell from 7.5 per cent in 2001, to 5.6 per cent in 2011.

Crime rates were the highest in the state at 14.9 per 100 people in 2014, but diminished between 2010 and 2014 – the only part of Melbourne where this occurred in that period.[14]

The Central Subregion is also the seat of major infrastructure including the key linkages in Melbourne's rail and road networks, and the Port of Melbourne. The Port is growing as global trade increases (see Figure 64 below), with implications for the health and functionality of Port Phillip Bay, and road and rail on the landside. Continued demand for exports will be driven by a strong economy, and will in turn, increase the pressure on this infrastructure over time.

FIGURE 64. FORECAST CONTAINERISED TRADE: PORT OF MELBOURNE



Source: Bureau of Infrastructure, Transport and Regional Economics 2014a.

Manufacturing jobs were once the backbone of the Central Subregion economy, but have been overshadowed by other sectors. Interestingly, manufacturing jobs in the very centre of Melbourne have grown recently, as high value manufacturing has a minor resurgence. But the relative importance of manufacturing is now small.

The Central Subregion has a strong retail and services sector. Retail has both struggled and evolved under threat from online selling. Retailers that remain offer a strong value proposition to customers in their Central Subregion stores. Entertainment, personal services and restaurants in the Central Subregion have blossomed as the population of the CBD and inner suburbs have boomed. Overall, gross regional product (GRP) has been in line with broader trends in Melbourne (Figure 55).

[14] The per capita measure for crime does not capture all the workers and visitors to the Central Subregion, particularly the CBD, Southbank and Docklands, at any given time.

The Central Subregion is also the hub for tourism in the state of Victoria, although this could come under threat by competition from other cities in Australia and globally. Globalisation forces, and the increased mobility of labour and capital, have led to increased competition among major cities as they aspire to become centres of capital accumulation and foci for the knowledge-based industries. Competitiveness - or success - is increasingly seen as tied to the social qualities and properties of urban places as well as their 'cultural products' (Gertler 2004).

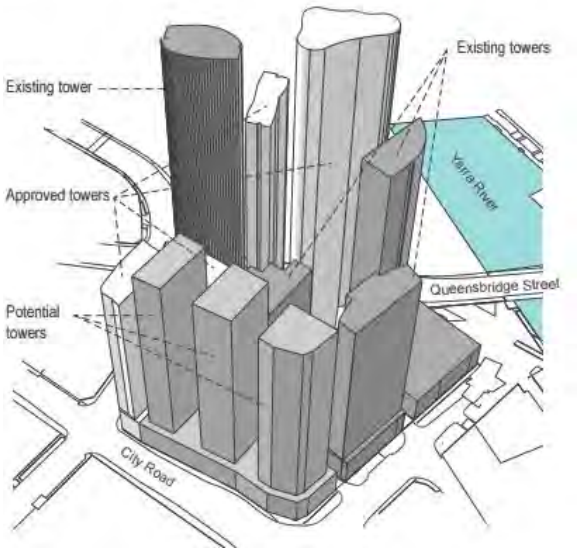
Cultural infrastructure, such as museums, galleries and theatres, is a key driver of international and interstate tourism, and these are most concentrated in the Central Subregion in Southbank and the 'arts precinct'.

It is widely recognised that arts and cultural visitors are more likely to have a longer visit and a higher average spend than non-cultural visitors, including on items not directly related to arts and culture, such as accommodation, transport and meals (Tourism Victoria 2010). The arts and cultural offer of a city is therefore critical to its economic success, creating demand for direct and indirect employment and contributing to increased spending in tourism and associated sectors.

Tourism in Melbourne is also heavily driven by sporting infrastructure and the ability to draw major national and international events. Those visiting Melbourne are three times more likely to attend a live sporting event compared to the national average (Roy Morgan 2015). Interestingly, sports tourists are more likely to attend concerts and visit theatres and museums, pointing to the importance of a well-rounded tourism infrastructure offer.

Many of the economic and social trends that have shaped the Central Subregion are expected to continue due to further growth in professional services and population servicing industries, along with the enduring strength in the construction sector. This will see the Central Subregion continue its transition to higher density with continued migration from across Australia and the world (see example from Southbank in Figure 65 below).

FIGURE 65. HIGH RISE DEVELOPMENT PATTERNS IN SOUTHBANK



Source: https://www.churchilltrust.com.au/media/fellows/Hodyl_L_2014_Social_outcomes_in_hyper-dense_high-rise_residential_environments_1.pdf

Solid growth is expected to be located in the CBD, Fishermans Bend Urban Renewal Area, E-Gate Precinct and the Arden-Macaulay Precinct. These urban renewal areas may shift the way the Central Subregion and Metropolitan Melbourne functions, helping to bridge the gap between the location of jobs and people.

Export of services - in the form of education, health, professional services and tourism will become more important. The future of retail remains to be seen with the threat from online sales and activity yet to be fully realised, and the extent to which consumers may ultimately prefer traditional retail as yet unclear. This could lead to change in the role of traditional retail strips in the Central Subregion.

The sharing economy could yet expand and have a greater impact on even more sectors of the economy. Its capacity to impact tourism and transport is already clear with traditional taxi and hotel industries experiencing significant competition. These will not pose a threat to the overall health of the Central Subregion economy but

could affect its composition and cause strains along the way. Competition from other cities for tourism spending is likely to be a bigger threat.

In the more distant future, the economic growth of the Central Subregion is expected to gradually reduce overtime as the growth of the working age population slows, but it is expected to remain positive. The key to this continued growth is the impact of climate change and how this is mitigated.

Melbourne has become warmer and drier, and this is likely to continue into the future. It is expected that there will be increased temperatures, more hot days, frequent and intense downpours with less rainfall in winter and spring, and harder and longer fire seasons. Whilst these trends are global, they can pose threats to Melbourne specifically, such as threats to tourism infrastructure, impacts on tourism events, disruption to daily services, increased maintenance costs and more stress on health and emergency services (DELWP 2015). The urban heat island effect, which causes metropolitan areas to be significantly warmer than its surrounding rural areas due to human activities, will likely cause additional strain on metropolitan infrastructure.

4.3.2 Population and employment scenarios

The level and distribution of population and employment growth will impact how the Central Subregion and Melbourne functions overall. The distributions and scenarios developed suggest a large range of futures are possible for the Central Subregion.

Business as usual distribution
The Central Subregion has experienced significant employment and population growth over the past thirty years. Some of this development has taken place in areas of high connectivity (e.g. Melbourne Central) and some in areas of low connectivity (e.g. the southern parts of Southbank).

Under the Business as Usual (BAU) distribution, this pattern of development would continue. Some jobs and dwellings would locate closer to tram and train infrastructure and others would be drawn to areas with lower accessibility on the fringe of the Central Subregion.

A BAU distribution would see the continued dominance of the Central Subregion persist in a broader Melbourne context. Transport infrastructure would face increased pressure, as people living in dispersed locations travel to the Central Subregion to access jobs. A BAU distribution would see a total of 820,000 to 1.1 million residents in the Central Subregion, and 1.2 to 1.6 million jobs (Table 22 and Table 23).

TABLE 22. POPULATION SCENARIOS ('000) – CENTRAL SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	535	535	535
	Consolidated	535	535	535
	Expansion	535	535	535
2021	BAU	580	605	590
	Consolidated	600	620	610
	Expansion	570	590	580
2031	BAU	660	720	880
	Consolidated	680	750	920
	Expansion	630	690	840
2046	BAU	820	960	1,090
	Consolidated	870	1,010	1,150
	Expansion	780	910	1,040

TABLE 23. EMPLOYMENT SCENARIOS ('000) - CENTRAL SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	785	785	785
	Consolidated	785	785	785
	Expansion	785	785	785
2021	BAU	870	880	880
	Consolidated	860	875	880
	Expansion	850	865	870
2031	BAU	920	1,065	1,230
	Consolidated	910	1,050	1,220
	Expansion	890	1,035	1,200
2046	BAU	1,200	1,395	1,590
	Consolidated	1,110	1,300	1,480
	Expansion	1,040	1,210	1,380

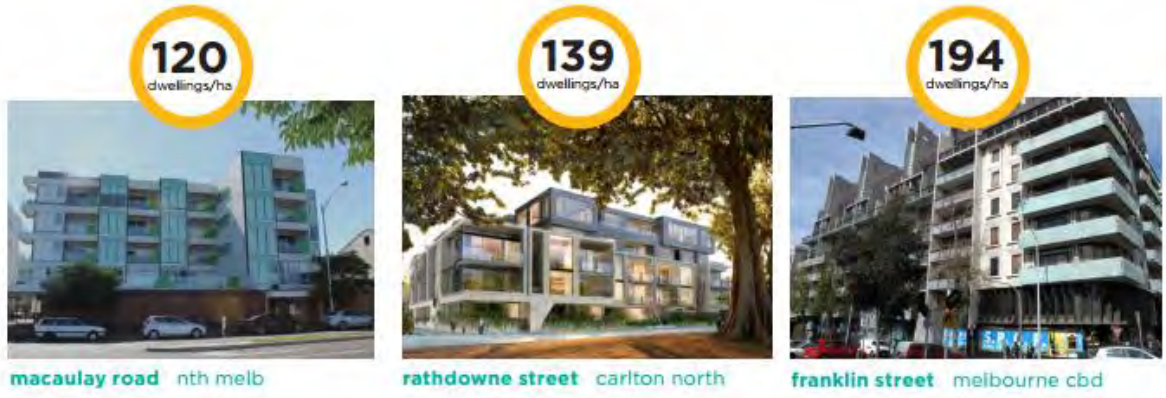
Consolidated growth

The Consolidated growth scenario would see more and larger development take place in areas of high accessibility.

This scenario would also see between 870,000 and 1.2 million residents in the Central Subregion, and 1.1 to 1.5 million jobs. When compared to the BAU distribution, this is slightly more residents, and slightly fewer jobs. This scenario would see a degree of rebalancing between the location of jobs and people in Melbourne, but the high level of potential growth means infrastructure would come under strain.

The type of development which would become more wide spread across the Central Subregion is shown in the following figure (Figure 66).

FIGURE 66. EXAMPLES OF DWELLING TYPES BY DENSITY



Source: City of Melbourne 2012

New transport investment would create new locations (for example proposed stations along the Melbourne Metro Rail Tunnel) of higher accessibility which would allow more intensive development. A high level of investment in the heavy rail network would also help deal with the significant commuter and business flows associated with the Consolidated growth scenario (Figure 67).

FIGURE 67. RAILWAY NETWORK DEVELOPMENT PLAN

Source: Public Transport Victoria 2012

Expansion distribution

Under an Expansion scenario, population growth would reach 780,000 to 1 million, and jobs growth would reach 1 million to 1.4 million. Whilst this is less than the BAU and Consolidated distribution scenario, it is still a significant addition.

FIGURE 68. YARRA'S EDGE DEVELOPMENT EXAMPLE

Source: http://we.mirvac.com/Yarras-Edge/YE-Awards/

The scenarios suggest that in the Central Subregion, population and jobs growth would continue and would be significant, regardless of the overall distribution and level of growth in people and jobs across Melbourne.

The Expansion distribution would have a greater development focus on areas with lower accessibility. For example, fringe areas in the Central Subregion which are assumed to have no new transport investment in the Central Subregion would attract more development than under the Business as Usual scenario.

Figure 68 shows a current development in Yarra's Edge (part of Fisherman's Bend) which would become the norm under the expansion scenario.

4.3.3 Infrastructure implications

The population and employment scenarios suggest that the Central Subregion may experience high levels of population and employment growth, even under the low growth scenario.

Potential pressure points include:

- Trains, trams, roads, parking, infrastructure for active transport and for freight will all be increasingly demanded and contested as the city grows in size, density and wealth. Intersections between transport modes - including bus lanes, bike lanes and railway crossings, could pose particular bottlenecks.
- Communications infrastructure will be another source of bottlenecks, with particular implications for professional services and other knowledge economy firms likely to locate in the Central Subregion.
- Increases in trade will lead to higher freight volumes passing through the Central Subregion, with growing pressure points in Port Phillip Bay and on the landside of the port.
- Increased demand for healthy inner city waterways and parks, and at the same time rising population pressures that will make such outcomes harder to achieve.

If levels of growth anticipated under the scenarios are achieved, then significant strain will be placed on existing infrastructure. High levels of employment growth will place particular pressure on transport infrastructure. This level of pressure may necessitate investment in new or upgraded infrastructure.

In planning for new communities, such as the urban renewal precincts of E-Gate and Arden Macaulay, infrastructure will likely need to be provided from the ground up as these locations are currently undeveloped. Infrastructure provision in the Central Subregion has a role to play in addressing Melbourne-wide issues, such as spatial inequality. For example, this may mean ensuring new urban renewal precincts are well-linked to the rest of Melbourne and also have good inter-precinct links.

Structural infrastructure may also be required to help close the gap between the location of people and jobs across Melbourne, which would be particularly pronounced under the expansion scenario whereby the gap between the location of job and population growth becomes larger.

Looking at other cities of this scale (for example, Singapore or London) pricing and regulation of existing infrastructure has been used to enable ongoing employment and population growth.

Increased population will likely require sufficient follower infrastructure. Ensuring access to social infrastructure such as public open space, schools, libraries and local level utilities will be important. A potential challenge in providing follower infrastructure will be the increasing scarcity of land in the Central Subregion.

The population will be from an increasingly diverse cultural background. Enabling culturally diverse communities to gain equitable access to culturally appropriate infrastructure is an important aspect of building social cohesion. There are implications for planning ethnically and culturally specific infrastructure, for example to accommodate variations in burial needs or places of worship.

Under the higher growth scenarios, the scale of growth may generate the need for structural infrastructure (which would also serve the other Melbourne Subregions) to manage the peak period commuter flows and open up more areas for high density commercial and residential hubs. Planning controls in areas outside of the CBD would need to evolve in order to accommodate forecast people and jobs. Follower infrastructure would increase in line with additional population and employment growth. The higher rate of growth would also require other threshold infrastructure investments to be made. For example, airport and seaport capacity and water supply would have to be addressed.

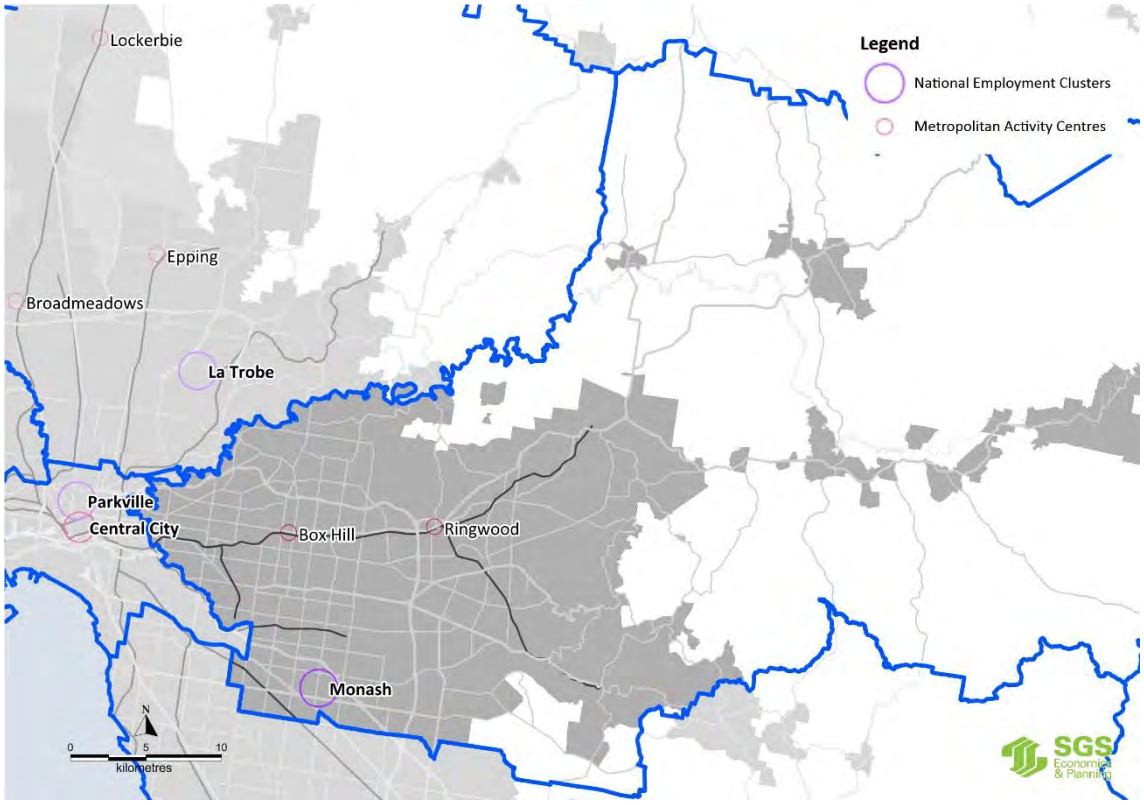
This higher growth scenario may not be reached due to climate change and its potential impact on the reliability of existing infrastructure. In addition, the increasing density of buildings and loss of green space exacerbates the heat island effect of cities, a factor likely to become more significant as a result of climate change and increasing numbers of days of extreme heat.

The Central Subregion is the key hub for Melbourne's transport infrastructure (road, port and rail networks) all of which are susceptible to damage from extreme wet, dry, hot and cold conditions. The direct financial costs of potential damage to this vital infrastructure are substantial. Indirect costs such as threats to human safety, the maintenance of critical supply lines and the commercial costs of delays could greatly amplify the consequences of such damage. Some ways to mitigate infrastructure against climate change impacts include increasing storm water capacity, adoption of water sensitive urban design and diversifying sources of power and water (DELWP 2015). Across all aspects of infrastructure planning – design and location, future climate and sea level rise should be considered.

4.4 East Subregion

The East Subregion covers the inner Eastern suburbs of Hawthorn and Camberwell, and extends through the Yarra Ranges.

FIGURE 69. EAST SUBREGION



The East Subregion of Melbourne has witnessed a long period of development which historically concentrated along railway corridors. Early Melbourne expanded eastwards initially, along the Yarra River and into Hawthorn and Kew in the mid to late 1800s. Residents were attracted by the undulating topography and fertile soil, and this led former farmlands to be progressively redeveloped for suburban residential uses.

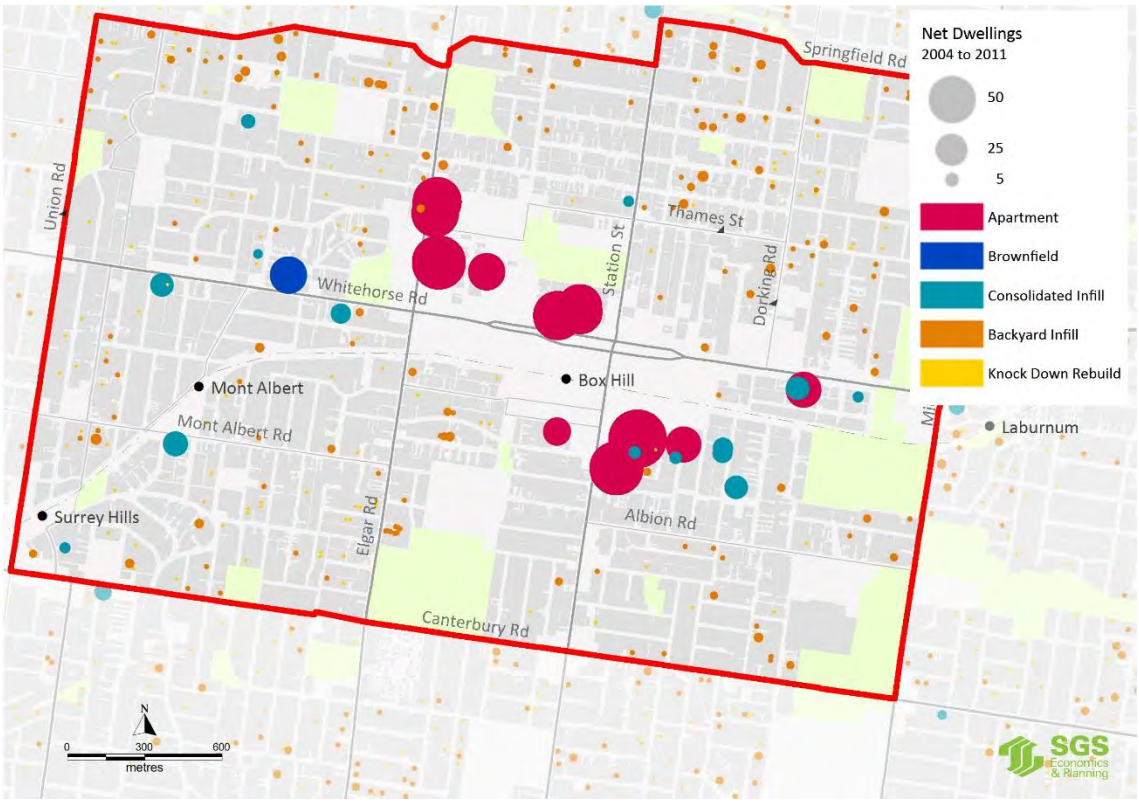
The eastern suburbs of Camberwell, Canterbury and Surrey Hills developed along the Lilydale railway line, eventually reaching Box Hill and Ringwood. Modest development also followed the tram network out to suburbs such as Burwood. High population growth following WWII coupled with strong economic growth which led the continued development of the East Subregion. The widespread use of the car and investment in the road network led to substantial expansion of development in the 1950s and 1960s.

A grid-like structure of north-south and east-west roads were constructed throughout the East Subregion, combined with radial freeway connections (Eastern and Monash Freeways). This supported the growth of Glen Waverley, Burwood East, Blackburn and Doncaster, and continues to support intra-regional movement. While rail and tram transport infrastructure is rich throughout the East Subregion, the Doncaster area is primarily serviced by a high quality DART bus system.

The Dandenong Ranges limit the potential for the East Subregion to accommodate greenfield development. Greenfield development is largely contained to sites converting to residential use, such as former golf courses in Doncaster and Croydon.

Large shopping centres and business parks emerged along major arterials such as Springvale Road and Middleborough Road. The existing centre of Box Hill was strengthened with substantial investments in education and healthcare institutes, as well as transport upgrades. Today, Box Hill is a significant focus of residential development. Figure 70 displays net dwellings by housing type from 2004 to 2011 in Box Hill, and the high number of apartment developments in particular.

FIGURE 70. NET DWELLING ADDITIONS BOX HILL, 2004-11



Source: SGS Economics & Planning 2014

FIGURE 71. MONASH UNIVESRITY, CLAYTON

Source: Monash University

The region's most significant employment centre is the Monash National Employment Cluster. In 2011 the Monash Employment Cluster contained around 83,000 jobs.

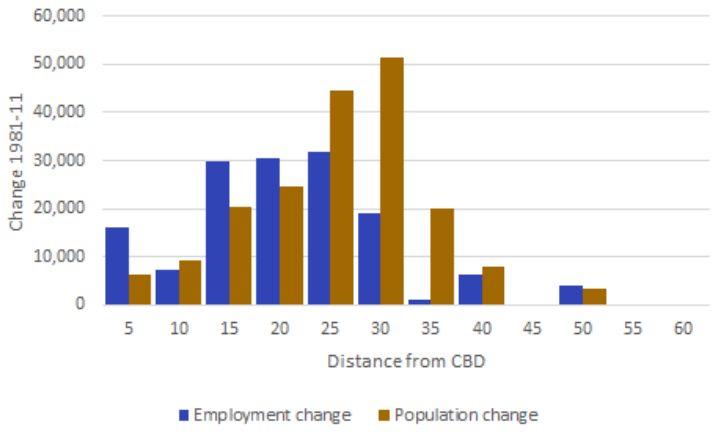
A key precinct in the Employment Cluster is Monash University (Figure 71). Since its opening in 1961, Monash University has grown considerably, supported by the development of

complimentary facilities, such as the CSIRO, Monash Medical Centre, the Australian synchrotron, and the Monash Children's Hospital.

Employment growth in the Monash National Employment Cluster is reflected in Figure 72 with jobs growth 20 to 25 kilometres from the CBD.

Through the 80s, 90s, and early 2000s urban development spread further eastwards along the road network developing suburbs such as Knox, Rowville, Wantirna, and Croydon, and reaching older townships such as Lilydale. With outward expansion limited by the Dandenong Ranges, the East Subregion has seen less growth than Melbourne's other Subregions in the last decade. In 1981 the East Subregion housed 30 per cent of Melbourne's total population; by 2011 its share had fallen to 25 per cent. Infill development is increasingly common.

FIGURE 72. EAST SUBREGION POPULATION AND EMPLOYMENT CHANGE 1981-2011



Source: ABS Census 1981, 2011

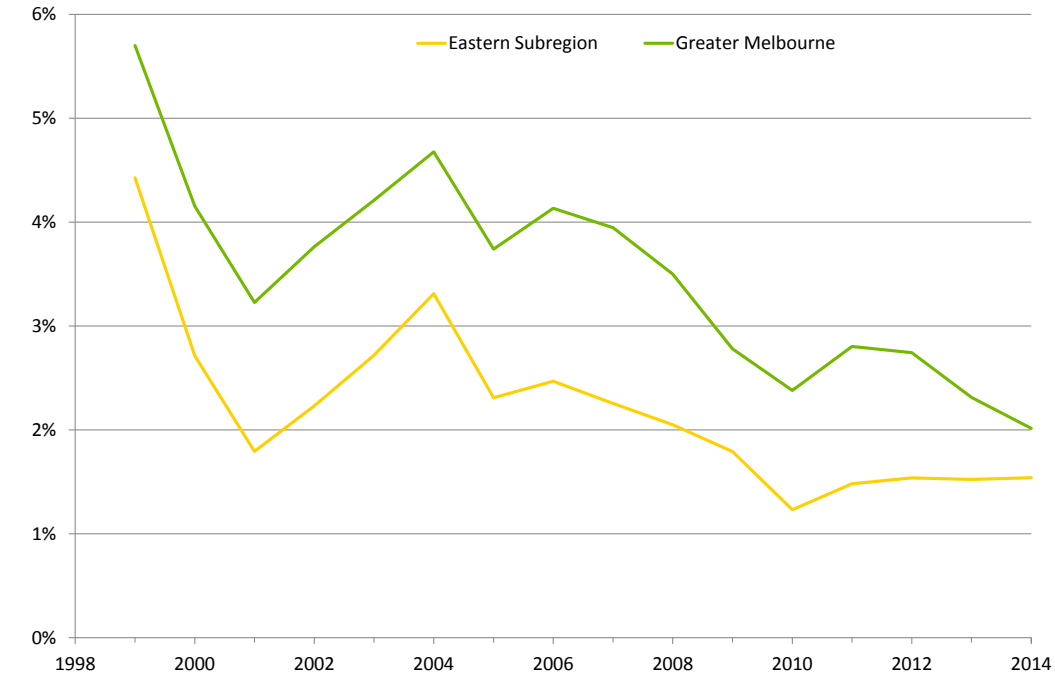
Employment growth over the same period has been strong 15 to 30 kilometres from the CBD, and the construction of Eastlink improved the business connectivity of these middle suburb employment centres. Of all the Subregions in Melbourne, the East Subregion has the strongest 'match' between areas of employment and population change, however employment is more focused towards the CBD.

4.4.1 Current and future state analysis

Melbourne's East Subregion is the most second populous part of the city, but the slowest growing. It has been adding people at a rate of just 0.8 per cent a year, as population growth has been focused in other areas (ABS 2015c). Over the decade of 2004 to 2014, population increased from around 974,000 people in 2004, to around 1,057,000 in 2014 (ABS 2015c). Current projections suggests a population of 1.5 million could be reached by 2046 – an addition of approximately half a million residents. The developed nature of the East Subregion means that CityLink, the Monash Freeway and EastLink have a less dramatic impact in generating additional residential growth when compared to the South Subregion.

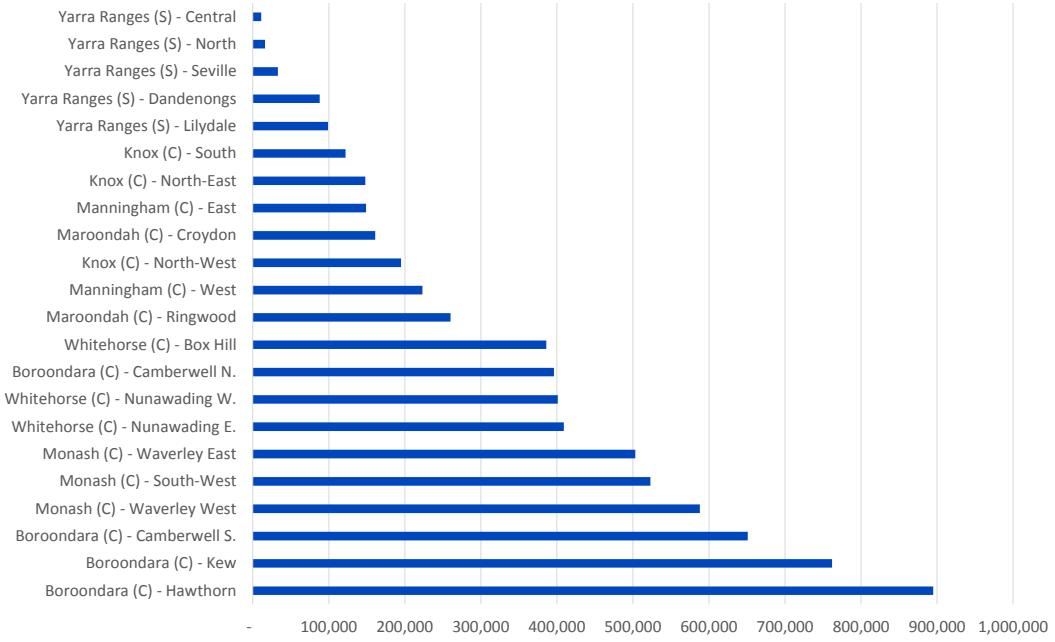
Change in GRP growth in the East Subregion has mirrored metropolitan trends (Figure 73). Figure 74 shows the number of jobs accessible within a 30 minute travel time for East Subregion municipalities.

FIGURE 73. GROSS REGIONAL PRODUCT – EAST SUBREGION



Source: SGS Economics & Planning

FIGURE 74. JOBS ACCESS WITHIN 30 MIN DRIVE, EAST SUBREGION (2011)



Source: SGS Economics & Planning

Household sizes in the East Subregion average 2.5 persons and the share of people born overseas has risen 1.6 percentage points to 34.1 per cent between 2006 and 2011 (ABS 2006; 2011).

As the most established and wealthiest part of Melbourne, the East Subregion has almost no areas of significant disadvantage, except for areas in the Yarra Valley in the far east of the Subregion (Figure 75). It also has the city's lowest crime rate. Nevertheless crime rose from 4.3 per 100 in 2010 to 4.9 per 100 in 2014 (CSV 2014).

The East Subregion has seen substantial growth in employment in the inner 30km over the last several decades. Its economy has continued to grow in recent years.

Individual income grew 4.2 per cent a year between 2006 and 2011 period, although during this period, unemployment rose from 4.4 per cent to 4.9 per cent (ABS 2006, 2011).

The East Subregion has seen its manufacturing sector shrink to 61,000 jobs, but the sector remains the biggest employer in the region.

Education and retail are also important to the East Subregion, which contains two major universities – Monash and Swinburne, plus the Southern Hemisphere's largest shopping mall in Chadstone. Health services are concentrated at Box Hill Hospital and Monash medical precinct.

While there are gaps in service, including at Chadstone Shopping Centre, the East Subregion of Melbourne is generally well-served by public transport (Figure 74). The tram network in the inner part of the Subregion is especially strong, and employment is focused in those areas. The Doncaster corridor, stretching from Balwyn North through to Templestowe and Donvale, has a high level of bus service, ensuring most parts of the East Subregion have access to some form of public transport (Figure 76).

Nevertheless, the car remains the dominant mode of choice for commuting in the Subregion and its dominance is fairly resilient. The share of people traveling to work by car fell from 84 per cent to 83 per cent between 2006 and 2011 (ABS 2006, 2011).

The East Subregion is expected to continue to grow, but with a decline in its share of employment and population within Greater Melbourne.

The East Subregion will continue to become denser as infill development populates the relatively high value land, starting from the inner suburbs and moving outward in areas well-served by transport infrastructure. The East Subregion will likely consolidate its future growth in targeted areas (including in the Monash Employment Cluster, Box Hill and Ringwood).

The East Subregion's strong population servicing industries will continue to grow in line with population, but retail could come under threat as the nature of the development of the retail sector becomes clearer. Chadstone and other shopping centres may need to adapt.

Strong growth in education and health service industries is expected to continue as the population continues to age and Asia continues to grow. The increasing importance of health and education both domestically and as exports is likely to be very advantageous for the East Subregion, which is well-positioned to leverage off its existing health and education facilities.

FIGURE 75. SEIFA INDEX – EAST SUBREGION

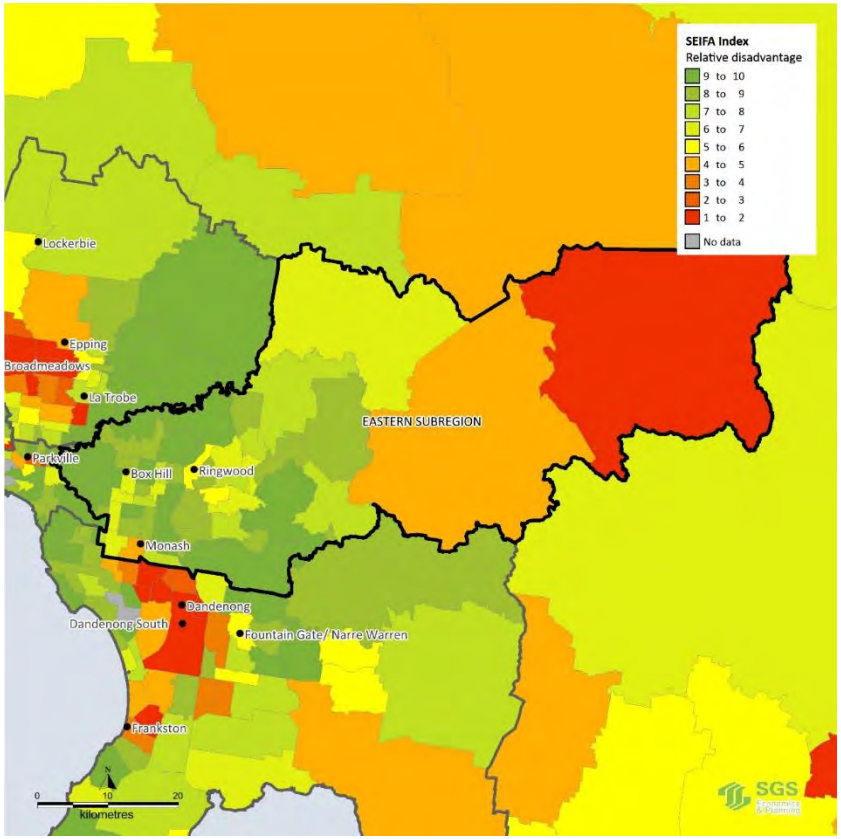
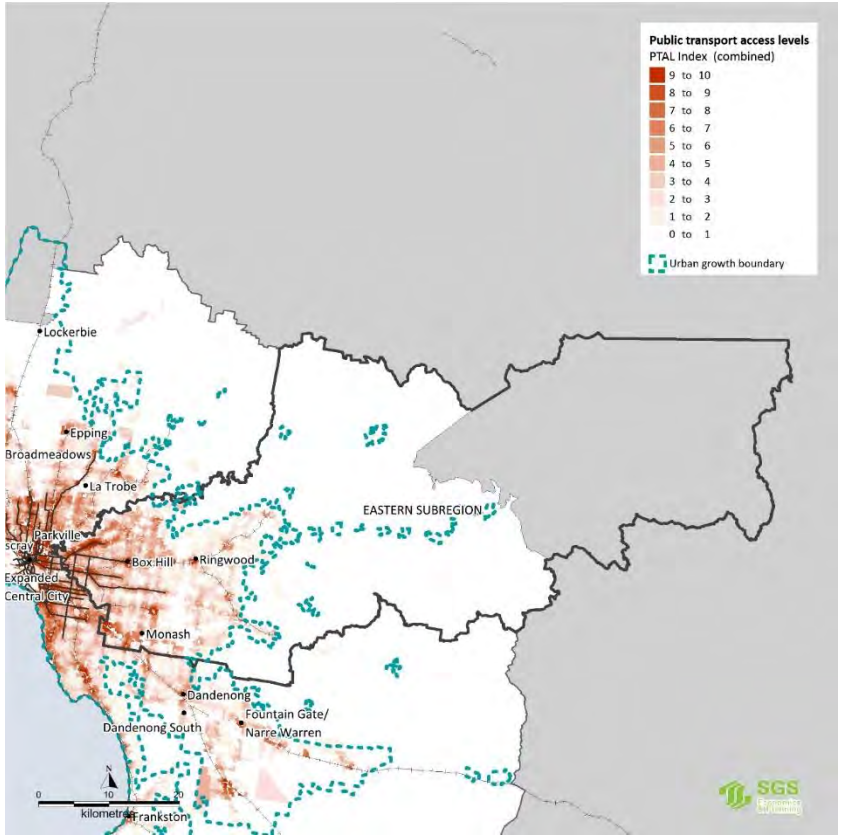


FIGURE 76. PUBLIC TRANSPORT ACCESSIBILITY LEVEL – EAST SUBREGION



4.4.2 Population and employment scenarios

There is significant variation between potential population and employment scenarios and distributions, each of which would generate different infrastructure needs.

Business as usual

Under a BAU distribution of growth across Melbourne, the East Subregion could be expected to reach a population of 1.2 to 1.6 million by 2046 (Table 24).

TABLE 24. POPULATION SCENARIOS ('000) – EAST SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	1,070	1,070	1,070
	Consolidated	1,070	1,070	1,070
	Expansion	1,070	1,070	1,070
2021	BAU	1,080	1,115	1,090
	Consolidated	1,100	1,145	1,120
	Expansion	1,050	1,090	1,060
2031	BAU	1,100	1,205	1,470
	Consolidated	1,150	1,260	1,540
	Expansion	1,050	1,150	1,400
2046	BAU	1,180	1,380	1,570
	Consolidated	1,260	1,475	1,680
	Expansion	1,110	1,290	1,470

This level of growth would mostly be accommodated through infill and brownfield development, with the Dandenong Ranges preventing further eastward expansion. Larger developments would be limited to conversion of non-residential uses into residential, such as developments on former golf courses. Employment under a BAU distribution could see a total of 670,000 to 890,000 jobs in the East Subregion by 2046 (Table 25).

TABLE 25. EMPLOYMENT SCENARIOS ('000) – EAST SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	495	495	495
	Consolidated	495	495	495
	Expansion	495	495	495
2021	BAU	530	540	540
	Consolidated	510	520	520
	Expansion	490	500	500
2031	BAU	550	635	740
	Consolidated	510	590	680
	Expansion	480	550	640
2046	BAU	670	780	890
	Consolidated	630	730	830
	Expansion	590	685	780

Under a BAU distribution, Box Hill and Ringwood would be on track to attract significant investment and development over the next decade, following on from recent historic trends. Under the Middle Growth, BAU Distribution the Monash Employment Cluster could reach around 145,000 jobs by 2046.

Consolidated distribution

A Consolidated distribution of growth would lead to 1.3 to 1.7 million total residents and 630,000 to 830,000 jobs by 2046. In a high growth scenario, an additional half a million people would reside the East Subregion. Limits to further expansion in the East Subregion means that this population growth would need to be accommodated through higher density development. The following figure provides some examples of medium density housing types that might emerge and become more common in the Subregion as population grows.

FIGURE 77. MEDIUM DENSITY HOUSING TYPOLOGIES

This effectively means a higher rate of population growth compared to the Business as Usual scenario, but a slightly lower rate of employment growth, as jobs are more focused in other parts of the city. It could be expected that there would be more office, health and education jobs throughout the Subregion, but that these jobs would be drawn to centres.

Employment growth in this distribution would be expected to be targeted in the East's key centres and the inner eastern suburbs. Smaller centres such as Camberwell Junction, Doncaster Hill, Glen Waverley, Wantirna South and Knox Centre would attract more development. Box Hill and Ringwood would potentially become the two largest non-CBD activity centres in Melbourne, and Monash Employment Cluster would experience further growth. Under the Middle Growth, Consolidated Distribution the Monash Employment Cluster could reach around 180,000 jobs by 2046.

The Monash Employment Cluster is the largest established employment cluster in Melbourne, comprising of the university, CSIRO Clayton, Synchrotron, Monash Medical Centre and Clayton Business Park. Whilst the cluster would need to become better integrated with its surrounding precinct, it could potentially attract high rise office towers of 10 to 20 storeys – significantly higher than the current five to six storeys in the cluster. The Monash-Box Hill and Box Hill-Ringwood employment corridors would

become high value office/business park areas, as many of the preconditions already exist in those corridors to enable higher growth. The removal of level crossings on the Dandenong railway corridor would help to facilitate more growth along that line as safety and congestion issues are improved.

Expansion distribution
Population and employment growth are expected under an Expansion distribution, but the total level of growth is lower than the Business as Usual and Consolidated distribution models. This reflects a 'rebalancing' of the city that is already underway (with more development in the west).

4.4.3 Infrastructure implications

Under most of the scenarios the population of the Subregion could reach between 1.2 and 1.7 million by 2046. Much of this growth could leverage off existing infrastructure, such as the Monash Freeway, EastLink, Dandenong and Eastern rail corridor, and improvements to this infrastructure, such as level crossing removal along the Dandenong railway corridor. The limited prospect for additional greenfield growth means that future growth will likely need to be primarily supported through follower infrastructure, and expansions to the capacity of existing infrastructure.

Potential pressure points include:

- The East Subregion may see education provision turning into a bottleneck. Growth of Australia's education export industry is likely to lead to increased demand for education in institutions like Monash University, already the largest in Australia, and in schools. Capacity to expand provision will be important in meeting demand.
- Transport systems in the East Subregion will also continue to be major pressure points as the population grows and the city becomes denser. All modes of transport stand to see growth in the East Subregion, which could intensify conflicts at intersections between transport modes. Transport infrastructure in the inner parts of the Subregion is likely to be increasingly contested, as it must be shared by local residents and those moving through.
- The health of the Yarra River will also be important to the East Subregion, with river health a contributor to some kinds of development that depend on a natural environment, and the need to preserve river health as a check on other kinds of development that is less compatible with healthy rivers, such as development right on river banks.

An ageing population in the East Subregion will have a significant impact on the economy and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing. This may require investment in the Subregion's health services to ensure facilities are able to respond to demand. However, a metropolitan-wide approach to health facility and service provision, or non-infrastructure solutions such as outreach services could address future need.

Many older people are in lone person households which can occupy larger dwellings as people choose to 'age in place' in the neighbourhoods they have lived in for long periods of time. This could create issues with housing affordability. Affordability problems diminish the capacity for people to take advantage of opportunities, like accessing employment opportunities or services. Enabling older people to live in more appropriate housing has a range of implications for infrastructure planning. High levels of population growth coupled with 'downsizing' of older populations could lead to a higher provision of smaller dwellings in locations with high access to infrastructure and services.

Increased population and job growth will place strain on transport infrastructure. This could be managed by new infrastructure provision, or through demand management of existing assets. New infrastructure could have the benefit of supporting new high density commercial and residential opportunities, and may also improve accessibility of the neighbouring South and Central Subregions.

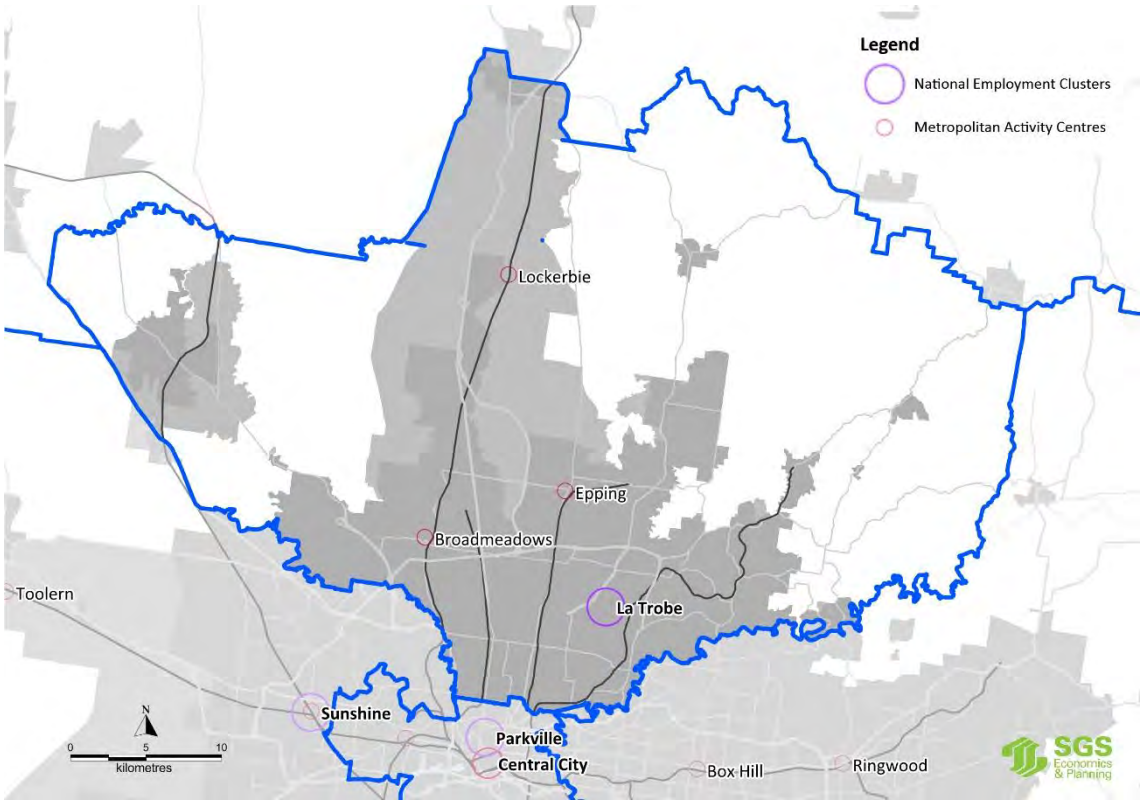
With a higher population there will be additional waste generated. Unless significant recycling regimes are implemented, by 2041 Metropolitan Melbourne will likely need to process and send one million tonnes of waste to landfill per year (Metropolitan Waste and Resource Recovery Group 2015). The

amount of potential landfill space is decreasing, with many landfills in the south east of Melbourne set to close over the next few years (Metropolitan Waste and Resource Recovery Group 2015).

4.5 North Subregion

The North Subregion of Melbourne extends from the inner suburbs of Northcote and Brunswick, through to the peri-urban outer north and satellite city of Sunbury. European settlement of the North Subregion began with government land sales in the mid-1800s in Northcote, and development focusing along what is now known as High Street. The primary thoroughfares of High Street, Plenty Road and St Georges Road were a substantial focus of initial development, along with the railway line which then extended to Whittlesea (the now South Morang railway line).

FIGURE 78. NORTH SUBREGION



From the 1920s, a thriving textile and footwear industry was formed in Brunswick and Coburg, providing employment opportunities for waves of European immigrants in the 1950s, 60s and 70s. Structural reshaping of the economy saw the decline of this industry, with textile manufacturing moving primarily offshore following national microeconomic reform. The legacy of this industry remains in Brunswick and Coburg, with its distinctive brick warehouses and factories interspersed with workers cottages and Californian Bungalows (Figure 79). A key feature of this development was the co-location of housing for local workers and their employment. This was particularly the case for those in the textile industry and manufacturing later in the century.

Many workers resided in the extensive housing commission estates developed in Glenroy, Coburg and Jacana following World War II (Figure 80). In the 1960s, a significant car industry was developed in Broadmeadows and the growth of middle ring suburbs of Thomastown and Lalor occurred around the same time, and was followed by subsequent growth in Keon Park and Mill Park in the 1970s and 1980s.

Early development also occurred in the North East, in suburbs along the Yarra River such as Ivanhoe, Heidelberg and Viewbank. Much of the eastern boundary of the North Subregion shares more similarity to the East Subregion in terms of topography and environment. This is reflected in the more ornate and impressive architecture of housing in the area. Heidelberg's Austin Hospital was initially founded in 1882

and the subsequent development around the train station saw Heidelberg become a substantial retail and employment centre.

FIGURE 79. SYDNEY ROAD, BRUNSWICK (1920)

Source: VictorianPlaces.com.au;

FIGURE 80. JACANA HOUSING COMMISSION ESTATE (1961)

Source: MelbournesNorth.com.au

Development throughout the North East has generally been at a lower density compared to the rest of the North Subregion, and environmental constraints prevent further expansion of the urban area beyond Diamond Creek.

The 1960s and 1970s saw the establishment of the city-shaping Melbourne Airport, Northland Shopping Centre (Figure 81) and Latrobe University (Figure 82) – all of which remain significant employment hubs but lack the public transport connectivity of other centres in Melbourne.

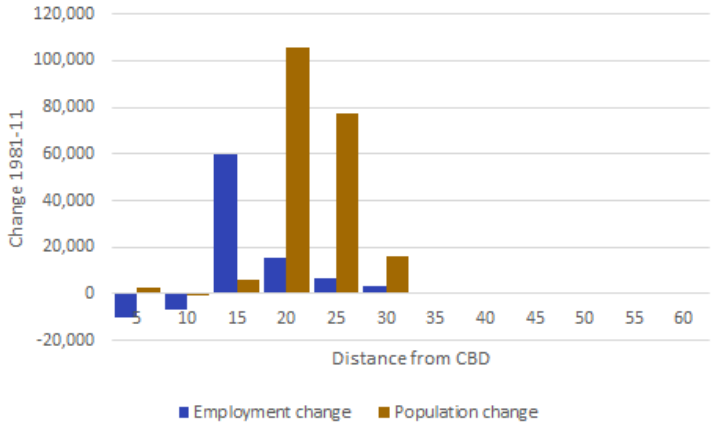
The Subregion, and Melbourne as a whole was further shaped by the construction of the Western Ring Road and CityLink in the 1990s, and upgrades to the Hume Highway and Tullamarine Freeway. This infrastructure helped support the subsequent residential development in suburbs such as Craigieburn in the outer north. It also supported industrial precincts in Epping and Thomastown.

FIGURE 81. NORTHLAND SHOPPING CENTRE (DATE UNKNOWN)

Source: MelbournesNorth.com.au

FIGURE 82. LATROBE UNIVERSITY

FIGURE 83. NORTH SUBREGION EMPLOYMENT AND POPULATION CHANGE 1981-2011



Source: ABS Census 1981, 2011

The decline in textile and footwear industries in Brunswick and Coburg, the development of industrial activities in Campbellfield-Thomastown, and the substantial greenfield residential growth further north of this industrial precinct are all clearly illustrated in Figure 83. While employment and residential uses have co-existed in the North Subregion for some time, there is a growing disconnect between the location of jobs and the location of housing, which may put pressure on transport infrastructure. Former employment-focused areas such as Coburg and Brunswick are transitioning to gentrified, higher density neighbourhoods. This means a net loss in employment lands for the most part, particularly in accessible locations. This places further pressure on the transport network as residents commute to the Central Subregion.

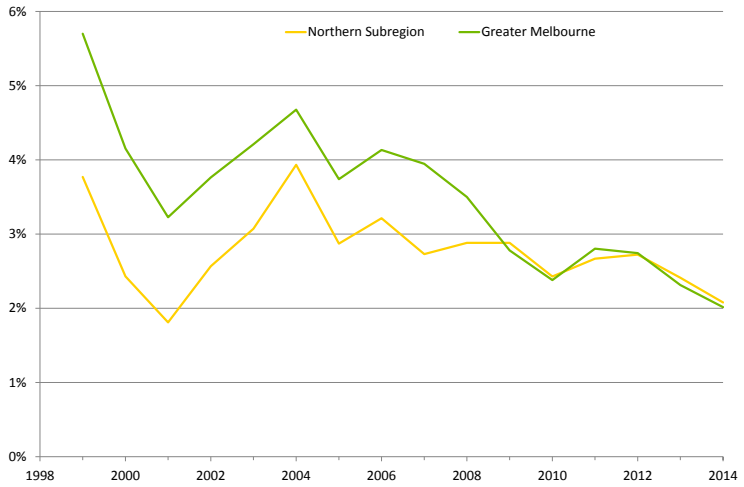
Today, the North Subregion is varied, with clear differences emerging between the infrastructure and access-rich inner North and North-East, and less well-connected growth areas. Substantial growth in the outer-north of Melbourne has placed downstream pressure on infrastructure, including the rail and road network. This is particularly the case in the growth areas of South Morang and Mernda, where rapid population growth and lower employment growth has caused congestion on key transport routes, such as the Metropolitan Ring Road, CityLink, Plenty Road Corridor and South Morang railway line. The demand on education and health facilities is also growing.

4.5.1 Current and future state analysis

The population of Melbourne's North Subregion has been growing quickly as the city expands to the north and west. Population rose 2.1 per cent per annum between 2004 and 2014, increasing from around 742,000 people to around 915,000 (ABS 2015c). Current projections suggest that growth in the North Subregion will continue, and rise to 1.5 million by 2046.

The economy of the North Subregion has been growing, with higher wages, higher employment and higher workforce participation. However, GRP growth has declined in line with trends in Melbourne overall (Figure 84).

FIGURE 84. GROSS REGIONAL PRODUCT – NORTH SUBREGION



Source: SGS Economics & Planning

Individual income grew at an overall rate of 4.7 per cent over the 2006 to 2011 period. The participation rate in the North Subregion has risen over the years from 62.5 per cent in 2001 to 65.0 per cent in 2011 (ABS 2006, 2011).

The employing sectors in northern Melbourne have diversified. Despite the decline in manufacturing across the region, manufacturing remained the largest employer in 2011, with 44,000 jobs (ABS 2011).

Manufacturing that remains is high value, such as biotech company CSL, which in 2014 announced a $200 million expansion of manufacturing operations in Broadmeadows.

Melbourne Airport is a large and growing employment centre in the North Subregion. La Trobe University is another major employer.

Despite rising employment, the North Subregion has experienced a rise in reported crime greater than other Melbourne Subregions. Offence rates rose from 6.5 offences per 100 people in 2010 to 7.9 offences per 100 people in 2014 (CSA 2014). Overall offence rates are lower than in the Central Subregion but higher than in the East Subregion.

The age structure of the North Subregion is skewed towards people in their mid-life – the North Subregion experienced the greatest proportional increases in its 30-34 population over the 2009 to 2014 period (ABS 2015c).

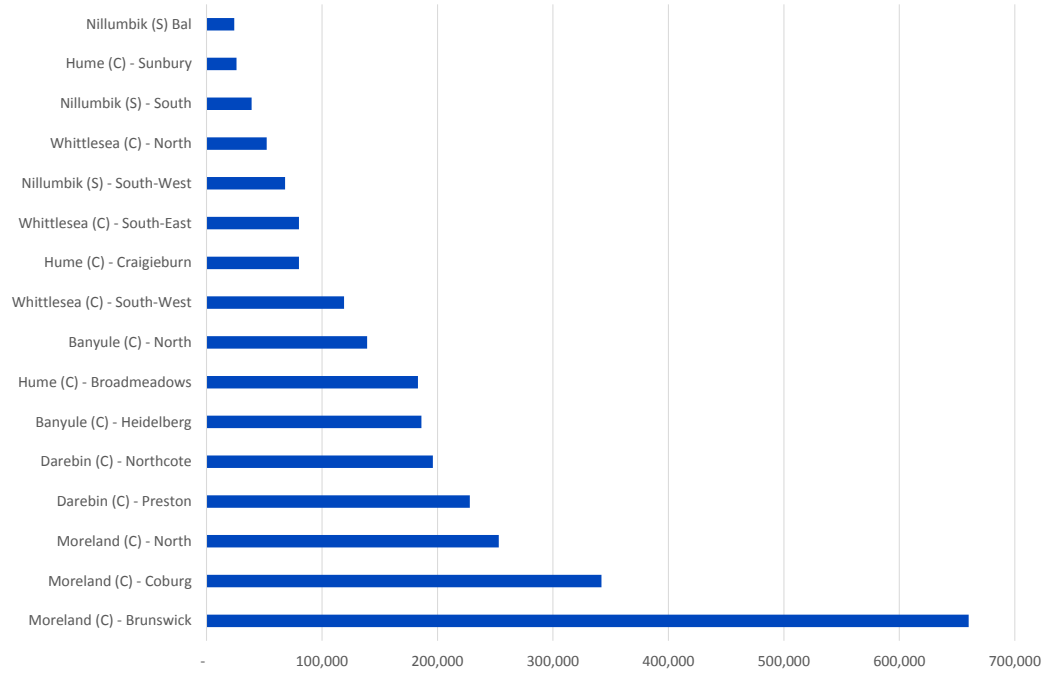
The obesity rate for males in the North Subregion increased from 14.6 per cent to 15.1 per cent over the 2008 to 2011-12 survey years and decreased marginally from 13.9 per cent to 13.8 per cent for female (Victorian Population Health Survey 2008, 2012). These rates are higher than the Central Subregion and Melbourne overall.

Household size in the North Subregion is higher than in the Central Subregion at 2.58 persons. It remained constant from 2006 to 2011 (ABS 2006, 2011).

The North Subregion has long been a destination for migrants and this trend has continued. The share of people born overseas rose from 33.9 per cent in 2006 to 34.6 per cent in 2011. The share of people with non-English speaking backgrounds rose from 36.9 per cent in 2006 and 38.1 per cent in 2011 (ABS 2006, 2011).

Access to jobs is unequal across the North Subregion (Figure 85). Job access from Moreland is significantly higher than from other locations. This is because of its proximity to the CBD and supply of public transport. The proportion of people travelling to work by car decreased from 81.3 per cent to 79.2 per cent over the period 2006 to 2011 (ABS 2006, 2011).

FIGURE 85. JOBS ACCESS WITHIN 30MIN – NORTH SUBREGION (2011)



Source: SGS Economics & Planning

Much of the jobs growth in North Subregion is located closer to the city centre, while much of the population growth is further from the city centre. Increased population growth will help drive employment growth in 0-10 kms from the CBD, while population growth will continue to be concentrated 20 to 25 kms from the CBD. This will place pressure on transport connections within the Subregion, particularly congested east-west connections and from the North to the Central Subregion.

SEIFA indices does not closely correlate public transport accessibility (Figure 86). Areas of disadvantage are focused around the central part of the North Subregion, particularly Broadmeadows and Heidelberg Heights. Heidelberg Heights is not particularly well connected to public transport, however Broadmeadows is well-serviced by rail and bus. The SEIFA results point to the historic development of these locations, rather than existing infrastructure provision.

Despite an extension to the Epping train line to South Morang, much of the outer north of Melbourne is far from high quality public transport (Figure 87). Public transport accessibility is richest in the inner parts of the North Subregion, where the tram network exists. Along the North Subregion's railway lines, accessibility is higher but there is a noticeable decline in accessibility between the corridors.

FIGURE 86. SEIFA INDEX – NORTH SUBREGION

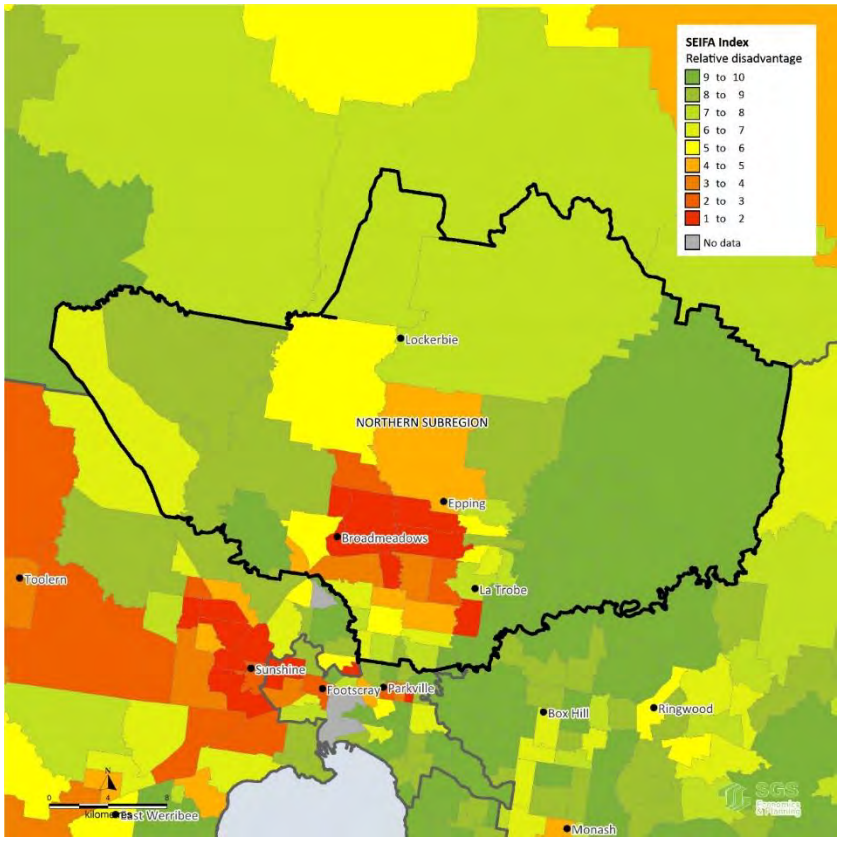
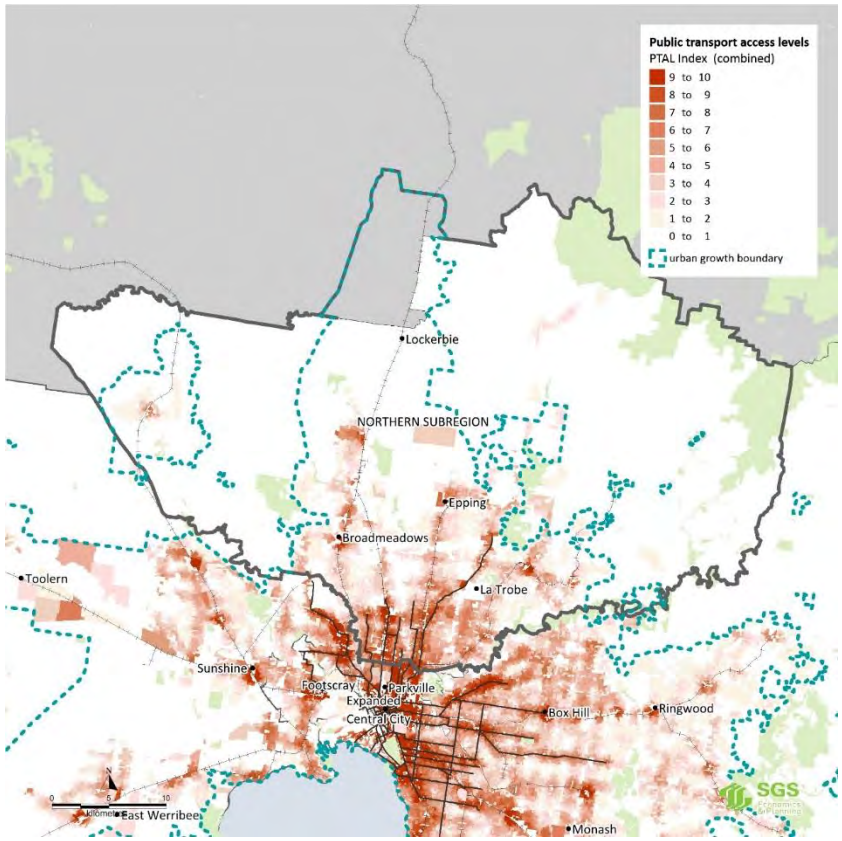


FIGURE 87. PUBLIC TRANSPORT ACCESSIBILITY LEVEL – NORTH SUBREGION



Melbourne's North Subregion is expected to play a more significant role in future employment in Greater Melbourne, and is projected to be strongest in the area located around 15km from the city's centre. The Western Ring Road and City Link, along with the close proximity of Melbourne Airport give the North Subregion the capacity to compete well in the booming logistics industry, which is likely to continue to grow.

Population servicing industries, including education, personal services and retail, are also likely to be major employers, along with professional services.

It is expected that high value knowledge manufacturing and health services will be a growing focus of the economy of the North Subregion. Northlink (2014) suggests that the closure of Ford Motor Company's Broadmeadows Plant in 2013 and La Trobe University and RMIT University's plans for expansion will drive this growth.

As the population of Melbourne increases and becomes denser, an increasing share of development in Metropolitan Melbourne is expected to be high density housing. The tide of densification can be expected to sweep outward from the inner suburbs slowly over the next 30 years. This will place greater demand on existing infrastructure in the inner parts of the Subregion.

Visualising changes in density in the North Subregion

The following figures present images that give a broad visual illustration of the nature of density in Melbourne. The below images are only intended to serve as illustrative and provide a broad point of comparison.

As the North Subregion grows, the middle ring suburbs of the Subregion will more closely resemble the development density of Ringwood. That is, single dwellings are replaced with townhouses and some small unit development. More recent subdivisions such as those in Craigieburn were developed at a higher density than was the case historically. The smaller lot pattern and curvilinear street layout would require innovative housing design to enable future redevelopment at higher densities.

North
Craigieburn

~25 kilometres from CBD

East
Ringwood

~25 kilometres from CBD

The strong growth in education and health service industries is expected to continue as the population continues to age and Asia continues to growth. The Northern Subregion is well-placed to exploit growth

in education via La Trobe National Employment Cluster (which had around 30,000 jobs in 2011) and RMIT University, and in health with the Austin and Northern Hospitals.

4.5.2 Population and employment scenarios

By 2046, the potential population of the North Subregion is between 1.27 and 1.73 million. The difference of over 500,000 persons is substantial, and would have a profound impact on how the Subregion functions. Similarly, employment is set to increase to between 460,000 and 710,000 jobs across the varying scenarios.

Business as usual distribution
If historic trends continue the North Subregion could see a population of between 1.27 and 1.68 million and 460,000 to 610,000 jobs by 2046 (Table 26 and Table 27).

TABLE 26. POPULATION SCENARIOS ('000) – NORTH SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	920	920	920
	Consolidated	920	920	920
	Expansion	920	920	920
2021	BAU	990	1,025	1,000
	Consolidated	980	1,020	1,000
	Expansion	1,000	1,035	1,010
2031	BAU	1,120	1,225	1,500
	Consolidated	1,100	1,210	1,480
	Expansion	1,130	1,240	1,510
2046	BAU	1,270	1,480	1,680
	Consolidated	1,230	1,440	1,640
	Expansion	1,300	1,520	1,730

TABLE 27. EMPLOYMENT SCENARIOS ('000) – NORTH SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	320	320	320
	Consolidated	320	320	320
	Expansion	320	320	320
2021	BAU	350	355	360
	Consolidated	360	370	370
	Expansion	370	375	380
2031	BAU	370	430	500
	Consolidated	400	460	530
	Expansion	400	465	540
2046	BAU	460	535	610
	Consolidated	530	620	710
	Expansion	540	625	710

Residential growth is expected to be a mix of continued greenfield development in the outer suburbs and infill and mixed-use development throughout the inner and middle suburbs. Jobs growth will occur at a number of locations. Under the Middle Growth, BAU Scenario the Latrobe National Employment Cluster could reach around 58,000 jobs by 2046.

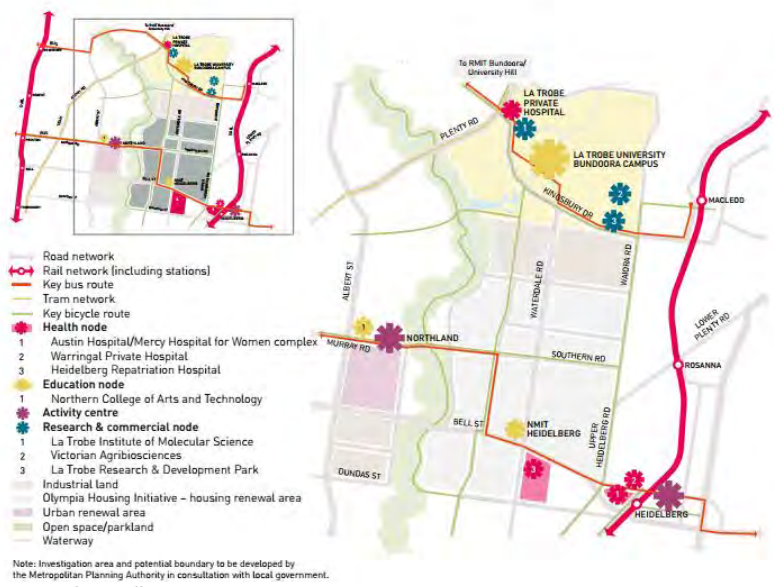
Under this distribution, existing trends are expected to continue. Traffic congestion would worsen and the need for population-driven infrastructure would continue to grow, whilst employment in population-driven industries and in higher value knowledge manufacturing and health would rise. The divide between the inner and outer parts of the North Subregion could be exacerbated under this distribution unless transport and regional infrastructure investments are made. A key issue in this distribution may be the risk of bushfire in the Subregion's outer north which would need to be mitigated against if additional development takes place.

Consolidated distribution

A Consolidated distribution of population would focus a greater proportion of people along the North Subregion's key transport corridors and activity centres, particularly around the La Trobe University Cluster (Figure 88). Under the Middle Growth, Consolidated Scenario the Latrobe National Employment Cluster could reach over 70,000 jobs by 2046.

The railway stations along the Upfield, South Morang and Hurstbridge line, and the tramway corridors of the north would see a greater proportion of surrounding development, as residential intensification is encouraged in areas with good accessibility. These corridors would also attract more commercial employment which seeks good accessibility to job markets.

FIGURE 88. EMPLOYMENT CLUSTERS AND ACTIVITY CENTRES, BUNDOORA, PRESTON AND HEIDELBERG



Source Plan Melbourne

Industrial development and employment is more likely to occur along the Hume Highway corridor than in nominated centres such as Broadmeadows, Lockerbie and Merrifield, given their location in the northern 'industrial belt' and the corridor's advantageous accessibility. Merrifield is also expected to attract commercial employment and residential development over time.

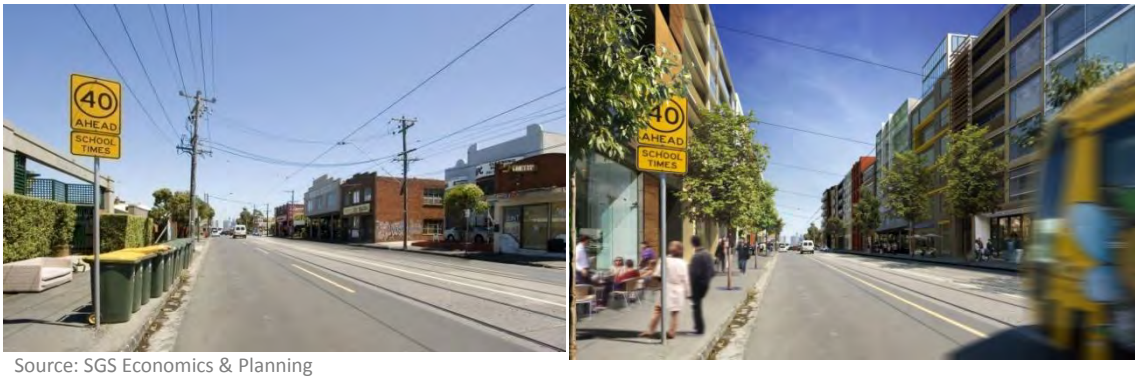
Growth within these centres and clusters would enable greater access to jobs and services for residents, potentially reducing overall infrastructure demand as existing infrastructure is utilised at a higher rate.

A Consolidated distribution would lead to a slightly lower population growth rate than the Business as Usual distribution in the North Subregion as at a metropolitan-level, more residential growth is focused into the Central Subregion. Less greenfield development on Melbourne's fringes, such as in the Mitchell LGA, would help to contain the geographic size of Melbourne. However, employment growth would be higher under a Consolidated distribution compared to a Business as Usual distribution. The Consolidated distribution therefore offers the North the opportunity to address the divide between jobs and people, albeit at a macro-level.

Photomontages provide images of the potential change that could take place in the Nicholson St Tram 96 corridor under the consolidated growth scenario (Figure 89).

FIGURE 89. POTENTIAL DENSIFICATION OF TRAMWAY CORRIDORS

Before **After**



Source: SGS Economics & Planning

Expansion distribution

An Expansion distribution would see a total of 1.3 to 1.73 million people in the North Subregion, and 540,000 to 710,000 jobs by 2046. This distribution would focus a greater proportion of development in greenfield locations, exacerbating any existing infrastructure backlog issues in the outer suburbs. This would in effect see a continuation of development trends first apparent in the North Subregion during the 1950s to 1970s. Whilst employment growth is set to be higher under an Expansion distribution, potentially increasing the job self-sufficiency of the Subregion, residents would continue to work in other parts of Melbourne. Industrial centres, such as Merrifield and Wollert may grow but would face constraints with higher population levels placing strain on transport networks. Bushfire risk will be high in the North Subregion in the future, so any additional development will need to be planned accordingly.

4.5.3 Infrastructure implications

Recent population growth in the North Subregion has placed stress on the road network and the heavy rail network. Under the various scenarios, by 2046, the population of the North could be between 1.3 and 1.7 million by 2046. Provision and management of structural infrastructure which enables better movement within and to and from the Subregion may be needed as a result.

Potential pressure points include:

- A divide between the public transport-rich inner areas, and poor access and services in the outer North.
- The closure of Ford's manufacturing operations in Australia will create unemployment in Broadmeadows, where some of its operations and downstream suppliers were located.
- The continued growth of Melbourne airport as a key gateway from Melbourne to access the global economy - especially its importance for tourism and the knowledge economy - represents a potential pressure point if not closely managed.
- Where the footprint of the Northern Subregion continues to move outwards, transport demand through the suburbs closer to the centre will become pressure points, as will biodiversity and competition for agricultural land.
- Outer suburban arterials are under major stress with population growth pressures.

Ongoing investments in the heavy rail network (Mernda extension and the impact of the Melbourne Metro) will support the growth anticipated under future population projections, while also helping to address existing disparities in accessibility within the Subregion.

Continued employment growth in the Subregion will provide local job opportunities, but will continue to place pressure on freight transport infrastructure. The freight task will continue to grow, and there may

be more ‘small van’ distribution, particularly with the growth of online businesses and subsequent increase in shipping.

It is possible that broader structural change in the economy will increase pressure on ICT infrastructure, which will continue to grow in the face of population and employment increases.

There is an opportunity to better leverage the Subregion’s major assets such as its universities, hospitals and Melbourne Airport. This could be achieved by prioritising accessibility and providing necessary supporting infrastructure, such as ICT infrastructure, facilities and appropriate land for supporting industry. These industries include businesses such as logistics and warehousing near the Airport, allied health providers near hospitals, and business parks/ business start-up incubators and research centres near the universities. Co-location of complementary land uses will help to redefine the role of these facilities to have an ever greater regional and metropolitan role.

The level of population growth expected in the North Subregion could increase demand on health and education services. Some additional demand may be absorbed by better supporting or expanding existing facilities, but new facilities may be required if demand exceeds the capacity to do this. The need for community infrastructure will also grow as the population increases. The location and type of this infrastructure depends on the ultimate distribution of growth, the existing network of facilities and the types of communities residing in the North Subregion in the future.

Greenfield development in northern growth areas, including Craigieburn and Mernda, currently have substantial infrastructure needs and costs. Various studies have indicated infrastructure deficits or ‘backlogs’ present challenges for future planning, particularly in high growth areas (Infrastructure Australia 2015, Victorian Auditor General 2013). Under all scenarios and distributions, greenfield development will continue but will be particularly pronounced under an Expansion distribution. The infrastructure needs of new communities will add to the existing backlog faced in Melbourne’s growth areas, which is increasing (Northlink 2014).

Infrastructure is not only a tool to manage and shape future economic and population growth, it is also vital to combating inequality. A core challenge for infrastructure provision is breaking down barriers for disadvantaged Victorians living in the North Subregion through improving access to infrastructure. SEIFA indices pointed to a number of established suburbs in the North Subregion as disadvantaged. There is also a clear statistical association between geographic areas of socio-economic disadvantage and poorer health outcomes. Addressing disadvantage from an infrastructure perspective could involve a mix of local infrastructure provision and better co-location of residential and employment areas to transport and other infrastructure. An affordable and diverse supply of housing in well-located and well-serviced areas is a key way of addressing disadvantage.

Climate change is set to continue to impact how Victorians live. In the North Subregion, bushfire risk is particularly high. Future development must be cognisant of this risk and new infrastructure will need to be planned accordingly. Some risks include Melbourne Airport and Essendon Airport operations being affected by smoke haze, communication towers and powerlines destroyed by fire, and damaged water catchments, resulting in water quality reduction and/or reduced quantity. There will be a need for continued investment in emergency services in the North Subregion, regardless of the population and employment scenario or distribution that results.

With increasing expansion to the north there is increased risk that the degradation of ecosystems, both by human activities and by climate change. This is likely to reshape ecosystems in the North Subregion. Impacts could include relative abundance of species, vegetation structure and impact of invasive species.

4.6 South Subregion

The South Subregion extends from the inner south-eastern suburbs of Caulfield and Brighton, through to the Mornington Peninsula in the south and to Gippsland to the east.

FIGURE 90. SOUTH SUBREGION

This varied Subregion contains some of Melbourne's earliest development, with development in Bayside being fuelled since the 1880s by property developers and speculators seeking to establish waterside towns. Along the railway line, suburbs such as Brighton, Sandringham, Chelsea and Frankston emerged (Figure 91, Figure 92 and Figure 93). The pattern of this development is evidenced through the highest densities being present along the Bay, and gradually reducing to the east of the Nepean Highway. The exclusion to this is a separate tract of development out to Western Port Bay, following the Stony Point Railway Line.

At the same time, development followed the railway corridor to Dandenong and out to Gippsland via the historic market garden areas of Cranbourne and Pakenham. Following WWII, development focused on the inner areas of Brighton East, Moorabbin and Caulfield, driven by rail and tram services which had been provided from the 1900s onwards.

Inland, the 1950s brought substantial change to Dandenong, with a host of large industries locating there, including Heinz, International Harvesters, and General Motors Holden. Located in what is now Dandenong South, road access was provided by the South Gippsland Highway, which paralleled the rail line between Melbourne's CBD and the Gippsland region. As in the East Subregion, the radial freeways were supported by a dense grid of arterial roads.

Prime agricultural land and market gardens filled the area between the 'Gippsland' and 'Bayside' corridors, but over time with the growth of car use this area gradually converted to residential use. This growth was particularly evident from the 1970s onwards, the period of time which also saw the development of Southland Shopping Centre in Cheltenham. Around this time, the growth corridors of

Cranbourne and Pakenham were first identified, with rapid greenfield development occurring throughout the 1980s to 2010s (Figure 94). Key drivers of development was the Monash Freeway, CityLink, Eastlink and the Peninsula Link roads.

FIGURE 91. BRIGHTON BEACH (1911)

FIGURE 92. SANDRINGHAM (1911)

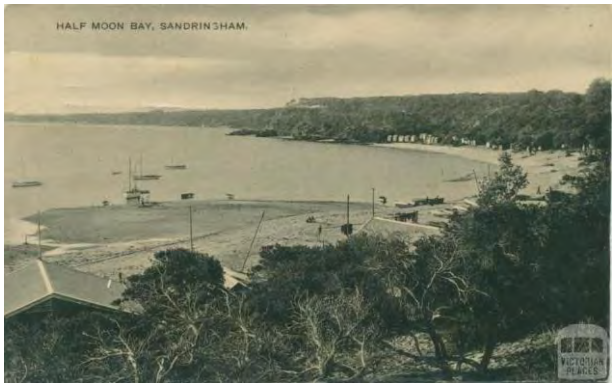


FIGURE 93. FRANKSTON (DATE UNKNOWN)

FIGURE 94. PAKENHAM (2002)

Source: VictorianPlaces.com.au

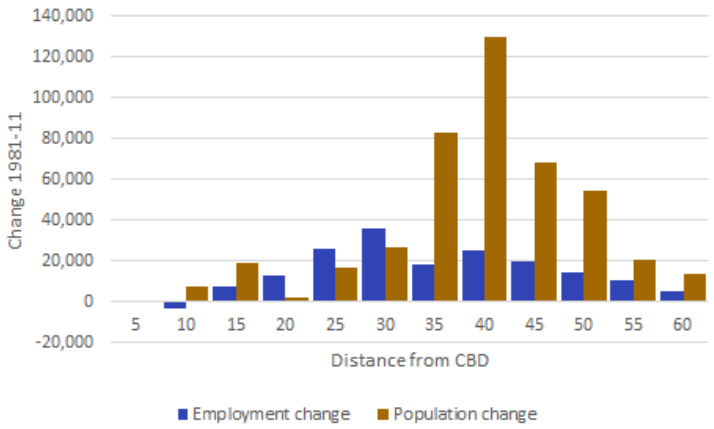
This substantial residential growth in the far south eastern regions of Cranbourne and Pakenham is reflected in the following figure, with the bulk of residential development in the corridor occurring between 35 and 50 kilometres from the CBD. This is substantially more than in the other Subregions.

The historic development patterns of the South Subregion have led to the region having a higher proportion of infill housing than other locations of Melbourne. The grid-like street pattern and larger historical subdivision of the inner suburbs is conducive to medium density development, and this has also been driven by less land availability in the Cranbourne-Pakenham growth corridor, when compared to the north and west growth areas of Melbourne.

Figure 95 depicts the South Subregion's employment and population change from 1981 to 2011. From an employment and service perspective, Frankston and Dandenong have historically served as the regional centres of the South East. Frankston, as a gateway to the Mornington Peninsula, is well serviced by transport, health and education infrastructure.

In the 1960s, public housing was developed in Frankston North. This contrasts to the south of Frankston which exhibits more qualities similar to the Mornington Peninsula and beyond.

FIGURE 95. SOUTH SUBREGION EMPLOYMENT AND POPULATION CHANGE 1981-2011



Source: ABS Census 1981, 2011

4.6.1 Current and future state analysis

The South Subregion of Melbourne has grown strongly at the urban perimeter while the Subregion as a whole has experienced economic change.

The population of the South Subregion of Melbourne has been growing strongly. It has increased from 991,000 people in 2004 to around 1,206,000 in 2014, a rate of 2.0 per cent a year (ABS 2015c). It is the city's largest Subregion. Current projections suggest that 1.83 million residents will reside in the South Subregion by 2046.

The South Subregion is home to a diverse mix of nationalities - 36 per cent of people were born overseas. That share rose 0.7 percentage points in the five years to 2011. In the same period there was a 2 percentage point increase in people from non-English speaking backgrounds, to 28.8 per cent (ABS 2006, 2011).

Population growth has been particularly strong among those aged over 50 and household sizes have been steady at about 2.4 persons per household (ABS 2011). The South Subregion has seen growth in high density housing around train stations and increased standalone housing at the urban fringe.

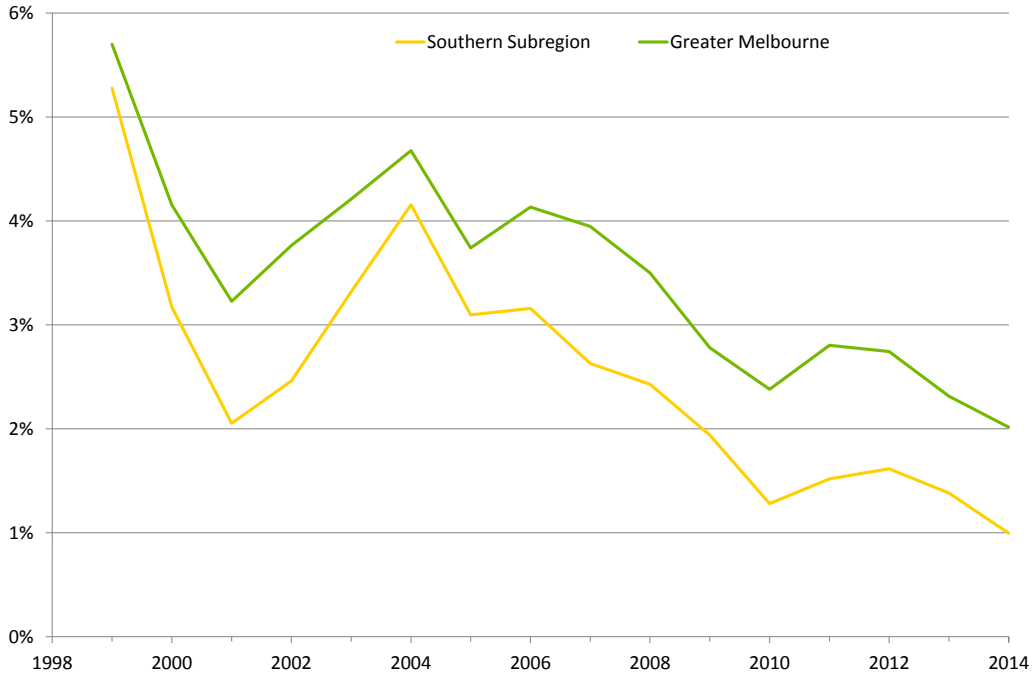
The South Subregion has seen its economy grow, although not as fast as other areas of the city.

Income grew at 4.4 per cent over the period 2006 to 2011 and unemployment fell from 6.4 in 2001 to 5.5 per cent in 2011. Labour force participation rose alongside the improvement in employment outcomes, from 63.8 per cent in 2001 to 65.3 per cent in 2011 (ABS 2006, 2011).

Manufacturing remains important to the South Subregion. The area around Dandenong is increasingly becoming a hub for precision manufacturing. At the same time, it is expected that the decline of the automotive industry in Melbourne and nationally, has affected and will continue to affect suppliers in the South Subregion.

Despite employment growth, the South Subregion has recorded a decline in the proportion of the metropolitan area's employment due to strong growth in the Central Subregion. Overall, GRP growth in the Subregion has declined, but remains positive, in line with trends in Melbourne (Figure 96).

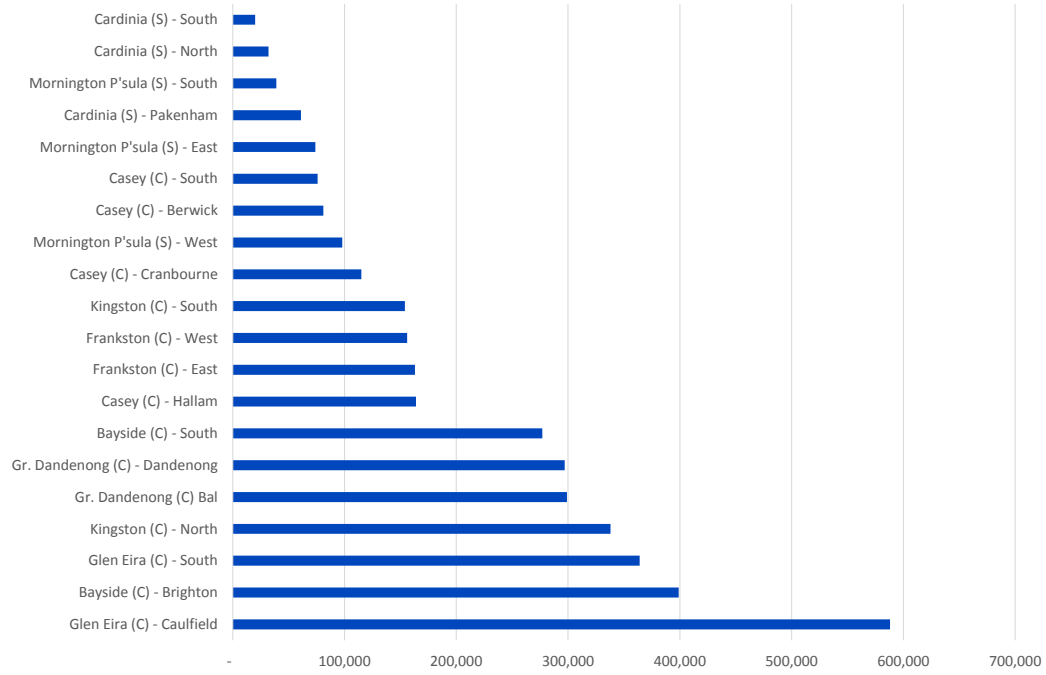
FIGURE 96. GROSS REGIONAL PRODUCT – SOUTH SUBREGION



Source: SGS Economics & Planning

Access to jobs is highest in the inner parts of the South Subregion, and in areas with higher employment such as Dandenong (Figure 97). The Dandenong South National Employment Cluster had around 50,000 jobs in 2011 and could exceed 76,000 jobs by 2046.

FIGURE 97. JOBS ACCESS WITHIN 30 MINS, SOUTH SUBREGION (2011)



Source: SGS Economics & Planning

The South Subregion contains some of the city's most advantaged and most disadvantaged areas (Figure 98). Areas around Frankston and Dandenong exhibit pronounced disadvantage, contrasting with the inner south-east, the Mornington Peninsula and the outer eastern suburb of Lysterfield.

The rate of reported crime is moderate in the South Subregion, but the offence rate rose from 6.2 offences to 6.9 offences per 100 people between 2010 and 2014 (CSA 2014).

In the inner parts of the South Subregion public transport access is very good, but at the urban fringe it is limited (Figure 99). The centres of Dandenong, Frankston and Fountain Gate – Narre Warren have higher public transport accessibility. The Southland Shopping Centre is a key retail node in the Subregion, and soon will have a railway station servicing it, increasing public transport access in Cheltenham.

This Subregion has the highest share of people commuting to work by car, at 85.7 per cent. The share fell slightly from 86.4 per cent between 2006 and 2011 (ABS 2006, 2011).

FIGURE 98. SEIFA INDEX – SOUTH SUBREGION

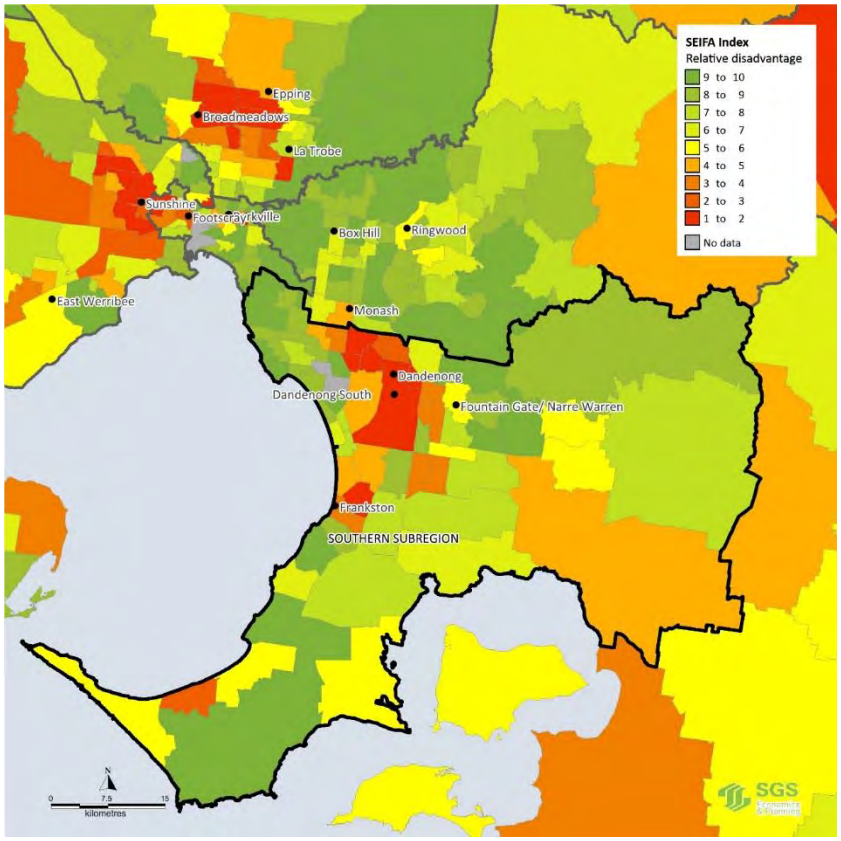
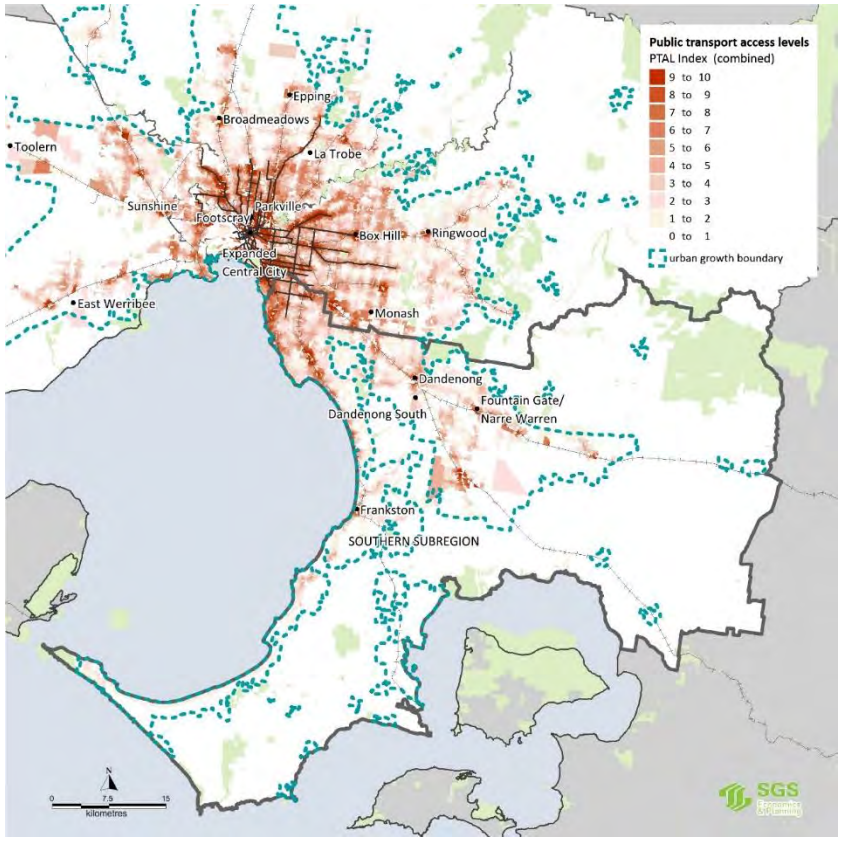


FIGURE 99. PUBLIC TRANSPORT ACCESSIBILITY LEVEL – SOUTH SUBREGION



The Southern Subregion is likely to experience growth in key industries including logistics, reflecting existing and future population growth, existing transport infrastructure and the availability of industrial land. Growth in high-value manufacturing could create a cluster of high growth industry around Dandenong, especially as the Australian dollar retreats from the highs of the last decade.

Future growth in export, freight and transport industries across Melbourne is likely to affect this Subregion given its population characteristics and industrial areas. Growth in population serving industries is also very likely in this heavily populated Subregion.

An increasing share of development in Metropolitan Melbourne is expected to be higher density housing. This could serve to reduce the pressure on transport demand, which is likely to be high in the large and dispersed South Subregion.

Visualising changes in density in the South Subregion

The following figures present images that give a broad visual illustration of the nature of density in Melbourne. The below images are only intended to serve as illustrative and provide a broad point of comparison.

As the South Subregion grows, Springvale is able to accommodate more people by developing in a similar pattern as Ringwood in the east. That is, single dwellings are replaced with townhouses and some small unit development.

South
Springvale

~25 kilometres from CBD

East
Ringwood

~25 kilometres from CBD

Future growth in population is expected to occur primarily in the areas of Casey and Cardinia. The extent to which this growth occurs in areas of agricultural and biodiversity value will need to be carefully managed.

The structural change in the South Subregion is expected to continue over coming years, although there are limits to the extent of change possible. The strong growth in education and health service industries is expected to continue as the population continues to age and Asia continues to grow.

4.6.2 Population and employment scenarios

The population and employment scenarios and distributions for the South Subregion suggest a wide range of possible outcomes.

Business as usual

A BAU distribution of growth could lead to a population of between 1.6 to 2.1 million by 2046 (Table 28), and 650,000 to 860,000 jobs (Table 29). This is an increase of at least 250,000 people over the next 30 years. This growth is likely to be distributed by continued greenfield development in the south east growth corridors, and infill development in the inner and middle suburbs.

TABLE 28. POPULATION SCENARIOS ('000) – SOUTH SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	1,250	1,250	1,250
	Consolidated	1,250	1,250	1,250
	Expansion	1,250	1,250	1,250
2021	BAU	1,320	1,370	1,340
	Consolidated	1,310	1,360	1,330
	Expansion	1,330	1,385	1,350
2031	BAU	1,440	1,585	1,940
	Consolidated	1,420	1,560	1,910
	Expansion	1,470	1,610	1,970
2046	BAU	1,600	1,865	2,120
	Consolidated	1,570	1,830	2,080
	Expansion	1,630	1,900	2,160

TABLE 29. EMPLOYMENT SCENARIOS ('000) – SOUTH SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	475	475	475
	Consolidated	475	475	475
	Expansion	475	475	475
2021	BAU	510	520	520
	Consolidated	510	520	520
	Expansion	530	540	540
2031	BAU	530	615	710
	Consolidated	530	615	710
	Expansion	570	655	760
2046	BAU	650	760	860
	Consolidated	630	735	840
	Expansion	700	820	940

A mix of development outcomes are anticipated, in line with recent trends showing the South Subregion of a higher proportion of infill development and medium density housing types than historical development patterns. These are likely to be well-located in terms of access to public transport and activity centres, but growth in greenfield locations would require additional infrastructure investment.

Overall the region is unlikely to substantially change under a BAU distribution, with the exception of more activity along the Pakenham corridor as capacity is gradually reached. Development may occur at higher levels in Central Dandenong, Dandenong North and Springvale. Springvale is well positioned to

leverage office, retail and mixed use development due to its proximity to Monash University in the East Subregion, its public transport connectivity, its strong cultural retail offer and access to the business park corridor along Springvale Road.

Consolidated distribution
A Consolidated growth scenario would result in a total population of 1.6 to 2.1 million by 2046 – slightly lower (30,000 to 40,000 less) than the BAU scenario. Development typologies are likely to be similar to that currently occurring in Melbourne's East Subregion, that is, at a higher density. The key difference to the BAU model of growth would be a higher concentration of development along the South Subregion's railway lines and around its key centres. The number of jobs could reach 630,000 to 840,000 by 2046 – marginally less than that achieved under a BAU scenario.

Under a Consolidated distribution, Dandenong and Frankston would grow to rival Box Hill, generating substantial housing densification around those centres. Southland is also well-positioned to grow, leveraging off recent investments into a new railway station for the centre. The impact of the EastLink would continue, with the corridor seeing an increased density of jobs and housing. Industrial areas of Dandenong South, Kingston and Pakenham would also grow.

Expansion distribution
The total population and employment levels that could be reached under an Expansion scenario are 1.6 to 2.2 million, and 700,000 to 940,000 respectively. This does not vary significantly from the BAU or Consolidated growth scenario, and would in effect be a continuation of development trends witnessed in the 1950s to 1970s. The location of these new residents and jobs is likely to be more dispersed, with some development concentrated towards the Pakenham and Cranbourne growth corridor.

An Expansion distribution will likely result in the Subregion remaining focused on industrial land uses, while population serving businesses follow population growth in the Cardinia to Pakenham growth corridor with planned industrial parks.

4.6.3 Infrastructure implications

Under most of the scenarios the population of the South Subregion could reach 1.6 to 2.2 million by 2046. Total population and employment levels do not vary widely between the distribution scenarios modelled, but it could be expected that under a Consolidated distribution, there would be more opportunity to leverage off existing infrastructure (Monash Freeway, EastLink, Dandenong and Frankston Rail Corridor), and through more intense use of land due to the co-location of growth and existing infrastructure assets.

Potential pressure points include:
- The impact of the whole metropolis on the health of Port Phillip Bay will be felt acutely in the South Subregion, which contains most of Melbourne's beaches. The health of the bay is a crucial pressure point for Melbourne and impact of any decline in water quality or biodiversity will be experienced in the South Subregion.
- Transport systems will also continue to be major pressure points as the population grows and the city becomes denser. All modes of transport stand to see user growth in the South Subregion, which could intensify conflicts at intersections between transport modes.
- Transport infrastructure in the inner parts of the Subregion is likely to be increasingly congested, as it must be shared by local residents and those moving through. Growth in the outer reaches will be increasingly costly to the extent they increase transport demand through the areas closer to the centre.

The historic development of the South Subregion means that it has a richer provision of infrastructure than most other locations in Melbourne. Similarly, its total population and number of jobs is much higher. All growth scenarios would place additional demand on significant strategic infrastructure, such as roads and public transport, along with health and education infrastructure. Consolidated growth around the Subregion's key centres may help with better utilisation of existing infrastructure assets.

Over time, follower infrastructure may be needed to maintain liveability in the Subregion if growth continues. The continued ageing profile of the South Subregion and Melbourne overall will place greater pressure on health infrastructure and services, and may also raise demand for services such as community transport. Enabling ageing in place for this population may require a supply of suitable and affordable smaller dwellings

However, enabling older people to live in smaller dwellings within their existing residential area has a range of implications for infrastructure planning. While infill development is able to leverage existing infrastructure, capacity issues, such as road and rail congestion, may emerge. Strategies for infrastructure planning can support ageing in place, such as public transport which supports independent mobility, and adequate housing or in-home technological interventions to support effective ageing in place. This must be balanced against the increased strain placed on infrastructure networks by increased densities.

Infrastructure can help to address the particular needs of disadvantaged areas where there are higher rates of social issues like domestic violence, chronic disease, lower levels of educational attainment and mental health issues. Pockets of disadvantage currently exist in the suburbs of Dandenong and Frankston, despite relatively good access to jobs and services. In these locations, where existing infrastructure provision is relatively high, a service-based approach (increasing awareness of and access to services and relevant programs) may help to alleviate disadvantage.

Given the extensive coastline of the South Subregion there may be effects on coastal infrastructure through sea level rise and coastal erosion. In this context, the role that the coastal ecosystems play in limiting damage from storms and similar events should be recognised. The threat of inundation due to sea level rise is another significant risk for infrastructure. Under high end scenario projections of a 1.1 metre rise in sea levels by 2100, approximately $226 billion in commercial, industrial, civil and residential infrastructure in Australia could be under threat from inundation and erosion hazards (National Sustainability Council 2013).

Sea level rise may also cause:

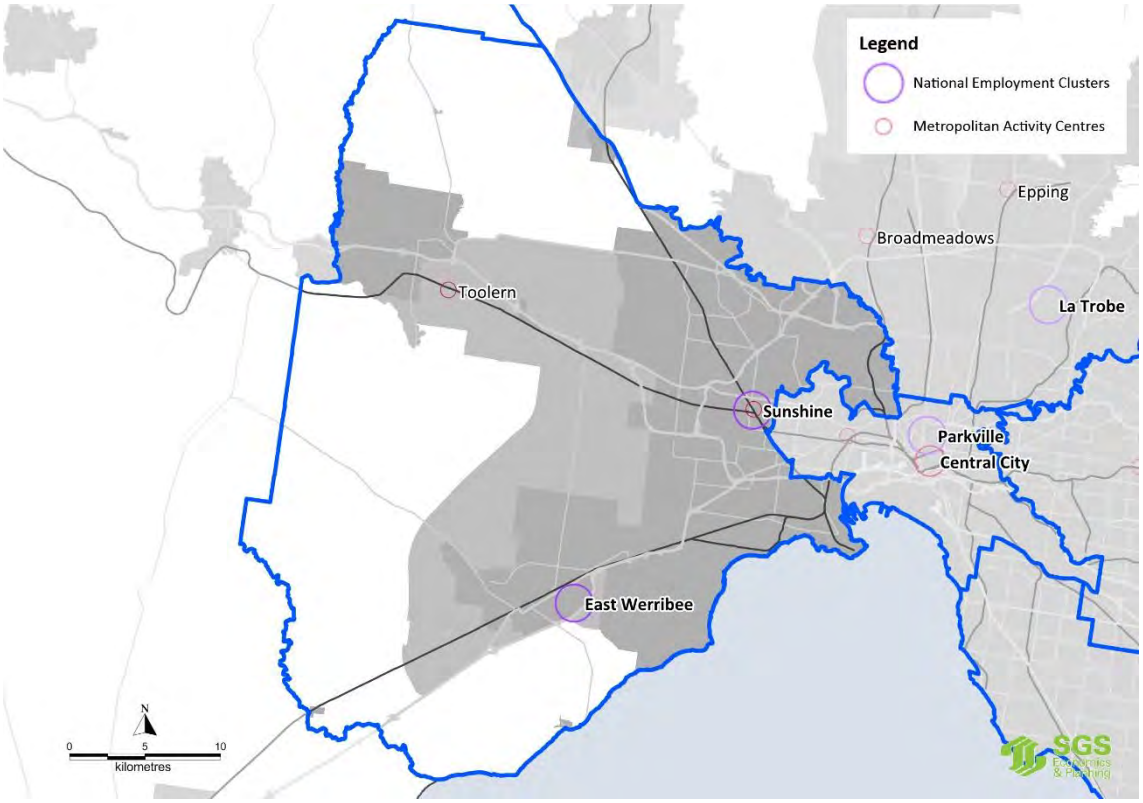
- Corrosion of pipes through salt water intrusion
- Roads to be washed away
- Ports flooded and degraded
- Homes and businesses inundated
- Flooding of exchange stations, sub stations, manholes and underground pits (Commissioner of Environmental Sustainability Victoria 2013).

In addition, there is a real risk of climate change having a negative impact on Aboriginal Heritage sites. As the majority of sites are part of the Victorian landscape itself, any degradation of the environment will likely have an impact on Aboriginal sites of significance. This is particularly pertinent in coastal and riverine locations, where sea level rise and erosion could lead to permanent degradation or destruction. Approaches to managing sea level rise can include retreat, protect, or a mixture of both. Protection approaches require infrastructure investment to reduce risk to coastal areas (such as seawalls).

4.7 West Subregion

The West Subregion extends from the inner west of Melbourne, through to the outer south and north west of the metropolitan area, capturing established areas of Williamstown and Essendon and extending through to the former townships, and now outer suburban locations of Melton and Werribee.

FIGURE 100. WEST SUBREGION



The West Subregion has historically been a focus for industrial uses, with early Melbourne development favouring the hilly terrain and higher quality soils in the east for residential uses. As a result, the inner west of Melbourne including Spotswood, Yarraville, Tottenham and Altona held much of Melbourne's critical early industry, located close to Victoria's first cargo port in Williamstown (Figure 101). This included abattoirs, waste management facilities, rail yards and refineries.

These uses were not conducive to high amenity neighbourhoods, and much early residential development focused on providing accommodating the local workforce. This in effect, led to more integration between the location of jobs and people. For example, the Sunshine Harvester Workers saw the establishment of the suburb of Sunshine (Figure 102). Exceptions to this include the satellite townships of Melton and Werribee, and the residential development of Essendon and surrounds, which more closely resembled the east.

With residential development focused in the vicinity of industrial areas much of the West has historically consisted of farms and grassland. The early industrial focus of the West Subregion led to larger subdivisions and a road network which provided access to the city, Port and regional locations. While this has resulted in the availability of large lots for conversion to residential uses, it has also led to constrained radial transport movement within the Subregion.

Exceptions to this development pattern in the West Subregion are the residential areas of Essendon (Figure 103) and Moonee Ponds. Located in the north west of the Subregion, these suburbs have

enjoyed close proximity to the CBD, high public transport accessibility and higher provision of education facilities.

However, if the initial development history of western Melbourne is characterised by its heavy industrial uses and non-urban expanses, a number of concurrent drivers have led to a significant period of transition characterised by rapid greenfield residential expansion. This transition is so substantial that many outer western localities in this Subregion are among the fastest growing residential areas in Australia. The Subregion as a whole experienced a population increase of almost 30 per cent between the Census nights of 2006 and 2011. Some of the key suburbs which characterise this residential expansion are Point Cook and Caroline Springs (Figure 104).

FIGURE 101. WILLIAMSTOWN (DATE UNKNOWN)

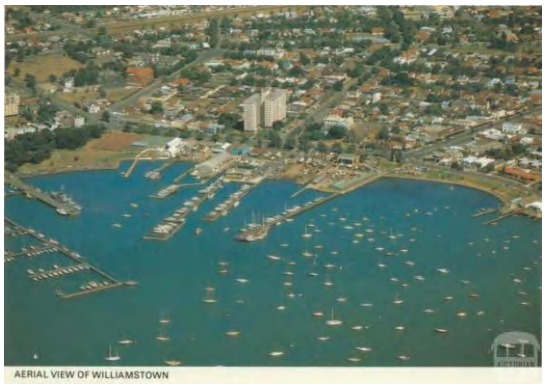


FIGURE 102. SUNSHINE HARVESTER WORKS AND HOUSING (1964)

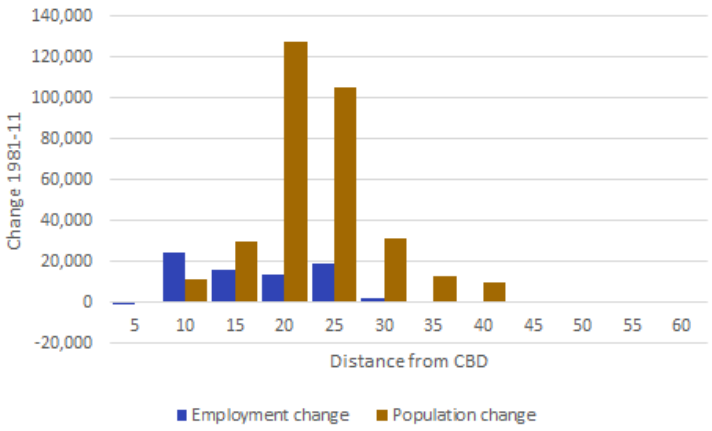
FIGURE 103. ESSENDON RESIDENCE (1946)

FIGURE 104. CAROLINE SPRINGS (2002)

Source: VictorianPlaces.com.au

Two primary forces have restructured the way the West Subregion functions – structural economic change including the declining importance of manufacturing, and the introduction of the city-shaping Western Ring Road, which opened up the Subregion to urban use. The West Subregion has seen rapid transformation over the past 10—20 years, with high population growth in new greenfield locations. Contributing factors include rising property prices throughout more established parts of Melbourne, reducing land availability in the south east, the relative proximity of the West to the CBD and government-led planning, support and infrastructure investment. Figure 105 highlights the strong population growth from 1981 to 2011 occurring 20-25 kilometres from the CBD. This greenfield growth includes the high amenity suburbs of Point Cook and Caroline Springs, which attracted a higher income and more educated demographic to the region.

FIGURE 105. WEST SUBREGION POPULATION AND EMPLOYMENT CHANGE 1981-2011



Source: ABS Census 1981, 2011

While the transformation of the West Subregion is most notably a story of greenfield expansion, the historically industrial areas of the inner- and middle-West Subregion are also in a transitional phase. Industrial land is increasingly being converted to residential uses in accessible locations. This includes large former industrial sites around Sunshine and specialised sites such as the former RAAF base in Williams Landing (Figure 106).

The growing importance of accessibility has also contributed to the gentrification of the inner west, in suburbs such as Newport and Spotswood. The 'wave' of gentrification may reach locations like Altona in the future, but will bypass the relatively prosperous Williamstown.

Employment uses and space-intensive industries remain a feature of the West Subregion with employment centres such as Werribee Employment Precinct and the Brooklyn-Tottenham industrial precincts.

FIGURE 106. WILLIAMS LANDING (2012)

Source: VictorianPlaces.com.au

Residential growth, coupled with continued industrial importance, has placed considerable constraints on existing transport infrastructure such as the West Gate Bridge and the heavy rail network. These effects have also been felt at a more local level, via congestion on main roads and high levels of demand for schools.

4.7.1 Current and future state analysis

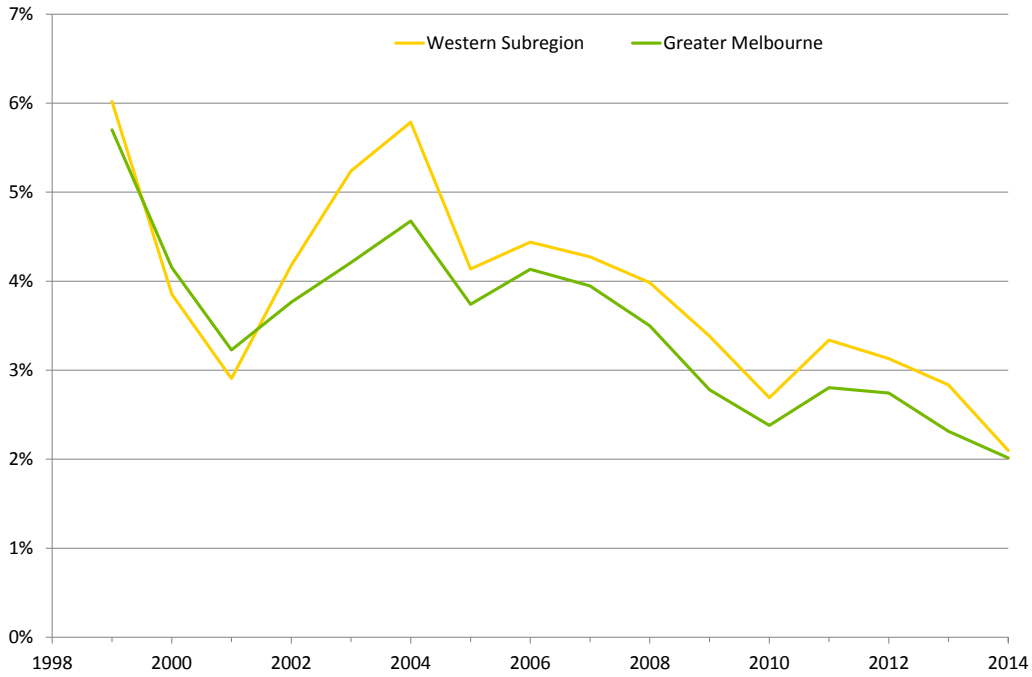
The West Subregion is the fastest growing region in Melbourne, adding people at a rate of 3.3 per cent a year over the decade to 2014. Its population grew from 529,000 to 734,000 in that period (ABS 2015c). Current projections expect the population of the West Subregion to reach 1.4 million by 2046 – a doubling of 2014 population levels.

The region has a high proportion of families– the fastest growing age profiles are young adults and those aged 30-34. Consistent with this, household sizes are the largest in Melbourne, at around 2.6 per cent (ABS 2006, 2011).

Net overseas migration has contributed very strongly to growth in the West Subregion. The share of people from non-English speaking backgrounds rose 2.7 percentage points between 2006 and 2011 (ABS 2006, 2011).

The economy of the West Subregion has grown, in line with strong population growth. Growth in GRP has declined (but remains positive) in the Subregion, in line with trends across Melbourne, but remains higher than the metropolitan area (Figure 107).

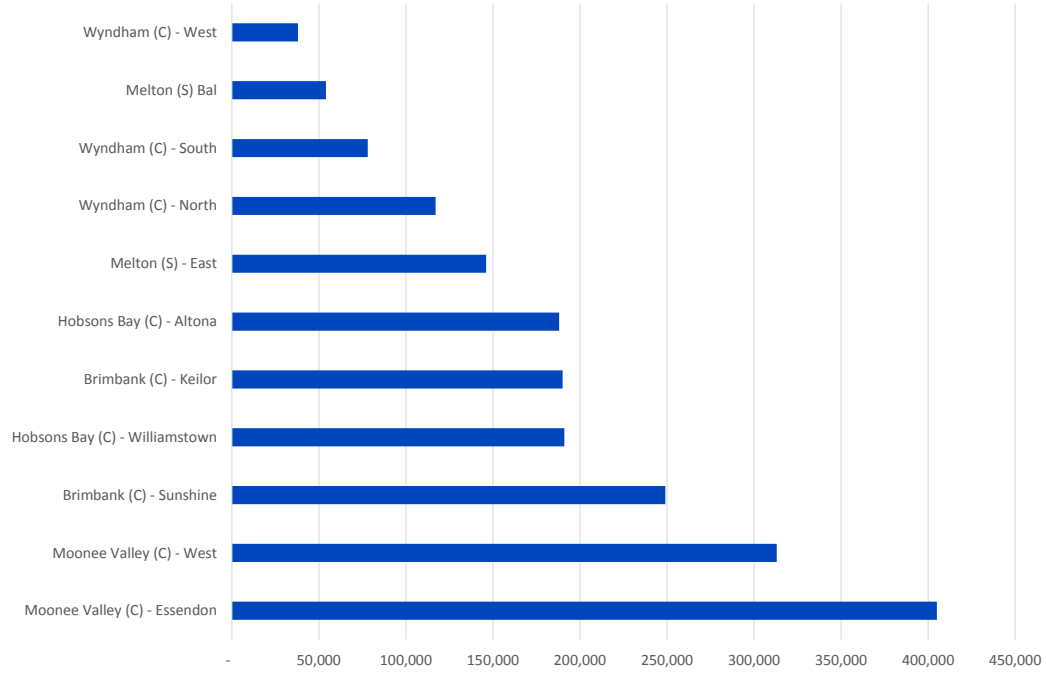
FIGURE 107. GROSS REGIONAL PRODUCT – WEST SUBREGION



Source: SGS Economics & Planning

Figure 108 shows that access to jobs within a 30 minute timeframe is varied across the West Subregion, with the suburbs of Moonee Ponds and Essendon - Moonee Valley enjoying the most access. There are two National Employment Clusters in the West Subregion, East Werribee (which is classified as an emerging cluster) and Sunshine (which had over 13,000 jobs in 2011).

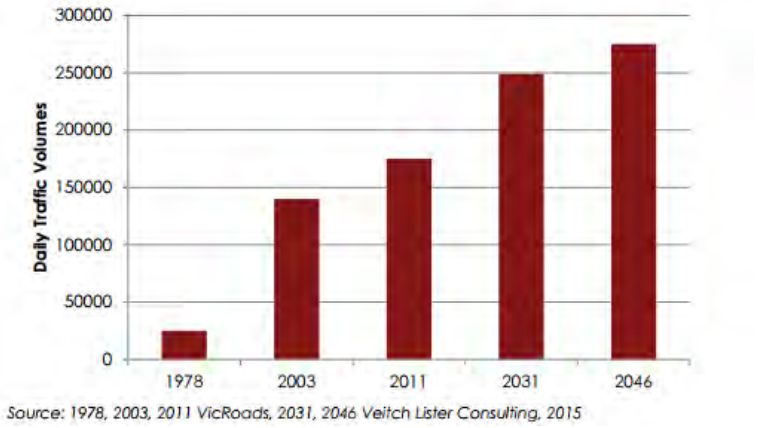
FIGURE 108. JOBS ACCESS WITHIN 30 MINS DRIVE, WEST SUBREGION (2011)



Source: SGS Economics & Planning

The proportion of people traveling to work by car is lower than other non-central parts of Melbourne, and decreased by 1.3 per cent from 85.2 per cent to 83.9 per cent over the period 2006 to 2011. Notwithstanding this, traffic volumes for the West Gate Bridge are high and are currently at capacity (Figure 109). It is expected that daily traffic volumes will continue to grow to 2046.

FIGURE 109. WEST GATE BRIDGE TRAFFIC VOLUMES



Source: VicRoads, Veitch Lister Consulting 2015

The West Subregion is expected to play a more significant role in future employment and housing within Greater Melbourne. Population growth in the West Subregion is likely to continue in a band some 20-25 km from the centre - not necessarily in the same areas expected to see employment growth - which are 10 to 30km from the centre of Melbourne.

An increasing share of development in the West Subregion is expected to be high density housing, close to existing transport infrastructure. Where this development is near existing and planned train lines it can help diminish long-run pressures on the already crowded road network linking the West Subregion to the Central Subregion.

Employment and household growth is expected to be concentrated in the Melton and Wyndham growth areas, particularly the East Werribee Employment Precinct (Figure 110). The East Werribee National

Employment Cluster is a key focus for employment growth, and substantial planning has been carried out to develop 142 hectares for retail, offices, apartments and industrial land, and a further 135 hectares for residential development (MPA 2014).

The West Subregion is likely to continue as a key hub providing logistics, professional and industrial services to the whole of Melbourne. As such, strong growth in professional services, education and health service industries is expected to provide a boost to the Subregion. It will also grow on its own terms with a boost in health services, education, tourism and population servicing industries.

The continued greenfield development in the Subregion, mixed with the growing appeal of well-connected locations in the north west (Essendon and Moonee Ponds) is likely to continue to attract working age people and families.

FIGURE 110. EAST WERRIBEE EMPLOYMENT PRECINCT VISUALISATION

Source: Growth Areas Authority 2013

Visualising changes in density in the West Subregion

The following figures present images that give a broad visual illustration of the nature of density in Melbourne. The below images are only intended to serve as illustrative and provide a broad point of comparison. As the West Subregion grows, St Albans is able to accommodate more people by developing in a similar pattern as Box Hill in the east. That is, single dwellings are replaced with townhouses and some small unit development.

West St Albans ~15 kilometres from CBD

East Box Hill ~15 kilometres from CBD

Disadvantage is very widespread in the West Subregion (Figure 111) and reported crime rose from 6.8 offences per 100 people to 7.9 offences per 100 between 2010 and 2014 (CSV 2014). Areas with a lower SEIFA index extend westwards of Sunshine, including suburbs of Deer Park and St Albans, and growing areas of Eynesbury, Melton and Rockbank. Less disadvantaged locations are focused in Williamstown, Point Cook, Essendon and Moonee Ponds, and Caroline Springs. Interestingly, Point Cook and Caroline Springs are relatively recent growth areas. Their less disadvantaged status, particularly when compared to other growth areas of Melbourne, may be a reflection of their closer proximity to the CBD and attraction of a professional workforce.

Labour Force participation has lifted and unemployment has improved, from 8.2 per cent in 2006 to 6.4 per cent in 2011 - still above the state average. Incomes grew 4.4 per cent a year between 2006 and 2011 (ABS 2006, 2011).

While the West Subregion has recorded a decline in manufacturing and industry over recent years, those sectors remained the largest employer in 2011, with 31,000 jobs.

Meanwhile, service-oriented sectors, along with education and health care, have grown. Employment growth in the West Subregion is geographically skewed. Very little employment growth has occurred further than 25km from the CBD, but an increasing share of jobs is located in those region.

Travelling outside the West Subregion for work is likely to be a continuing trend. The Subregion features a growing share of Melbourne's households, but a shrinking share of jobs. Public transport access is among the most limited in all of Melbourne (Figure 112). However, the recently developed Regional Rail Link has improved service, and has also had an impact on development patterns.

FIGURE 111. SEIFA INDEX – WEST SUBREGION

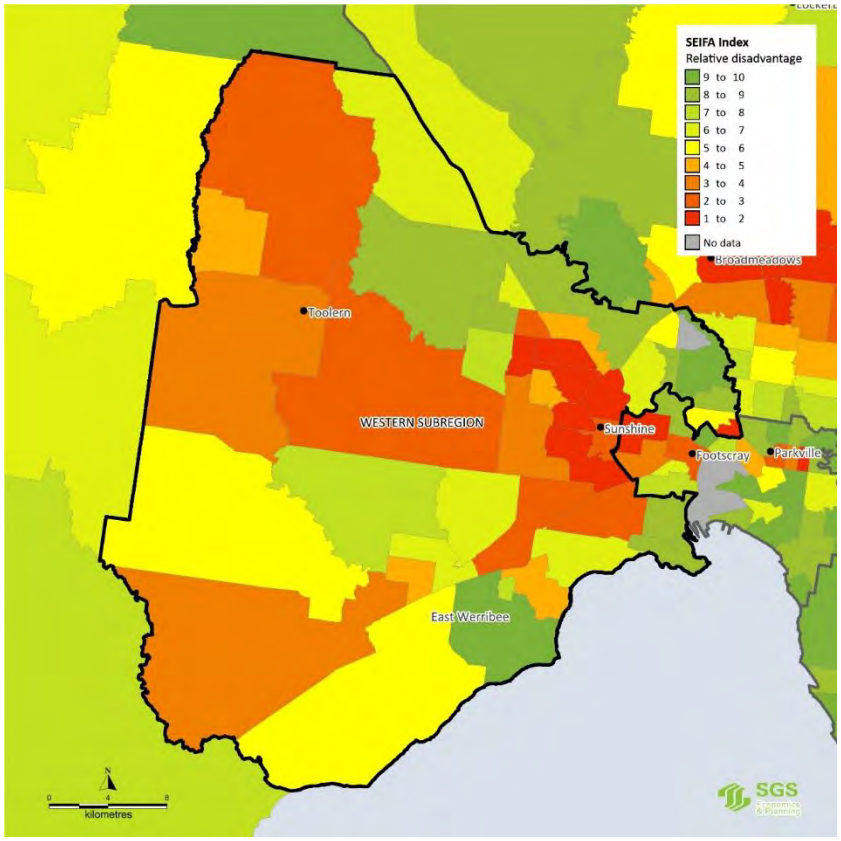
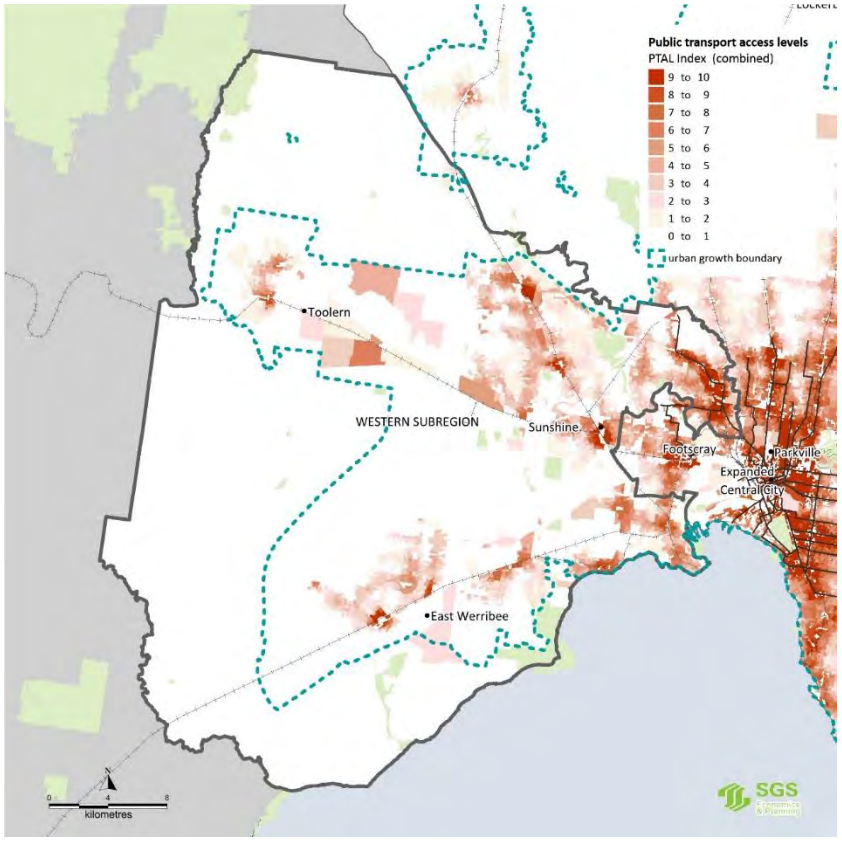


FIGURE 112. PUBLIC TRANSPORT ACCESSIBILITY INDEX – WEST SUBREGION



4.7.2 Population and employment scenarios

A range of population and employment outcomes are possible for the West Subregion. The comparative low density-nature of the Subregion, large scale former industrial sites and availability of greenfield land mean that it would be highly affected by the overall shape and level of growth across Melbourne.

Business as Usual

By 2046, the population of the West Subregion could reach between 1.2 and 1.6 million (Table 30), and employment levels of between 350,000 and 460,000 (Table 31). Under this distribution, residential growth would continue throughout the greenfield locations of the West Subregion, adding at least 400,000 new people to the Subregion. This substantial growth would place pressure on all aspects of infrastructure.

Whilst the number of jobs is set to at least double, the proportion of jobs relative to people in the West Subregion is lower than in other Subregions, suggesting continued reliance on the Central Subregion and other locations in Melbourne for employment. This would generate continued pressure on strategic transport infrastructure. Some job growth would occur in Sunshine (possibly up to over 40,000 jobs) and Werribee (possibly up to around 15,000 jobs) in line with projections, but these would be primarily smaller nodes with population-servicing retail, commercial and industrial jobs.

TABLE 30. POPULATION SCENARIOS ('000) – WEST SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	775	775	775
	Consolidated	775	775	775
	Expansion	775	775	775
2021	BAU	840	875	850
	Consolidated	830	855	840
	Expansion	870	900	880
2031	BAU	1,000	1,095	1,340
	Consolidated	960	1,050	1,280
	Expansion	1,040	1,140	1,390
2046	BAU	1,230	1,430	1,630
	Consolidated	1,170	1,360	1,550
	Expansion	1,290	1,500	1,710

TABLE 31. EMPLOYMENT SCENARIOS ('000) – WEST SUBREGION

		Low Growth	Middle Growth	High Growth
2016	BAU	245	245	245
	Consolidated	245	245	245
	Expansion	245	245	245
2021	BAU	270	275	280
	Consolidated	290	290	290
	Expansion	290	300	300
2031	BAU	290	330	380
	Consolidated	310	360	420
	Expansion	320	375	430
2046	BAU	350	405	460
	Consolidated	420	490	560
	Expansion	460	535	610

Consolidated distribution
Under a Consolidated distribution, a higher proportion of residential and employment growth could be expected to occur in the Subregion's key centres and transport corridors. Overall however, the potential quantum of population growth is similar to that realised under a BAU distribution of growth across metropolitan Melbourne (1.2 to 1.6 million).

The total number of jobs could reach between 420,000 and 560,000 – higher than under a BAU scenario, as a higher proportion of employment is focused in the Subregion's centres. Employment opportunities would be concentrated around Werribee, East Werribee, Footscray and Sunshine (which as an employment centre would function more like how Box Hill functions today). The National Employment Cluster at Sunshine could perhaps reach over 40,000 jobs and East Werribee could reach almost 30,000 jobs under this distribution.

Development in smaller nodes such as Diggers Rest, Plumpton and Toolern would occur, but at slower rate. There would be more and larger scale business parks, such as those found in the South and East Subregions.

Land lying between Werribee, Footscray and Sunshine may be developed over time if appropriate infrastructure and amenity is provided to attract a population and industry. The Melbourne Metro would reduce travel times from these centres substantially, supporting higher rates of growth.

This would help to alleviate some demand for strategic infrastructure as a lower proportion of journey to work trips may be made to other Subregions, but the overall quantum of growth suggests that journeys outside of the West Subregion for employment would continue to rise.

Expansion distribution
Under an Expansion distribution, the proportion of population growth in the West Subregion would be higher, reaching between 1.3 and 1.7 million people by 2046, and 460,000 to 610,000 jobs. While the level of jobs growth would help to promote self-containment and reduce the proportion of cross-city trips, the rate of population growth – up to 2.5 times the current population, would generate significant infrastructure need.

Diggers Rest, Plumpton, Toolern and Altona could be expected to accommodate higher levels of employment in the short to medium term, improving local resident access to jobs. However, agglomeration forces across the metropolitan area would mean that those centres would struggle to attract higher order investment or jobs.

Under a high growth scenario for the Expansion distribution model, and the business as usual and consolidated models, risks to the environment would need to be carefully managed. Development will require climate change risks, such as coastal inundation and bushfire, to be carefully managed.

4.7.3 Infrastructure implications

Under all of the scenarios the population of the West Subregion could reach between 1.2 and 1.7 million by 2046. Recent population growth in the West Subregion has placed stress on the road network (in particular) and the heavy rail network.

Potential pressure points include:

- Transport systems will also continue to be major pressure points as population grows and the Subregion becomes larger and denser. All modes of transport stand to see growth in the West Subregion - private and public, passenger and freight. Intensifying conflicts at intersections between transport modes are likely.
- The West Subregion's links to the Central Subregion could become a particular bottleneck for both individuals and freight, placing limits on the region's potential growth. Transport infrastructure in the inner parts of the Subregion is likely to be increasingly contested, as it must be shared by local residents and those moving through.
- The West Subregion's rural interface is likely to be an ongoing bottleneck, with high-value agriculture and horticulture located inside the Subregion. The impact of further urban development on biodiversity will also be a constraining factor on outward growth.
- There is also a pressure point between road transport infrastructure serving both regional/interstate connections (to Geelong/Adelaide) and serving urban growth.

In response to this rapid growth, several notable transport projects are either newly opened, under construction, or in the planning phase. Opened in June 2015, the Regional Rail Link (RRL) provides a new rail line from Sunshine to Werribee through the greenfield growth areas of the west with new stations at Wyndham Vale and Tarneit, as well as opportunities for four more stations in the longer term.

The recently announced Western Distributor will help to increase road capacity in the West Subregion and will have flow on effects for the whole of Melbourne.

Managing existing infrastructure and planning for new initiatives will be required if high population and employment growth occurs. It is expected that even under a low growth scenario, the resident population would at least double. Transport infrastructure would need to respond to existing development patterns in the West Subregion, which lacks a north-south grid that is present in more developed Subregions in Melbourne.

Infrastructure could play a strong role in combating inequality in the Subregion, which is pronounced in the less accessible parts of the outer west where future residential greenfield development is planned, and in older suburban locations of St Albans and Deer Park. This may mean transport infrastructure which enhances accessibility to services in other locations, or greater provision of services and facilities in these locations. This could be achieved by new infrastructure or through reshaping existing assets to manage demand or provide outreach services, for example.

The construction and operation of some structural infrastructure uses, such as hospitals and tertiary education facilities, can increase local employment opportunities temporarily and over the longer term. There is also an opportunity for public investment in infrastructure to be leveraged through private sector participation which can in turn promote higher rates of economic growth and employment.

Greenfield development in Melton and Wyndham is likely to generate substantial infrastructure needs and costs. Various studies have indicated infrastructure deficits or ‘backlogs’ present challenges for future planning, particularly in high growth areas (Infrastructure Australia 2015, Victorian Auditor General 2013). There are multiple ways in which infrastructure access is provided to future communities.

The proportion of greenfield land available in the West Subregion presents clear opportunities to invest in structural infrastructure which will influence the role it plays in Melbourne’s economy. Strategic, forward infrastructure planning ahead of anticipated growth will have a greater impact on how these areas function. In communities with high disadvantage, it is likely that raising private investment will be more challenging, thus increasing the need for targeted public intervention. Infrastructure has a role to play in addressing broader social issues such as inequality, and in leveraging opportunities such as increasing diversity. Certain infrastructure can encourage people to share spaces and experiences and

potentially develop lasting connections, for example open spaces, recreation facilities, libraries, and schools.

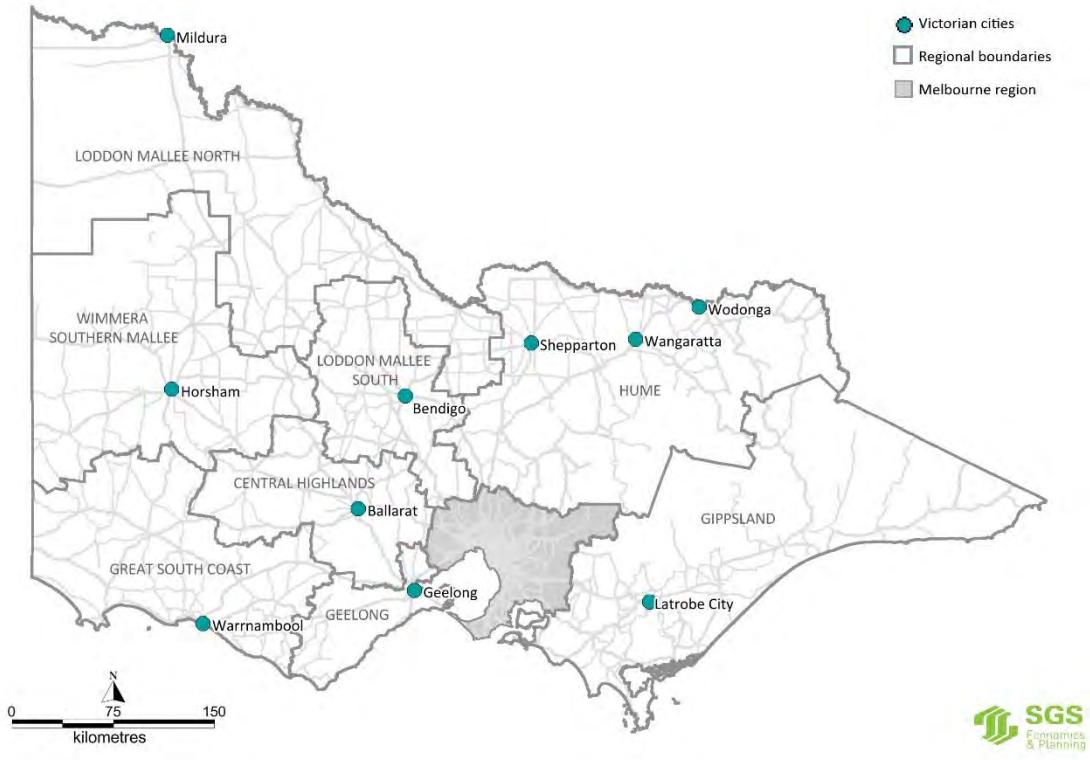
5 REGIONAL VICTORIA

5.1 The changing nature of Regional Victoria

Over the last 30 years Regional Victoria's landscape has changed significantly. No longer is it a simple agricultural landscape interspersed with rural towns. The pattern of development has been shaped by geography, function, and transport technology and networks. As these factors have changed over time, so too have settlements. Early settlement patterns were largely determined by the requirements of industry – agriculture in areas with appropriate soil and rainfall and mining in areas with mineral resources. The location of key transport hubs were also determined by geography, particularly with relation to sea and river ports. Transport costs and travel times were high, so towns established alongside industry and transport hubs. With such a settlement pattern, most of Victoria's towns were established in the 19th century, with settlements developing spatially alongside industries as they developed across the State.

Through the 20th century the spatial link between industry and population weakened. Transport technology reduced transport costs and travel times, industries restructured and rose or fell in prominence, and households became increasingly wealthy. In the early part of the 20th century, this resulted in a shift in emphasis away from employment and industry toward amenity factors as key shapers of settlement patterns. For regional locations this change was accompanied with a decline in agricultural employment.

FIGURE 113. REGIONAL VICTORIA



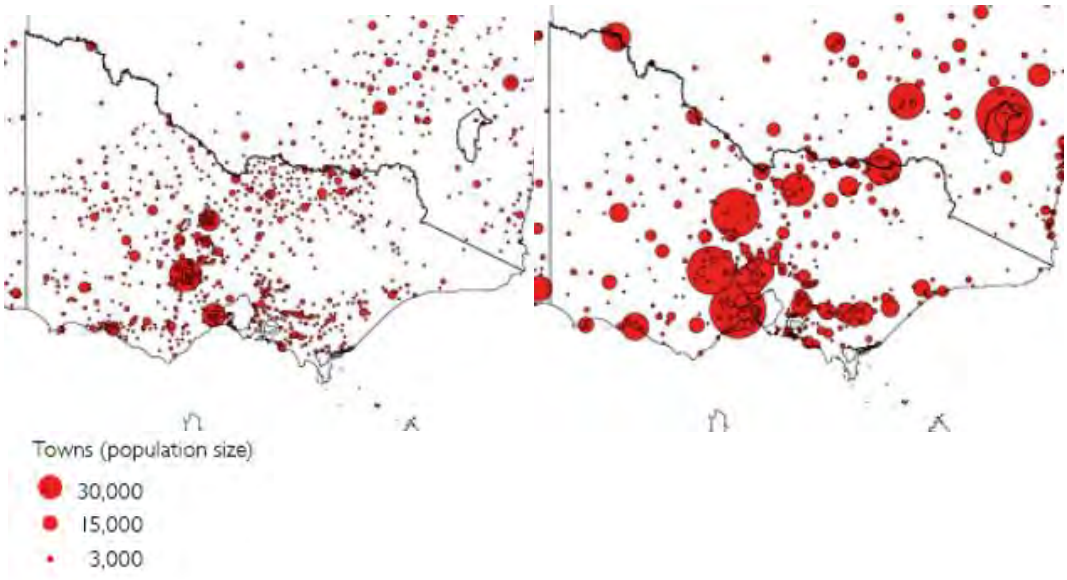
Outcomes across Regional Victoria are diverse:

- Changing trade patterns, consumer preferences and climate change have influenced what and where we farm, while technology has influenced how we farm.
- Amenity landscapes have influenced where and how we live, with improvements to transport accessibility allowing commuting to Melbourne and major provincial centres.
- New policy positions, which support the water market, have led to a revolution in how we both manage and distribute our reduced water supply.
- The dominant economic and cultural role of Melbourne, together with enhanced transport links to the major towns within approximately 100km, has seen much of the State's population growth concentrated in Melbourne and its hinterland.
- Development pressures and climate change have increased stress and the rate of decline in the health of our natural environment.
- Ageing of the population, which is particularly evident in less urbanised parts of Regional Victoria.
- The increased incidence and severity of natural hazards, such as sea level rise, bushfire and flood, have influenced development standards and settlement patterns.
- Declining agricultural commodity prices, a reduction in trade barriers and falling terms of trade for Australia's agricultural produce have weakened the viability of many agricultural enterprises. In order to survive and prosper, the agricultural sector has had to rationalise with a number of much larger agricultural conglomerates expanding at the expense of small, once viable farm holdings and enterprises which have all but disappeared in some parts of Regional Victoria.

All these changes have influenced the settlement patterns of Regional Victoria both in terms of growth and change. Changes have included a drift to larger provincial towns from farms and smaller settlements, the emergence of a few dominant regional towns, and the beginnings of major urban cities, including Geelong, Ballarat and Bendigo.

As a result, the proportion of people living in small towns has declined dramatically in the last 150 years. This has resulted in some small towns disappearing all together while many others have shrunk as population increasingly clusters in regional centres (Figure 114). The concentration of population into regional centres is clearly illustrated in the below figure which compares town sizes using the Census in 1911 and 2006.

FIGURE 114. TOWN POPULATION SIZE 1911 AND 2006



Source: SGS Economics & Planning adapted from BITRE 2014b

Of the towns that have disappeared or seen a prolonged decline in population, most are in Victoria's far west, around the wheat and wool region of the Wimmera. As technology has changed and climate constraints impacted, many of the towns of the region have seen population decline. Towns such as St Arnaud, Dimboola, Murtoa, Natimuk, and Rupanyup have experienced decline since the 1910s, while others such as Ararat (pictured in Figure 115 below), Warracknabeal, and Nhill housed higher populations in the 1960s than they do today. This pattern of decline is not uncommon amongst locations heavily dependent on mining or agricultural activities.

FIGURE 115. ST ARNAUD AT ITS PEAK

Source: VictorianPlaces.com.au

In contrast, some parts of Regional Victoria continue to be dominated by small towns, in particular the Wimmera, Mallee and Gippsland. These areas have seen substantial change in recent times, often a decline in population and a rapid ageing of those who remain.

These towns and communities are much more than bricks and mortar. They are part of the rich history and social fabric of Victoria. As many towns are facing population and/or economic decline, the future of these places is dependent on broader issues and trends, and how policy responds to challenges.

Retaining and growing the population of these towns and their economies is likely to require action. This could include youth attraction and retention initiatives and building community capacity and connectedness. Addressing challenges in these locations such as the ageing population and growth of the knowledge sector in major metropolitan locations and subsequent 'pull' of Melbourne will need to be considered alongside the costs these initiatives may present. A whole of Victoria approach to social, economic and environmental resilience is required and decisions will need to be made about how and where growth occurs.

This Section of the report examines a range of broad issues and trends affecting Regional Victoria, before delving into region and regional town specific commentary. Regional Victoria is comprised of several large regions, each of which have at least one regional city or centre (see Table 32).

TABLE 32. VICTORIAN REGIONS AND REGIONAL CITIES

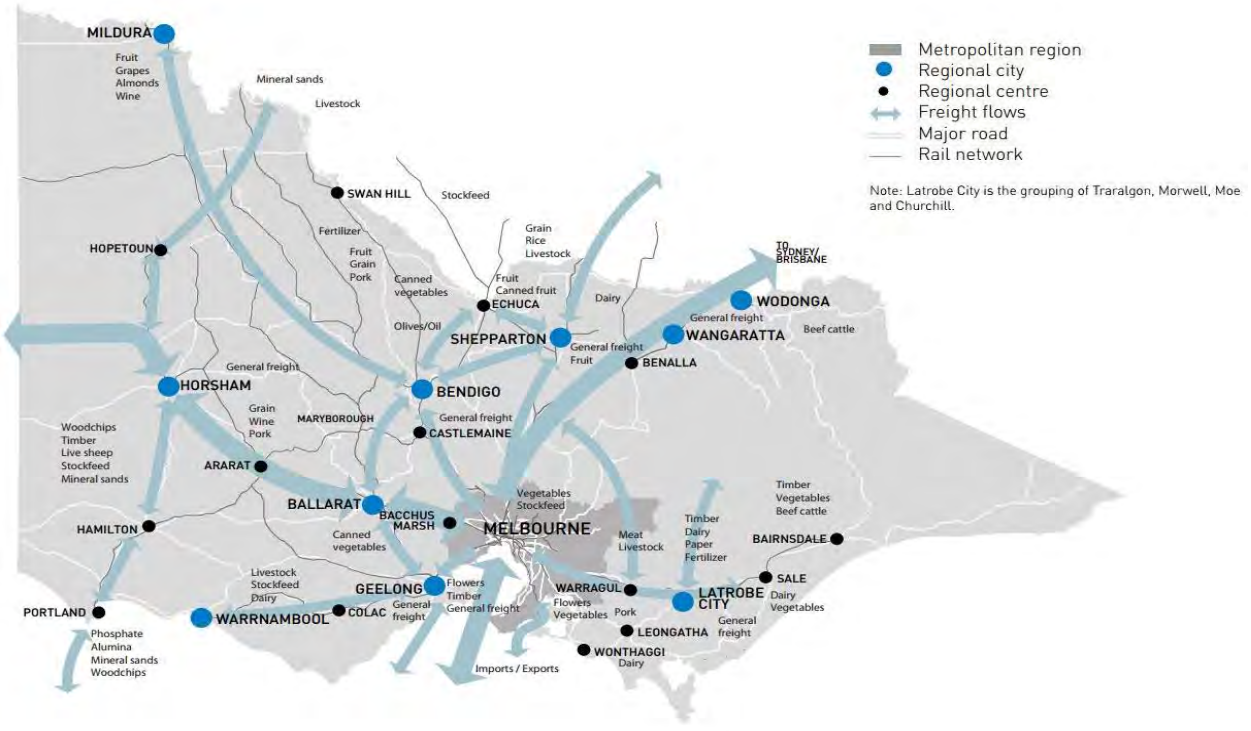
Region	Regional City
Geelong	Geelong
Gippsland	Latrobe City
Great South Coast	Warrnambool
Hume	Shepparton, Wangaratta and Wodonga
Loddon Mallee North	Mildura
Loddon Mallee South	Bendigo
Wimmera Southern Mallee	Horsham

5.1.1 A less diverse and slower growing economy

The economy of Regional Victoria is still focused on agricultural, mining and manufacturing (Figure 2). The economy of Regional Victoria has grown at half the rate of Melbourne. Even when accounting for population growth, the economic growth rate per capita growth rate of Melbourne is roughly double that of Regional Victoria. This low rate of growth has resulted in a modest growth rate in Regional Victoria of 0.9 per cent per annum compared to a growth rate of 1.8 per cent in Metropolitan Melbourne (ABS 2015a).

Notwithstanding slower growth, Regional Victoria's agricultural and manufacturing industries continue to generate significant commodity and freight flows. In addition, as illustrated in Figure 116, significant freight travels through Regional Victoria from Melbourne to Sydney via Wangaratta and Wodonga. Horsham is also a key centre along the freight network, as both an intermediate point between Melbourne and Adelaide as well as the agriculture sector producing goods for export. Agricultural products also flow from Mildura, Shepparton and Latrobe City while ports at Portland, Geelong and Melbourne export goods from across the state.

FIGURE 116. KEY COMMODITY AND FREIGHT FLOWS



There is a shrinking gap between the growth rates in Metropolitan Melbourne and Regional Victoria. Population growth in Regional Victoria averaged 12,000 persons per annum between 2011 and 2014 (Figure 117).

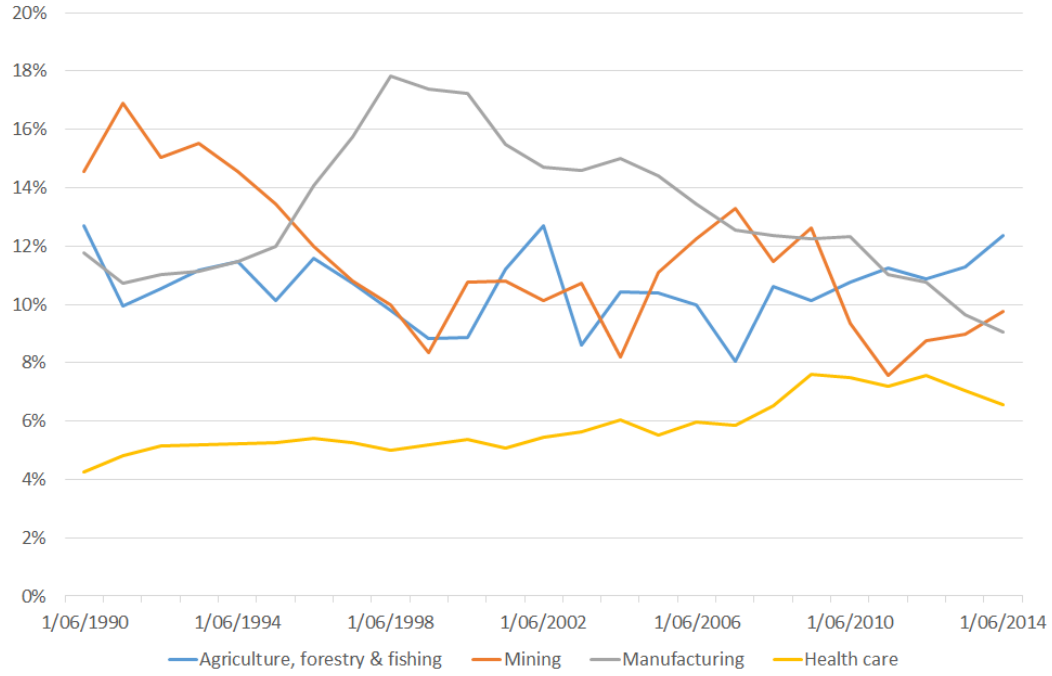
FIGURE 117. POPULATION 2001 TO 2014, REGIONAL VICTORIA

Source: ABS cat. no. 3218.0, Regional Population Growth, Australia2013-14.

Overall however, the percentage of Victorians living in Regional Victorian has declined from approximately 28 per cent in 2001 to 25 per cent in 2014 (ABS 2015a). Figure 119 illustrates the dispersed nature of population gains and declines over 2004-2014.

Regional Victoria is expected to absorb around 24 per cent of Victoria's population growth to 2036.

FIGURE 118. REGIONAL VICTORIA GDP INDUSTRY CONTRIBUTIONS



Source: SGS Economics & Planning

The key indicators for Regional Victoria illustrate some variation between regions, for example in the proportion of people aged over 65 and the scale of population change, while labour force participation and the unemployment rate are reasonably consistent across Regional Victoria. These are illustrated in Table 33.

TABLE 33. KEY INDICATORS – REGIONAL VICTORIA

Region	Population			Labour force participation		Proportion aged 65+		Unemployment rate	
	2004	2014	Change	2006	2011	2006	2011	2006	2011
Central Highlands	158,300	184,800	26,500	62.1%	62.6%	14.2%	15.2%	6.1%	8.3%
Geelong	240,700	273,900	33,200	61.5%	62.1%	16.1%	16.7%	5.9%	8.4%
Gippsland	292,000	352,200	60,200	60.9%	61.4%	15.6%	16.8%	5.9%	8.6%
Great South Coast	99,700	101,100	1,400	64.5%	64.2%	16.4%	17.6%	4.7%	8.6%
Hume	251,900	274,300	22,400	63.9%	62.7%	15.2%	16.9%	5.0%	8.4%
Loddon Mallee North	125,800	126,700	900	62.1%	60.3%	16.6%	18.3%	5.0%	8.5%
Loddon Mallee South	168,900	189,800	20,900	61.4%	61.8%	15.2%	16.7%	6.0%	8.4%
Wimmera Southern Mallee	49,600	47,900	-1,700	61.6%	60.2%	19.5%	20.7%	4.8%	7.8%

Source: ABS 2006, 2011 - 2014

The economic profile of Regional Victoria can also be described by the employment structure of the regions and Regional Cities. The following tables provide a summary of the five largest employing sectors for each of the regions and Regional Cities in 2011 (see Table 34 and Table 35)

The manufacturing, health care and social assistance, and retail sectors feature in the top five sectors in all regions, and agriculture, forestry and fishing, construction and education are also present in many regions.

In the regional cities, many of the same sectors dominate the employment profile. The major differences between regions and regional cities include agriculture forestry and fishing is less prominent, while public administration and safety, and accommodation and food services (key tourism sectors) are more prominent in the regional cities.

TABLE 34. TOP 5 EMPLOYMENT SECTORS BY REGION 2011

Region	1	2	3	4	5
Central Highlands	Health Care and Social assistance	Retail	Manufacturing	Construction	Education
Hume	Manufacturing	Retail	Health Care and Social assistance	Agriculture forestry and fishing	Construction
Gippsland	Construction	Retail	Health Care and Social assistance	Agriculture forestry and fishing	Manufacturing
Geelong	Retail	Manufacturing	Health Care and Social assistance	Construction	Education
Great South Coast	Agriculture forestry and fishing	Health Care and Social assistance	Retail	Manufacturing	Construction
Loddon Mallee North	Agriculture forestry and fishing	Retail	Health Care and Social assistance	Manufacturing	Construction
Loddon Mallee South	Retail	Health Care and Social assistance	Manufacturing	Construction	Education
Wimmera Southern Mallee	Agriculture forestry and fishing	Health Care and Social assistance	Retail	Manufacturing	Construction

Source: ABS, 2011

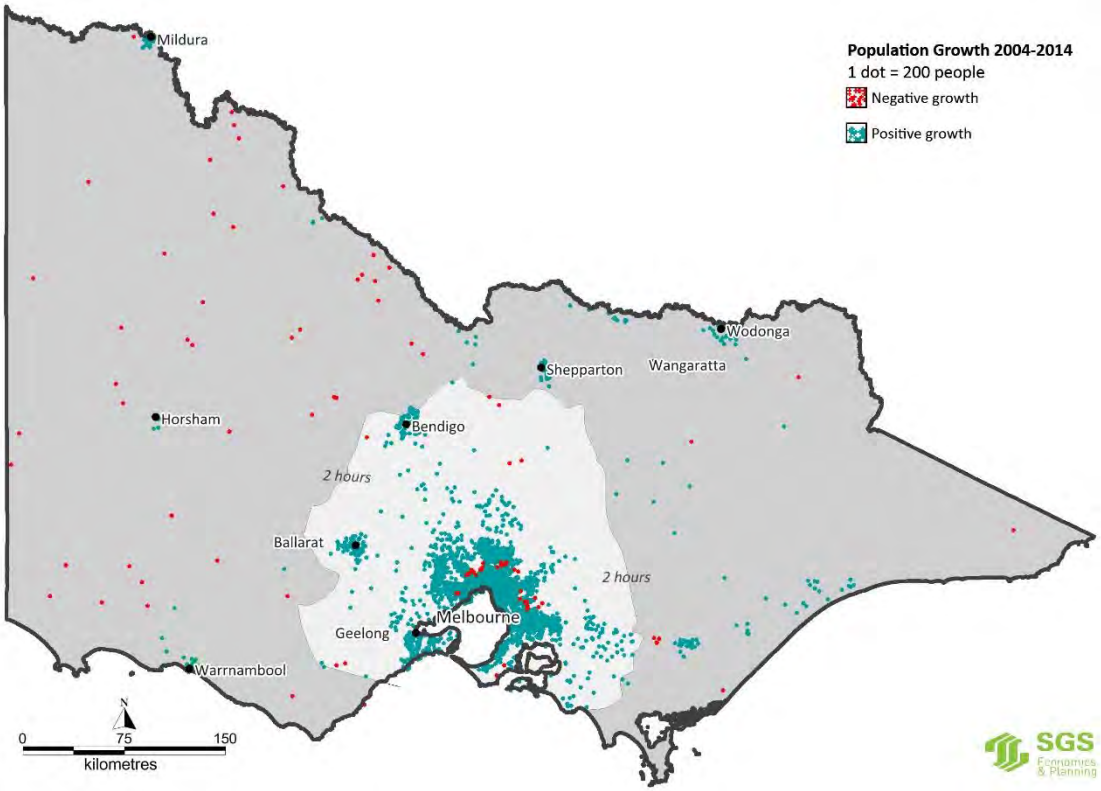
TABLE 35 TOP 5 EMPLOYMENT SECTORS BY REGIONAL CITY, 2011

City	1	2	3	4	5
Ballarat	Health Care and Social Assistance	Retail	Manufacturing	Education and Training	Construction
Bendigo	Health Care and Social Assistance	Retail Trade	Education and Training	Construction	Manufacturing
Geelong	Retail	Manufacturing	Health Care and Social Assistance	Education and Training	Construction
Horsham	Health Care and Social Assistance	Manufacturing	Health Care and Social Assistance	Education and Training	Construction
Latrobe	Health Care and Social Assistance	Retail Trade	Manufacturing	Construction	Public Administration and Safety
Mildura	Retail	Health Care and Social Assistance	Education and Training	Accommodation and Food Services	Manufacturing
Shepparton	Health Care and Social Assistance	Retail Trade	Manufacturing	Construction	Education and Training
Warrnambool	Health Care and Social Assistance	Retail Trade	Education and Training	Accommodation and Food Services	Construction
Wangaratta	Health Care and Social Assistance	Retail Trade	Manufacturing	Public Administration and Safety	Education and Training
Wodonga	Manufacturing	Health Care and Social Assistance	Retail	Public Administration and Safety	Construction

Source: ABS 2011

The combination of declining economic growth and low population growth (see Figure 119) has contributed to lower socioeconomic outcomes in Regional Victoria when compared with Melbourne. The average community in Australia has a SEIFA of 1,000. In Melbourne the average score is 1,018 while in Regional Victoria it is 980 (ABS 2012).

FIGURE 119. POPULATION CHANGE 2004-14

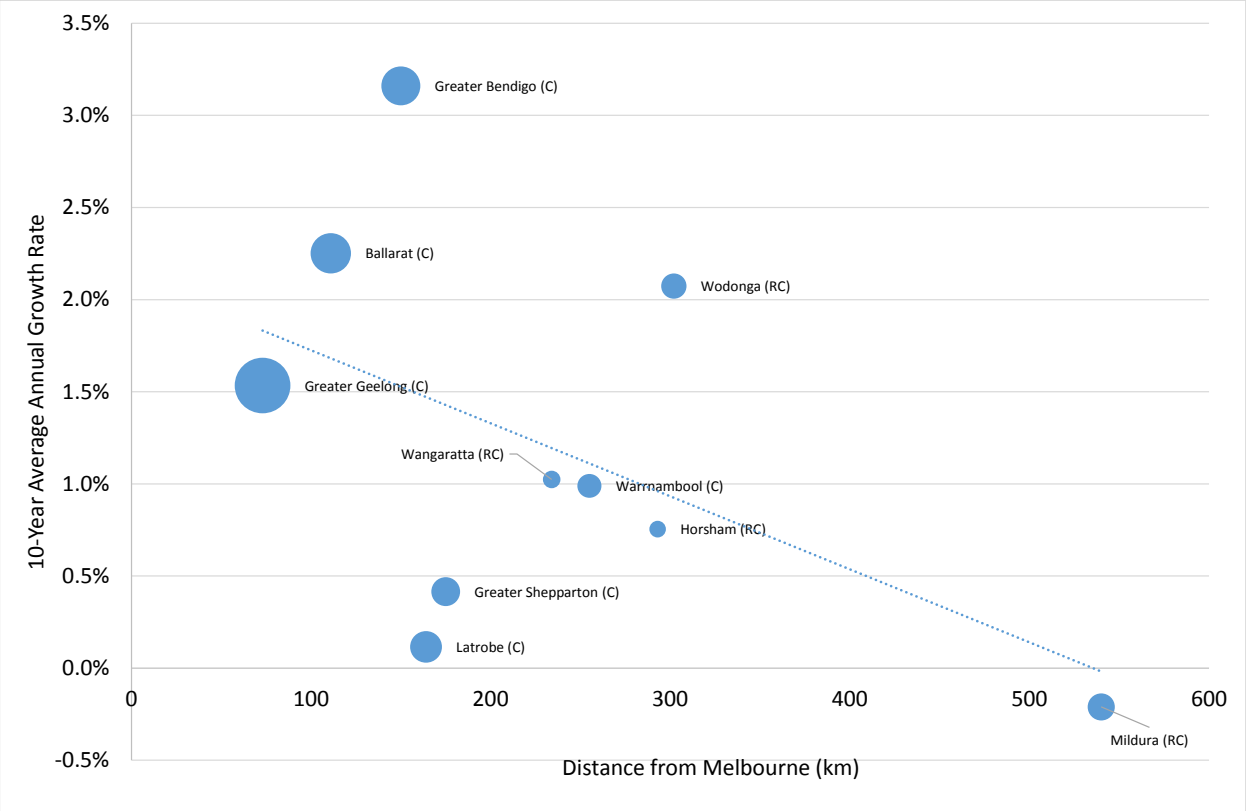


5.1.2 The varied influence of Melbourne

Melbourne's economy partially influences the economic prosperity of regional cities and towns. Figure 120 highlights the ten year average growth rate in Gross Regional Product of regional cities by distance from Melbourne and relative population size. Bendigo and Ballarat have demonstrated the highest level of growth over a 10 year period, and are among the closest to Melbourne. However, Wodonga's growth rate has been higher than Geelong despite its distance from Melbourne. This could reflect Wodonga's strategic location on the Hume Highway, Wodonga's proximity to Albury and the economic restructuring that has taken place in Geelong.

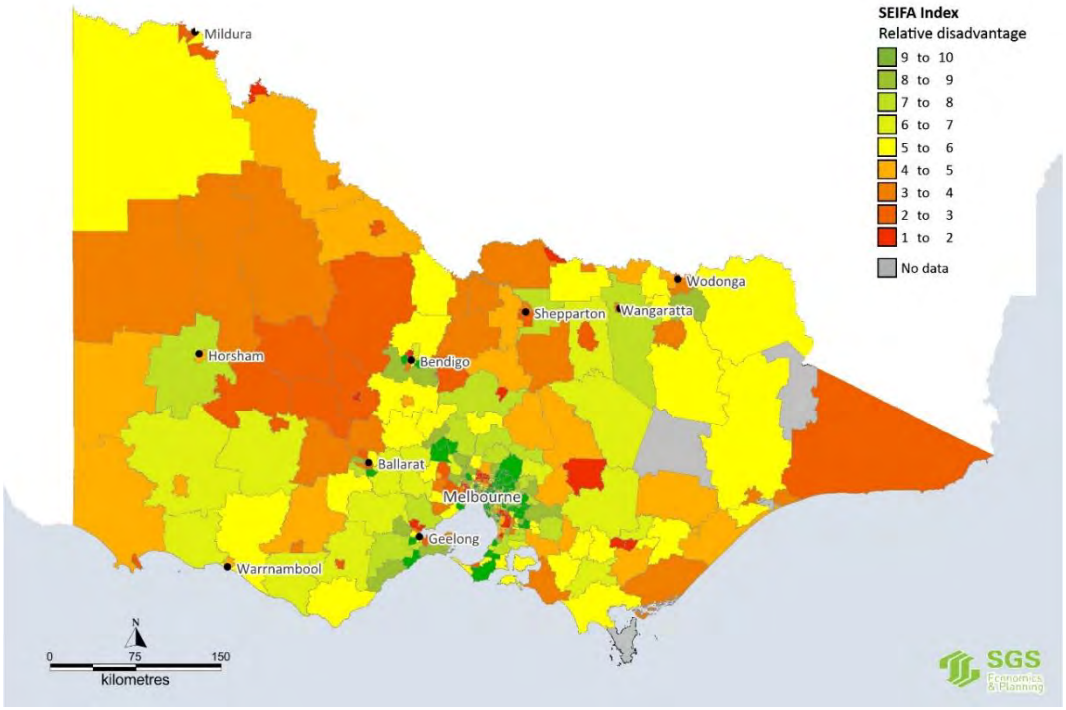
Cities of 200-300 kilometres distance from Melbourne have shown positive growth of up to approximately one per cent (Wangaratta, Shepparton, Horsham and Warrnambool). The farthest regional city, Mildura, has shown a negative growth rate over the past decade.

FIGURE 120. GRP OF REGIONAL CITIES BY POPULATION SIZE AND DISTANCE FROM MELBOURNE (2005-2015)



The influence of Melbourne is also demonstrated in SEIFA indices across Victoria (Figure 121). Areas surrounding Melbourne generally have a higher SEIFA, as do locations immediately surrounding Bendigo, Ballarat, Geelong and Wangaratta.

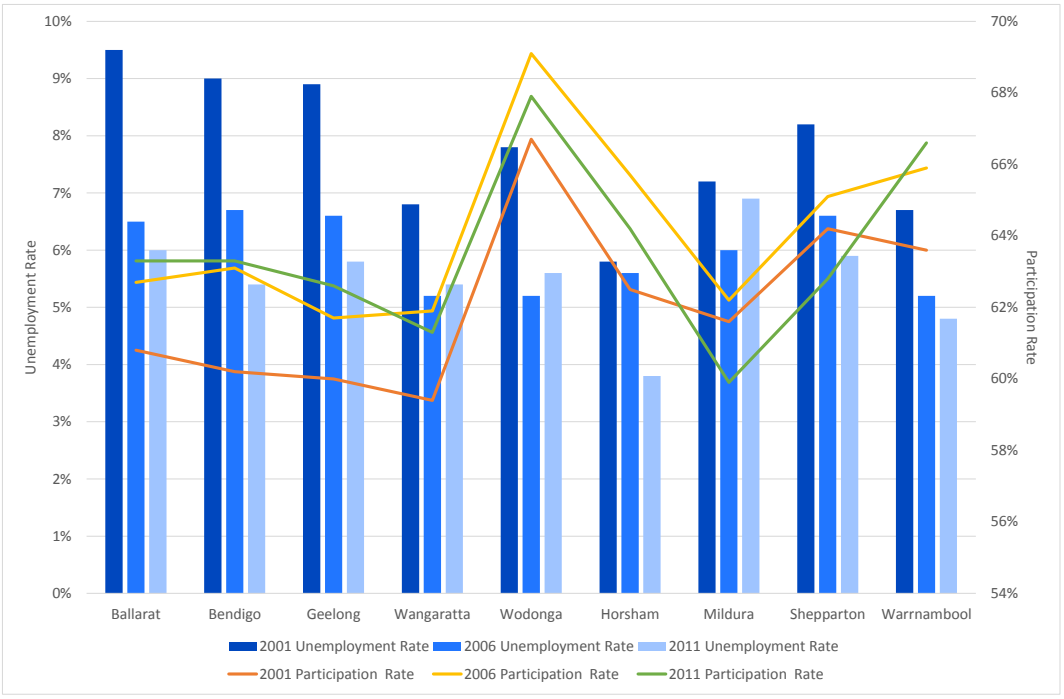
FIGURE 121. SEIFA INDEX 2011 - VICTORIA



Source: ABS SEIFA cat. no. 2033.0.55.001

The influence of Melbourne is less evident in terms of unemployment and participation rates (Figure 122). Horsham has the lowest unemployment rate, followed by Warrnambool, Bendigo and Wangaratta. Unemployment rates are highest in Bendigo and Mildura.

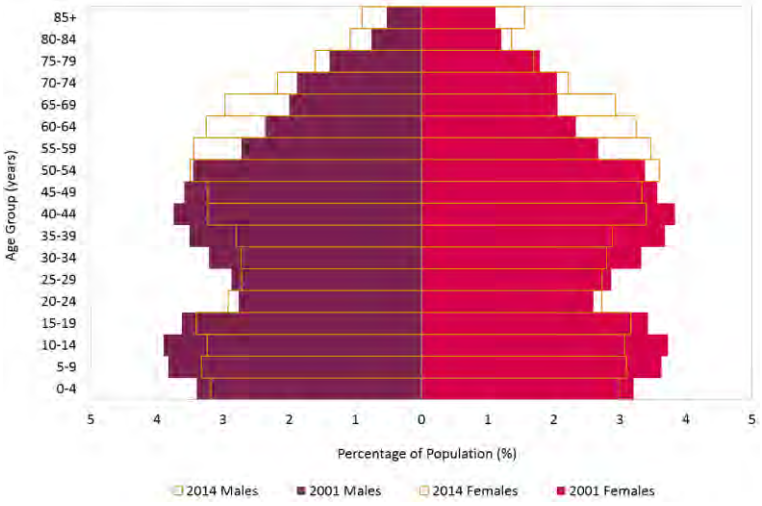
FIGURE 122. UNEMPLOYMENT RATES BY REGIONAL CITIES, 2001, 2006 AND 2011



5.1.3 An ageing and diverse, but increasingly unhealthy population

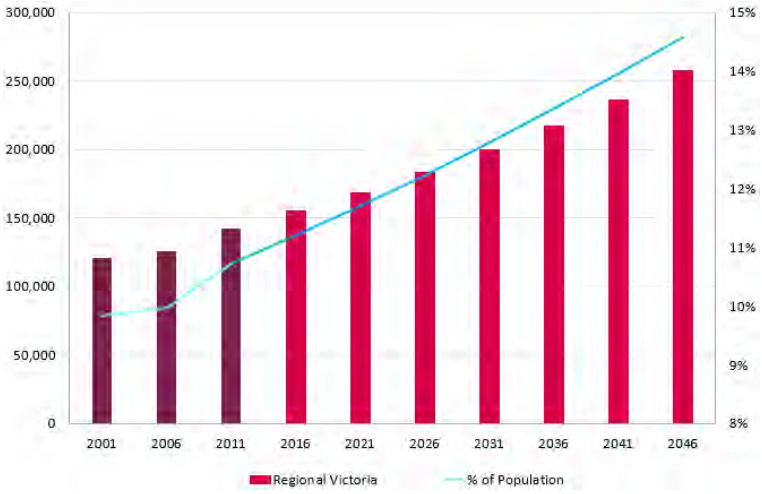
Ageing is a clear trend across Victoria, with reduced mortality, lower fertility, immigration and increased life expectancy as key contributing factors (Figure 123). In Regional Victoria, the proportion of those aged over 64 years is projected to increase from 14 per cent to 16 per cent between 2016 and 2036 (Victoria in Future 2015).

FIGURE 123. REGIONAL VICTORIAN POPULATION BY AGE AND GENDER, 2001 AND 2014



Source: ABS cat no. 3201.0

FIGURE 124. NUMBER & PERCENTAGE OF OVERSEAS BORN POPULATION, REGIONAL VICTORIA



Source: ABS 2011 Census of Population and Housing, cat. no. 2003.0

The number of overseas born people in Regional Victoria increased between 2001 and 2011 from 121,000 to 143,000 (Figure 124). As a share of the total population in Regional Victoria, the percentage of overseas born people rose marginally from 10 per cent in 2001 to 11 per cent in 2011 (ABS 2001, 2011). Should immigration policy remain similar, this trend is projected to continue, with approximately 11 per cent of people born overseas in 2016, 13 per cent in 2036, and 15 per cent in 2046.

Life expectancy is slightly lower in Regional Victoria at 78.9 years of age for males and 83.8 years of age in 2007 compared to the Victorian average of 80.3 years of age for males and 84.4 years of age for females (ABS 2014a). Similarly, infant mortality is slightly higher. Improvements have been made for both indicators over previous years, indicating a positive future trajectory based on current conditions.

Rates of some chronic diseases are progressively increasing in Regional Victoria, reflecting the ageing population profile and increasing prevalence of some risk factors, like obesity. In particular, incidences of cardiovascular disease. Presently, 7.3 per cent of people (9 per cent of males and 5.6 per cent of females) in Regional Victoria are affected by heart disease, higher than the Victorian average (Victorian Population Health Survey 2012). There are regional variations in rates of chronic diseases with remote and disadvantaged areas demonstrating higher incidences.

The prevalence of obesity in adults living in Regional Victoria is higher than the state average. The proportion of obese adults has increased from 19.8 per cent in 2006 to 20.7 per cent in 2011-12 (Victorian Population Health Survey 2011-12). While observed disease rates are higher in Regional Victoria, both subjective health status and self-assessed standard of living are higher than the state-wide average. Table 36 notes the Regional Victoria and state health and wellbeing indicators.

TABLE 36. REGIONAL VICTORIA & STATE, HEALTH AND WELLBEING INDICATORS

	Regional Victoria		State of Victoria	
	2000s	Present	2000s	Present
Life expectancy males	75 -78	>79	76 - 79	>80
Life expectancy females	81-83	>83	82 - 84	>84
Cardiovascular disease % males	8.6% (2008)	9.0% (2011-12)	8.4% (2003)	8.7% (2011-12)
Cardiovascular disease % Females	6.0% (2008)	5.6% (2011-12)	4.8% (2003)	5.5% (2011-12)
Type 2 diabetes %	4.8% (2008)	4.7% (2011-12)	3.9% (2005)	5.0% (2011-12)
Land transport accidents %	n/a	n/a	32,522 (2004)	35,916 (2013)
Obesity %	19.8% (2008)	20.7% (2011-12)	13.9% (2003) 16.7% (2008)	17.5% (2011-12)
Subjective health status	75.1 (2001)	79.0 (2014)	75.0 (2001)	76.2 (2014)
Self-reported health status (% Excellent/Very Good)	43.3% (2008)	45.9% (2011-12)	43.7% (2008)	46.6% (2011-12)
Self-assessed standard of living (index score)	74.7 (2001)	80.2 (2014)	76.3 (2001)	79.4 (2014)
Subjective wellbeing (index score)	78.3 (2007)	79.3 (2011)	76.4 (2007)	77.5 (2011)

Source: Victorian Population Health Survey 2008 & 2011-12, Victorian health information surveillance system (VHISS), ABS cat. no. 3303.0 Causes of Death 2013, Community Indicators Victoria.

5.1.4 Strong education outcomes, with some areas to improve

Most children living in Regional Victoria have been consistently 'on track' in early childhood development between 2009 and 2012 (Table 37). The Australian Early Development Index (AEDI) for children on track rose for most domains from 2009 to 2012 and the proportion of children considered developmentally vulnerable reduced from 21.1 per cent in 2009 to 20.6 per cent in 2012 (Australian Early Development Census 2012). These figures however are all below state average levels. Remote areas and areas of relative socio-economic disadvantage were more likely to have children identified as developmentally vulnerable.

Between 2008 and 2014, the proportion of children in year five who met or exceeded literacy standards in Regional Victoria has improved from 90.8 per cent to 92.3 per cent (Table 37). Trends in numeracy have remained relatively stable at around 95 per cent from 2008 to 2014. There are variations between regions however, with children in some remote or disadvantaged areas attaining lower levels of literacy and numeracy compared to the rest of Regional Victoria.

There is a positive trend in apparent retention rates across both government and non-government schools in Regional Victoria. Overall, it has improved from approximately 84.4 per cent in 2006 to 90.0 per cent in 2012. This trend is projected to continue. However, apparent retention rates decrease with remoteness.

Levels of post-school qualifications are lower in Regional Victoria compared to the whole of state. There is a positive trend in levels of post-school qualifications: 61 per cent of people living in Regional Victoria aged 25-64 had a non-school qualification in 2014, up from 55 per cent in 2006.

School retention rates and the proportion of the population with non-school qualifications has increased over the last decade (Table 37). However, literacy and numeracy rates have declined from 2008 to 2014.

TABLE 37. REGIONAL VICTORIA & STATE OF VICTORIA, EDUCATION

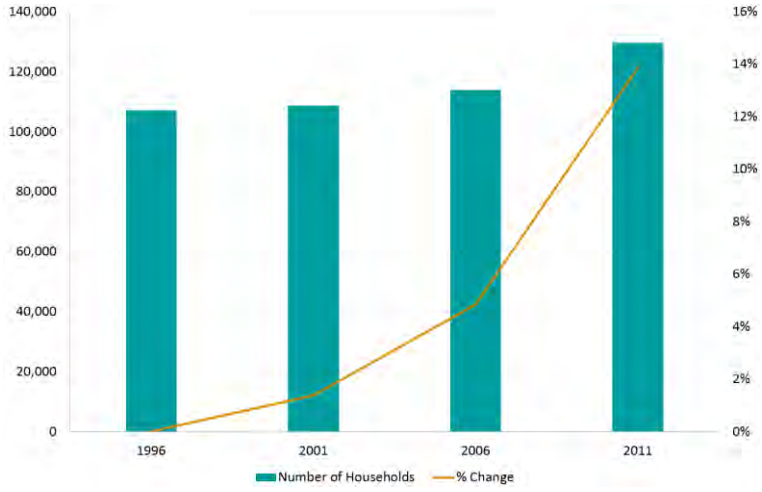
	Regional Victoria		State of Victoria	
	2000s	Present	2000s	Present
Percentage of children vulnerable on one or more domains of the AEDC	21.1% (2009)	20.6% (2012)	20.3% (2009)	19.5% (2012)
Percentage of children vulnerable on two or more domains of the AEDC	11.1% (2009)	10.5% (2012)	10.0 (2009)	9.5% (2012)
Proportion of students in years 5 who meet or exceed the benchmarks for Literacy	90.8% (2008)	92.3% (2014)	92.0% (2008)	93.5% (2014)
Proportion of students in years 5 who meet or exceed the benchmarks for Numeracy	93.6% (2008)	92.9% (2014)	94.1% (2008)	93.8% (2014)
School retention rate (Yr 7 - 12)	68.5% (2006)	69.5% (2012)	78.8% (2006)	83.0% (2012)
Proportion of those with non-school qualification	48.6% (2006)	55.2% (2011)	56.6% (2006)	61.2% (2011)
Percentage of children vulnerable on one or more domains of the AEDC	21.1% (2009)	20.6% (2012)	20.3% (2009)	19.5% (2012)
Percentage of children vulnerable on two or more domains of the AEDC	11.1% (2009)	10.5% (2012)	10.0% (2009)	9.5% (2012)

Source: Australian Early Development Census, Summary Statistics Victorian Schools, Department of Education and Early Childhood Development

5.1.5 Housing is more affordable in Regional Victoria than in Melbourne, however there is still housing stress

In Regional Victoria, the HAI shows an increase in housing affordability over the 2010 to 2014 period, increasing from around 50- index points to around 70 index points.

FIGURE 125. PROPORTION OF HOUSEHOLDS ON RENT & RATE OF CHANGE, REGIONAL VICTORIA



Source: SGS Economics & Planning, based on ABS

Even though affordability has improved, purchasing housing remains unaffordable and mortgage repayments commonly absorb more than 30 per cent of earnings for average households. There is an increasing trend towards renting (Figure 125), though rental affordability is under strain in some areas of Regional Victoria and, in particular, for low income groups.

The RAI was 120 in June 2015 for Regional Victoria, marginally up from the June 2012 quarter and slightly

lower than in Metropolitan Melbourne (Figure 126). Under these conditions, the average household would experience moderate housing stress paying 25 per cent of income on rent. However, the RAI for lower income households in Regional Victoria falls well below the threshold of 100, indicating unaffordable rents for these groups. The RAI for very low income (Q1) family households was 48 and 29 for non-family households, indicating that these households would need to spend 36 per cent of their income on rent.

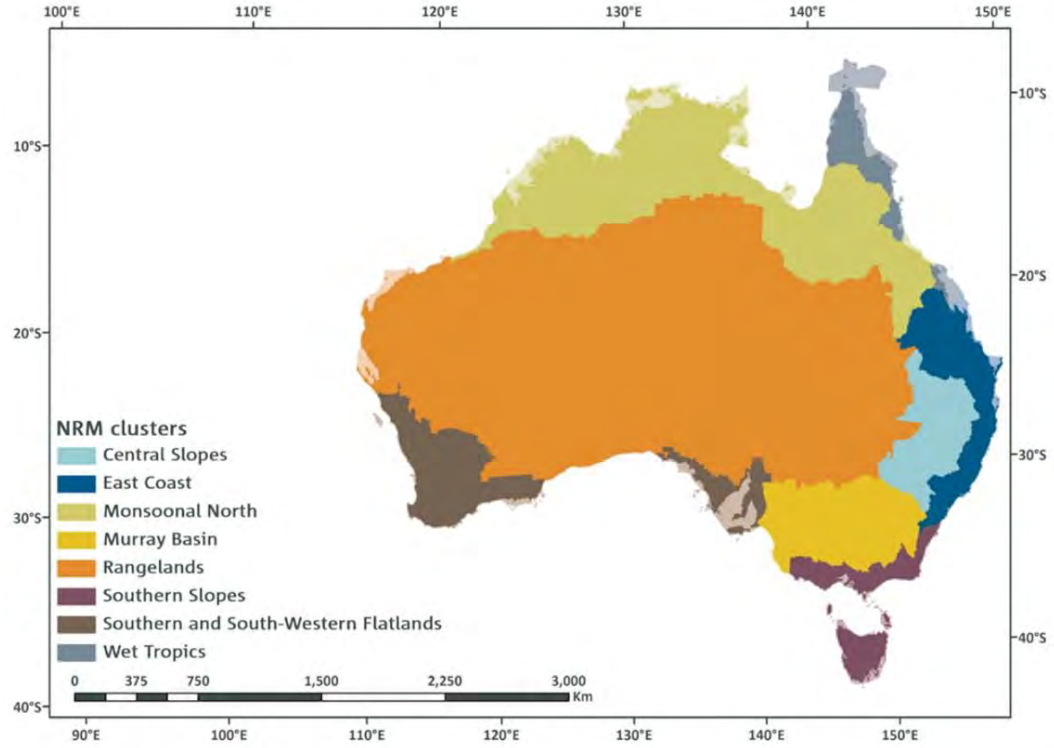
FIGURE 126. RENTAL AFFORDABILITY INDEX - REGIONAL VICTORIA

Source: SGS Economics & Planning, 2015

5.1.6 The continued impact of climate change

The most up to date climate change projections are detailed in the reports titled *Climate Change Australia: Projections for Australia's NRM Regions,* published by CSIRO and the Bureau of Meteorology (2015). The projections are designed to assist planning and managing Natural Resource Management (NRM) regions in Australia. Victoria has two natural resource management clusters – the Southern Slopes and Murray Basin (Figure 127).

FIGURE 127. NATURAL RESOURCE MANAGEMENT CLUSTERS OF AUSTRALIA



Source: CSIRO and Bureau of Meteorology, 2015

Table 38 describes the climatic trends recorded across the two Victorian clusters (CSIRO and Bureau of Meteorology 2015).

TABLE 38. CLIMATE CHANGE INDICATORS: MURRAY BASIN AND SOUTHERN SLOPES CLUSTERS

Indicator	Murray Basin	Southern Slopes
Higher temperatures	Temperatures have increased since national records began in 1910, particularly since 1960. Over 1910–2013, mean surface air temperature has increased by 0.8 °C using a linear trend.	Mean surface air temperatures increased in the last century, and particularly since 1960. Between 1910 and 2013, using a linear trend, mean temperature increased by 0.8 to 1.0 °C.
Rainfall trends	The Murray Basin cluster experienced prolonged periods of extensive drying in the early 20th century and again by the end of the century. In the latter, drying occurred primarily during the cool season. Overall, there is no long term trend in annual rainfall throughout the 20th century.	The cluster experienced wet and dry decades through the 20th century, and shows a drying trend in rainfall since 1960, especially in autumn.
Sea levels	Relative sea level has risen around Australia at an average rate of 1.4 mm/year between 1966 and 2009, and 1.6 mm/year after the influence of the El Niño Southern Oscillation (ENSO) on sea level is removed.	
Sea surface temperature	Sea-surface temperatures around Australia have warmed by 0.9°C since 1900. In 2013, temperatures were 0.5°C above the 1961–1990 average of 22.3°C. Sea-surface temperatures around parts of Australia have been mostly well-above average since 2010, with persistent regions of very warm to highest-on-record temperatures to the south and west of the	

Indicator	Murray Basin	Southern Slopes
	continent throughout much of 2013.	
Acidic oceans	About 30 per cent of the anthropogenic carbon dioxide emitted into the atmosphere over the past 200 years has been absorbed by the oceans. This has led to a 0.1 pH fall in the ocean's surface water pH (a 26 per cent rise in acidity).	

Source: CSIRO and Bureau of Meteorology, 2015

Looking forward, it is expected that there will be:

- Continued warming and increases in mean, daily maximum and minimum temperatures
- More frequent and hotter days with less frost
- Less rainfall in cooler seasons, but with regional differences
- Increased intensity of heavy rainfall events with more time in droughts
- Changes in wind speed
- Increased solar radiation and reduced relative humidity in spring and winter'
- Increased evaporation rates, reduced soil moisture and runoff
- A harsher fire weather climate in the future
- Higher sea levels and more frequent sea level extremes
- Warmer oceans in the future.
- More acidic oceans (CSIRO and Bureau of Meteorology 2015).

Appendix 1 provides further detail on specific climate change impacts that are anticipated in Victoria.

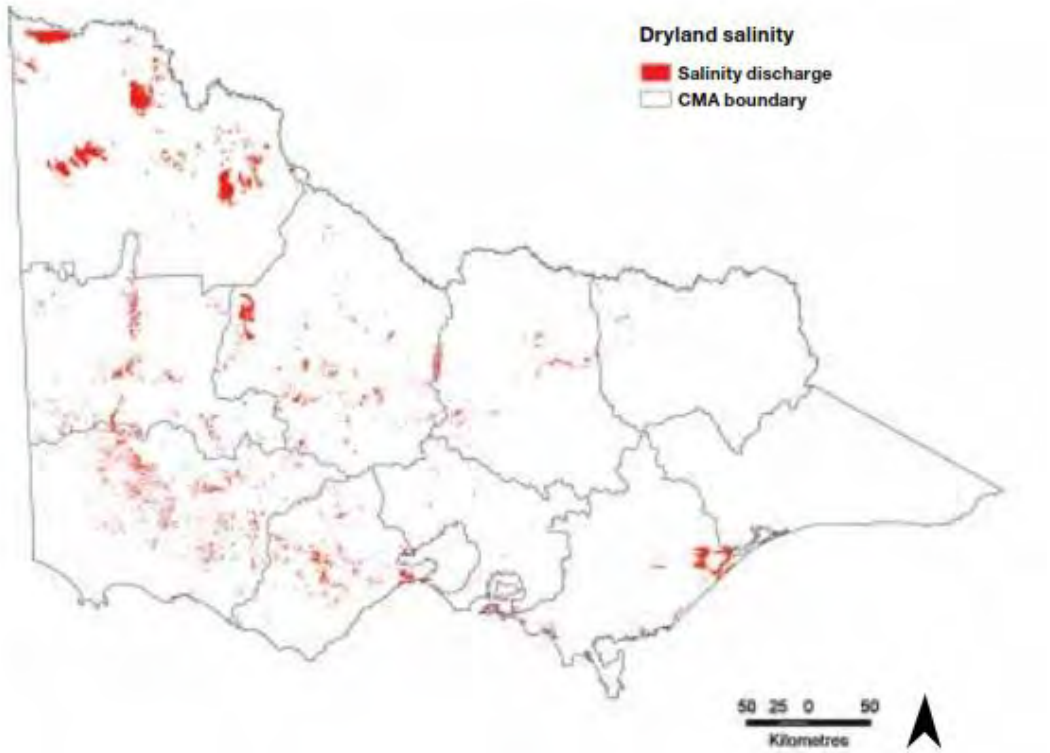
5.1.7 Soil health is a growing environmental challenge in the regions

As much as 60 per cent of Victorian soils are prone to erosion and soil structure decline. Climate, land form and management practices all contribute to this. Erosion ranks as a significant concern on agricultural land, with 37 per cent of farm businesses reporting erosion as a land management problem in 2006–07 (Commissioner for Environmental Sustainability Victoria 2013).

Erosion also affects public land, particularly in the context of fire, which greatly increases the likelihood of erosion. Over 55 per cent of soil in Victoria's public land is highly susceptible to water erosion, although soils naturally vary in their susceptibility to water erosion. Unfortunately, no state-wide data have been collected since 1991, which makes it difficult to assess the extent of soil decline. Soils in central and western Victoria are generally more susceptible to soil structure decline than those in eastern Victoria (Commissioner for Environmental Sustainability Victoria 2013).

Around 247,000 hectares of soil in Victoria are estimated to be affected by dryland salinity – which is two per cent of dryland agriculture areas (Figure 128). The areas most affected include northern and western Victoria (particularly the Mallee) and eastern Victoria near Sale. Western Victoria is generally more severely affected by salinity than eastern Victoria due to its flat nature and loss of native vegetation (Commissioner for Environmental Sustainability Victoria 2013).

FIGURE 128. ESTIMATE OF AREA AFFECTED BY DRYLAND SALINITY IN VICTORIA, 2011



Source: DEPI 2011

Soil acidification is a naturally occurring soil chemical process which occurs very gradually in undisturbed ecosystems. It can, however, be accelerated by agriculture and vegetation clearing, and in Victoria the area affected by acid soils in increasing. Nearly half of Victorian farm businesses reported soil acidity as a land management issue in 2006–07 (Commissioner for Environmental Sustainability Victoria 2013). Areas most at risk of soil acidification are the North East, Goulburn Broken, Glenelg Hopkins, West Gippsland, southern parts of the North Central region and the southern Wimmera (Commissioner for Environmental Sustainability Victoria 2013).

Soil is one aspect of the environment underpinning agricultural production. Agriculture is an important industry in Victoria both economically and in terms of supporting the network of regional towns across Victoria. In 2014, there were 78,759 Victorians employed in the Agriculture, Forestry and Fishing industries (ABS 2014c). The industry represented 2.61 per cent of the share of Victoria's Gross State Product (ABS 2014c). The environment provides the underpinning infrastructure for agricultural production in terms of soil health, and water. While these environmental contributions can be supplemented (e.g. through irrigation and fertilizer), poor quality soils will require greater human inputs/costs to generate the same output. Loss of profitability and productivity has the potential to impact the state economically and socially, via the impact on regional areas.

In the year ending 2013-2014, there was 12,290,000 hectares of farm land in Victoria, with 4,445,000 hectares (36 per cent) used for crops (including broad acre cropping, hay and silage, nurseries, cut flowers and cultivated turf, fruit and nuts, and vegetables) (ABS 2015i). The total area of farm land in Victoria has decreased by 0.2 per cent since 2006 (12,314,000 hectares). Despite this, the area used for crops between 2006 and 2014 increased by 36.7 per cent (ABS 2015i).

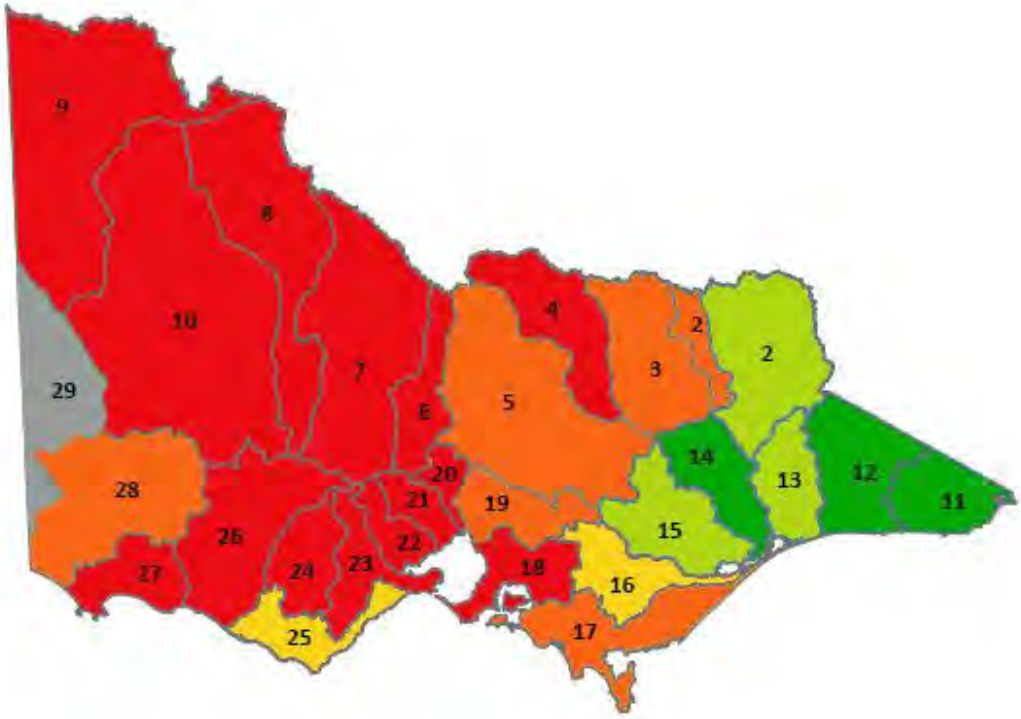
5.1.8 River system and water quality is varied

The 2010 ISC benchmark on Victorian River Condition (Department of Environment and Primary Industries, or DEPI) assessed approximately 29,000 km of rivers and streams. As shown in Figure 129, the

basins located in the eastern area of Victoria had more river length in good or excellent condition compared with basins in the west. Three basins (East Gippsland, Snowy and Mitchell) had at least 70% of their river length in good or excellent condition (DEPI, 2010). These basins are largely inside National Parks. Almost half the basins in Victoria have less than 10% of major rivers and tributaries in good or excellent condition. Typically these basins have been extensively cleared for agriculture. It should be noted however that stream condition within river basins can be variable (for example, the upper reaches or the Thomson are in good condition, whereas the lower reaches have been highly modified and are in poorer condition) (DEPI, 2010).

At a state-wide and national level, salinity, turbidity, nitrogen, algal blooms and phosphorus are considered to be the most significant river contaminants and risks to water quality. However, pH levels, pesticides, heavy metals and temperature also affect water quality at local and regional levels. Water salinity is a critical issue for lowland inland waters, and while Victoria has some naturally occurring saline areas, most salinity has been caused by native vegetation clearing or excess irrigation. River regulation coupled with increased nutrient inputs and low streamflow are recognised as a major cause of cyanobacterial blooms in rivers (Commissioner for Environmental Sustainability Victoria 2013).

FIGURE 129. PERCENTAGE RIVER LENGTH IN GOOD OR EXCELLENT CONDITION 2010



Environmental Condition

- < 10%
- 11 - 30%
- 31 - 50%
- 51 - 70%
- >100%
- Insufficient Data

1. Upper Murray
2. Kiewa
3. Ovens
4. Broken
5. Goulburn
6. Campaspe
7. Loddon
8. Avoca
9. Mallee
10. Wimmera
11. East Gippsland
12. Snowy
13. Tambo
14. Mitchell
15. Thomson
16. Latrobe
17. South Gippsland
18. Bunyip
19. Yarra
20. Maribyrnong
21. Werribee
22. Moorabool
23. Barwon
24. Corangamite
25. Otway
26. Hopkins
27. Portland
28. Glenelg
29. Millicent Coast

Source: DEPI 2010

TEXT BOX 7. NATURE BASED TOURISM

Tourism is an increasing economic contributor to Victoria in terms of contribution to GSP and employment. This is especially so in regional areas. Nature-based tourists (visitors who undertake at least one nature-based tourism activity during their visit to Victoria), mostly like to go to the beach, undertake bushwalking or rainforest walks, or visit national parks or state parks (Tourism Victoria, 2014). The condition/health of these parks therefore provide infrastructure to the generation of tourism benefits.

At the year ending 2014, the 1.4 million nature-based tourism visitors represented 70 per cent of all international overnight visitors to the State. Compared to year ending June 2013, international overnight nature-based tourism visitors to Victoria increased by 10.7 per cent. During the same period Victoria also received 3.7 million domestic overnight nature-based visitors, an increase of 12.2 per cent on the year ending 2013. A further 4.3 million daytrips were undertaken by domestic nature-based visitors in Victoria, increasing by 16.9 per cent from the year ending 2013 (Tourism Victoria 2014).

The following regions of Victoria have priorities around further developing and strengthening nature based tourism infrastructure:

- Daylesford and Macedon Ranges (walking and cycling trails)
- Gippsland (national parks such as the Tarra Bulga tree-top walk, Coastal Wilderness Walk and the Gippsland Lakes).
- Great Ocean Road (Great Ocean Road, Twelve Apostles the Great Ocean Walk and Aboriginal tourism experiences).
- Grampians (National Park, Aboriginal tourism experiences)
- Murray (Murray River adventure trails, and River Red Gum National Park)
- High Country (Falls Creek, Mount Hotham, Winton Wetlands, bike trails)
- Phillip Island (nature park and penguin experience)
- Yarra Valley and Dandenong Ranges (Victorian Government 2013).

5.1.9 Erosion is a significant concern

Erosion ranks as a significant concern on agricultural land in Victoria, with 37 per cent of farm businesses reporting erosion as a land management problem in 2006–07 (Commissioner for Environmental Sustainability Victoria 2013). It is also a challenge on public land, particularly in the context of fire, which greatly increases the likelihood of erosion. Victorian soils naturally vary in their susceptibility to water erosion, ranging from low in the relatively dry, flat areas of western Victoria to very high in the Central Highlands and East Gippsland. Over 55 per cent of soil in Victoria's public land is highly susceptible to water erosion due to the higher rainfall and steep slopes that dominate public land in central and eastern Victoria. Only 0.2 million hectares of Victoria's cropping land is highly susceptible to water erosion.

The real significance of soil structure decline as an environmental issue in Victoria is unclear, as no state-wide data have been collected since 1991. At that time approximately 30 per cent of the state's agricultural land was considered to be severely degraded due to soil structure decline. Nearly half of Victorian farmers still consider soil compaction to be a significant issue. Soils in central and western Victoria are generally more susceptible to soil structure decline than those in eastern Victoria (Commissioner for Environmental Sustainability Victoria 2013).

5.1.10 Population and employment scenarios

Under a middle growth scenario, Regional Victoria's average annual population growth over the next 30 years is projected to be close to 1.48 per cent, which is broadly in line with the average growth rate recorded over the past decade. At 2046, this annual growth rate corresponds to a population of 2.1 million people (Table 39).

Reflecting the uncertainties associated with future population growth, low and high growth scenarios assume that Regional Victoria's average annual population growth over the next 30 years is again close to 0.9 per cent and just under 2 per cent respectively. At 2046, these annual growth rates correspond to populations of 1.8 million and 2.3 million people.

The overall population of Regional Victoria is not assumed to deviate substantially under the different assumptions regarding spatial distribution. However, under the Expansion distribution the employment rate is expected to be reduced as more job growth occurs in the middle and outer suburbs of Melbourne.

Regional Victoria's population could reach between 1.8 and 2.3 million by 2046. This is an increase of up to 800,000 on current levels. Population does not vary between BAU, Consolidation or Expansion distributions.

TABLE 39. POPULATION SCENARIOS ('000) – REGIONAL VICTORIA

		Low Growth	Middle Growth	High Growth
2016	BAU	1,429	1,429	1,429
	Consolidated	1,429	1,429	1,429
	Expansion	1,429	1,429	1,429
2021	BAU	1,483	1,502	1,530
	Consolidated	1,483	1,502	1,530
	Expansion	1,483	1,502	1,530
2031	BAU	1,656	1,827	1,876
	Consolidated	1,656	1,827	1,876
	Expansion	1,656	1,827	1,876
2046	BAU	1,850	2,172	2,300
	Consolidated	1,850	2,172	2,300
	Expansion	1,850	2,172	2,300

Consistent with the treatment of Melbourne, the projections implicitly assume that the retirement age continues its steady rise over time. Under these assumptions, the number of jobs within Regional Victoria is expected to reach just over 1 million by 2046 (Table 40).

Over the next 30 years, Regional Victoria is expected to continue recording a declining share of Victoria's employment under each of the scenarios examined. This is consistent with the structural change occurring in the Victorian economy that is seeing a growing share of service-based businesses wanting to be centrally located within Melbourne.

The number of jobs in Regional Victoria could reach between 900,000 and 1.1 million by 2046 (Table 40). Unlike population, employment will vary between the BAU, Consolidation and Expansion scenarios. However, the level of variation is minimal (200,000 in total).

TABLE 40. EMPLOYMENT SCENARIOS ('000) – REGIONAL VICTORIA

		Low Growth	Middle Growth	High Growth
2016	BAU	722	732	747
	Consolidated	724	734	749
	Expansion	723	732	745
2021	BAU	752	786	804
	Consolidated	756	791	808
	Expansion	753	785	802
2031	BAU	798	883	911
	Consolidated	806	893	918
	Expansion	800	883	906
2046	BAU	905	1,064	1,136
	Consolidated	917	1,084	1,148
	Expansion	906	1,065	1,127

5.1.11 Key indicators by regional city

The following table (Table 41) provides a summary of key indicators by regional city which are detailed further in subsequent regional sections of the report. Population, growth rates, SEIFA indices, employment and employment growth are tabulated, alongside key industries to provide a high level comparison.

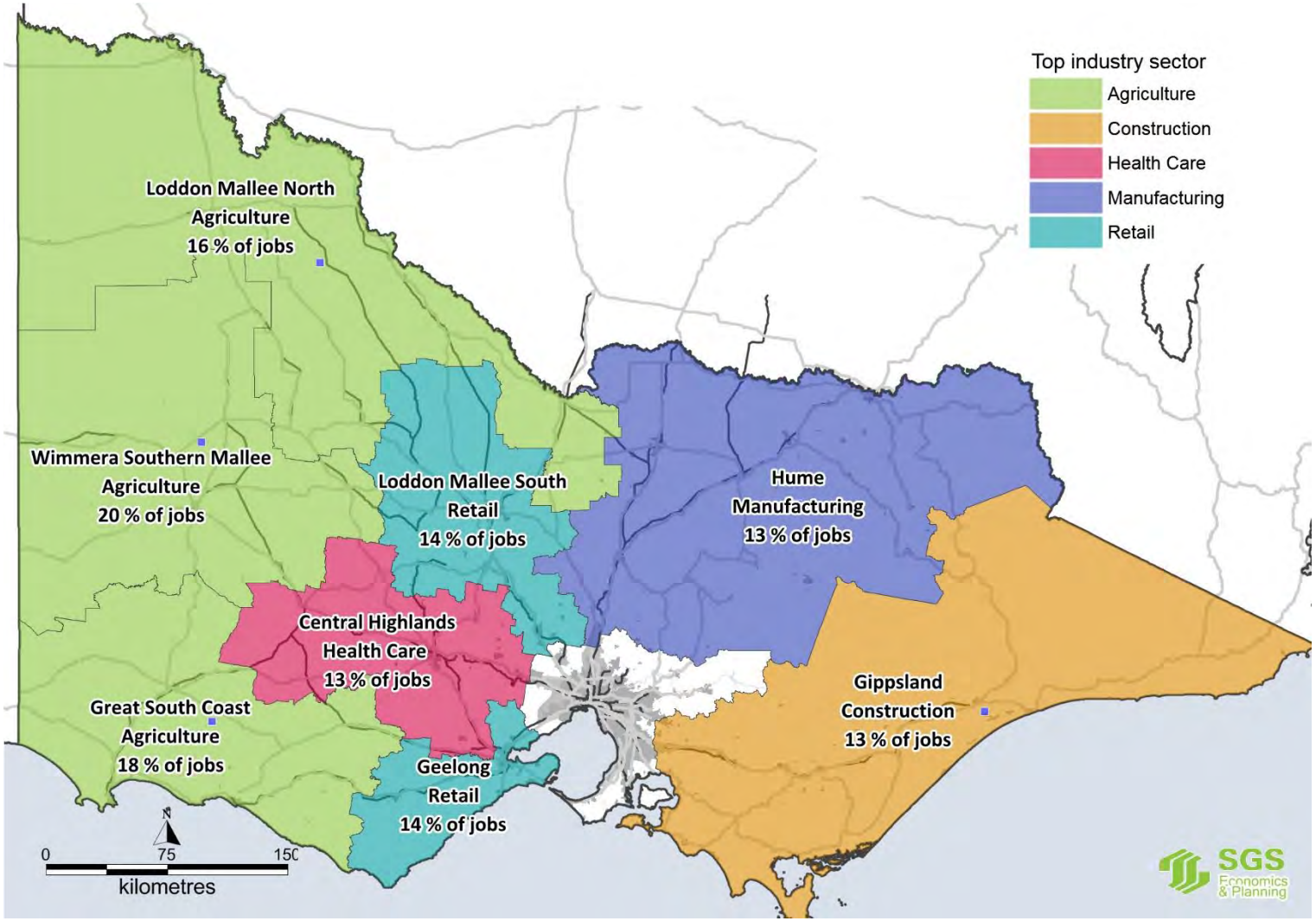
TABLE 41. KEY INDICATORS BY REGIONAL CITY

	Ballarat	Bendigo	Geelong	Horsham	Latrobe	Mildura	Shepparton	Wangaratta	Warrnambool	Wodonga
Population	93,000	86,000	176,000	16,000	58,000	42,000	47,000	18,000	33,000	36,000
Growth Rate	1.8%	1.2%	1.1%	1.3%	1.1%	0.5%	1.3%	1.1%	1.3%	1.1%
SEIFA Rank - Lower number is more disadvantaged	30	29	39	35	7	3	15	27	31	26
Employment	48,000	44,000	91,000	8,000	27,000	20,000	25,000	9,000	17,000	20,000
Growth Rate	1.7%	2.1%	2.0%	-1.4%	0.3%	0.9%	0.1%	-0.8%	0.4%	1.0%
Distance from Melbourne (km)	111	150	73	293	164	540	175	234	255	302
Key Industries										
1	Health Care and Social Assistance	Health Care and Social Assistance	Retail Trade	Health Care and Social Assistance	Health Care and Social Assistance	Retail Trade	Health Care and Social Assistance	Health Care and Social Assistance	Health Care and Social Assistance	Manufacturing
Jobs	7,500	7,000	13,500	1,500	4,000	3,500	4,000	2,000	2,500	3,500
Share of total jobs	16%	16%	15%	19%	15%	18%	16%	22%	15%	18%
2	Retail Trade	Retail Trade	Manufacturing	Manufacturing	Retail Trade	Health Care and Social Assistance	Retail Trade	Retail Trade	Retail Trade	Health Care and Social Assistance
Jobs	7,000	6,500	13,000	1,000	4,000	2,500	4,000	1,000	2,500	2,500
Share of total jobs	15%	15%	14%	13%	15%	13%	16%	11%	15%	13%
3	Manufacturing	Education and Training	Health Care and Social Assistance	Health Care and Social Assistance	Manufacturing	Education and Training	Manufacturing	Manufacturing	Education and Training	Retail Trade
Jobs	6,000	4,000	12,500	500	2,500	1,500	2,500	1,000	1,500	2,500
Share of total jobs	13%	9%	14%	6%	9%	8%	10%	11%	9%	13%
4	Education and Training	Construction	Education and Training	Education and Training	Construction	Accommodation and Food Services	Construction	Public Administration and Safety	Accommodation and Food Services	Public Administration and Safety
Jobs	4,500	3,500	8,000	500	2,500	1,500	2,500	500	1,500	2,500
Share of total jobs	9%	8%	9%	6%	9%	8%	10%	6%	9%	13%

	Ballarat	Bendigo	Geelong	Horsham	Latrobe	Mildura	Shepparton	Wangaratta	Warrnambool	Wodonga
Other key aspects	Growing tourism and hospitality industry	Strong arts scene attracting visitors to the city	Large automotive industry	Drawing much of its recent population growth from surrounding area	Strong dependence on coal fired power generation	A key food producing area	Food producer and manufacturer adjusting to changing markets	Strong wine and food offer in nearby King Valley	Dairy farming and associated processing is a strength	Key location on Hume corridor between Sydney and Melbourne
	Emerging renewal energy sector	Lifestyle attracting new wave of migrants to the city and surrounds	Size and scale much bigger than other regional cities		Dairy farming is a strength	Strong economic links to the Murray River	Large Indigenous community		Tourism related to the Great Ocean Road	Larger size when Albury is considered as part of the city
	A growing University sector		Good access to Melbourne						A retirement location for people in the Wimmera	

The map below highlights the top industry sectors by each region in Victoria.

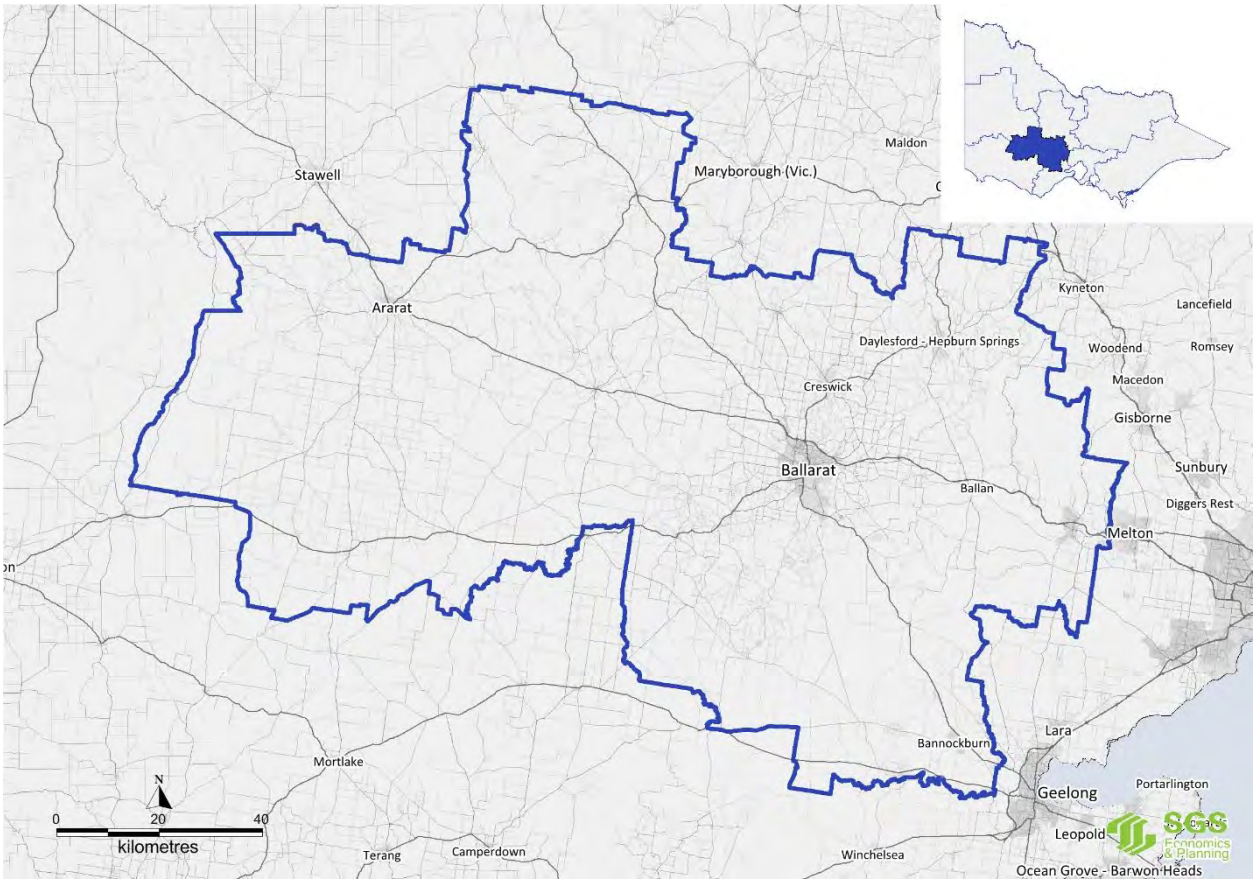
FIGURE 130 TOP INDUSTRY SECTORS BY REGION



5.2 Central Highlands – Ballarat

The Central Highlands region area was inhabited by the Wathaurung, an Indigenous Australian tribe, for at least the last 25,000 years with 140 archaeological sites having been found in the region. The region abuts the outer western suburbs of metropolitan Melbourne near Melton and extends westwards along the Western Highway and Ballarat rail corridor. It includes the Regional City of Ballarat and local government areas of Ararat, Ballarat, Golden Plains (northern section), Hepburn, Moorabool and Pyrenees.

FIGURE 131. CENTRAL HIGHLANDS



Ballarat is the historical dominant centre of the region and has a strong role in influencing development throughout its hinterland. Ararat, Bacchus Marsh and Daylesford are smaller towns within the region. Ballarat offers higher order services to this hinterland, particularly to the west, which is predominately rural. This western hinterland has experienced lower growth than the eastern areas of the region – which are peri-urban in nature and contain many residents who commute to Melbourne. Towns such as Clunes, Creswick and Daylesford are also heavily linked to Ballarat and have exhibited growth in recent years, offering high amenity lifestyle options.

A pivotal point in the development of the region was in 1851 when gold was first discovered near Ballarat. This discovery signified the beginning of the Australian gold rush and with this Ballarat saw rapid expansion. A rail line to Geelong was opened in 1862, providing access to port and further on to Melbourne, and in 1870 Ballarat was proclaimed a city in its own right. It boasted a population of 50,000 people – twice that of rival Bendigo. People from the world over were drawn to Ballarat by the immense wealth on offer at the gold fields, with this wealth reflected in the many notable civic buildings constructed in the 1870s and 1880s. High quality schools and colleges, including Ballarat Grammar were

also established in this period of great prosperity. These high quality institutes and architectural buildings remain central in Ballarat's ability to attract and retain people.

A direct rail connection to Melbourne was completed in 1889. Locally, Ballarat was serviced by its own tram network which closed in the 1970s. Mining activity spurred a host of supporting industries – brick works, timber mills, woollen mills, agriculture and livestock, and by the time mining activities slowed towards the turn of the century, an industrial sector had emerged. The broader region also had strong sheep and wool, and dairy and meat industries, with Ballarat acting as the focal point for commerce in these industries and transport hub for export.

From the 1870s to the 1930s Ballarat was Australia's largest inland city (Figure 132). However, its development was interrupted by WWI, the Depression, and WWII. In the interwar years provisional dominance shifted to Geelong, with growth stagnating somewhat in Ballarat.

FIGURE 132. BALLARAT CITY CENTRE (1917)

Source: VictorianPlaces.com.au

From the mid-1960s onwards the Western Freeway was completed, providing a transport-based 'spine' to the region. This spine handles significant freight movements. Through the 1970s manufacturing increased, with Ballarat attracting companies such as Mars, McCain Foods, and the Ballarat North Workshops, which perform the maintenance functions for much of Melbourne's metropolitan rail fleet. Tourism also emerged as an important sector, with the opening of Sovereign Hill in 1970 and the protection and refurbishment of historical buildings helped to turn Ballarat into a major tourist attraction. In more recent times there has been resurgence in gold mining and exploration in Ballarat and its neighbouring region.

While population growth continued at the national average, this was supported by upgrades in rail connections to Melbourne in the 2000s, coupled with issues of decreasing housing affordability in metropolitan Melbourne and high levels of amenity in Ballarat. Ballarat's regional servicing role was further strengthened by investments in additional higher education and healthcare facilities, and a technology park has emerged around Federation University.

5.2.1 Current and future state analysis

The Central Highlands region's economy has grown at a similar rate to the state average as it has adjusted to the structural economic changes. The region's population is expected to continue to grow, but with a changed demographic and economic focus.

Ballarat is the major settlement in the region with 99,000 people in 2014, nearly half the region's population, is Victoria's third largest city. It is the fastest growing Regional City, growing at 1.7 per cent a year over the decade to 2014 (ABS 2015a). It is also the centre for economic growth in the region and has experienced one of the highest rates of economic growth in Regional Victoria over the last decade.

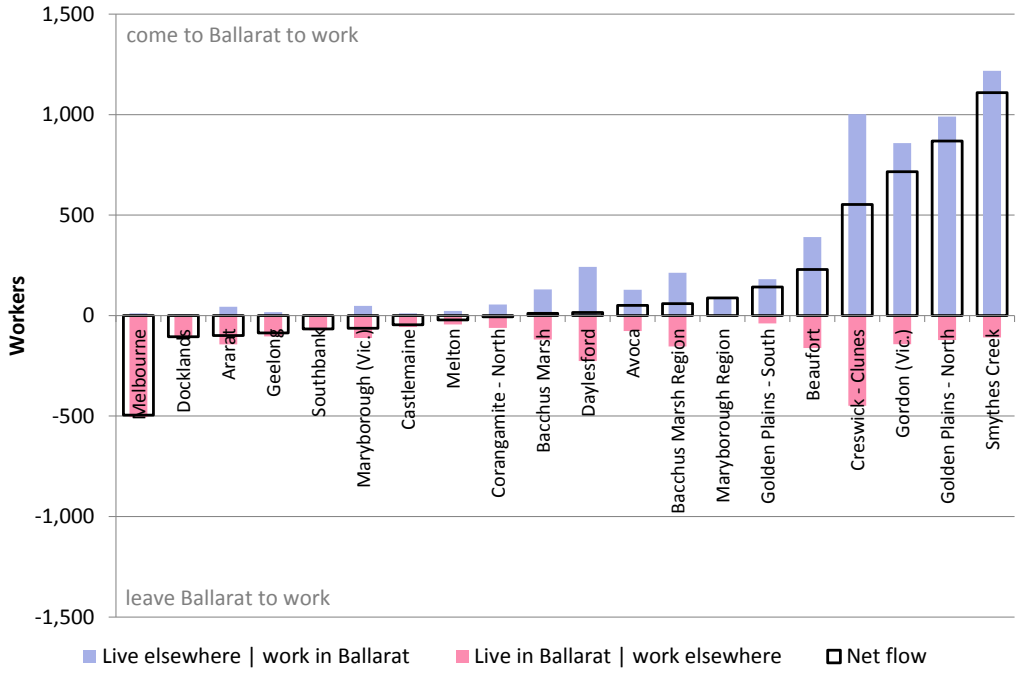
The region abuts Metropolitan Melbourne, and Bacchus Marsh has emerged as a major peri-urban town, reflecting its close proximity to Melbourne. Smaller settlements, particularly those in the western parts of the region, have experienced lower rates of growth. Enhanced transport links between Ballarat and Melbourne have enhanced the access to a range of goods and services for many smaller towns.

As with most regions, the majority of population growth forecast to occur in Central Highlands is likely to be located in existing major population centres of Ballarat and Bacchus Marsh while some smaller settlements may also experience growth, particularly those that have good access to larger centres (e.g. Ararat).

Ballarat is a key 'commuter' town for Melbourne, with Ballarat residents working in Melbourne CBD, Docklands and Southbank (Figure 133). However, a proportion of residents work in rural locations outside of Ballarat. Most significantly however, a large proportion of workers living in rural locations of Smythes Creek, Golden Plains and Creswick commute to Ballarat for work, highlighting its important regional employment role.

Ballarat may grow as a "dormitory" suburb for jobs in Melbourne, with commuters taking advantage of rail connections that increase in time-competitiveness compared to living in the outer reaches of Melbourne.

FIGURE 133. RESIDENT AND WORKER FLOWS INTO/OUT OF BALLARAT



Source: ABS Census 2011 Journey to Work

Manufacturing continues to be a major generator of income in the region, although the role of traditional manufacturing is in decline as a regional wealth generator. While only 200 jobs were lost in this sector in the region between 2001 and 2011 (2.5 per cent across 10 years), the sector will continue to shed jobs up to 2026 driven by structural change and globalisation (ABS 2015d).

Tourism infrastructure, including the goldfields and Sovereign Hill, wine regions of Pyrenees and Great Western, the Grampians National Park as well as the spa district at Daylesford- Hepburn are a growing component of the regional economy. Ballarat's strategic location on four major highways and a railway line provides high levels of accessibility and will support continued attraction of national and international tourists as the sector grows under a lower Australian dollar. This should further boost service sector employment in retail, entertainment and cultural infrastructure (Victorian Government 2014a).

The Central Highland's agricultural sector is likely to be significantly affected by climate change, including increased temperatures, fewer frosts, more hot days and warm spells and less rainfall. A harsher fire season is also likely. Earlier flowering and planting times, changes to the way pests and diseases are distributed, pasture growth, and reduced water security will all impact the sector. Health infrastructure will experience increased demand, and tourism infrastructure is also likely to occur. Tourists unfamiliar with local conditions may also be placed at increased risk (Department of Environment, Land Water and Planning 2015a).

While mining is not a major direct contributor to employment, it generates wealth for the region and also indirectly contributes to the machinery manufacturing sector.

Population driven sectors including healthcare, education, retail and construction are also growing in response to population growth while the growth of services, finance, research, ICT and business services are helping to strengthen and diversify the economy. Between 2009 and 2014, Ballarat gained:

- 109 extra health businesses
- 56 accommodation/food businesses.
- 198 financial and insurance businesses
- 92 professional, scientific, and technical service businesses (ABS 2015i).

Across the region between 2001 and 2011 over 2,000 jobs in the professional, scientific, and technical services jobs were added (ABS 2001, 2011).

The education sector is expected to record strong growth building on existing major tertiary education institutions include Federation University, ACU and the Deakin University medical school. The health and community services industry is forecast to see the largest employment growth of 2.9 per cent up to 2026 (SGS Economics & Planning 2015).

Agriculture is the second highest export sector and a significant employer, especially in Ararat and Pyrenees. While it has declined in terms of its contribution to the overall regional economy, opportunities remain for growth in food and fibre production, minerals and extractive industries, forestry and renewable energy, and could support smaller settlements and rural communities. The region's highly productive land supports a mix of broad acre grazing and cropping with some areas of intensive agriculture, including horticulture, viticulture and poultry.

Income growth in the 2006 to 2011 period was strong, at 4.5 per cent a year and economic growth was 2.25 per cent a year in the last decade in Ballarat (ABS 2006, 2011). Unemployment fell from 9.5 per cent in 2001 to 6.0 per cent in 2011 (ABS 2011). Reported crime is higher than in most of Melbourne. It rose from 9.9 offences per 100 people to 10.3 between 2010 and 2014 (CSV 2014).

The demographics of Ballarat are changing. The dominant age group in Ballarat is young adults aged 20-24 but the proportion of population aged 55 and over (especially those aged 65-69) increased over 2009

to 2014 (ABS 2015c). One in 4 people living in Ballarat are predicted to be over the age of 60 by 2021 (Victoria in Future 2015).

Household sizes in Ballarat have shrunk from 2006 to 2011, going from 2.34 to 2.29 persons per households across these two years (ABS 2006, 2011). 51 per cent of people reported their health status as excellent or very good in 2011-12, higher than much of Melbourne (Victorian Population Heath Survey 2012).

Ballarat's environment is threatened by a range of issues, including pests threatening native flora and fauna, weeds, management of wetlands, salinity, and loss of native vegetation and the impact of climate change.

5.2.2 Population and employment scenarios

Ballarat's population growth could vary widely, with between 26,000 and 149,000 additional residents by 2046, and 4,000 to 50,000 additional jobs pending on the distribution and scenario that results (Table 42 and Table 43). This could lead to vastly different outcomes in Ballarat.

Business as usual distribution
The BAU scenario projects between 133,000 and 183,000 people would live in Ballarat by 2046; under a high growth scenario this represents nearly a doubling of the current population. This would generate significant demand for additional infrastructure including health, education, retail and community infrastructure.

This scenario would result in between 62,000 and 85,000 jobs, a significant level of growth which would require additional employment land.

Consolidated distribution
Under a Consolidated distribution, levels of growth would be higher: over 200,000 people and 101,000 jobs under a high growth outcome. This is larger than the current size of Geelong, and would require consideration of the internal transport network to link residential areas and new employment areas, to ensure continued accessibility to employment and services.

Expansion distribution
An Expansion scenario would produce between 119,000 and 159,000 people, and 55,000 and 74,000 jobs. This would create demand for additional employment areas, transport and local infrastructure.

TABLE 42. POPULATION SCENARIOS ('000) – BALLARAT

		Low Growth	Middle Growth	High Growth
2016	BAU	93	93	93
	Consolidated	93	93	93
	Expansion	93	93	93
2021	BAU	98	102	103
	Consolidated	100	102	106
	Expansion	97	98	100
2031	BAU	114	139	138
	Consolidated	124	143	155
	Expansion	107	122	126
2046	BAU	133	175	183
	Consolidated	152	187	216
	Expansion	119	149	159

TABLE 43. EMPLOYMENT SCENARIOS ('000) – BALLARAT

		Low Growth	Middle Growth	High Growth
2016	BAU	51	53	54
	Consolidated	52	53	55
	Expansion	50	51	52
2021	BAU	52	58	58
	Consolidated	55	59	62
	Expansion	51	54	55
2031	BAU	54	66	65
	Consolidated	59	68	73
	Expansion	51	58	59
2046	BAU	62	81	85
	Consolidated	71	87	101
	Expansion	55	69	74

5.2.3 Infrastructure implications

Most scenarios have Ballarat with a possible population of between 150,000 and 200,000 in 2046. Much of this growth would leverage off existing strategic and structural infrastructure and via more intensive land use patterns. It is possible that a proportion of these new residents will commute to Melbourne, placing pressure on rail infrastructure and service provision.

Potential pressure points include:

- Climate change and population ageing are key pressure points for Ballarat, with potential effects on social and economic trends that could affect infrastructure demand.
- More frequent fires, higher temperatures and less predictable rainfall could all exacerbate existing constraints around water supply. Local catchments may need to be optimised or supplemented to support a significantly larger population in Ballarat.
- High house prices in Melbourne, in combination with strong transport links, could lead to a surge in demand for housing in Ballarat. Such growth could create pressure points around urban form, whether it is achieved via infill and rising densities, or at the fringes, where development faces trade-offs with agricultural land and/or the natural environment.
- Ballarat's role as a service economy centre will depend on strong links to Melbourne, Bendigo, and Geelong. Pressure on these connections will likely be a limiting factor to Ballarat's potential.
- As Ballarat's economy evolves to feature more services, which are likely to be centralised, demand for transport that serves those areas efficiently could also be a pressure point affecting population growth.
- Increased demand on the road and rail network for passenger and freight movements.

Rising temperatures and less regular rainfall will place pressure on the availability of water for household consumption. An increased number of residents and workers may place pressure on existing water infrastructure, requiring significant upgrades pending current capacity levels. The growth would also require more follower infrastructure (e.g. schools and healthcare) to help ensure accessibility to key services, and maintain the attractiveness of the region from a liveability perspective.

An ageing population in Ballarat will have a significant impact on the economy and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing.

The continued growth of Ballarat as a residential location for Melbourne-based workers may require future increases to transport infrastructure. Ballarat's overall offer as a residential location will be a key driver of whether this occur, as will the relative affordability of housing in Melbourne compared to Ballarat.

There will also be increasing pressure on existing farming due to climate change (rising temperatures and less regular rainfall), considerable pressure on the potential food production in the Central Highlands. There are already challenges with dry soil salinity within the areas surrounding Ballarat.

The increased likelihood and size of extreme fire events due to climate change, combined with increasing population in the Ballarat, will require consideration must be given to the capacity of emergency services system to deal with these events. Bushfires may also result in:

- Communication towers destroyed by fire
- Powerlines destroyed by fire
- Burnt catchments resulting in water quality reduction
- Houses, communities, and sometimes entire towns destroyed in fringe locations and rural areas (Commissioner of Environmental Sustainability Victoria 2013).

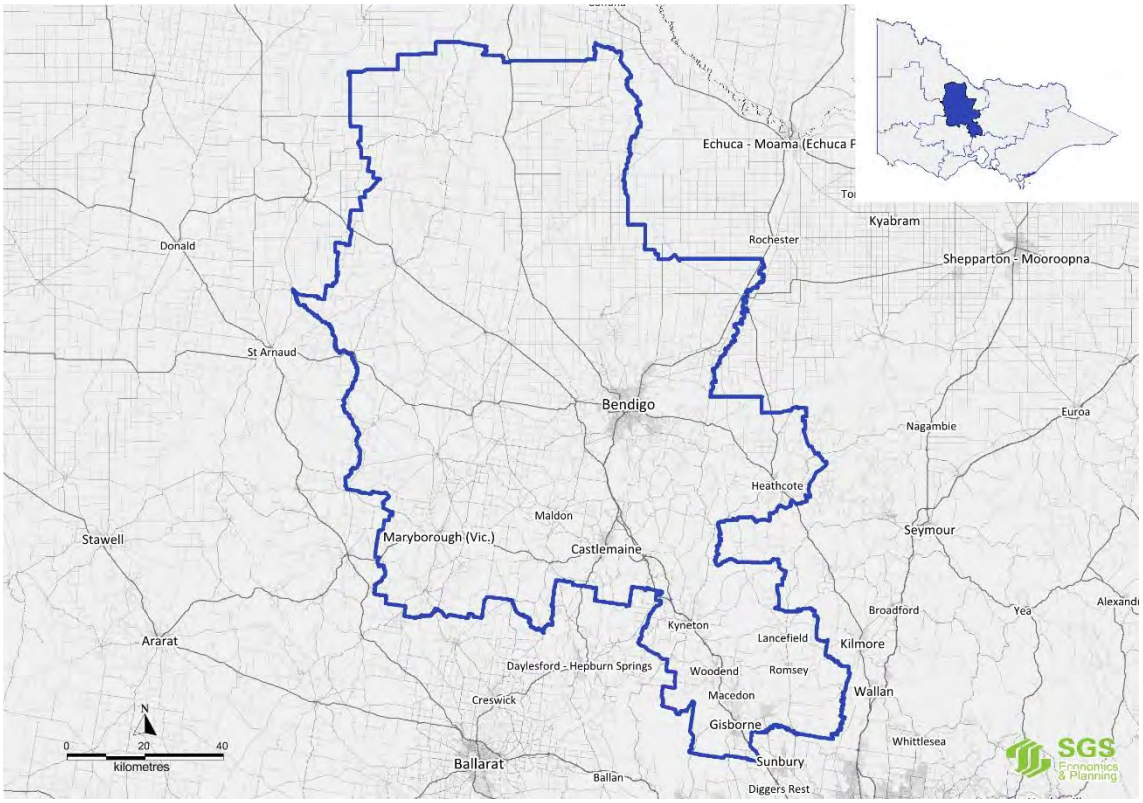
5.3 Loddon Mallee South - Bendigo

The Loddon Mallee South Subregion stretches from the northern outskirts of Melbourne (north of Sunbury) to the largely agricultural areas of the Shire of Loddon in the far north. The Dja Dja Wurrung, also known as the Jaara people and Loddon River tribe, an Aboriginal tribe which occupied the watersheds of the Loddon and Avoca Rivers in the Bendigo region of Regional Victoria.

Bendigo is the dominant centre, offering a raft of higher order services. Other major centres include Maryborough and Castlemaine and a range of smaller settlements (Heathcote, Woodend, Lancefield and Romsey) are located in attractive rural landscape areas.

Bendigo is well connected to the other large centres of Gisborne, Kyneton, Castlemaine, and Maryborough, which in turn offer Subregional services to the smaller villages that surround them.

FIGURE 134. LODDON MALLEE SOUTH



Similar to Ballarat, Bendigo owes much of its development to the Australian gold rush of the 19th century. Following the discovery of gold in 1851, people from across the world flocked to the goldfields, and in just three years Bendigo's population grew to 15,000 people. Soon after the discovery of gold the Bendigo Bank (known then as the Bendigo Building Society) was founded.

In 1862 a direct rail connection with Melbourne is opened, as were lines further north to Echuca on the Victorian-New South Wales border, opening up a major corridor for passengers and freight movements. Industries emerged to support the growing population attracted initially by the prospects of the goldfields. A tram network began operating in Bendigo in 1890, reinforcing a shopping precinct that included the first Myer store.

With mining operations contracting at the turn of the century, Bendigo saw a rapid drop off in population, with the city reduced from a population in 1901 of over 30,000 to just over 17,000 people ten years later. Manufacturing industries increasingly became the focus, and a large ordinance factory was built during the war years. Following WWI, defence industries in Bendigo expanded, with the opening of businesses such as Thales Australia (defence technology) and Australia Defence Apparel. Despite decline, the manufacturing sector continues to be the largest contributing sector to the region's economic output.

The region's water assets contribute to an attractive natural environment, support important ecosystems and supply water for the population, environment and businesses.

Bendigo has increasingly attracted population from its surrounding hinterland towns, and in more recent years provided an alternative residential location to Melbourne. Other centres such as Castlemaine and Heathcote have also seen a marked increase in population, particularly since the Regional Fast Rail project improved travel times to and from Melbourne.

Tourism has emerged as an important industry in Bendigo, particularly spurred by the success of the Bendigo Art Gallery, the largest regional art museum in Australia (see Figure 135), as well as the city's cultural heritage. Bendigo is host to a La Trobe University campus, and a regional TAFE, and in offering a high amenity town centre, commercial office development has increasingly been developed. The Bendigo Bank headquarters and an AAPT call centre are located in the central city.

FIGURE 135. BENDIGO ART GALLERY

Source: Fender Katsalidis Architects

5.3.1 Current and future state analysis

Bendigo's population grew at 1.5 per cent a year over the decade to 2014, to around 92,000 (ABS 2015c). Overall the region grew at 1.2 per cent a year over the same period. Bendigo is likely to continue to grow over the next 30 years.

The region's economic growth is being driven by financial, health and insurance services, manufacturing and mining while agriculture continues to be a significant employer, particularly horticulture, viticulture, poultry and swine (ABS 2015d). Good soil and vast tracts of land mean the agriculture sector is diverse. Bendigo's economy depends on strong links to other regional towns and to Melbourne. Manufacturing - especially food manufacturing- remains important and education and health care are performing well. Income grew 4.5 per cent a year between 2006 and 2011, and unemployment fell from 9.0 per cent in 2001 to 5.4 per cent in 2011 (ABS 2006, 2011). In line with this improvement, the labour force

participation rate in Bendigo city rose from 60.2 per cent in 2001 to 63.3 per cent in 2011 (ABS 2006, 2011).

While Bendigo has seen a decline in its agricultural and manufacturing sectors in recent years, its service-oriented sectors, along with education and health care, have grown. There has been increase in the number of education-related businesses by 12 and increase in the number of health-related businesses by 72 (ABS 2015i). Despite the decline, manufacturing continues to be the largest contributing sector to the region's economic output. The region's strengths lie in the food manufacturing, telecommunications, and finance and insurance service sectors. The Bendigo Bank is the only Australian bank to be headquartered in a regional area (Victorian Government 2014b).

Population-driven sectors such as healthcare, construction, education and retail trade are also significant to the regional economy (ABS 2015d). Economic growth is expected to be broad-based, including food and agriculture, tourism, financial services, health and professional services.

Intensive agricultural production is of growing importance in certain locations and includes cattle feed lots, piggeries and poultry farms. The equine industry also has a growing presence in the region. Any expansion of the region's intensive agriculture (broiler farms, egg production and piggeries) would also contribute to other emerging strengths in food processing and freight-related industries.

Climate change may impact on the agricultural sector, potentially changing the mix of agricultural enterprises in the region. Increased temperatures, fewer frosts, more hot days and warm spells and less rainfall are likely to affect the productivity of agriculture. A harsher fire season is also likely. Accordingly, potential damage to tourism infrastructure and the increased risks to visitors will need to be managed. Local health and community infrastructure will also experience increased demand as a result of a changing climate. Climate change is likely to also result in reduced average rainfall and stream flow in the region which will have implications for irrigated and non-irrigated enterprises and for communities (Department of Environment, Land Water and Planning 2015b).

While manufacturing and mining sectors remain significant to Greater Bendigo, it is expected that over the next twenty years the overall economic output and employment numbers of these two sectors will fall, and employment in the region will continue to shift towards service-oriented industries. The establishment of branches of key companies in the professional services sector is expected to create a significant number of jobs and contribute millions of dollars to the Greater Bendigo economy.

There are, however, opportunities to leverage the high degree of expertise which currently exists in the local manufacturing sector, particularly defence equipment manufacturing and engineering. High value agricultural production, processing and manufacturing may also present opportunities to generate local income (Victorian Government 2014b).

The region's gold deposits have, over recent years, re-emerged as a local economic driver. This has had flow on effects for quarrying services and hydraulic manufacturers. There may be opportunities emerging from mineral sands mining in the Loddon Mallee North region.

Growth is expected in the health care and social assistance sector, particularly with the development of the new Bendigo Hospital, considered the largest project in the history of the region. Across the region, the health care and social assistance sector experienced the greatest increase between 2001 and 2011 with the addition of over 3,000 jobs (ABS 2001, 2011).

With major infrastructure projects including the duplication of the Calder Freeway, upgrades to railway infrastructure and increased frequency of train services, travel to and from Greater Bendigo will be facilitated, including to and from Melbourne.

These infrastructure upgrades will enable Bendigo companies to utilise labour based elsewhere and for Bendigo residents to seek work elsewhere. Improved labour market matching will lift productivity and contribute to both population growth and economic growth.

Greater Bendigo has experienced growth in tourism in recent years. Employment in the arts and recreation sector has correspondingly also grown. Key attractors include the Bendigo Art Gallery, quality accommodation attractions and major events, the latter of which has grown substantially. Better transport infrastructure can lift tourism. Continued investment in arts infrastructure and services is likely to help leverage transport investments.

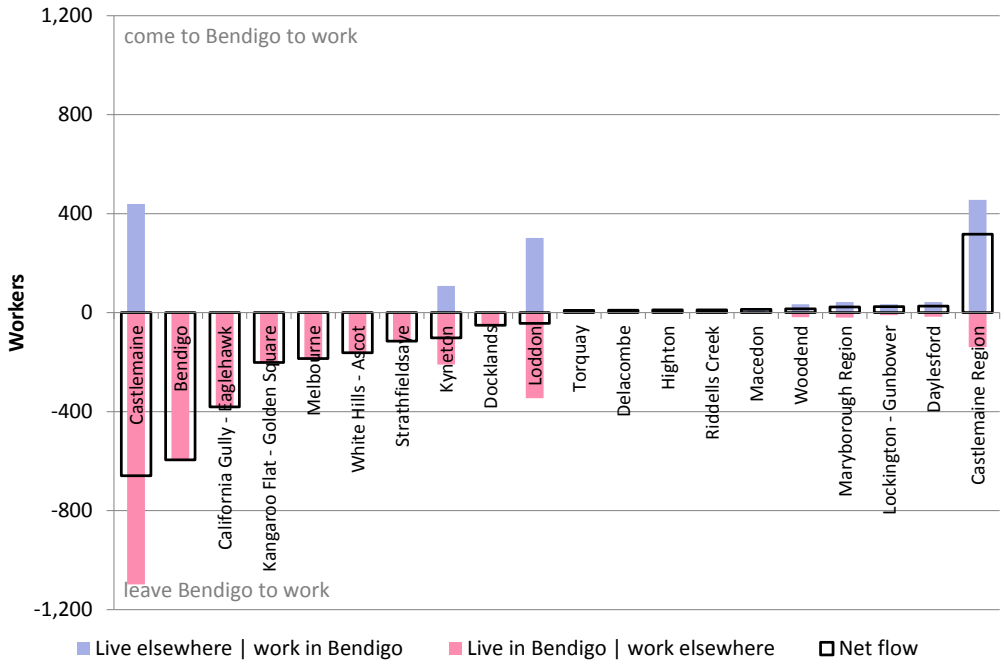
The age group over 60 grew most strongly over the decade to 2014 (ABS 2015c). The proportion of people in the region aged over 65 is, however, slightly lower than the average for Regional Victoria. Nonetheless, a rising population of those aged over 65 will lead to increased demand for health services. In 2011-12, 43.8 per cent of people reported their health status as being excellent or very good. Average household size fell slightly from 2.32 person to 2.28 persons from 2001 to 2011 (ABS 2001, 2011).

Bendigo is becoming attractive for an increasingly diverse range of people. For the Bendigo LGA, the number of people born overseas was 11.7 per cent in 2011, up from 11.2 per cent in 2006 (ABS 2006, 2011). The proportion of people with non-English speaking backgrounds rose from 6.0 per cent in 2006 to 7.2 per cent in 2011 (ABS 2006, 2011).

Bendigo has been growing strongly and ageing at the same time as its healthy economy and affordable housing attract people. Population growth is expected to continue at a rate of just over 1.5 per cent a year in coming decades. This can be accommodated in greenfield areas in Bendigo's growth corridors and the Marong Township.

A significant proportion of Bendigo's residents work in Castlemaine and the surrounds of Bendigo (California Gully – Eaglehawk) (Figure 136). A smaller proportion travel to Melbourne for work. This suggests that Bendigo acts a regional centre for employment and jobs are more 'contained' to the region than is the case for Ballarat.

FIGURE 136. RESIDENT AND WORKER FLOWS INTO/OUT OF BENDIGO



Source: ABS Census 2011 Journey to Work

The increase in population has also seen a significant number of residential building approvals over the period July 2012 - August 2015 with 2,947 approvals (ABS 2015k). This impacts the construction industry, which has seen an increase in 119 construction-related businesses over the period 2009-2014.

Bendigo's natural environment is an important contributor to its economy and lifestyle. The regional environment features the threatened Box-Ironbark Forest, Riverine Grasslands, the Orange-Bellied Parrot and internationally-significant wetlands. The natural environment is under threat from soil disturbance, salinity, vegetation loss and the impacts of climate change.

5.3.2 Population and employment scenarios

Population and employment scenarios and distributions for Bendigo (Table 44 and Table 45) suggest a wide range of possible outcomes for the city, each generating varying infrastructure need.

Business as usual distribution
Under a BAU distribution Bendigo would grow to between 122,000 and 168,000 people, and 57,000 and 78,000 jobs, meaning that under a high scenario Bendigo would effectively double in size.

Consolidated distribution
Under a Consolidated distribution, Bendigo would grow to between 140,000 and 197,000 people, and 65,000 and 92,000 jobs, generating demand for additional health, education, retail, recreation and community infrastructure as well as employment areas and internal transport networks to maintain accessibility.

Expansion distribution
Under an Expansion distribution, Bendigo would grow to between 110,000 and 145,000 people, and 51,000 and 68,000 jobs. While this is somewhat less than the Consolidated and BAU scenarios, it still represents growth which would require additional supporting infrastructure.

TABLE 44. POPULATION SCENARIOS ('000) – BENDIGO

		Low Growth	Middle Growth	High Growth
2016	BAU	86	86	86
	Consolidated	86	86	86
	Expansion	86	86	86
2021	BAU	91	94	95
	Consolidated	93	95	98
	Expansion	90	91	93
2031	BAU	105	125	127
	Consolidated	115	133	142
	Expansion	100	113	116
2046	BAU	122	156	168
	Consolidated	140	173	197
	Expansion	110	137	145

TABLE 45. EMPLOYMENT SCENARIOS ('000) – BENDIGO

		Low Growth	Middle Growth	High Growth
2016	BAU	46	47	48
	Consolidated	47	48	49
	Expansion	45	46	47
2021	BAU	47	51	52

	Consolidated	49	53	55
	Expansion	46	48	49
2031	BAU	49	58	59
	Consolidated	53	62	66
	Expansion	47	53	54
2046	BAU	57	72	78
	Consolidated	65	80	92
	Expansion	51	63	68

5.3.3 Infrastructure implications

Most scenarios have Bendigo with a population of between 120,000 and 200,000 in 2046. Much of these growth would leverage off existing strategic and structural infrastructure and via more intensive land use patterns. Given the strong regional employment role of Bendigo, there may be a need to upgrade connections from rural locations into the regional city with population and jobs growth.

Potential pressure points include:

- Climate change and population ageing are key pressure points for Bendigo, with potential effects on social and economic trends that could affect infrastructure demand.
- Bendigo is likely to continue to grow but water supply issues limit the ability of Bendigo to support a much higher population. Local catchments may need to be optimised or supplemented to support a significantly larger population.
- As Bendigo's economy evolves to feature more services, which are likely to be centralised, demand for strong local public transport systems could also be a pressure point affecting population growth.
- Connections to Melbourne and Ballarat are a key pressure point that can influence the potential growth of Bendigo.

Growth would in turn necessitate more follower infrastructure (e.g. schools, telecommunications capacity) to help maintain the attractiveness of the region and to support ongoing economic development. An ageing population in the Bendigo and the surrounding hinterland will have a significant increase on the demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing. Rising temperatures and less regular rainfall will place pressure on the availability of water for household consumption

There will also be increasing pressure on existing farming surrounding Bendigo due to climate change (rising temperatures and less regular rainfall), and there are already challenges with dry soil salinity within the areas surrounding the city.

The increased likelihood and size of extreme fire events due to climate change, combined with increasing population in the north, will require consideration must be given to the capacity of emergency services system to deal with these events. Bushfires may also result in:

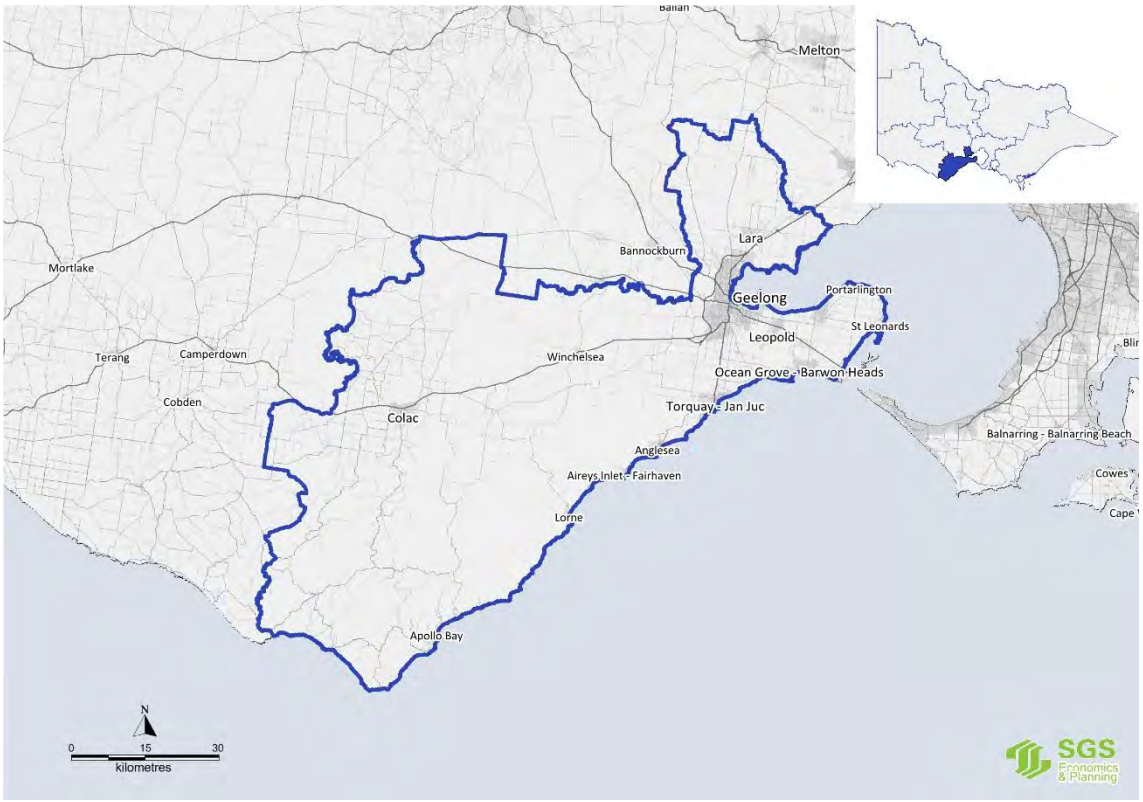
- Communication towers destroyed by fire
- Powerlines destroyed by fire
- Burnt catchments resulting in water quality reduction
- Houses, communities, and sometimes entire towns destroyed in fringe locations and rural areas (Commissioner of Environmental Sustainability Victoria 2013).

5.4 G21 - Geelong

Geelong is Victoria's second largest city and the dominant centre of the G21 region. The G21 Region Alliance (G21) is the formal alliance of government, business and community organisations working together within the Geelong region across five municipalities – Colac Otway Shire, Golden Plains Shire (southern portion only), City of Greater Geelong, Borough of Queenscliffe and Surf Coast Shire (see http://www.g21.com.au/ for more information). The Wathaurung have inhabited this area for at least the last 25,000 years.

The region's parks, rural and urban areas contain a rich Indigenous and post-contact cultural heritage that requires recognition, protection and preservation. Some of the more significant Indigenous sites in the region include the You Yangs, the foothills of the Otway Range and our coastline. Protection of significant sites from disturbance is important as is the involvement of the Traditional Owner groups who play an active role in cultural heritage management (Victorian Government 2014c).

FIGURE 137. G21 - GEELONG



Geelong was a pivotal point in the transport network between Melbourne, Ballarat and the Western Districts. The gold rush greatly increased Geelong's maritime activity, with the route between Geelong and Ballarat flatter and easier to travel than the Ballarat-Melbourne route. Geelong's population went from 8,000 in 1851 to 22,000 in 1853.

With such growth, connectivity to Melbourne has critical. In 1857 the two were linked by rail. A few years later the rail connection to Ballarat was established in 1862. Drawing resources from a large western hinterland and with a port, Geelong developed a large manufacturing base, becoming one of Australia's largest industrial centres. Early manufacturing was in industries such as wool mills, ropeworks, and paper mills.

The mid-1800s saw some of Geelong's notable institutions developed, including Geelong Grammar School and Geelong National Grammar School (later the Matthew Flinders Girls' Grammar). By the late 1800s the Gordon Education Institute was opened. This institute is now the largest TAFE in Victoria.

Geelong became a city in 1910, and was operating an electric tram network by 1912 (Figure 138). World War I slowed the city's development, but in the early 1920s, Geelong experienced strong industrial growth: three woollen mills, Cresco fertilizers, the Ford Motor Company's vehicle plant near Corio, the Corio whisky distillery (1928), and the Geelong Advertiser's radio station 3GL (1930) all opened. This economic growth resulted in population growth, and in the 1930s Geelong surpassed Ballarat as Victoria's second largest city.

War again interrupted Geelong's development in the 1940s, but the post-war period saw another boom in economic development and population. The Shell Oil Refinery opened at Corio in 1954, and the Alcoa aluminium refinery at Point Henry in 1963. Between 1947 and 1965 Greater Geelong's population went from 58,400 to 101,600 persons.

FIGURE 138. GEELONG'S MOORABOOL STREET

Source: VictorianPlaces.com.au

This period saw substantial public housing constructed to house the growing workforce, with public housing built in the suburbs of East Geelong, Norlane, North Shore, and Corio.

Serving its growing urban population as well as the surrounding hinterland, Geelong developed a strong retail and recreation core, including the first Target store in Australia.

The loosening of tariff protections in the 1970s and 1980s hit the industrial base of Geelong particularly hard, with many warehouses and mill stores in the central parts of Geelong left vacant, and companies such as Ford staging a gradual withdrawal from Geelong-based production.

As the economy increasingly orientated around professional services, education and healthcare, some of these vacant inner city sites become the focus of redevelopment and urban renewal efforts. Deakin University opened a water front campus in a retrofitted wool store.

Through the 2000s Geelong continued to grow, less driven by its own economy and increasingly as a commuter city of Melbourne. Regional Fast Rail improved travel times and service frequency to Melbourne, and Melbourne's issues with housing affordability attracted many people to Geelong. Geelong has steadily grown its services based economy, particularly in the education and healthcare sectors.

The city's population is anticipated to grow substantially over the next 50 or so years, with development of areas such as Armstrong Creek contributing to projections for the Greater Geelong region of 500,000 persons by 2051. With an expanded urban area and workforce catchment, coupled with a denser urban core, Geelong is anticipated to increasingly offer knowledge intensive employment in the professional services, healthcare, education, and finance and insurance sectors.

5.4.1 Current and future state analysis

Geelong's population and economy have grown at a moderate rate in recent years as the economy changes. The Greater Geelong municipality accommodates over 75 per cent of the region's population (ABS 2015a).

Population in Geelong grew at 1.5 per cent a year over the decade to 2014, increasing to around 184,000 in 2014 (ABS 2015a). Across the region, population grew at an average annual rate of 1.3 per cent. Individual income in Geelong grew at 4.7 per cent over 2006 to 2011 (ABS 2006, 2011).

Geelong has experienced moderate economic growth in the last 10 years of 1.53 per cent per annum. Activity has been supported by solid economic growth in regional and metropolitan centres that have strong trade/freight flows with Geelong including Melbourne, Ballarat, and Warrnambool.

The regional economy is dominated by Geelong, however the broader economy continues to diversify, building on its traditional strengths in agriculture, manufacturing, construction and tourism. As is the case in many areas, the nature of manufacturing has changed and the previous focus on heavy manufacturing has been replaced by more advanced materials and processes. Overall, the sector provides around 20 per cent of the region's value added production and 12 per cent of employment (ABS 2015d). The number of jobs in the sector has remained stable between 2001 and 2011 although the number of manufacturing businesses declined by 102 between 2009 and 2014 and its contribution to economic output is declining (ABS 2015i).

Although it has experienced economic growth in recent years, the region is currently in transition, particularly in regards to the trends occurring in the manufacturing sector which is consistent with regional and national trends. The end of car manufacturing at Ford in 2016 will be a further push for the ongoing major re-organisation of Geelong's economy.

Over the next 20 years, it is expected the contribution of manufacturing will decrease, the health care and social assistance, education and training and financial and insurance service industries will become increasingly important sectors.

Avalon Airport, Regional Fast Rail and the Geelong Ring Road have provided opportunities to leverage the enhanced accessibility to and within the region provided by this infrastructure for services, freight and logistics based economic activity (Victorian Government 2014c).

In terms of agriculture, sheep, beef and dairy are the main activities. There is also some broad acre cropping and horticultural activities. A shift towards more intensive agriculture, such as poultry, will enhance existing food processing activity in Geelong and Colac.

The natural resources available in the region also provide an opportunity to generate income for the region through the supply of energy, construction materials, landscaping and agricultural products.

Tourism assets in the region include world recognised destinations such as the Great Ocean Road and Bells Beach and a wide range of experiences, such as coastal, food and wine, nature, cycling and walking experiences, are available. The number of visitors to the region is expected to rise to over nine million by 2030.

Geelong has seen an increase in professional services and office related employment, including the relocation of the TAC headquarters. The establishment of the NDIS headquarters has further enhanced the role of the city as a health centre. The health care and social assistance sector made the largest contribution to job growth between 2001 and 2011 in the region (over 5,000 additional jobs) (ABS 2001, 2011).

Victoria's ageing population and a shift in industry composition are likely to continue for some time and the impacts of these trends are expected to be acute in Geelong, a region based on manufacturing with a slightly older than average population.

Residential expansion has been occurring, with neighbouring areas such as Bannockburn, in the Golden Plains Shire Council, seeing sustained population growth in recent years, generally driven by Bannockburn's close commute to Geelong. Similarly, areas such as Barwon Heads, since the 1960s, and more recently Torquay, provide high amenity residential suburbs to Geelong. Geelong is the gateway to the Surf Coast, and the development of the peri-urban surrounds of Geelong has been greatly aided by the development of the Geelong Ring Road in the 2010s. The region's unique environment supports growth in the lifestyle and tourism sectors.

Bolstering the tourism offer, and improving the accessibility of these assets presents an opportunity for the region to diversify its economy. The ageing population is expected to limit natural population growth and reduce the demand for certain population servicing industries.

Climate change is likely to mean a warmer and drier climate, although more frequent and intense downpours, more hot days and warm spells. The threat of bushfire is likely to increase and there will be increased frequency and height of extreme sea level events. This is likely to mean changes to fodder and pasture production for the dairy industry, impacts on pests and diseases, heat stress on livestock and crops, impacts on water security and the impacts of bushfire. The tourism industry is also likely to be affected (damage to infrastructure, increased risks to visitors) and the local health and community infrastructure will also experience increased demand (Department of Environment, Land Water and Planning 2015d).

Geelong is expected to experience skills shortages in all sectors that are important to the region, most significantly in health and social assistance. To some extent this may be managed via commuting from Melbourne's growing West Subregion but it may require further migration or training for the current population.

Unemployment has fallen over the years from 8.9 per cent in 2001, to 5.8 per cent in 2011 higher than much of the rest of Victoria (ABS 2001, 2011). The labour force participation rate has lifted slightly, going from 60.0 per cent in 2001 to 62.6 per cent in 2011 (ABS 2001, 2011).

Despite the overall decline in manufacturing, specific sub-sectors sectors focussing on high-value added advanced manufacturing have continued to show positive growth, and the manufacturing sector continues to play a vital role in the economy[15].

Offsetting this decline in activity, other service sectors have recorded positive growth such as education and other professional services[16]. In addition, the ageing population has led to solid growth in health

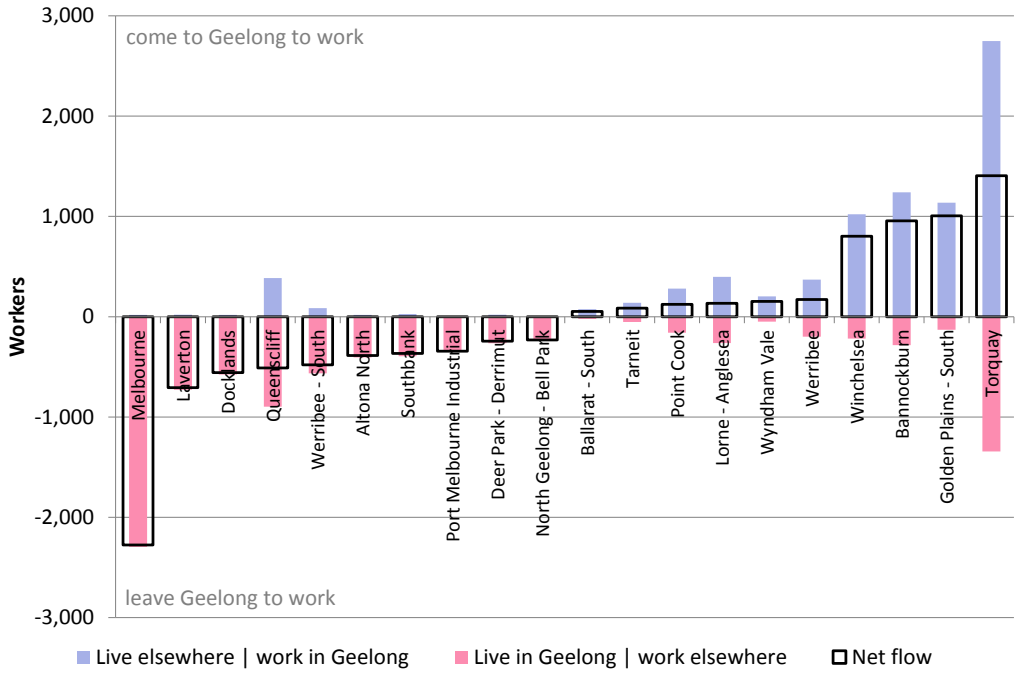
[15] At present, manufacturing businesses contribute approximately 40 per cent of Geelong's output and 39 per cent of the region's GRP, which is more than five times any other single sector.

[16] For more information, please see: http://www.deakin.edu.au/__data/assets/pdf_file/0008/259478/Geelong-Report.pdf

related services, with an increase in 143 Health Care/Social Assistance business from 2009-14 (ABS 2015i).

At the same time, Geelong's residents commute to Melbourne CBD, Docklands and the industrial areas of Laverton, Werribee, Altona and Deer Park for employment (Figure 139). Conversely, residents in the broader region in locations such as Torquay, Bannockburn, Queenscliff and Winchelsea commute into Geelong for work.

FIGURE 139. RESIDENT AND WORKER FLOWS INTO/OUT OF GEELONG



Source: ABS Census 2011 Journey to Work

The increase in population has also seen a significant number of residential building approvals over the period July 2012 - August 2015 with 5,155 approvals – the largest in any regional city (ABS 2015k). This is consistent with the increase in the number of construction-related businesses by 58 over the period 2009-2014 (ABS 2015i).

Additionally, Geelong's workforce profile is shifting from private employers to those dependent on government funds. This is a key challenge for Geelong as more of its workforce becomes employed in lower wealth generating industries that are tied to Government policy.

Reported crime rose sharply in Geelong from 6.8 offences per 100 people to 8.3 offences per 100 people, consistent with the difficult economic circumstances and the broader lift in reported crime across the state (CSV 2014).

The demographics of Geelong are changing along with the economy of the city and the shape of the state. While the dominant age group is adults aged 20-24, the proportion of population aged 60 increased proportionally over 2009-2014 (ABS 2015c).

Average household sizes in Geelong LGA are relatively low and have remained steady at around 2.2 (ABS 2011).

Spatially, population and economic activity in Geelong is expected to shift towards Armstrong Creek, which has been designated as a key growth centre. Geelong also has a great deal of potential to move towards a denser housing stock over time particularly in and around the central business district.

Geelong is unusual in becoming less diverse in terms of birth country. In the Geelong LGA, the number of people born overseas decreased from 21.1 per cent to 20.5 per cent across 2006 and 2011. There was however a slight increase in the proportion of people with non-English speaking backgrounds from 13.2 per cent in 2006 to 13.7 per cent in 2011 (ABS 2006, 2011).

5.4.2 Population and employment scenarios

Like Ballarat and Bendigo, Geelong's potential future varies widely. Table 46 and Table 47 document the population and employment scenarios for Geelong.

Business as usual distribution
Under a BAU distribution, Geelong would grow to between 241,000 and 325,000 people, and 134,000 and 181,000 jobs. This is growth of between 65,000 and 149,000 people, and 43,000 and 90,000 jobs. While reasonably significant in the context of growth across Regional Victoria, given the existing scale of Geelong, including existing infrastructure, it would be anticipated that limited additional significant infrastructure would be required should this distribution eventuate at a low rate of growth.

Consolidated distribution
Under a Consolidated distribution, Geelong would grow to between 274,000 and 379,000 people, and 152,000 and 211,000 jobs. This scale of development – potentially a doubling of the size of Geelong - would generate demand for additional health, education, retail, recreation and community infrastructure as well as employment areas and internal transport networks to maintain accessibility.

Expansion distribution
Under an Expansion distribution, Geelong would grow to between 224,000 and 284,000 people, and 124,000 and 158,000 jobs. While this is somewhat less than the Consolidated and BAU scenarios, it still represents growth which would require some additional supporting infrastructure.

TABLE 46. POPULATION SCENARIOS ('000) – GEELONG

		Low Growth	Middle Growth	High Growth
2016	BAU	176	176	176
	Consolidated	176	176	176
	Expansion	176	176	176
2021	BAU	184	186	193
	Consolidated	189	193	200
	Expansion	183	185	189
2031	BAU	211	228	253
	Consolidated	229	270	281
	Expansion	203	225	232
2046	BAU	241	278	325
	Consolidated	274	348	379
	Expansion	224	268	284

TABLE 47. EMPLOYMENT SCENARIOS ('000) - GEELONG

		Low Growth	Middle Growth	High Growth
2016	BAU	103	104	108
	Consolidated	105	108	112
	Expansion	102	104	105
2021	BAU	109	112	120
	Consolidated	114	123	127
	Expansion	107	112	114
2031	BAU	118	128	141
	Consolidated	128	151	157
	Expansion	113	126	129
2046	BAU	134	155	181
	Consolidated	152	194	211
	Expansion	124	149	158

5.4.3 Infrastructure implications

Most scenarios have Geelong with a possible population of between 230,000 and 380,000 in 2046. This wide range highlights the different trajectories which the economy of Geelong could take. Existing strategic and structural infrastructure will underpin the low end of the population growth scenarios.

Potential pressure points include:

- The key pressure point for Geelong in the near term is likely to be industrial restructuring to deal with the closure of Ford's manufacturing plant and the downstream effects on the automotive supply industry. These effects could take decades to wash through.
- Tourism is likely to be a significant part of the future economy of Geelong as it evolves to feature more services. As services are likely to be centralised, demand for strong transport systems optimised for servicing dense nodes. This could also be a pressure point affecting population growth.
- Connections to Melbourne and Ballarat are a key pressure point that can influence the potential growth of Geelong.
- Climate change and population ageing are key pressure points for Geelong, with potential effects on social and economic trends that could affect infrastructure demand.
- As Geelong moves to Armstrong Creek and development intensifies along the south west coast, the competition for agricultural land and natural amenity will only intensify.

A poor response to the current economic structural adjustment will result in a lower population and lower employment, increasing socioeconomic disadvantage. In contrast, higher economic/employment growth will lead to higher population growth and improved outcomes. The continued relationship of Geelong to Melbourne will be affected by economic growth. Economic decline is likely to lead to a greater dependency on Melbourne for employment.

There are two ways to frame the link between employment and infrastructure. First, infrastructure provision can support skills development and population wellbeing to enhance employment opportunities, for example through education, community and health facilities. Communities equipped with access to a full gamut of social infrastructure have greater opportunities to access employment and support for wellbeing.

Infrastructure can help to address the particular needs of disadvantaged areas where there are higher rates of social issues like domestic violence, chronic disease, lower levels of educational attainment and mental health issues.

An ageing population in Geelong will have a significant impact on the economy and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing.

There are already challenges with dry soil salinity within the areas surrounding Geelong, which will increased climate change will impact on local food production.

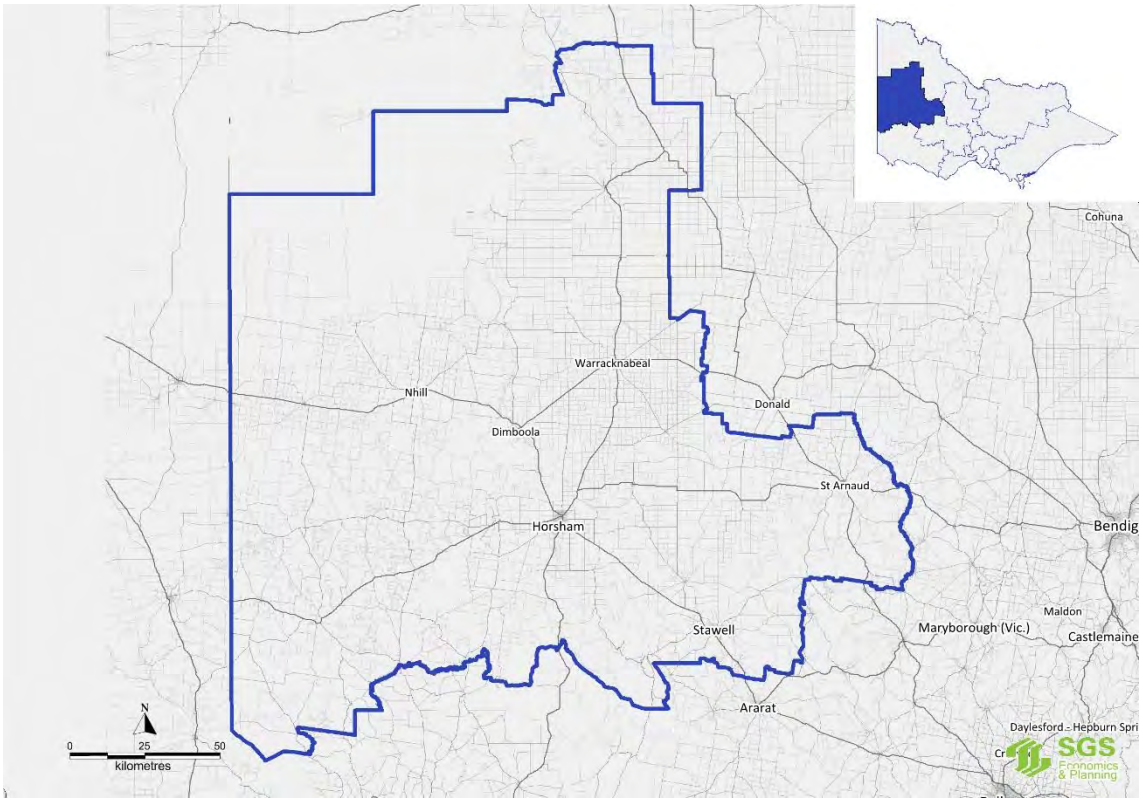
Coastal infrastructure and housing will be impacted on by sea level rise and coastal erosion. In this context the role that the coastal ecosystems play in limiting damage from storms and similar events should be recognised. The threat of inundation due to sea level rise is another significant risk for infrastructure.

5.5 Wimmera Southern Mallee - Horsham

The Jardwadjali (also known as Jadawadjali) people are Indigenous Australians who occupy the lands in the upper Wimmera River watershed east to Gariwerd (Grampians) and west to Lake Bringalbert. The towns of Horsham, Cavendish, Coleraine, Apsley, Minyip and Donald are within their territory. There are many cultural and environmental heritage sites in the Wimmera with more than 2,000 sites of indigenous archaeological significance associated with the catchments' reserves, waterways, floodplains, and wetlands.

The vast Wimmera South Mallee district is a region of high productivity, broad acre dry land cropping and grazing. Horsham is the Regional City of the Wimmera South Mallee district, a region covering the municipalities of Hindmarsh, Horsham, Northern Grampians, West Wimmera and Yarriambiack. The region is one of the world's largest grain, pulse and oilseed growing regions and exports. As such, these industries provide many of the support services necessary to sustain agricultural production as well as research, development and value-adding opportunities. The region has the least diverse economy in Regional Victoria.

FIGURE 140. WIMMERA SOUTHERN MALLEE



With an economy so heavily focused on agriculture, outward migration, and an ageing population, most towns within the region have experienced population decline over recent decades. Horsham has been the largest town in the region since the late 1800s, providing a wide range of services to the whole region and adjoining areas.

Horsham's early development largely occurred following the construction of a rail line in 1879. The town developed several flour mills, and played an important regional servicing role to the surrounding farming communities, hosting a hospital, churches, and schools.

Through the 20th century this regional servicing role was reinforced by the construction of the Western Highway linking Horsham to Melbourne and Adelaide, as well as the Henty Highway, which runs north–south to provide access to the Port of Portland, an export port for the regions commodities such as grain and mineral sands (Figure 141).

FIGURE 141. HORSHAM (1960)

Source: VictorianPlaces.com.au

5.5.1 Current and future state analysis

As a regional city, Horsham has seen moderate population growth. Growth has generally been as a result of residents moving from smaller settlements or rural areas to be better connected to services. Also driving growth has been the continued consolidation of farms in the surrounding region, resulting in improved farm efficiency, but also reduced demand for labour. The region has experienced population decline at an average rate of 0.4 per cent a year between 2004 and 2014 (ABS 2015a).

Developments such as regional livestock exchange, abattoirs, retail and recreation facilities, and higher education institutes, including the Victorian Institute of Dryland Agriculture, have increased Horsham's regional importance (Victorian Government 2014d).

The region comprises large areas of highly productive cropping and grazing land. It is one of the world's largest grain, pulse and oilseed growing regions and exports around 60 per cent of the total harvest. These agricultural uses dominate the land use profile, economy and employment within the region and there is some livestock grazing in the southern areas of the region. The sector is declining in its contribution to the employment profile of the region; in 2001 agriculture comprised nearly 25 per cent of employment in the region and by 2011 it was 20 per cent (ABS 2001, 2011).

The region, and Horsham's future will be shaped in part by the demand for food from Asian markets. A continued consumer evolution toward high quality clean food, especially protein, is likely to prove beneficial for the region, with its existing strengths in agriculture. Diversification of the economy will, however, also be important as this is a sector particularly exposed to external economic and environmental factors.

Opportunities to diversify and grow the sector include:

- Increasing local processing of the agricultural products
- Clustering some agricultural functions (intensive poultry farms or viticulture) to support growth of the sector and encourage efficiencies through access to appropriate skills, infrastructure and transport
- Leveraging the supply of industrial land in Horsham, and transport access provided through the Wimmera Intermodal Freight Terminal.

The expansion of agricultural uses which are currently small scale in the region (horticulture, viticulture, piggeries and intensive poultry farms) may occur over time as a result of access to research and development capabilities and infrastructure. Other potential future growth industries include food processing, mining, engineering and manufacturing, renewable energy and tourism (Victorian Government 2014d).

Agriculture is likely to be significantly affected by climate change, including increased temperatures, fewer frosts, more hot days and warm spells and less rainfall. A harsher fire season is also likely. Earlier flowering and planting times, changes to the way pests and diseases are distributed, pasture growth and reduced water security will all impact the sector. Health infrastructure will experience increased demand, and tourism infrastructure is also likely to occur. Tourists unfamiliar with local conditions may also be placed at increased risk (Department of Environment, Land Water and Planning 2015b).

Manufacturing, tourism, transport and mining also generate income in some areas of the region. Horsham, as the main township, provides many of the support services necessary to sustain agricultural production as well as research, development and value-adding opportunities. Overall however, the regional economy is one of the least diversified in Victoria. Population trends could also make serving a developing agricultural industry difficult. Horsham's population is ageing, meaning a diminishing workforce, and higher demand for health services. Inward migration from overseas or elsewhere in Australia may be necessary to boost the economy by creating demand for other kinds of services. Focusing on increasing the labour force participation rate could also support emerging industries.

Outside of agriculture, the region presents several other competitive advantages for industry development, namely in food processing manufacturing, and renewable energy. Just outside of Horsham there is the Wimmera Intermodal Freight Terminal. Additionally, the Grampians, Little Desert and Wyperfeld National Parks, together with Mount Arapiles, provide the significant tourist attractions of the region.

There are deposits of minerals within the region, including gold mining in Northern Grampians Shire and mineral sands in the western and northern parts of the region.

Horsham accommodates most of the higher order services in the region. The structure of the settlement pattern, characterised by significant distances between settlements, means that some smaller settlements provide a wider range of services than would normally be provided in settlements of such a size. For example, there are public hospitals in Stawell, Dimboola, Nhill, St Arnaud, Edenhope, Warracknabeal, Jeparit and Rainbow. Horsham and Stawell also have TAFE and university campuses.

The tourism sector is an important part of the Wimmera Southern Mallee's economy and is focused on the region's environmental assets, including national parks, waterways and lakes. These places attract tourists for predominantly nature-based activities. Wine tourism also occurs in the region's south-east.

Horsham's population is growing slowly. Horsham and Halls Gap are the only areas in the region to experience recent growth.

Economic growth in Horsham has been 0.75 per cent a year and income growth has been 4.5 per cent a year. Unemployment however has remained low. The unemployment rate fell from 5.8 per cent in 2001 to 3.8 per cent in 2011 (ABS 2001, 2011).

Economic activity in Horsham has also been supported by solid economic growth in Ballarat, which has strong trade/freight flows with Horsham.

Consistent with the ageing population in Horsham, household size has shrunk from 2.20 to 2.14 persons per households between 2006 and 2011 (ABS 2006, 2011).

During the July 2012-August 2015 period, there were only 296 residential building approvals in the Horsham region, the smallest of any of the regional cities (ABS 2015k).

There was some increase to diversity in the Horsham area. The number of people born overseas increased from 9.7 per cent to 10.5 per cent across 2006 and 2011 and there was an increase in the proportion of people with non-English speaking backgrounds from 5.3 per cent in 2006 to 6.5 per cent in 2011 (ABS 2006, 2011).

Reported crime rose from 9.2 to 12.1 offences per 100 people between 2010 and 2014 (CSV 2014).

5.5.2 Population and employment scenarios

The total quantum of population and employment growth that could be expected in Horsham is unlikely to vary substantially between growth scenarios and distributions (see Table 48 and Table 49).

Business as usual distribution
Under a BAU distribution, Horsham would grow to between 21,000 and 28,000 people, and 15,000 and 19,000 jobs. This is very limited population growth while employment is likely to double. Limited additional infrastructure is likely to be required should this occur.

Consolidated distribution
Under a Consolidated distribution, Horsham would grow to between 24,000 and 33,000 people, and 16,000 and 22,000 jobs. This scale of development – potentially nearly doubling the size of Horsham - would generate demand for some limited additional health, education, retail, recreation and community infrastructure. Some limited additional employment areas may be required but internal transport networks should be sufficient to maintain accessibility.

Expansion distribution
Under an Expansion distribution, Horsham would grow to between 20,000 and 25,000 people, and 14,000 and 17,000 jobs. While some additional areas would be required for housing and some social and community infrastructure, it is not anticipated that this would require significant additional employment or transport infrastructure.

TABLE 48. POPULATION SCENARIOS ('000) – HORSHAM

		Low Growth	Middle Growth	High Growth
2016	BAU	16	16	16
	Consolidated	16	16	16
	Expansion	16	16	16
2021	BAU	17	16	17
	Consolidated	17	17	18
	Expansion	16	17	17
2031	BAU	19	19	22
	Consolidated	20	24	25
	Expansion	18	20	21
2046	BAU	21	22	28
	Consolidated	24	31	33
	Expansion	20	23	25

The number of jobs in Horsham could reach between 14,000 and 22,000 by 2046 (Table 49). This is an increase of around 5,000 to 10,000 on existing levels.

TABLE 49. EMPLOYMENT SCENARIOS ('000) – HORSHAM

		Low Growth	Middle Growth	High Growth
2016	BAU	10	10	10
	Consolidated	10	11	11
	Expansion	10	10	10
2021	BAU	11	11	12
	Consolidated	11	12	13
	Expansion	11	11	11
2031	BAU	12	12	14
	Consolidated	13	16	16
	Expansion	12	13	13
2046	BAU	15	15	19
	Consolidated	16	21	22
	Expansion	14	16	17

5.5.3 Infrastructure implications

Most scenarios have Horsham with a population of between 20,000 and 33,000 in 2046. An ageing population in Horsham and surrounding areas will have a significant impact on the economy and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing. This level of growth would require more follower infrastructure (e.g.

Potential pressure points include:

- Climate change will potentially change the nature of activities that are supported in the Horsham region. Higher fire risk and changed rainfall patterns could affect industry.
- Ageing infrastructure and a limited local population to fund maintenance and repairs could eventually result to infrastructure degradation. Continued investment in existing infrastructure will be necessary to sustain growth.

community facilities and health infrastructure) to help maintain the liveability and attractiveness of the region.

At present, there is increasing pressure for the movement of freight within the region, particularly for bulk commodities such as grain. In addition, there are a number of challenges for transport services throughout the region, including declining populations in many areas and significant distances between relatively small settlements. This may generate a need for investment in structural infrastructure.

Poor soil conditions, rising temperatures and less regular rainfall could place pressure on food production in the surrounding hinterland. In this context the infrastructure implications concern:

- The availability of water for agriculture from local sources and the Murray Darling Basin.
- Impacts on employment opportunities and the community's social capital from reduced profitability in agriculture

5.6 Gippsland – Latrobe City

The Gippsland region is located in the south-east of Victoria. The Gunai or Kurnai, is an Indigenous Australian nation of south-east Australia whose territory occupies most of present-day Gippsland and much of the southern slopes of the Victorian Alps. The Gunai or Kurnai's connection to Country endures today.

Gippsland extends from the edge of Metropolitan Melbourne in the region's west to the most easterly point of Victoria. Along the north it borders New South Wales in the far east and then the Hume region. Its southern border is defined by coastline, and includes the most southerly point of Victoria, Wilsons Promontory. Gippsland includes the local government areas of Bass Coast, Baw Baw, South Gippsland, Latrobe, Wellington and East Gippsland. The regional city, Latrobe, comprises the towns of Moe, Morwell, Traralgon and Churchill.

Covering such a large area, the region exhibits substantial diversity, particularly in contrasting those areas directly abutting Metropolitan Melbourne with those further east.

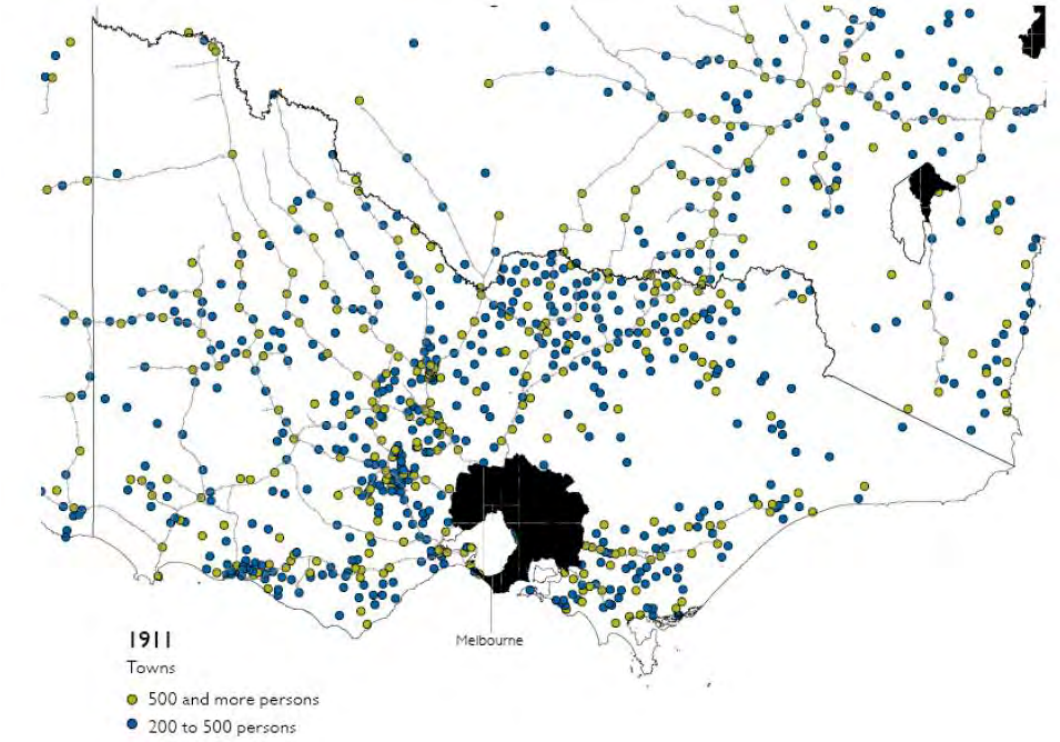
The region's early non-Aboriginal history lay in forestry and agriculture, with dairy farming in particular a strong industry from the mid-1800s. Prior to the development of the east-west rail spine that has since defined settlement in the region, Bairnsdale played an important port function. Timber and agriculture products could be carried across the Gippsland Lakes and transported to markets further afield through the port. As a transport hub, Bairnsdale became the key commercial centre for the surrounding region. The lakes also became a popular tourist attraction in the late-1800s.

Bairnsdale's importance as a port city diminished with the construction of a rail link from Melbourne in 1888, with freight and passengers increasingly taking the inland route. With the development of the rail line, settlements along the corridor emerged and prospered. Gippsland's centres such as Sale, Lakes Entrance, Drouin and Warragul developed along this major east-west transport corridor, predominately serving the timber and agriculture industries.

Also along this rail corridor developed the towns of Moe, Morwell and Traralgon in the Latrobe Valley. The region, rich in brown coal was initially agricultural, with grazing and dairying becoming prominent industries. However, with advancements in electricity generation, the abundance of brown coal became the driving factor behind a period of substantial economic and population growth from the 1920s onwards.

This spine of towns along the rail corridor is illustrated in Figure 142 below of settlements in 1911. This image also highlights the disconnect between the Gippsland region and the rest of Regional Victoria, with the Snowy Mountains and Victorian Alpine region acting as a substantial natural barrier to development, and major transport routes from Melbourne orientated north and west. This results in many of the towns of the Gippsland region having a smaller hinterland than regional centres in the north and west of the State.

FIGURE 142. VICTORIAN TOWNS IN 1911



Source: BITRE 2014b

The prospects of the region as a whole, and particularly the towns of Moe, Morwell and Traralgon changed substantially from the 1920s onwards, with advancements in electricity generation, and an abundance of brown coal driving a period of economic and population growth.

'Yallourn A' power station was opened by the State Electricity Commission (SEC) in 1928 alongside the purpose built township of Yallourn. The township housed the workers and their families that were needed to construct the power station and its accompanying coal pit. The houses were built and owned by the SEC, and the town consequently dismantled to access the coal reserves situated underneath.

FIGURE 143. YALLOURN POWER STATION AND COAL PIT (1964)

Source: VictorianPlaces.com.au

In the decades that followed the construction of Yallourn A, several other power stations were progressively built in the Valley, attracting some heavy industry. Accompanying the development of each power station, townships were also progressively built to house the expanded labour force. While having historical routes that predate the development of power stations, townships such as Moe saw considerable change, growing from under 1,000 people in 1911 to over 15,000 people by 1961. The township of Churchill, just south of Traralgon, was constructed to house the workforce needed to build and service the Hazelwood power station from 1965 onwards. Today the town has a population of around 5,000 people and has a regional Monash University campus. Privatisation of power stations in the 1990s resulted in a substantial reduction in labour, and a subsequent extended period of population decline in the surrounding settlements. Collectively the Latrobe Valley townships of Traralgon, Moe, Morwell and Churchill have been conceptualised as a collective agglomeration or 'networked city'.

Transport in Gippsland is largely orientated east-west, with the Princes Highway and Bairnsdale rail line defining the corridor. The Princes Highway runs from Melbourne to Sydney and connects most of the major settlements in the Gippsland region. The V-Line service runs from central Melbourne to Bairnsdale via the major centres of Drouin, Warragul, Moe, Morwell, Traralgon and Sale, although most daily services terminate at Traralgon. Once services enter metropolitan Melbourne they share track space with metropolitan services on the Pakenham line.

North-south movement in Gippsland is facilitated by the South Gippsland, Bass and Strzelecki Highways, with no rail service running north-south. The Gippsland region also has a wide range of courier, container, and bulk haulage transport, along with rail transport to the Port of Melbourne and connections to the Port of Hastings.

5.6.1 Current and future state analysis

Latrobe City grew at an average rate of 0.6 per cent between 2004 and 2014, one of the slowest growing regional cities. The region grew at 1.9 per cent per year on average over the same period (ABS 2015a).

Outside of the dominant east-west corridor, the townships of Leongatha, Korumburra, Wonthaggi and Inverloch are located at the south-west end of the region. Located closer to Melbourne and offering higher natural amenity on the coast, these areas have experienced significantly higher levels of growth than other parts of the Gippsland region in recent decades. The two LGAs that border metropolitan Melbourne, Baw Baw (1.6 per cent) and particularly Bass Coast (2.6 per cent), have experienced growth above the state average (ABS 2015a). This is likely to have contributed to the 8,000 additional construction jobs that have occurred in the region between 2001 and 2011 (ABS 2001, 2011). By contrast, Latrobe, the most populous LGA and host of Moe, Morwell and Traralgon, grew at only 0.5 per cent per annum over the 1996 to 2011 period (ABS 1996, 2011).

Migration in and out of Gippsland varies greatly by age. There is a long established trend of school leavers migrating out of Gippsland for Melbourne and other cities, while young families and those reaching, or having already reached retirement age migrating into the Gippsland region. Along the coastline many areas are subject to significant seasonal population fluctuations, and many settlements will need to address the impacts of inundation linked to climate change in the future (State Government of Victoria 2015).

Today Gippsland's economy is predominately based around natural resources and commodities, with key industry sectors including agriculture, forestry, dairy and pastoral industries, fishing, and mining in coal, oil and gas extraction and processing. The agribusiness sector is a significant employer in the region, with over 37 per cent of Gippsland's business involved in agriculture and fishing and a further 15 per cent involved in upstream processing operations. Energy production is one of Gippsland's major industries, both in the coal rich Latrobe Valley and Bass Coast's oil and gas fields. The region produces around 90 per cent of Victoria's electricity, 97 per cent of Victoria's natural gas, and 46 per cent of Australia's oil. The sector marginally increased its share of regional employment (3.1 per cent to 3.5 per cent) between 2001 and 2011.

A strong tourism industry is emerging in Gippsland, drawing on the natural resources of the region and its unique and diverse culture and terrain (Victorian Government 2014e). Some of the key tourism assets of the region include the Gippsland Lakes, Wilsons Promontory, Far East Gippsland and the Alpine country. Other popular tourist destinations include Phillip Island, Walhalla, the Baw Baw Plateau, the Strzelecki Ranges and the Gourmet Country Region. The region is a popular destination for day trips from Metropolitan Melbourne given its reasonable accessibility.

This, and other sectors are likely to be under threat as a result of climate change. Damage to tourism infrastructure and the increased risks to visitors will need to be managed, and the snow season is likely to be shorter with reduced snow depth. Local health and community infrastructure will also experience increased demand. Climate change is also likely to mean a warmer and drier climate; more hot days and warm spells and fewer frosts. The threat of bushfire is likely to increase and there will be warmer and more acidic oceans. Changes to pests and diseases, pasture growth and farm businesses affected by bushfire (Department of Environment, Land Water and Planning 2015f).

The crime rate in Latrobe is reasonably high, increasing from 10.9 offences per 100 people in 2010 to 15.8 in 2014 (CSV 2014).

Latrobe City's population has aged; the proportion of people aged over 65 increased over the 2009 to 2014 period. As with other regional cities, household size has declined from 2.25 in 2006 to 2.19 in 2011 (ABS 2015a, ABS 2006, 2011).

Incomes have risen 5.3 per cent over the 2006 to 2011 period (ABS 2006, 2011).

The unemployment rate did not change dramatically between 2011 (7.8 per cent) and 2015 (7.6 per cent). There has been no change in proportion of people born overseas – steady at 19.4 per cent - reasonably high for a regional city. Non-English speaking background increased slightly from 10.5 per cent to 11.5 per cent (ABS 2006, 2011).

5.6.2 Population and employment scenarios

Latrobe City has the potential to grow minimally or quite extensively over the next 30 years, depending on the distribution of development across Melbourne and Regional Victoria.

Business as usual distribution
A BAU distribution of growth could see between 8,000 and 30,000 additional residents in Latrobe City (Table 50). There could be between 4,000 and 14,000 additional jobs by 2046 (Table 51).

This level of growth could generate additional demands for local infrastructure, but is unlikely to require significant infrastructure to support it. For example, depending on the location of population and job growth within Latrobe City, upgrades and/or expansions to main and arterial roads may be required, along with additional capacity to health and education facilities. Links between the three townships will be particularly important.

Consolidated distribution
A Consolidated distribution of jobs and people in Latrobe City could see between 27,000 and 46,000 additional residents, and 8,000 to 21,000 additional jobs. Whilst this is higher than the BAU distribution, it is likely that this growth would not generate significant demand for infrastructure. The dispersed nature of Latrobe City across three settlements means that this growth could be catered for through existing infrastructure.

Expansion distribution
An Expansion distribution of population and employment growth would see the least amount of additional people and jobs in Latrobe City by 2046. 3,000 to 19,000 additional residents, and 1,000 to 9,000 additional jobs.

TABLE 50. POPULATION SCENARIOS ('000) – LATROBE CITY

		Low Growth	Middle Growth	High Growth
2016	BAU	59	59	59
	Consolidated	59	59	59
	Expansion	59	59	59
2021	BAU	61	61	64
	Consolidated	62	64	66
	Expansion	60	61	62
2031	BAU	62	67	74
	Consolidated	67	79	82
	Expansion	60	66	67
2046	BAU	67	76	89
	Consolidated	76	96	105
	Expansion	62	74	78

TABLE 51. EMPLOYMENT SCENARIOS ('000) – LATROBE CITY

		Low Growth	Middle Growth	High Growth
2016	BAU	27	27	27
	Consolidated	27	27	27
	Expansion	27	27	27
2021	BAU	28	28	29
	Consolidated	29	29	30
	Expansion	27	28	29
2031	BAU	28	31	34
	Consolidated	31	36	38
	Expansion	27	30	31
2046	BAU	31	35	41
	Consolidated	35	44	48
	Expansion	28	34	36

5.6.3 Infrastructure analysis

Most scenarios have Latrobe City with a possible population of between 62,000 and 105,000 in 2046. The ageing and declining population in the broader region will increase demand for health care and housing for the aged.

Potential pressure points include:

- Climate change will potentially change the nature of activities that are supported in the Horsham region. Higher fire risk and changed rainfall patterns could affect industry. Higher rail fall may result in a higher rate of road degradation.
- Ageing infrastructure and a limited local population to fund maintenance and repairs could eventually result to infrastructure degradation. Continued investment in existing infrastructure will be necessary to sustain growth.
- Links to other surrounding centres including the Bass Coast, Wonthaggi and Phillip Island will may become pressure points as the region grows.

There is likely to be continued growth in areas close to Melbourne (peri-urban areas) and supporting infrastructure will be needed in these areas. This will include increasing the capacity of existing network infrastructure (transport and ICT) and facilities (health, education and community) commensurate to population increases.

The energy generation activities that currently occur in the region are likely to be under threat from more sustainable energy sources, and also face challenges in terms of resilience in the context of climate change. A key challenge for the region will be economic transitioning and ensuring appropriate social infrastructure and services are in place to support communities.

There may be opportunities for lower carbon energy sources such as oil and gas in the region. Large scale investment in sustainable and transformative industry may assist in the region's economic restructuring and help to mitigate potential unemployment and social isolation that could result from the decline of the coal industry.

Increasing demand for freight may occur as a result of the evolution of the food production industry. This could have impacts on transport infrastructure, but could be provided for on an as needs basis.

Poor soil conditions, rising temperatures and less regular rainfall could place pressure on food production in the surrounding hinterland. In this context the infrastructure implications concern:

- The availability of water for agriculture from local sources
- Impacts on employment opportunities and the community's social capital from reduced profitability in agriculture

The increased likelihood and size of extreme fire events due to climate change, combined with increasing population in the north, will require consideration must be given to the capacity of emergency services system to deal with these events. Bushfires may also result in:

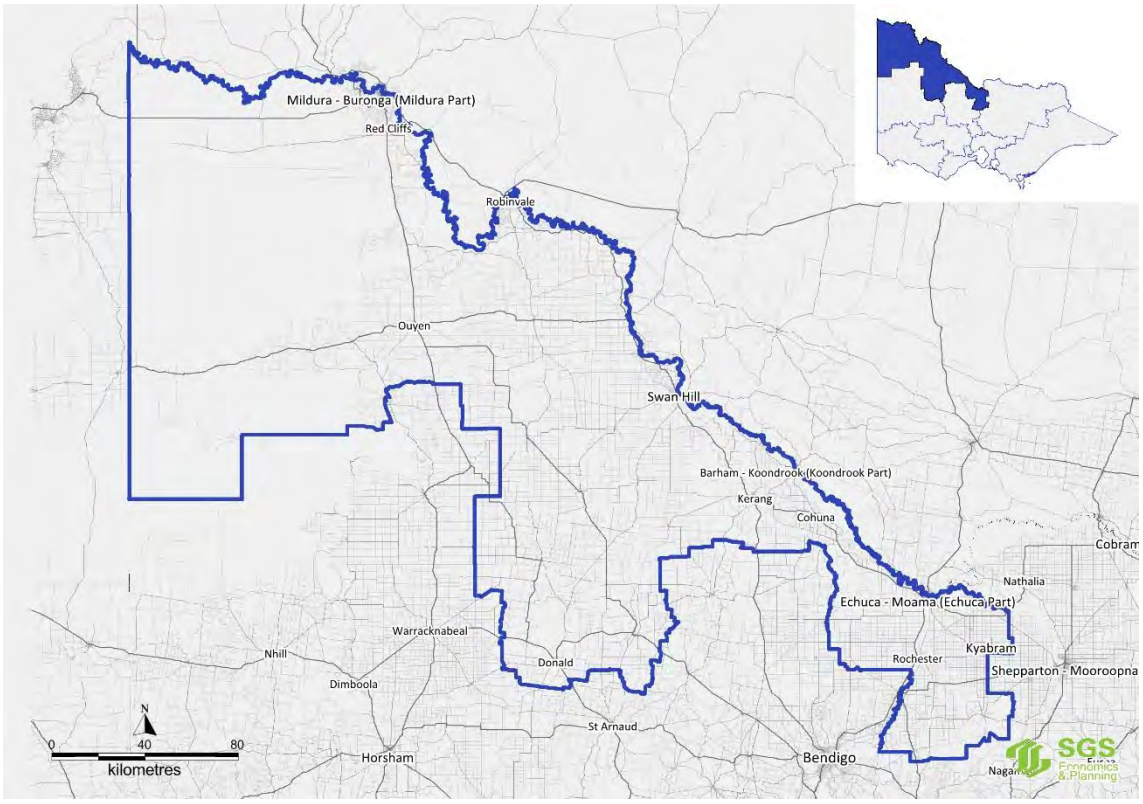
- Communication towers destroyed by fire
- Powerlines destroyed by fire
- Burnt catchments resulting in water quality reduction
- Houses, communities, and sometimes entire towns destroyed in fringe locations and rural areas (Commissioner of Environmental Sustainability Victoria 2013).

5.7 Loddon Mallee North - Mildura

The Loddon Mallee North region borders New South Wales to the north, and South Australia to the west. Located on the banks of the Murray River in the dry north-west of Victoria, Mildura is the regional city of the region. Many Aboriginal peoples lived around the site of Mildura because of the abundant food sources. Local tribes included the Latje Latje and Yerre Yerre. The Mallee CMA region includes more than 3,800 Aboriginal archaeological sites. The location of such sites is strongly influenced by flooding regime and water availability. The boundary between non-alluvial areas and alluvial areas is particularly important.

The region consists of the municipalities of Buloke, Campaspe, Gannawarra, Mildura and Swan Hill. Mildura is supported by larger towns at Swan Hill and Echuca, both of which are also located on the Murray River.

FIGURE 144. LODDON MALLEE NORTH



Much of the region's modern history stems from the massive irrigation works that were carried out from the late 1800s. With a reliable source of water secured, the region prospered agriculturally, developing a cast fruit industry, including drying and preserving.

Early transportation of freight was undertaken by river boat before the development of railway connections to Melbourne in 1903. By the 1930s Mildura and its surrounding region produced over half of Australia's dried fruit, with this economic growth seeing the population double.

Through the 20th century road infrastructure was developed. The Calder Highway and Sturt Highway, alongside the interstate rail connections, made Mildura an important transport hub on the national road and rail networks. With this 'tri-state' location, transport and logistics businesses have a presence.

Manufacturing, and particularly food product and beverage manufacturing, has development in Mildura, with these industries reliant on inputs from the surrounding agricultural sector. Tourism also plays a part in Mildura's economy, with the winter sunshine promoted to attract visitors.

With a productive agricultural hinterland, associated manufacturing industries, and occupying a prominent position on interstate transport routes, Mildura is the dominant centre of the north-west. Serving the surrounding region, Mildura is host to higher education institutes – La Trobe University and Sunraysia TAFE, several hospitals, Mildura Centro (a large shopping centre complex), and numerous recreation facilities. The population of Mildura and the surrounding region has an older age demographic than Victoria as a whole.

5.7.1 Current and future state analysis

Mildura's population has been growing at a moderate pace, despite a shrinking economy.
Its population has risen from 40,000 in 2004 to 44,000 in 2014, while economic growth has been negative, at -0.2 per cent a year over the period 2004 to 2014 (ABS 2015a, ABS 2015d). Across the broader region, population growth has occurred at an average annual rate of approximately 0.1 per cent.

In the regional city of Mildura, the future looks likely to be one of growth as a diverse set of sectors with positive prospects look set to expand their footprint in the town. Activity may be further supported by further economic growth in Bendigo which has strong trade/freight flows with Mildura.

Most people in the Loddon Mallee North region live in the three large centres on the Murray River, Mildura, Swan Hill and Echuca. These centres provide services to those living across state borders, especially in the NSW town of Moama (across the river from Echuca).

The region has a relatively diverse community profile including:
- a strong Aboriginal community in and around Robinvale,
- many people from Mediterranean backgrounds who migrated to the region as a result of the expansion of irrigation and fruit growing in the 20th century, and
- more recently established Polynesian and Middle Eastern populations in Swan Hill.

Along with this, there are highly mobile groups associated with seasonal and transient workforces in the fruit growing and mining industries in the region (Victorian Government 2014e).

Irrigated dairy and horticulture in the local government areas adjacent to the Murray River.

The region is a major producer of fruit, wine, nuts, vegetables, dairy products, cereals, meat and wool and is part of a nationally significant 'food bowl' region. Agriculture continues to be the backbone of the region's economy, and the region's agriculture industries are also well placed with prospects for solid growth in line with population growth throughout Victoria, economic growth in key Asian markets, and trade liberalisation. Labour needs in the sector are, however, decreasing and the sector lost 4,000 jobs between 2001 and 2011 (ABS 2001, 2011). The effect of drought is likely to have influenced this, and the loss of 119 agricultural businesses from the region over the period 2009-2014 (ABS 2015i).

Mildura is likely to see expansions in mining and renewable energy sectors. This is expected to increase employment in these and other local industries - professional services, and transport and logistics. For example, the first stage of a $420 million large scale solar power station is to be built in the Mildura - Red Cliffs region.

Renewable energy generation, aquaculture and ecotourism provide opportunities to diversify the economy. The growth of the renewable energy sector would also provide cheaper electricity for existing industry, business and households within and outside the region and potentially attract new industry and business. Gypsum mining may also provide a further opportunity for economic diversity.

Climate change may impact on the agricultural sector; increased temperatures, fewer frosts, more hot days and warm spells and less rainfall are likely to affect the productivity of the sector. A harsher fire season is also likely. Damage to tourism infrastructure and the increased risks to visitors will need to be managed. The local health and community infrastructure will also experience increased demand and other infrastructure may experience increased flood damage (Department of Environment, Land Water and Planning 2015c).

Other sectors include manufacturing (food processing) construction and service provision. Manufacturing, particularly food processing, will continue to play an important role in the regional economy and ensuring there is a suitably skilled workforce to support this will be important.

The cost of energy may also impact the prospects of the sector. Manufacturing, as well as the agriculture sector will also rely on an appropriate freight network including transport logistics and warehousing.

There is also some mining of mineral sands in the region and this, with other extractive industries has supported new rail freight investment and infrastructure.

Health has been a rare growth industry. That sector added 23 businesses over the period 2009-2014 and 1,400 jobs across the region. The tourism sector has also strengthened, reflecting its location on the banks of the Murray River and being flanked by impressive natural surrounds and national parks.

The average age of the population is expected increase over time in line with broader national trends, which is expected to limited natural population growth and reduce the demand for population servicing industries.

Unemployment in Mildura shrunk slightly from 2001 to 2011 from 7.2 per cent to 6.9 per cent - higher than most of the rest of the state. The labour force participation rate has fallen from 61.6 per cent in 2001 to 59.9 per cent in 2011 (ABS 2001, 2011).

Falling labour force participation is explained by to a combination of weak employment growth and population ageing. Between 2009 and 2014, the share of population aged over 55 increased strongly (ABS 2015a).

Skill shortages in health, education, manufacturing, agriculture and construction sectors will need to be addressed, particularly in the context of an ageing population and its growing demand for health professionals.

Inbound migration to serve those industries will likely be necessary, and Mildura will need to exploit its natural environment and connectivity advantages to obtain population growth. Raising the labour force participation rate may also mitigate worker shortages.

The decreasing number of workers who can replace the retiring workforce places pressure on the region to increase its participation rate.

Household size has been shrinking as the population ages. The average number of persons per household fell from 2.2 to 2.1 in the period 2006 to 2011.

Mildura is in the Mallee region, which features rivers and wetlands in precarious health. Soil conditions are in good condition. Widespread changes in dryland agricultural management practices over recent years has dramatically reduced the risk, incidence and severity of soil erosion.

5.7.2 Population and employment scenarios

There is a mild level of variation between population and employment scenarios and distributions for Mildura (see Table 52 and Table 53).

Business as usual distribution
Under a BAU distribution Mildura would grow to between 56,000 and 75,000 people, and 30,000 and 40,000 jobs. This represents increases of between 14,000 and 33,000 people, and 10,000 to 20,000 jobs. This scale of development would generate demand for some limited additional health, education, retail, recreation and community infrastructure. Some limited additional employment areas may be required but internal transport networks should be sufficient to maintain accessibility.

Consolidated distribution
Under a Consolidated distribution, Mildura would grow to between 64,000 and 87,000 people, and 34,000 and 46,000 jobs. This represents nearly a doubling of the size of Mildura and would have similar infrastructure requirements to the BAU scenario.

Expansion distribution
Under an Expansion distribution Mildura would grow to between 53,000 and 66,000 people, and 28,000 and 35,000 jobs. As with the other two scenarios, there would be some demand created for additional infrastructure under this scenario but not significant.

TABLE 52. POPULATION SCENARIOS ('000) - MILDURA

		Low Growth	Middle Growth	High Growth
2016	BAU	42	42	42
	Consolidated	42	42	42
	Expansion	42	42	42
2021	BAU	44	44	46
	Consolidated	45	46	47
	Expansion	43	44	45
2031	BAU	50	51	59
	Consolidated	54	64	66
	Expansion	48	53	55
2046	BAU	56	60	75
	Consolidated	64	82	87
	Expansion	53	62	66

TABLE 53. EMPLOYMENT SCENARIOS ('000) - MILDURA

		Low Growth	Middle Growth	High Growth
2016	BAU	21	21	22
	Consolidated	22	22	23
	Expansion	21	21	22
2021	BAU	23	23	25
	Consolidated	24	26	26
	Expansion	22	23	24
2031	BAU	25	26	30
	Consolidated	27	32	33
	Expansion	24	27	28
2046	BAU	30	32	40
	Consolidated	34	43	46
	Expansion	28	33	35

5.7.3 Infrastructure implications

Most scenarios have Mildura with a possible population of between 53,000 and 87,000 in 2046. An ageing population in Mildura and surrounding areas will have a significant impact on the economy and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing. This level of growth would require more follower infrastructure (e.g. community facilities and health infrastructure) to help maintain the attractiveness of the region from a liveability perspective.

Potential pressure points include:

- River health will continue to be vital to Mildura for its agriculture and tourism industries.
- A northerly location and high temperatures make Mildura vulnerable to any warming effects associated with climate change.

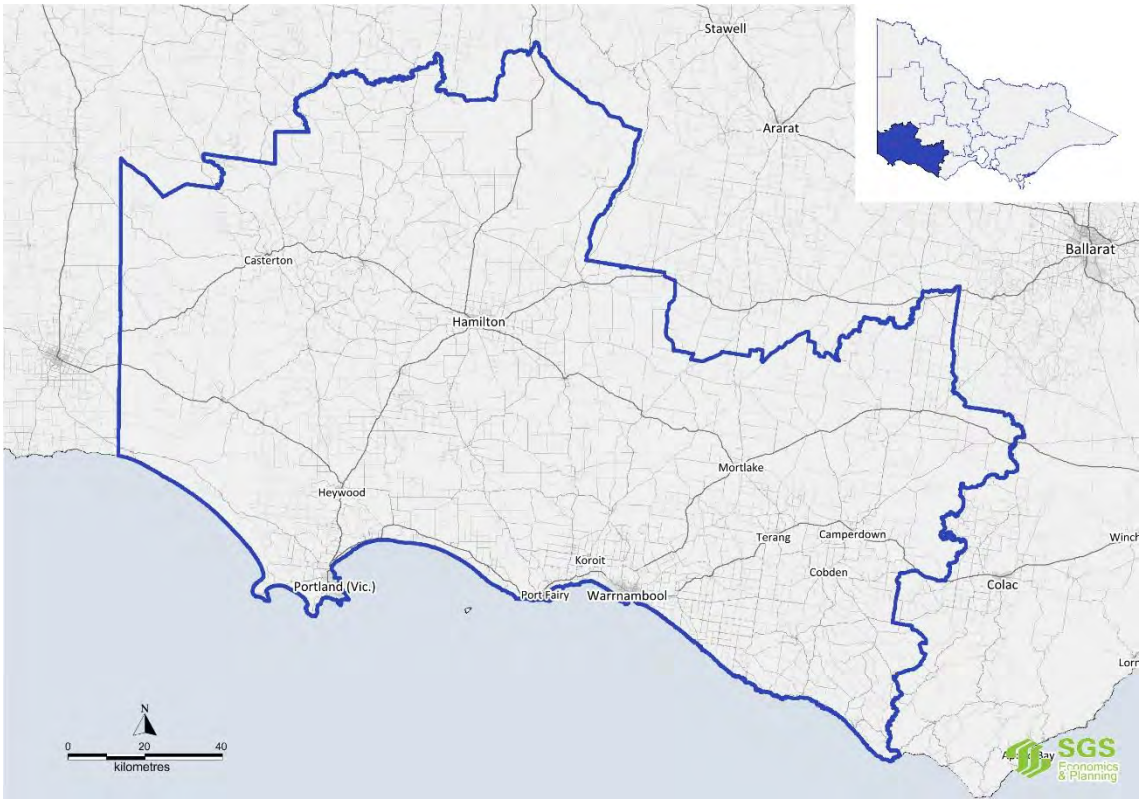
With Mildura's economy expected to diversify through expansions in mining and renewable energy, increased employment in these sectors may require supporting infrastructure. Continued growth in the food production sector may also place pressure on strategic infrastructure (including transportation (freight), food and water storage and irrigation). Continued economic and employment growth will require supporting infrastructure which would increase the capacity of existing road networks, and health and education facilities.

With the frequency of droughts expected to rise due to climate change, pressure will be placed on dams, irrigation and other types of water infrastructure within the Loddon Mallee North region.

5.8 Great South Coast – Warrnambool

The Great South Coast region sits at the south-east of Victoria, along the coast between Geelong and the South Australian border. The Gunditjmara, who inhabited western Victoria including the area around Warrnambool, have many sacred sites and places of deep cultural connection. The region includes the local government areas of Corangamite, Glenelg, Moyne, Southern Grampians and Warrnambool. Agriculture (particularly dairy), forestry and fishing industries are the cornerstones of the local economy, supported by manufacturing that adds value to these primary industries, renewable energy, and tourism. Warrnambool as the regional city is the dominant population centre, and acts as the hub for many of region's services and industries. Other major centres include Portland and Hamilton, and these are well connected to Warrnambool as well as Geelong and Melbourne.

FIGURE 145. GREAT SOUTH COAST



Warrnambool has its origins as a port town from the mid-1800s. Prior to the construction of the railway, the port at Warrnambool allowed for goods from the largely pastoral western Victoria to be exported. The Victorian gold rush resulted in increased demand for agricultural products, with Warrnambool and its surrounding region experiencing high growth in the wool, wheat and potato industries. A regional dairying industry emerged and Warrnambool developed a butter and cheese factory in 1888.
In 1890 the railway network was extended to Warrnambool, therefore providing a reliable and time efficient land route to Geelong and Melbourne. With this rail connection the importance of Warrnambool's port declined until its eventual closure in 1942. The Port of Portland has retained its significance and continues operations today.

Through the early- to mid-20th century Warrnambool developed a strong manufacturing base, with the opening of the Fletcher Jones trouser factor in 1947 bringing the number of large factories in Warrnambool to four. This industrial development was assisted by the decision in the 1920s to extend the Princes Highway through Warrnambool and to the South Australian border.

However, as changes to tariffs impacted on these industries, Warrnambool increasingly looked to tourism. In 1975 Flagstaff Hill was opened, a maritime museum complex around two lighthouses and nineteenth century defensive gun fortifications. The Great Ocean Road has also grown as a destination for national and international tourists.

FIGURE 146. WARRNAMBOOL (1976)

Source: VictorianPlaces.com.au

Warrnambool has increasingly been the major provider of tertiary services to the Great South Coast Region and has a growing professional services base. The city has a campus of Deakin University, and is host to South West TAFE, two hospitals (one of which is a teaching hospital), and state government agencies. The city, and the broader region, has an ageing population.

5.8.1 Current and future state analysis

Warrnambool has been one of the faster growing cities in Regional Victoria, thanks to a growing services and tourism sector, and strong performance in agriculture.

Warrnambool is likely to benefit from a range of simultaneous economic and social trends that will drive growth in the region in the next 30 years: food production and export, renewable energy and urbanisation.

The dominant land use, economic driver and employer in the region is the agricultural sector. Moderate temperatures and good rainfall have supported this sector, which has demonstrated flexibility and resilience in rural production. Employment has, however, declined in terms of overall number (10,700 jobs to 9,700) and proportion of the workforce (22 percent to 18 per cent) between 2001 and 2011 (ABS 2001, 2011).

Food production and export is likely to form a significant part of Australia's export growth in coming decades and Warrnambool is well placed to take advantage of the growing wealth and consumer demand in Asia.

Dairying is the main agricultural industry in the south, while the west focuses on forestry. Livestock and grains industries are located in the north or the region. Dairying and meat production, primarily located in the south, are key industries for value-adding growth, particularly given the scale of growth of the

Asian middle class, and the shift in preferences from this growth towards more 'western' diets. Sufficient milk processing capacity exists within the region to cater for the expected growth until around 2020, however further processing beyond this is likely to be required (Victorian Government 2014g).

Renewable energy is also likely to cause strong economic growth and attract population. Links to the national power grid and natural gas and wind resources mean Warrnambool has seen unprecedented investment interest from Australian and international energy generation companies.

The third trend that will lift Warrnambool is urbanisation. It will continue to be a hub for regional migration, which will add significantly to demand for industries that serve population - things like education, health, construction, retail, etc. The health care and social assistance sector grew the largest over the period 2001 to 2011, adding over 1,500 jobs (ABS 2001, 2011).

The coastal location combined with the region's lakes, estuaries and rivers accommodate various commercial, aquaculture industries and recreational fishing activities (Victorian Government 2014g).

These assets may come under threat as a result of climate change, which is likely to mean a warmer and drier climate, although more frequent and intense downpours, more hot days and warm spells. The threat of bushfire is likely to increase and there will be increased frequency and height of extreme sea level events. This is likely to mean changes to fodder and pasture production for the dairy industry, impacts on pests and diseases, heat stress on livestock and crops, impacts on water security and the impacts of bushfire (Department of Environment, Land Water and Planning 2015d).

The tourism industry is also likely to be affected (damage to infrastructure, increased risks to visitors) and local health and community infrastructure will also experience increased demand (Department of Environment, Land Water and Planning 2015d).

Other sectors which contribute to the regional economy and employment include manufacturing, retail and healthcare. Education institutions generate significant employment and add to the knowledge and research capacity of the region. The professional and service economy within the region is growing, and alternative energy production is also taking place; the region has geothermal, natural gas, wave and wind energy projects either in operation or with planning approvals.

Economic growth has been 1 per cent a year over the ten years to 2014 and incomes have risen 4.4 per cent over the 2006 to 2014 period (ABS 2015d). Unemployment fell from 6.7 per cent in 2001 to 4.8 per cent in 2011 (ABS 2001, 2011).

Amid a state-wide rise in reported crime, Warrnambool has proved relatively immune. The offence rate rose from 6.8 per 100 persons to 7.0 per 100 persons (CSV 2014).

Warrnambool has proved a more desirable location than some other Regional Victorian cities, attracting net inward migration of 1,300 persons between 2006 and 2014 (ABS 2015b). The number of people born overseas increased slightly from 12.1 per cent to 12.6 per cent across 2006 and 2011 (ABS 2006, 2011). Population growth was over 2,500 in the same period, or 1 per cent a year and building approvals have been strong as the population climbed to 34,000 (ABS 2015k).

Like much of Victoria, Warrnambool has seen a prominent population shift to older people in its age profile over the 2009 and 2014 period, with the proportion of population aged 55 and over increasing (ABS 2015a).

As the proportion of youth population has shrunk, average household sizes have decreased. From 2006 to 2011, persons per household fell from 2.37 to 2.28 (ABS 2006, 2011).

The region faces a significant risk in not being able to source and retain sufficient and appropriate skills to service growing demands; existing skill shortages are likely to become more pronounced due to increase in the average age of the population.

Expected inflows of people are likely to more than compensate for decreased natural growth caused by population ageing.

Two-thirds of future employment growth by 2026 will be in health and community services, retail trade and transport and storage (SGS Economics & Planning 2015).

The environment in the region around Warrnambool is sensitive to threats from rabbits and other pests, weeds and also the effects of climate change.

5.8.2 Population and employment scenarios

Varied potential outcomes exist for Warrnambool, with up to a doubling of population possible by 2046 see Table 54 and Table 55).

Business as usual distribution
Under a BAU scenario, Warrnambool's population is projected to growth to between 45,000 and 60,000 people, and 25,000 and 34,000 jobs. This represents growth of between 12,000 and 27,000 people and 8,000 and 17,000 jobs.

This is fairly limited growth and is therefore likely to only require limited infrastructure to support population growth and change.

Consolidated distribution
Under a Consolidated distribution Warrnambool's population is projected to growth to between 51,000 and 69,000 people, and 28,000 and 39,000 jobs.

As with the BAU scenario, there is likely to be demand for additional infrastructure in Warrnambool as a result of this, but it would be limited to population driven infrastructure including health and community infrastructure.

Expansion distribution
Under an Expansion distribution, Warrnambool is projected to grow to between 42,000 and 52,000 people, and 23,000 and 29,000 jobs.

As with the other scenarios, this is likely to generate demand for some limited additional infrastructure.

TABLE 54. POPULATION SCENARIOS ('000) – WARRNAMBOOL

		Low Growth	Middle Growth	High Growth
2016	BAU	33	33	33
	Consolidated	33	33	33
	Expansion	33	33	33
2021	BAU	34	34	36
	Consolidated	35	36	37
	Expansion	34	35	35
2031	BAU	39	41	47
	Consolidated	42	50	52
	Expansion	38	42	43
2046	BAU	45	50	60
	Consolidated	51	65	69
	Expansion	42	49	52

TABLE 55. EMPLOYMENT SCENARIOS ('000) – WARRNAMBOOL

		Low Growth	Middle Growth	High Growth
2016	BAU	18	18	19
	Consolidated	19	19	20
	Expansion	18	18	19
2021	BAU	20	20	22
	Consolidated	21	22	23
	Expansion	19	20	21
2031	BAU	22	23	26
	Consolidated	23	28	28
	Expansion	21	23	24
2046	BAU	25	28	34
	Consolidated	28	36	39
	Expansion	23	28	29

5.8.3 Infrastructure implications

Most scenarios have Warrnambool with a possible population of between 42,000 and 69,000 in 2046. This level of growth would require more follower infrastructure (e.g. community facilities and health infrastructure) to help maintain the attractiveness of the region from a liveability perspective. Continued growth will place pressure on existing infrastructure such as roads, ICT and rail.

Potential pressure points include:

- Growing is likely to place pressure on local transport and community infrastructure in Warrnambool and on links to other towns and cities (including Port Fairy, Geelong and Melbourne).
- An increased urban footprint will also affect the natural environment around Warrnambool with potential impacts on natural habitats.
- But Warrnambool's liveability and productivity are placed at risk by Climate change and the ensuing potential effects in terms of fire, and higher temperatures. Higher rainfall also can result in higher rates of road degradation.

A growing agriculture sector will place pressure on existing urban amenities such as on-site water and sewerage as well as increase demand for high-quality transport and logistics infrastructure to facilitate growth in new markets.

An ageing population in Warrnambool and surrounding areas will have a significant impact on the economy (via the ageing nature of the farming workforce) and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing.

Rising temperatures, less regular rainfall and increasing soil salinity could place pressure on food production in the surrounding hinterland. In this context the infrastructure implications concern:

- The availability of water for agriculture from local sources and the Murray Darling Basin.
- Impacts on employment opportunities and the community's social capital from reduced profitability in agriculture

There are effects on coastal infrastructure from climate change through sea level rise and coastal erosion. In this context the role that the coastal ecosystems play in limiting damage from storms and similar events should be recognised. The threat of inundation due to sea level rise is another significant risk for infrastructure.

The increased likelihood and size of extreme fire events due to climate change, combined with increasing population in the north, will require consideration must be given to the capacity of emergency services system to deal with these events. Bushfires may also result in:

- Communication towers destroyed by fire
- Powerlines destroyed by fire
- Burnt catchments resulting in water quality reduction
- Houses, communities, and sometimes entire towns destroyed in fringe locations and rural areas (Commissioner of Environmental Sustainability Victoria 2013).

Of economic importance, is the Port of Portland – an asset of national significance, supporting exports of grains, livestock, timber, mineral sands and woodchips but it is constrained with a limited area for expansion. Climate change poses risks and costs to the Port, through inundation and sea level rise (DTPLI 2014b).

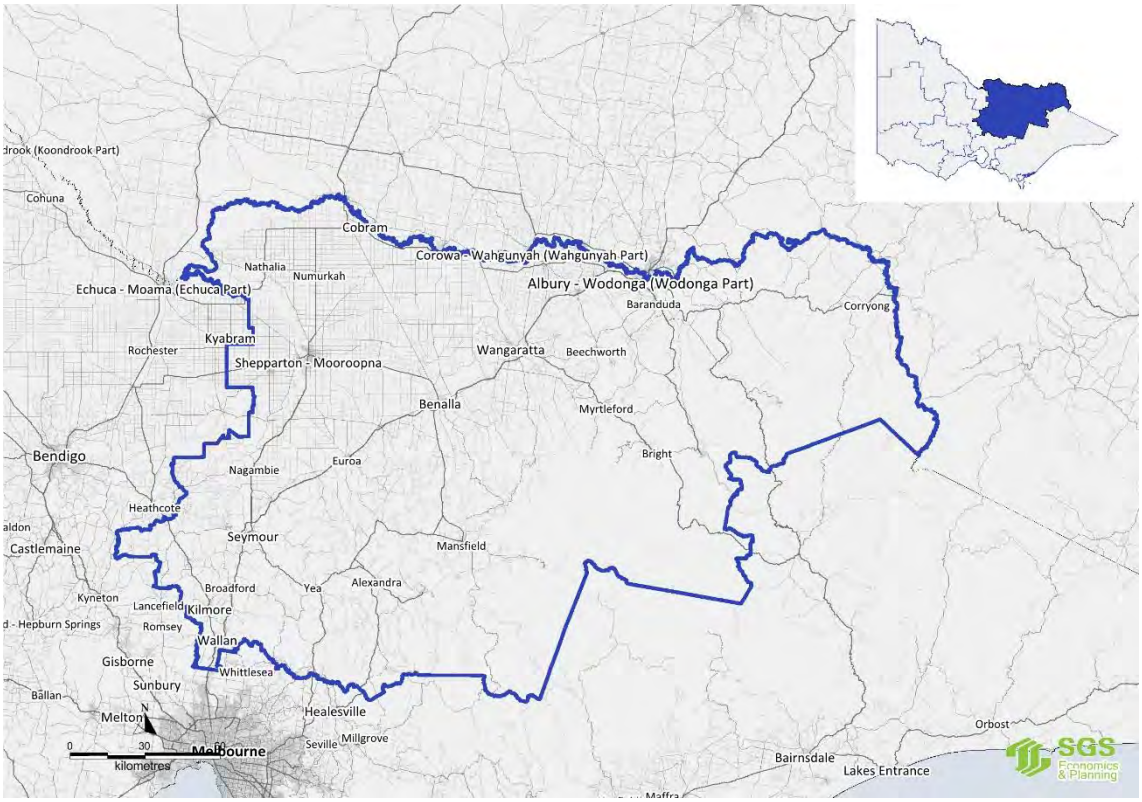
5.9 Hume – Shepparton, Wangaratta and Wodonga

The Hume region is located strategically along major national road and rail transport routes and in 2011, the region had a population of 276,300 people (ABS 2015a). The region has a range of settlement types, including Melbourne's peri-urban regions, regional cities (Shepparton, Wangaratta and Wodonga, each with broader catchments), regional centres such as Benalla, townships and villages, rural residential areas, small and relatively isolated communities, and a small number of alpine resorts.

The southern part of the region lies within the peri-urban influence of Melbourne. The regional cities and centres act as hubs, providing services to networks of smaller settlements.

The Goulburn Valley is an irrigated agricultural area that falls across, and includes, areas within Hume, Loddon Mallee, Lower Murray-Darling Basin and the Goulburn River region.

FIGURE 147. HUME



Shepparton

Shepparton is the centre of the broader Goulburn Valley region. Prior to the European settlement of Australia, Shepparton was inhabited by the Yorta Yorta people (Yorta Yorta Nation Aboriginal Corporation 2015). Their traditional lands run from approximately Cohuna to Albury/Wodonga. They take in areas now better known by their non-Indigenous names of Echuca, Shepparton, Benalla, Corowa and Wangaratta. The Yorta Yorta's connection to Country endures today.

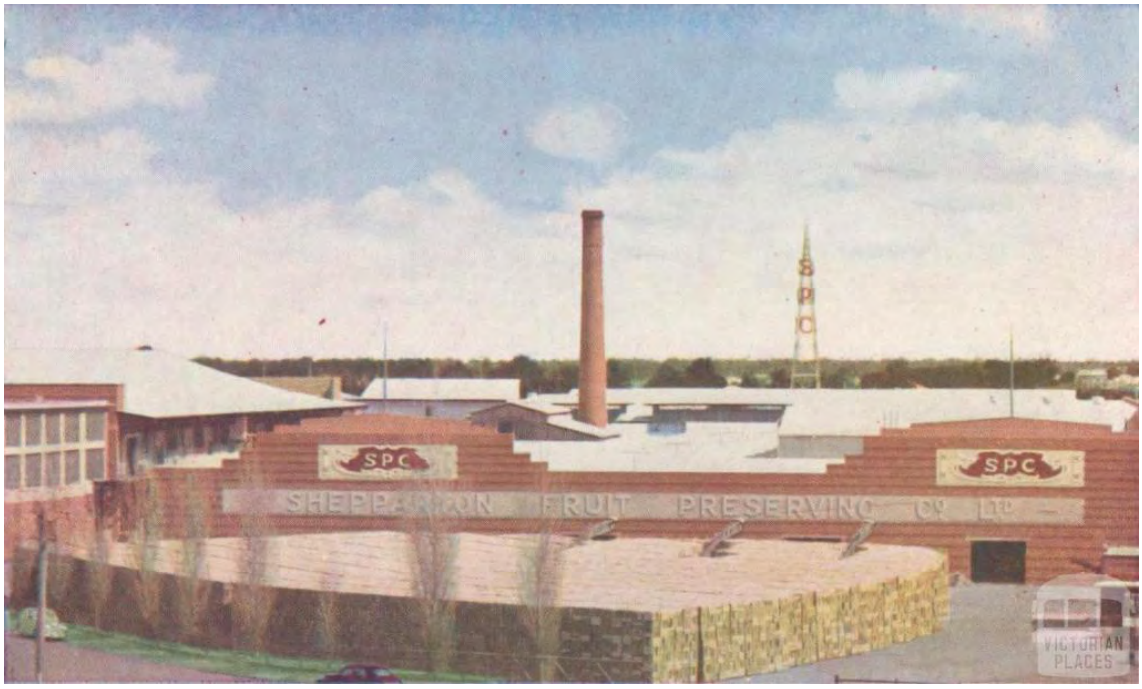
Shepparton is located on the Goulburn River, between the major regional cities of Bendigo to the south-west and Wangaratta and Albury-Wodonga to the east. Its northern border is shared with New South Wales. It is a highly productive agricultural region. Shepparton is host to a majority of its jobs and residents.

While a small village previously, Shepparton grew when gold prospectors from the Bendigo region headed east and crossed the Goulburn River. In 1860 Shepparton was declared a town, and by the 1880s river boats provided transportation, linking Shepparton, via the Goulburn River to the towns of the Murray River further north. At the time the region was dominated by wheat production, which was transported by road and river boat.

Rail was extended from Seymour to Shepparton in 1880, promoting industrial growth. However, it was not until irrigation works took place around the turn of the century that Shepparton experienced more rapid growth. The Goulburn Valley irrigation scheme brought water to much of the surrounding region, providing fertile grounds for agricultural expansion. Key agricultural activities included fruit growing and dairying, and as the focal point for the broader region, Shepparton quickly developed a food manufacturing base, resulting in a period of high growth.

During World War I many fruit orchards in the region produced large crops, resulting in the Shepparton Irrigators Association forming a cooperative cannery – the Shepparton Preserving Company (SPC) in 1917 (Figure 148). By the 1930s SPC had become Australia's largest fruit processing plant.

FIGURE 148. SHEPPARTON PRESERVING COMPANY (SPC)



Source: VictorianPlaces.com.au

Proclaimed a city in 1949, Shepparton went through another period of strong population growth following World War II. The Goulburn Valley irrigation scheme was enlarged with the construction of the Eildon Dam in the early 1950s, and a wave of migrants, particularly Italians, contributed to the population tripling in the following decades. Over 1,000 Victorian Housing Commission homes were built. SPC accounted for over half the workforce in the city at this time.

The 1960s and 70s saw a campaign to revitalise the City of Greater Shepparton, with local governments promoting the replacement of old buildings. As a result of the intensive use of irrigation the soil and water table in the region was affected by increased salinity. To address the agricultural and environmental issues the Victorian Government announced the modernisation of irrigation infrastructure in the Goulburn Murray Irrigation District (GMID) in June 2007.

Today agriculture remains a highly productive sector of the economy and its primary driver. Agricultural activity is predominantly in the dairy and fruit industries. Manufacturing and logistics are also important

sectors, with these sectors associated with, and heavily dependent on, the agricultural sector. In 2014, with support from the Victorian Government, Coca-Cola Amatil (now owners of SPC) pledged a new round of investment in SPC, and signed a large supply deal with Woolworths.

As the regional centre for the Goulburn Valley, Shepparton provides a range of high-order services, and is host to the Shepparton Regional Hospital, University of Melbourne campus at nearby Dookie, La Trobe University, and Goulburn Ovens Institute of TAFE.

Wangaratta

Wangaratta sits centrally in the region, with Shepparton to the west and Wodonga to the east. The traditional indigenous owners of the area surrounding Wangaratta are the Yorta Yorta people. Today, Wangaratta sits on major transport routes between Melbourne and Sydney.

Situated on the junction of the Ovens and King Rivers, Wangaratta grew quickly following the discovery of gold in the Ovens Valley in the 1850s. Miners used the town as a base for commerce, with banks, insurance companies, breweries, mills, and religious institutions emerging.

In 1873 the rail line between Melbourne and Wodonga via Wangaratta was opened, with rail access reinforcing Wangaratta's regional role. It became the centre for retail and education in Victoria's north-east (later performed by Wodonga), and by the 1930s was host to a number of schools and technical colleges.

During World War II an aluminium factory was developed, and while this closed after the war, the building was converted to the Bruck Mills for production of rayon (a fibre made primarily from wool pulp). At its peak the mills' workforce exceeded 1,000 people. With a steady post-war period of growth in manufacturing industries, particularly textiles, Wangaratta's population doubled in the 15 years following World War II to reach 13,000 people. To house the growing workforce, the Victorian Housing Commission built housing in the south of the city (Figure 149).

FIGURE 149. WANGARATTA HOUSING COMMISSION ESTATE (1960)

The upgrading of the Hume Highway meant Wangaratta was strategically placed on both major rail and road corridors between Melbourne and Sydney. Building on Wangaratta's heritage in the textiles

industries, Yakka Overalls established in the 1970s and by the late 1980s had three large factories employing around 1,300 people. The rolling back of tariff protections impacted on the local textiles industry, and the Yakka factory closed in 2000. However, the Bruck factory diversified into specialist fabrics and remains in operation.

The decline in the textiles industry following tariff removals was somewhat offset by growth in the tertiary sector, with IBM operating in Wangaratta from the mid-1980s until the mid-1990s. The city's employment was increasingly driven by growth in the service sectors, with Wangaratta host to several primary and secondary schools, a TAFE, a Charles Sturt University led regional university campus specialising in agricultural courses, major retail chains, and a range of recreation facilities.

The city also has a tourism sector, with the city on route to the snow field regions of Mount Buffalo, Falls Creek and Mount Hotham.

Wodonga

Situated on the southern bank of the Murray River that divides Victoria and New South Wales, Wodonga is generally considered in combination with Albury, which sits on the New South Wales bank of the Murray. Together they are the major regional centre for north-east Victoria and south-east New South Wales. Of the Aboriginal tribes inhabiting the general area, the Wiradjuri people were believed to have moved into the Albury-Wodonga region shortly before the early explorers arrived. The Wiradjuri's connection to Country endures today.

Wodonga was of initial importance as a point of inter-colonial trade, and its population grew rapidly from the 1870s as pastoral runs were opened and the railway from Melbourne to Wodonga was opened in 1873. The rail lines in New South Wales and Victoria were built at different gauges, necessitating that all passengers and goods travelling between Melbourne and Sydney had to be unloaded and loaded onto different trains at Albury-Wodonga, a practice that was in place until the 1960s.

Prior to Federation other cross-border differences also impacted on Wodonga's growth, with differing taxation rates promoting saleyards in Wodonga. On the city's river flats dairy cattle were numerous and several butter factories emerged.

During World War II two military camps were established in the east of Wodonga – Bandiana and Bonegilla. Following World War II, Wodonga saw a substantial wave industrial development in the clothing, timber milling and pipe making industries. Many migrants from Europe arrived, with the former military camp at Bonegilla converted to a migrant reception centre. Between 1947 and 1954, Wodonga Shire's population more than doubled, with some of the population housed in Victorian Housing Commission homes. The city added several primary schools, a high school, and technical school, as well as retail and recreation services.

FIGURE 150. WODONGA OLYMPIC SWIMMING POOL (1965)

Source: VictorianPlaces.com.au

Population and industrial growth continued in the 1960s, notably with the opening of the Uncle Ben's pet food factory and an export abattoir. With this prolonged period of post-World War II growth, the Commonwealth, New South Wales and Victorian Governments agreed to the Albury-Wodonga Development Scheme in 1973. This scheme planned to decentralise population from Australia's existing major cities, and through the Albury-Wodonga Corporation, invested in the infrastructure of the city.

The initial population target for the combined city was 300,000 people by 2000 (from a base of 38,000 in 1971). This was later downwardly revised to 150,000 people, then 106,000 in the year 2000.
While the Albury-Wodonga regional city still fell well short of those projections, Wodonga did double in population between 1971 and 1991. In the 1980s the original saleyard site was developed for the Wodonga Plaza Shopping Centre. In 1985 the Hume Freeway bypass of Wodonga was completed, and in 1991 a local campus of La Trobe University was opened in the facilities previously occupied by a TAFE. In 2014 Federal legislation to close down the Albury-Wodonga Corporation was passed.

Today Wodonga has strengths in freight and logistics, manufacturing, defence, education, health, business services, major sporting events and arts and culture. It provides retail and recreation facilities to the broader region, as well as higher education and healthcare services.

5.9.1 Current and future state analysis

Of the regional cities in the region, population change has varied:

- Wodonga has grown very strongly in recent years, with high population growth and economic growth as the city has built on its existing advantages.
- Shepparton's population has grown moderately in the face of slow economic growth and challenging environmental conditions
- Wangaratta has experienced modest population growth and weak economic growth in recent years.

Overall the population of the region has grown at an average rate of 0.9 per cent a year between 2004 and 2014 (ABS 2015a). Wodonga's population has grown at 1.3 per cent a year over the decade to 2014

to 38,000. The presence of Albury directly across the Murray River means that opportunities and the range of services available in Wodonga are greater than a comparable sized city. The city is likely to continue to grow in population and economic terms with the trends that have energised the Northern Victorian region showing no signs of abating.

Wodonga's strategic advantage is expected to continue to develop further, including a new industrial park, opening up further opportunities for food manufacturing and agribusiness. Development will focus on the CBD, increasing the importance of this central hub as a driver of economic growth and development in the surrounding residential and industrial areas. Retail jobs increased by over 2,500 jobs between 2001 and 2011 (ABS 2001, 2011). Wodonga's strong logistics industry means it is well-placed to take advantage of increased trade links with Asia although this may not necessarily generate significant employment.

The strong growth in education and health service industries is expected to continue as the population continues to age and regional population growth accelerates. The growing population should support these industries.

The city has a relatively young population which should help to encourage future workforce growth in the city's economy. Further out from Wodonga, trend growth is expected to gradually reduce over time as the younger cohorts' population growth slows.

Shepparton's population grew 1.2 per cent a year from 2004 to 2014, increasing from around 44,000 to 49,000 (ABS 2015a). The increase occurred despite net 1,468 people moving away from Shepparton to other parts of Australia between 2006 and 2014. The city is expected to continue its role as a growing regional centre with increased urbanisation bringing more people to Shepparton from surrounding districts. A growing population should create a positive feedback loop supporting the growth of retail, health services and education in the CBD.

However, the ageing population is expected to limit natural population growth and population-based services in regional areas given the age distribution of rural communities.

While manufacturing and mining sectors remain significant to Shepparton, their output and employment numbers are expected to fall in the next two decades. Employment in the region will continue to shift towards service-oriented industries.

Agriculture and food manufacturing in Shepparton is expected to be supported by strong growth in Victoria's population, the evolution of consumer tastes in Asian markets and trade liberalisation (Victorian Government 2014f).

In Wangaratta, population growth was much lower at 0.5 per cent 2004 to 2014; reflecting the trying economic conditions and a relative fall in working age population, suggesting some younger people are moving away (ABS 2015a). This is likely to continue as the city faces a period of low growth and an ageing population. The rate of population growth is forecast to be only 0.39 per cent per annum from 2011-2031. This is likely to result in only modest growth in population serving services such as retail and other food services. Manufacturing, agricultural and utility services are expected to continue to decline. Growth is anticipated to occur in the service-oriented sectors, along with health care, education and arts and recreation industries.

Wangaratta's arts and recreation services sector is expected to grow 3.3 per cent per annum on average from 2011 to 2031, placing it in the top three forecasted fasted-growing sectors in future years.

Wangaratta is forecast to have an older population in future. An estimated additional 100 aged care beds are likely to be required by 2021 and reduced need for kindergarten and childcare places is also forecasted.

With reduction in household sizes and demand for more affordable dwellings, it is projected that more compact, urban housing forms will be required in the region in future to complement detached greenfield housing development.

Other notable changes include:

- In Wangaratta - income growth was a low 3.7 per cent 2006 to 2011, and unemployment fell from 9.5 per cent in 2001, to 6.0 per cent in 2011, a rate still higher than much of the rest of the state.
- Average household sizes in Wangaratta LGA have declined noticeably over the period 2006 to 2011, going from 2.26 to 2.13 persons per households.
- Wodonga has proved attractive for new arrivals. The number of people born overseas increased marginally from 13.1 per cent to 13.5 per cent between 2006 and 2011. Wangaratta has become less diverse. The share of people born overseas decreased from 13.0 per cent to 12.3 per cent between 2006 and 2011 (ABS 2006, 2011).

Wodonga has seen a rise in people aged 55 years and over and a fall in those aged 35-39. This coincided with average household size shrinking in the period 2006 to 2011, from 2.41 persons per household to 2.36 (ABS 2006, 2011). There was also a proportional increase in the numbers of older people. Despite this, Wodonga's population is particularly young compared to other regional cities, with a high proportion of people aged 17 and under (26.1 per cent) and a low proportion of people aged 60 and over (17.5 per cent) (ABS 2006, 2011).

Older people have risen as a share of Wangaratta's population, and there has been proportional decline in the number of males aged 20-24 alongside a proportional increase in females in this age group over the period (ABS 2006, 2011).

Crime rates increased in all three regional cities. Tough economic conditions in Shepparton coincided with higher reported crime, up from 9.6 offences per 100 people to 11.4 in the period 2010 to 2014. Wangaratta saw the biggest increase in reported crime in Victoria, rising from 7.3 offences per 100 people in 2010 to 11.7 in 2014. Reported crime has risen in Wodonga, from 6.9 offences per 100 people to 8.5 per 100 in 2014 (CSV 2014).

Shepparton's regional landscape is highly modified for agriculture with remaining vegetation fragmented into parcels under 1 hectare and found mainly on private land, waterways, wetlands and roadsides. Major threats to the environment include further loss and decline of vegetation, salinity, poor natural drainage, future farming options, floods and especially climate change.

Wangaratta sits in a region with substantial environmental challenges. The water catchment management of which it is part has extremely diverse species population and landscapes. Of these species, 227 flora species are rare or threatened and 102 fauna species are rare or threatened. Climate change will increase the pressure on the environmental assets of the Wangaratta region.

The Region's economy is driven by a range of factors, including:

- the size and growth of its population
- the availability of physical and social infrastructure
- the labour force and density of manufacturing industries (co-location)
- access to natural resources, including water, irrigation infrastructure and productive agricultural land
- iconic tourism destinations such as the Alpine areas and the Murray River
- its strategic location on the Hume (Melbourne-Canberra-Sydney) and Goulburn Valley (Melbourne-Brisbane) national road and rail freight and transport corridors. Access to south-east Australia's population, industry and services is a significant locational advantage of the Hume Region, which continues to attract investment. Major interstate transport corridors (Hume and Goulburn Valley) offer opportunities for transport logistics and warehousing as well as freight movement through and within the region.

These assets and subsequent economic activity is not distributed evenly across the region.

The Wodonga economy has strengthened steadily, building on quality road infrastructure. Wodonga is increasingly considered a strategic location for many national and multinational businesses, particularly transport, logistics, warehousing, etc. More than 75 per cent of Australia's population is able to be reached by next-day transport (CoW 2015).

Population serving industries – including a strong education sector – have also grown in Wodonga which had an average annual economic growth over the decade to 2014 of 2.08 per cent. As a result, unemployment in the city of Wodonga trended downwards from 7.8 per cent in 2001, to 5.6 per cent in 2011, and individual income in Wodonga LGA grew at 4.0 per cent between 2006 and 2011 (ABS 2006, 2011).

Shepparton's economy grew at just 0.42 per cent a year 2004 to 2014, and income growth was low at 3.9 per cent 2006 to 2011. The region has struggled with tough conditions for local industry, including a high Australian dollar. Labour Force participation decreased, from 64.2 per cent in 2001 to 62.8 per cent in 2011. Unemployment improved from 8.2 per cent 2001 to 5.9 per cent in 2011, still higher than much of the rest of the state (ABS 2006, 2011)

Greater Shepparton has a higher share of manufacturing jobs compared with Regional Victoria (13.3 per cent compared with 10.8 per cent). Fruit canning is a major industry in the district, but has struggled with international competitiveness and insufficient rainfall.

Shepparton has also seen a shift away from labour-intensive and industrial sectors towards knowledge-intensive industries. The region saw the number of agricultural businesses fall whilst financial and insurance and professional, scientific and technical service businesses increased in number (ABS 2015i).

The logistics industry is also strong in Shepparton, which is on the junction of the Midland and Goulburn Valley Highways. Shepparton's location makes it an important freight collection and distribution centre, particularly for agriculture and manufacturing (Victorian Government 2014f).

Agriculture is likely to be significantly affected by climate change, including increased temperatures, fewer frosts, more hot days and warm spells and less rainfall. A harsher fire season is also likely. Earlier flowering and planting times, changes to the way pests and diseases are distributed and pasture growth and reduced water security will all impact the sector (Department of Environment, Land Water and Planning 2015e).

Damage to tourism infrastructure and the increased risks to visitors will need to be managed, and the snow season is likely to be shorter with reduced snow depth. Local health and community infrastructure will also experience increased demand (Department of Environment, Land Water and Planning 2015e).

Health infrastructure will experience increased demand, and tourism infrastructure is also likely to occur.

The region's economy is becoming more sophisticated and diverse, but still has a high reliance on manufacturing and agriculture. This is a challenge, particularly given changing climatic conditions, the impact of the Murray-Darling Basin Plan, fluctuations in the value of the Australian dollar, the global labour market and Australia's trade policies. Businesses will need to respond to these challenges while improving productivity to sustain and grow the regional economy. Leveraging off and capitalising on the $2 billion irrigation modernisation investment and on-farm irrigation efficiency program in the Goulburn Valley also presents opportunities. Agricultural production and associated food processing will continue to be an important contributor to the region's economy. The region's natural beauty is a drawcard for the tourism industry, which will continue to be important to generate regional wealth and interest from investors (Victorian Government 2014f).

5.9.2 Population and employment scenarios

Business as usual distribution
Under a BAU distribution:

- Shepparton would grow to between 65,000 and 87,000 people, and 36,000 and 48,000 jobs (Table 56 and Table 57)
- Wangaratta would grow to between 23,000 and 30,000 people and 21,000 and 27,000 jobs (Table 58 and Table 59)
- Wodonga would grow to between 51,000 and 69,000 people, and 26,000 and 36,000 jobs (Table 60 and Table 61).

Shepparton is likely to require some additional health, education, retail, recreation and community infrastructure. Some limited additional employment areas may also be required

Wangaratta's growth is somewhat more limited, but may still require additional infrastructure particularly social, health and community infrastructure and services.

Wodonga's additional infrastructure requirements would need to be considered in conjunction with those of Albury to ensure efficient delivery of infrastructure but it is likely some additional infrastructure would be required.

Consolidated distribution
Under a Consolidated distribution:

- Shepparton would grow to between 74,000 and 102,000 people, and 41,000 and 56,000 jobs.
- Wangaratta would grow to between 26,000 and 35,000 people and 23,000 and 31,000 jobs
- Wodonga would grow to between 58,000 and 82,000 people, and 30,000 and 42,000 jobs

As with the BAU scenario, there is likely to be demand for additional infrastructure in Shepparton, Wangaratta to a lesser extent and Wodonga should be planned in conjunction with neighbouring Albury.

Expansion distribution
Under an Expansion distribution:

- Shepparton would grow to between 60,000 and 76,000 people, and 33,000 and 42,000 jobs.
- Wangaratta would grow to between 22,000 and 27,000 people and 20,000 and 24,000 jobs
- Wodonga would grow to between 46,000 and 60,000 people, and 24,000 and 31,000 jobs

These projections represent relatively limited growth, but would, in the case of Shepparton, generate demand for some additional infrastructure. Wangaratta's growth is limited and, as with the other scenarios, Wodonga should be planned in conjunction with neighbouring Albury.

TABLE 56. POPULATION SCENARIOS ('000) – SHEPPARTON

		Low Growth	Middle Growth	High Growth
2016	BAU	47	47	47
	Consolidated	47	47	47
	Expansion	47	47	47
2021	BAU	50	50	52
	Consolidated	51	52	54
	Expansion	49	50	51
2031	BAU	57	62	68
	Consolidated	62	73	76
	Expansion	55	61	62
2046	BAU	65	74	87
	Consolidated	74	94	102
	Expansion	60	72	76

TABLE 57. EMPLOYMENT SCENARIOS ('000) – SHEPPARTON

		Low Growth	Middle Growth	High Growth
2016	BAU	26	27	28
	Consolidated	27	28	29
	Expansion	26	27	27
2021	BAU	28	29	31
	Consolidated	29	32	33
	Expansion	27	29	29
2031	BAU	30	33	36
	Consolidated	33	39	40
	Expansion	29	32	33
2046	BAU	36	41	48
	Consolidated	41	52	56
	Expansion	33	40	42

TABLE 58. POPULATION SCENARIOS ('000) – WANGARATTA

		Low Growth	Middle Growth	High Growth
2016	BAU	18	18	18
	Consolidated	18	18	18
	Expansion	18	18	18
2021	BAU	19	18	19
	Consolidated	19	19	20
	Expansion	18	19	19
2031	BAU	21	20	25
	Consolidated	23	27	27
	Expansion	20	22	23
2046	BAU	23	22	30
	Consolidated	26	35	35
	Expansion	22	26	27

TABLE 59. EMPLOYMENT SCENARIOS ('000) – WANGARATTA

		Low Growth	Middle Growth	High Growth
2016	BAU	13	12	13
	Consolidated	13	13	14
	Expansion	12	13	13
2021	BAU	14	13	15
	Consolidated	14	16	16
	Expansion	14	14	14
2031	BAU	16	15	19
	Consolidated	17	21	21
	Expansion	16	17	18
2046	BAU	21	19	27
	Consolidated	23	31	31
	Expansion	20	23	24

TABLE 60. POPULATION SCENARIOS ('000) – WODONGA

		Low Growth	Middle Growth	High Growth
2016	BAU	36	36	36
	Consolidated	36	36	36
	Expansion	36	36	36
2021	BAU	38	39	40
	Consolidated	39	40	41
	Expansion	37	38	39
2031	BAU	44	51	53
	Consolidated	48	55	59
	Expansion	42	47	48
2046	BAU	51	64	69
	Consolidated	58	72	82
	Expansion	46	57	60

TABLE 61. EMPLOYMENT SCENARIOS ('000) – WODONGA

		Low Growth	Middle Growth	High Growth
2016	BAU	22	23	23
	Consolidated	23	23	24
	Expansion	22	22	23
2021	BAU	23	24	25
	Consolidated	24	26	27
	Expansion	22	23	24
2031	BAU	24	28	28
	Consolidated	26	30	32
	Expansion	22	25	26
2046	BAU	26	33	36
	Consolidated	30	38	42
	Expansion	24	30	31

5.9.3 Infrastructure implications

Shepparton
Most scenarios have Shepparton with a possible population of between 60,000 and 100,000 in 2046. The growth would require more follower infrastructure (e.g. community facilities and health infrastructure) to help maintain the attractiveness of the region from a liveability perspective.

Potential pressure points include:
- Shepparton's role as a functional and desirable regional centre will depend on strong urban form. A growing city provides an opportunity to remake parts of the city.
- Connections to Melbourne and other regional areas are under strain and will likely increase.
- Climate change places Shepparton at higher risk of higher temperatures and more frequent fires, with potential effects on liveability and agricultural productivity.
- The impact of growing population and industry on biodiversity will also be a risk factor for future growth.

An ageing population in Shepparton will have a significant impact on the economy (via the ageing nature of the farming workforce) and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing.

Wangaratta
Most scenarios have Wangaratta with a possible population of between 22,000 and 35,000 in 2046. This level of growth would require more follower infrastructure (e.g. community facilities and health infrastructure) to help maintain the attractiveness of the region from a liveability perspective.

Potential pressure points include:
- Climate change poses a risk to Wangaratta's productivity and liveability, via increased fire risk and potential effect on agricultural productivity
- Wangaratta's low growth forecasts mean it faces a very small but nevertheless real risk of decline. A falling population can see little-used infrastructure fall into disrepair and population-serving industries recede, creating a feedback loop that inhibits population growth further. Natural patterns of settlement should avert this outcome but if it come to fruition Wangaratta will require a change to productivity or liveability, in order to reverse it.

An ageing population in Wangaratta and surrounding areas will have a significant impact on the economy (via the ageing nature of the farming workforce) and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing.

Wodonga
Most scenarios have Wodonga with a possible population of between 46,000 and 82,000 in 2046. Employment growth in the region is likely to be linked to Wodonga's role as strategic hub on the Eastern

Potential pressure points include:
- Wodonga's logistics advantages are highly dependent on road infrastructure including the Hume Highway. Community attitudes to trucks on the highways and in large cities therefore pose a risk to its continued ability to grow while depending on road transport. Emissions standards changes may also increase pressure on the use of trucks.
- Wodonga is dependent on the health of the Murray River for attracting tourists, and for the health of surrounding irrigated agriculture.
- Wodonga is at risk from climate change, including higher risk of fire and the impact of possible higher temperatures on liveability and agricultural productivity.

seaboard, thus placing pressure on transport linkages from Wodonga to the broader regional, national and global market.

An ageing population in Wodonga and surrounding areas will have a significant impact on the economy and increase demand for aged care services and infrastructure provision, including aged care facilities and appropriate age-friendly housing. This level of growth would require more follower infrastructure (e.g. community facilities and health infrastructure) to help maintain the attractiveness and liveability of the region.

Across the region

Rising temperatures and less regular rainfall in the region, as well as poor soil conditions in the areas surrounding Wangaratta and Wodonga could place pressure on food production in the region. In this context the infrastructure implications concern:

- The availability of water for agriculture from local sources and the Murray Darling Basin.
- Impacts on employment opportunities and the community's social capital from reduced profitability in agriculture

Further challenges exist with dry soil salinity and flooding of low lying areas within the areas surrounding Shepparton, which combined with increased climate change will impact on food production.

The increased likelihood and size of extreme fire events due to climate change, combined with increasing population in the north, will require consideration to be given to the capacity of emergency services system to deal with these events. Bushfires may also result in:

- Communication towers destroyed by fire
- Powerlines destroyed by fire
- Burnt catchments resulting in water quality reduction
- Houses, communities, and sometimes entire towns destroyed in fringe locations and rural areas (Commissioner of Environmental Sustainability Victoria 2013).

6 CONCLUSION

There are several major conclusions that can be drawn from this report.

Population and employment in Victoria will continue to grow, although the rate and profile of growth will vary.

While there is some uncertainty regarding the exact future population, Melbourne is very likely to continue to grow fast, and to accommodate a significant proportion of Victoria's growth. This will be distributed across the metropolis and many parts of Melbourne will undergo significant change: growth areas will develop quickly in to new communities, inner areas will grow as demand for high amenity locations with access to the CBD increases, and middle ring suburbs will continue to evolve.

Regional Victoria is likely to experience a more limited rate of growth: some regional cities may grow, largely at the expense of rural areas and smaller townships, while some areas will experience population decline.

Overall, Victoria's population is likely to age, and this will occur to a greater extent in Regional Victoria. Employment is anticipated to continue to grow across Melbourne and Regional Victoria, although the profile and scale of this will vary by location.

Major forces will continue to influence how and where Victorians live, work and play.

The economic structural change which has seen the shift towards higher skilled, more knowledge intensive jobs, and driven the renaissance of Melbourne's central city, will continue. Areas experiencing significant population growth will continue to generate demand for retail, health, education and other sectors servicing households, while areas which were once bastions of larger scale manufacturing, such as Geelong, will need to draw on their local strengths and adjust to new economic and employment patterns.

A range of changes to the climate are anticipated, and this will affect, among other things, agricultural production and subsequently the economies of Regional Victoria. Key factors in agricultural production (water access, soil quality) will be increasingly variable.

Trends towards reducing reliance on fossil fuels and implementing mechanisms to reduce emissions, (including reducing car usage) will be influenced by how cities are planned and managed, including how new infrastructure is provided and how existing assets are managed.

The projected growth and change, combined with major trends, will have implications for the environmental, economic and social outcomes across Victoria.

Significant population growth in areas which have limited access to employment creates challenges, particularly socioeconomic disadvantage and lower social capital and human capital development.

Disadvantaged areas have higher rates of social issues like crime, domestic violence, chronic disease, lower levels of educational attainment and mental health issues. There is a risk that these trends will worsen without intervention, but infrastructure provides an opportunity to mitigate this to some extent.

An ageing population will generate demand for infrastructure and services. An ageing population can slow economic growth as there are less workers to fill available jobs and people's expenditure patterns change. Managing this issue will be a challenge across the whole of Victoria, but is particularly acute in many regional areas of the State.

There could be impacts on employment opportunities and the community's social capital from reduced profitability in agriculture.

Infrastructure can help inform growth and change and other outcomes across Victoria.

Major transport infrastructure can improve access to economic and other opportunities, and, in some cases, influence the spatial distribution of such opportunities. Investment in regional areas can support industry development and tourism facilities, improve access to education and other services, and create liveable cities.

The role of transport infrastructure in influencing economic and other outcomes is particularly evident in central Melbourne, where infrastructure investment has generated significant benefits for Victoria, and has helped shape the scale and location of growth.

The link between infrastructure provision and usage and the growing issues of climate change is more complex. While extreme events and gradual changes in climate patterns have been observed, how that will impact of the future development of Victoria is less clear.

In future, how Victoria responds to broader challenges and opportunities will be influenced by decisions about the scale, scope and timing of infrastructure delivery.

Specific locations and their infrastructure need to be identified.

While planning for infrastructure requires long lead times and occurs in a particularly complex environment, it is crucial that a strategic approach is taken, and the broader context considered. This will ensure that we invest in infrastructure which creates a resilient, liveable and prosperous Victoria.

This means that infrastructure initiatives need to be conceptualised within the context of a 'creating the sort of Victoria we want' and following the more conventional 'predict and provide' philosophy where infrastructure simply responds to demonstrated demand.

APPENDIX 1. VICTORIAN CLIMATE CHANGE IMPACTS

The most up to date climate change projections are detailed in the reports titled *Climate Change Australia: Projections for Australia's NRM Regions,* published by CSIRO and the Bureau of Meteorology (2015). The projections are designed to assist planning and managing Natural Resource Management (NRM) regions in Australia.

The pathways (used for climate modelling and research) describe four possible climate futures, all of which are considered possible depending on how much greenhouse gases are emitted in the years to come. Two Representative Concentration Pathways (RCP4.5 and RCP8.5) are discussed in Table 63 below, as they have varying implications on global warming and sea level rise increase (shown in Table 62).

TABLE 62. REPRESENTATIVE CONCENTRATION PATHWAYS

	AR5 global warming increase (degrees Celsius) projections		**AR5 global mean sea level (metre) increase projections**	
Timeframe	**2046-2065**	**2081-2100**	**2046-2065**	**2081-2100**
Scenario	Mean and *likely* range	Mean and *likely* range	Mean and *likely* range	Mean and *likely* range
RCP2.6	1.0 (0.4 to 1.6)	1.0 (0.3 to 1.7)	0.24 (0.17 to 0.32)	0.40 (0.26 to 0.32)
RCP4.5	1.4 (0.9 to 2.0)	1.8 (1.1 to 2.6)	0.26 (0.19 to 0.33)	0.47 (0.32 to 0.63)
RCP6.0	1.3 (0.8 to 1.8)	2.2 (1.4 to 3.1)	0.25 (0.18 to 0.32)	0.48 (0.33 to 0.63)
RCP8.5	2.0 (1.4 to 2.6)	3.7 (2.6 to 4.8)	0.30 (0.22 to 0.38)	0.63 (0.45 to 0.82)

Source: IPCC, 2014

The table below describes the climatic trends projected for the two Victorian natural resource management clusters. These projections are reliant on various greenhouse gas trajectories adopted by the IPCC for its fifth Assessment Report (AR5) in 2014.

TABLE 63. CLIMATE CHANGE PROJECTIONS: MURRAY BASIN AND SOUTHERN SLOPES CLUSTERS

Projections	**Murray Basin**	**Southern Slopes**
Higher temperatures	Continued substantial warming for the Murray Basin cluster for mean, maximum and minimum temperature is projected with very high confidence, taking into consideration the robust understanding of the driving mechanisms of warming and the strong agreement on direction and magnitude of change amongst GCMs and downscaling results. By 2030, the mean warming is projected to be around 0.6 to 1.3°C above the climate of 1986–2005, with only minor difference between RCPs. For late in the 21st century (2090), it is 1.3 to 2.4°C for RCP4.5* and 2.7 to 4.5°C for RCP8.5*.	Continued increases in mean, daily maximum and daily minimum temperatures are projected for the Southern Slopes cluster with very high confidence. By 2030, the projected increase of mean annual temperature is around 0.4 to 1.1°C above the climate of 1986–2005. For late in the century (2090), there is a large difference between emission scenarios, with projected warming of 1.1 to 2.0°C for RCP4.5 and 2.5 to 4.0°C for RCP8.5.
Hotter days, more frequent hot days, less frost	A substantial increase in the temperature reached on the hottest days, the frequency of hot days and the duration of warm spells are projected with very high confidence. Correspondingly, a decrease in the frequency of frost days is projected with high confidence. A change in diurnal range (the difference between daily minimum and maximum temperature)	A substantial increase in the temperature reached on the hottest days, the frequency of hot days and the duration of warm spells is projected with very high confidence. Correspondingly, a decrease in the frequency of frost-risk days is projected with high confidence. For example, in Melbourne the annual average number of days above 35°C is projected to

Projections	Murray Basin	Southern Slopes
	is projected during the cool part of the year (April to October) where daily maximum could warm up to 1°C more than daily minimum by 2090 following the RCP8.5 high emission scenario.	more than double by 2090 under RCP8.5 and median warming.
Generally less rainfall in cooler seasons, but with regional differences; less snow (in the southern slopes). No rainfall changes in the warm season Murray Basin.	By 2030, there is high confidence that natural climate variability will remain the major driver of rainfall differences from the climate of 1986–2005 (annual-mean changes of -10 to +5 per cent, winter-mean changes of -15 to +10 per cent, and summer-mean changes of -15 to +15 per cent). Late in the century (2090) under both RCP4.5 and RCP8.5, there is high confidence that cool season rainfall will continue to decline and there is medium confidence that rainfall will remain unchanged in the warm season (November to March).	There is high confidence that natural climate variability will remain the major driver of rainfall changes by 2030. Changes in 20-year mean rainfall are about -10 to +5 per cent annually and about -20 to +15 per cent seasonally. A good understanding of the driving mechanisms and high agreement between models means there is high confidence for rainfall decreases in winter and spring in this cluster under higher emissions (RCP8.5) from 2050 to 2090, but with some differences between sub-clusters and between seasons. By 2090, spring rainfall is projected to decrease across every sub-cluster by around -25 to +5 per cent under RCP4.5 and -45 to +5 per cent under RCP8.5. Most models project a decrease in winter rainfall in Victoria of up to -15 per cent under RCP4.5 and up to -30 per cent under RCP8.5.
Increased intensity of heavy rainfall events, more time in drought	There is high confidence that the intensity of heavy rainfall events will increase. There is low confidence in the magnitude of change, and therefore the time when any change may be evident against natural variability, cannot be reliably projected. There is medium confidence that the time spent in meteorological drought, and the frequency of extreme drought, will increase over the course of century under RCP8.5.	There is high confidence that the intensity of heavy rainfall events will increase. The magnitude of change, and the time when any change may be evident against natural variability, cannot be reliably projected. There is medium confidence that the time spent in meteorological drought will increase over the course of the 21st century in line with changes to mean rainfall, and the frequency and duration of extreme droughts will increase. Projected changes to drought vary by sub-cluster and are greater for RCP8.5 than for RCP4.5.
Changes in wind speed	Small changes are projected for mean surface wind speeds with high confidence under all RCPs by 2030. Decreases in winter wind speeds are projected for 2090 with medium confidence based on model results and physical understanding (i.e. a southward movement of storm tracks and a strengthening of the subtropical ridge). Small or inconsistent changes are present in the other seasons.	Small changes are projected with high confidence for mean surface wind speed under all RCPs, by 2030. Literature suggests a decline in the number, but an increase in the intensity, of East Coast lows, which would have an effect on both mean rainfall and heavy rain events, especially in the eastern districts of the Southern Slopes.
Increased solar radiation and reduced relative humidity in winter and spring	Small changes are projected for solar radiation and relative humidity by 2030. By 2090, there is high confidence in increased winter and spring radiation (related to decreases in cloudiness associated with reduced rainfall), medium confidence in decreases in relative humidity in summer and autumn, and high confidence in decreases in winter and spring.	An increase in solar radiation and a decrease in relative humidity are projected in the winter and spring under RCP4.5 and RCP8.5 with high confidence. Changes in solar radiation and relative humidity are influenced by changes in rainfall (and associated changes to cloudiness) and temperature in the Southern Slopes. Projected changes in summer and autumn solar radiation and relative humidity are less clear.
Increased evaporation rates, reduced soil moisture and runoff	Projections for potential evapotranspiration indicate increases in all seasons, with largest rates projected with high confidence in summer by 2090. Soil moisture projections suggest overall seasonal decreases by 2090 (medium confidence). These changes in soil moisture are strongly influenced by those in rainfall, but tend to be more negative due to the increase in potential evapotranspiration. For similar reasons, runoff is projected to decrease (low confidence).	There is high confidence that potential evapotranspiration will increase in Southern Slopes in all seasons by 2090, with largest absolute rates in summer. This is driven largely by increasing temperatures, but also changes to radiation, humidity and wind speed. Changes to rainfall and evapotranspiration are projected to lead to a decrease in soil moisture and runoff under RCP4.5 and RCP8.5 with high confidence. Changes in soil moisture and runoff are strongly influenced by changes in rainfall, but tend to be more negative due to the increase in potential evapotranspiration.
A harsher fire weather climate in the future	There is high confidence that climate change will result in a harsher fire-weather climate in the future. However, there is only low confidence in the magnitude of the projected change to fire weather.	There is high confidence that climate change will result in a harsher fire-weather climate in the future. However, there is low confidence in the magnitude of the change to fire-weather. This depends on the

Projections	Murray Basin	Southern Slopes
	This depends on the rainfall projection and its seasonal variation. The enhanced summer rainfall projected in some scenarios could moderate the number of severe fire weather days.	rainfall projection, particularly its seasonal variation.
Higher sea levels and more frequent sea level extremes	There is very high confidence that sea level will continue to rise in the 21st century. By 2030 the projected range of sea level rise for Victorian coastline is 0.07 to 0.19m above the 1986–2005 level. Past 2030, projections are sensitive to emissions pathways. By 2090, RCP4.5 gives a rise of 0.27 to 0.66m, and RCP8.5 gives a rise of 0.39 to 0.89m. These ranges of sea level rise are considered likely. However, if a collapse in the marine based sectors of the Antarctic ice sheet occurred, these projections could be much higher by late in the century.	
Warmer oceans in the future.	Warming is projected in the range of 1.5 to 3.4°C for RCP8.5 by 2090.	Warming is projected to continue, with increases in the range of 1.6 to 5.1°C by 2090 are projected under RCP8.5.
More acidic oceans	There is very high confidence that around Australia the ocean will become more acidic. By 2030, pH is projected to fall by up to an additional 0.08 units in the coastal waters. By 2090, pH is projected to fall up to 0.15 under RCP4.5 and up to 0.33 under RCP8.5. This would represent an additional 40 per cent and 110 per cent in acidity respectively. Continued acidification will compromise the ability of calcifying marine organisms such as corals, oysters and some plankton to form their shells or skeletons.	

Source: CSIRO and Bureau of Meteorology 2015.

APPENDIX 2 – SCENARIOS TECHNICAL APPENDIX

Inherent uncertainty in forecasting

Producing land use forecasts requires assumptions to be made about two key parameters:

- Firstly, the level of aggregate population and employment growth Melbourne is likely to experience.
- Secondly, the distribution of this aggregate level of population and employment growth.

Both of these parameters are highly uncertain and are driven by a range factors that are both known when projections are produced and factors that are unknown. The latter could include changes in technology that, for example, reduce the need for people to live in close proximity to public transport. The various sources of uncertainty have been well articulated by Donald Rumsfeld, former Secretary of Defence:

> *"Reports that say something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones"- Donald Rumsfeld.*

Historical (in)accuracy of planning forecasts

Reflecting the nature of uncertainty outlined above, planning forecasts have historically been quite inaccurate. For example:

In 1929, the population of Melbourne was predicted to increase to 2 million in 20 years. In reality, it took close to 40 years to reach this level due in part to the Great Depression and World War II (see below).

FIGURE 151. 1929 POPULATION FORECASTS

In view of these considerations the Commission considers it wise, from a town-planning point of view, to base its calculations of future population upon the average of 3·5 per cent. per annum increase. The population of the Metropolis should on this basis reach the following approximate figures in the years indicated :—

1930	1,083,000
1940	1,528,000
1948	2,012,000

This would mean the doubling of the present population in 20 years' time.

The population of Melbourne is 56 per cent. of that of the State of Victoria.

In 1954, the population was expected to increase to 2.4 million in 25-30 years (early 1980s), where in fact 2.4 million was reached in 1970; some 10-15 years earlier than expected[17].

FIGURE 152. 1954 POPULATION FORECASTS

STATISTICAL COMPARISON OF EXISTING CONDITIONS AND PLANNING PROPOSALS

Statistical District	Municipality	Area (acres)	Population		Industry*		Shopping‡	Public Open Space†	
			1952-3	Planned	Existing	Planned	Planned No.	Existing	Planned
Central	Melbourne	7,850	101,100	90,000	473	627*	860*	1,286	1,480
	Port Melbourne	2,585	13,750	15,000	421	806	180	70	185
	South Melbourne	2,200	43,500	45,000	217	370	430	457	459
	Richmond	1,520	37,200	38,000	201	292	560	189	219
	Collingwood	1,170	28,500	30,000	209	338	325	95	167
	Fitzroy	900	32,000	32,000	101	78	630	47	47
	Total		256,050	250,000	1,622	2,511	2,985	2,144	2,557
Western	Williamstown	3,430	28,900	40,000	228	683	350	247	417
	Footscray	4,370	57,800	68,000	520	814	780	315	464
	Werribee	36,390	6,200	24,000	128	2,304	205	223	623
	Sunshine	19,900	26,900	78,000	1,063	4,701	290	213	689
	Total		119,800	210,000	1,939	8,502	1,625	998	2,193
Northern	Essendon	4,090	59,500	70,000	31	59	880	330	415
	Brunswick	2,595	59,000	55,000	120	163	700	103	142
	Northcote	2,840	46,800	50,000	73	220	540	215	250
	Coburg	4,700	61,000	85,000	80	329	630	237	444
	Preston	9,000	57,750	108,000	200	491	670	307	542
	Keilor	35,080	6,500	75,000	40	234	270	54	802
	Broadmeadows	35,230	14,900	85,000	41	429	550	164	792
	Whittlesea	29,500	2,000	22,000	24	483	140	27	101
	Total		307,450	550,000	609	2,408	4,380	1,437	3,488
Eastern	Heidelberg	27,540	52,700	120,000	151	301	1,005	977	1,308
	Eltham	9,890	4,750	40,000	18	113	155	126	350
	Kew	3,590	33,500	35,000	5	8	355	446	660
	Hawthorn	2,450	41,000	42,000	9	184	595	141	174
	Camberwell	8,735	90,600	115,000	18	85	1,200	757	761
	Doncaster and Templestowe	22,000	5,450	80,000	34	95	295	332	948
	Box Hill	5,200	32,000	62,000	7	140	820	373	579
	Nunawading	10,490	16,750	95,000	57	434	500	141	595
	Ringwood	5,715	9,500	41,000	32	386	350	133	353
	Total		286,250	630,000	331	1,746	5,275	3,426	5,728
Southern	St. Kilda	2,060	58,800	66,000	10	39	850	290	284
	Prahran	2,375	60,700	68,000	48	178	940	82	93
	Malvern	3,890	50,800	56,000	30	83	805	369	362
	Caulfield	5,450	84,200	85,000	19	48	1,320	350	384
	Brighton	3,305	43,300	46,000	20	19	430	340	337
	Sandringham	3,745	32,000	43,000	56	200	525	486	496
	Mordialloc	3,090	19,100	30,000	70	158	240	143	166
	Chelsea	3,050	15,200	27,000	20	91	255	208	315
	Frankston and Hastings	11,800	11,500	53,000	9	186	630	417	867
	Oakleigh	3,360	21,200	36,000	106	520	340	95	110
	Moorabbin	13,730	52,300	105,000	158	862	1,390	339	767
	Mulgrave	16,830	11,950	90,000	26	848	475	211	1,292
	Dandenong	35,840	20,500	85,000	108	927	680	187	721
	Total		481,550	790,000	680	4,159	8,880	3,517	6,194
Metropolitan Total			1,451,100	2,430,000	5,181	19,326	23,145	11,522	20,160

(*) Excluding Extractive Industries.

(†) Including creek reserves, public golf courses, etc.

(‡) Number of Units with average frontage of 20 feet.

(*) Excluding Central Business Area.

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Figures for Industry and Public Open Space show areas in acres.

Victoria's official government population projections, Victoria in Future (VIF), have routinely been upwardly revised in recent years. For example, the 2004 VIF projected that Melbourne would reach a population 4.5 million in 2031, where in fact it is likely that Melbourne will reach 4.5 million in 2015. As illustrated in the following table, the 2014 release of VIF has Melbourne growing from a population of 4.17 million people in 2011 to almost six million by 2031. Compared with VIF estimates made in the last decade, this forecast is a substantial upward revision. The current VIF (2014) projection for Melbourne's population at 2031 is over 1.4 million people higher than the 2004 VIF vintage. Comparing the VIF 2014 projection with the VIF 2012 projection also reveals a large discrepancy, with the city anticipated to house an additional 540,000 people by 2031 when compared to the projection made just two years previously.

17 http://www.dtpli.vic.gov.au/__data/assets/pdf_file/0016/230371/Planning-Scheme-1954-Report_Appendix.pdf

TABLE 64. VARIOUS VINTAGES OF MELBOURNE POPULATION PROJECTIONS

VIF Vintage	2011 Population Estimates / Projections	2031 Population Projection	Revision Compared with 2004	Revision Compared with 2008	Revision Compared with 2012
VIF 2014	4,170,000	5,860,000	1,320,000	580,000	450,000
VIF 2012	4,140,000	5,410,000	870,000	130,000	-
VIF 2008	4,080,000	5,280,000	740,000	-	-
VIF 2004	3,880,000	4,540,000	-	-	-

Source: Victoria in Future. Note: Numbers have been rounded to the nearest 10,000

Given the historic inaccuracy of central planning forecasts, SGS has incorporated uncertainty into the forecast framework. In addition to the central scenario, a range of alternative scenarios have been produced that reflect two key dimensions:

- The level of aggregate population and employment growth, and
- The spatial distribution of this aggregate level of population and employment growth.

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