

INFRASTRUCTURE
VICTORIA



October 2023

Choosing Victoria's future

Five urban development scenarios



About us

Infrastructure Victoria is an independent advisory body with 3 functions:

- preparing a 30-year infrastructure strategy for Victoria, which we review and update every 3 to 5 years
- advising the government on specific infrastructure matters
- publishing research on infrastructure-related issues.

Infrastructure Victoria also helps government departments and agencies develop sectoral infrastructure plans.

Infrastructure Victoria aims to take a long-term, evidence-based view of infrastructure planning, and we inform community discussion about infrastructure provision.

Infrastructure Victoria does not directly oversee or fund infrastructure projects.

Acknowledgement

Infrastructure Victoria acknowledges the Traditional Owners of Country in Victoria and pays respect to their Elders past and present, as well as Elders of other First Peoples' communities. We recognise that Victoria's infrastructure is built on land that has been managed by Aboriginal people for millennia.





Contents

Summary	4
Victoria's choices will shape its future	8
Key findings	14
Recommendations	26
Dispersed city	34
Melbourne keeps expanding	34
Impacts and costs of the dispersed city scenario	37
Policies that could enhance or mitigate dispersed city outcomes	41
Consolidated city	46
Melbourne develops high-density precincts	46
Impacts and costs of the consolidated city scenario	50
Policies that could enhance or mitigate consolidated city outcomes	54
Compact city	58
Melbourne is a compact, high-density city	58
Impacts and costs of the compact city scenario	61
Policies that could enhance or mitigate compact city outcomes	66
Network of cities	70
Victoria's 3 largest regional cities grow rapidly	70
Impacts and costs of the network of cities scenario	73
Policies that could enhance or mitigate network of cities outcomes	76
Distributed state	80
Many more people live in dispersed rural areas	80
Impacts and costs of the distributed state scenario	82
Policies that could enhance or mitigate distributed state outcomes	88
References	91



Summary



Summary

What will living in Victoria be like in 2056? Where will people live and work? And how will this affect the infrastructure they need, their quality of life, and the natural environment?

Government projections suggest around 11 million people will live in Victoria in 2056. That is about 4.5 million extra people compared to 2022. How and where Victoria builds homes and infrastructure for all these people has consequences for Victorians' quality of life, the Victorian economy, and the natural environment.

Governments, businesses and individual people make choices that shape our cities and regions. They choose places to build and buy homes, and where road and rail connections will go. They design infrastructure networks for electricity, water and telecommunications, and the locations of major facilities for people, like schools, hospitals, parks, sports grounds and community facilities. The combined effect of all these choices influences how people live, work, learn, socialise and move around Victoria.

Infrastructure Victoria explored 5 different scenarios to help better understand the consequences of these different choices. We wanted to show how different ways of growing might affect Victorians in the future. Each scenario represents a different way Victoria's cities and regions might change in the future. All of them have the same number of people, but each assume new homes and infrastructure are built in different places.

Our 5 urban development scenarios for Victoria

Infrastructure Victoria developed these 5 scenarios for this report:

- **dispersed city:** Melbourne's growth areas have many more detached homes
- **consolidated city:** Melbourne's inner and middle areas have many more medium-density homes
- **compact city:** Melbourne's inner areas have many more high-density homes
- **network of cities:** regional centres have many more homes
- **distributed state:** regional towns and rural areas have many more homes.

City shape choices have consequences

We analysed these different city shapes, to find out how each scenario performed on different measures. We looked at how many homes might be built in different places, the types of homes produced, and how expensive they might be. We looked at the performance of the economy, and what types of jobs people might work in. We estimated the quantity of greenhouse gas emissions that might be produced, and how much land each scenario might use. We also examined the types of infrastructure these different city shapes might need to function, and how much this infrastructure might cost.

Each scenario has advantages and disadvantages. But overall, the results tell us that more consolidated or compact cities usually perform better on many dimensions. These types of cities typically allow people more choices to find an affordable home in different places, more options to travel, and make it easier for people to get to important destinations, like work, study, or to access health and social services. They avoid building too many homes in places where people find it hard to reach the jobs and services they need.

Our research finds that more consolidated or compact cities in Victoria have stronger economies. They offer businesses better opportunities to hire great staff and make more connections with potential customers and markets. They are more likely to create high-paid, secure work. And infrastructure in these types of cities is likely to be more affordable for governments. For example, our modelling shows infrastructure for each new home in a more dispersed city costs \$59,000 more than in a compact city, with a total additional cost of up to \$41 billion.

The environmental impacts of more compact or consolidated cities in Victoria are less harmful. These city shapes produce fewer greenhouse gas emissions overall, especially because people have more chances to walk, cycle or use public transport. They use less land that might otherwise be used to grow food or provide habitats for wildlife. For example, we estimated a dispersed city might use an extra 30,000 hectares of land, compared with a compact city.

Victoria faces choices that involve compromise

No city is perfect. Governments and communities face choices between alternatives that will not always suit everyone. For example, unlocking the benefits of more consolidated or compact cities means building more townhouses and apartments. This means more people will live in these types of homes, and not everyone can live in a detached house. It also means established suburbs will change more quickly, and construction activities will generate more noise and disruption. Construction will also generate more greenhouse gas emissions, although these will be more than offset by fewer emissions from transport.

Similarly, while overall infrastructure costs are lower in more consolidated or compact cities, this is not true for every infrastructure type. Some costs might be higher, particularly for schools, community facilities and open space, because these would need to be built in established suburbs, where land and construction is more expensive.

Many people will still live in Melbourne's outer suburbs, new growth areas, and regional areas in any future. But making measured choices about our city shape will ensure that these residents can also be served with the infrastructure they need in a timely way.

A pathway to a better quality of life and more choices for Victorians

We did this research to show people how different choices might affect the lives of Victorians in the future. We hope it can help inspire governments, businesses and communities to coordinate their decisions to create a shared view of how Victoria might change in the decades ahead.

Victoria is already mapping out these pathways. *Plan Melbourne 2017–2050*, Melbourne's metropolitan planning strategy, includes an aspiration for 70% of new homes to be built in established areas. Regional cities including Ballarat and Bendigo aspire to achieve 50% of growth in their established areas.^{1,2}

But governments will need to make changes to achieve these goals. We have used our research to develop recommendations for the Victorian Government to help put the state on a trajectory to a fairer, more productive and more sustainable future.

Our recommendations set out changes the government can make to help achieve a more consolidated or compact city shape and reduce some of the difficulties that might cause. The government can use different tools to help do this. It can better plan its infrastructure, to help smooth the path to its desired city shape. It can reform its planning and taxation policies to help build more apartments and townhouses in good locations and minimise the effects on other people. It can include regional Victoria in its future plans, and help regional cities grow with enough jobs and infrastructure to support those communities. And it can better incorporate climate change in the way we build our cities, to make sure Victoria grows sustainably and achieves its zero emissions targets.

Ultimately, Victorians will choose the type of cities and regions they want to live in. We think this research shows that they can have better lives, higher incomes, and a more sustainable environment if they choose to live closer together.

Recommendations



Use a new plan for Victoria to reinforce established area growth, set regional city urban growth boundaries, and include housing targets for the established areas of Victorian cities. Use these targets in land use framework plans, regional growth plans, and the Victoria Planning Provisions.



Develop and publish long-term plans for infrastructure sectors to meet the policies and targets set by a new plan for Victoria. Use these integrated land use and infrastructure plans to decide infrastructure project funding.



Reform infrastructure contributions, remove taxes and subsidies that fuel dispersed growth, and change planning rules to create more compact cities in Victoria.



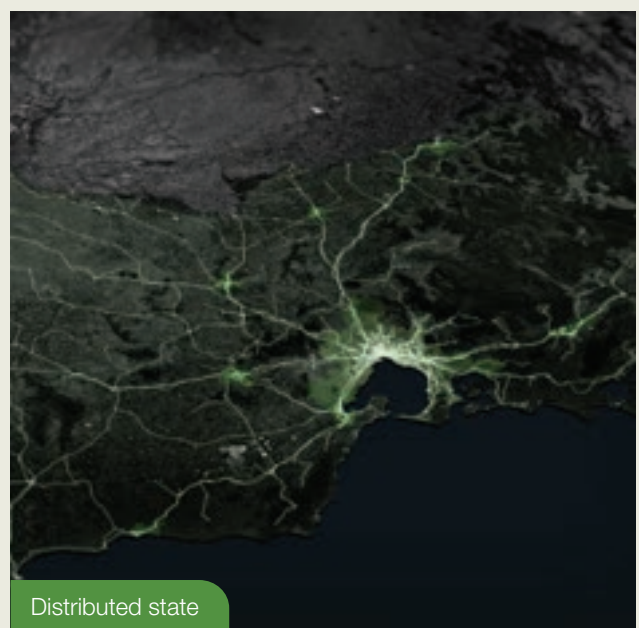
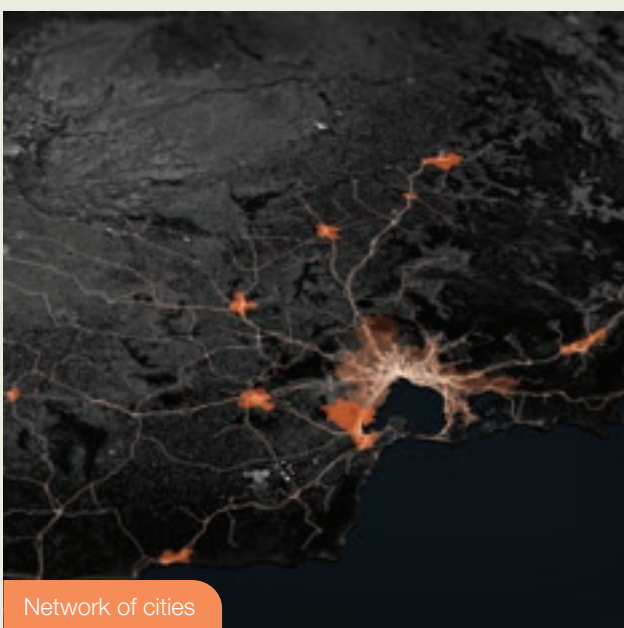
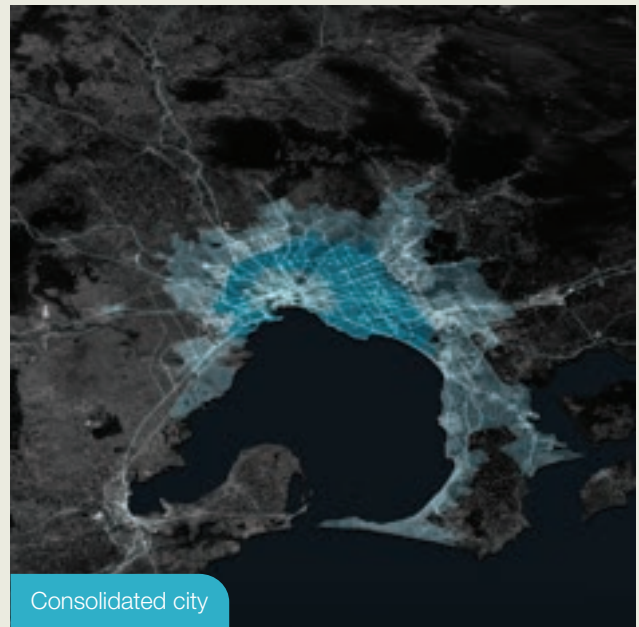
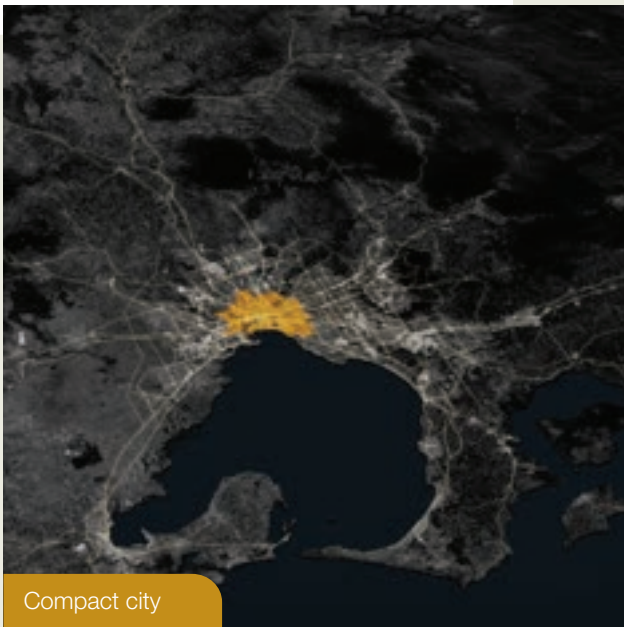
Plan for and deliver infrastructure that supports more people and jobs locating in established parts of major regional centres, including local transport, energy, water and digital infrastructure.



Plan for efficient and resilient electricity distribution infrastructure. Stimulate development and use of zero or low carbon materials and building construction and operation methods that reduce greenhouse gas emissions.

Choosing Victoria's future

Five urban development scenarios



By the numbers



11 million people

Victoria's population is expected to reach more than 11 million people in the next 30 years



56%

of metropolitan Melbourne's growth has been occurring in outer and growth areas, with greater proportions in regional cities

Benefits of more compact cities



\$59,000 per new home

Infrastructure cost saving for every additional new home in a compact city compared to a dispersed city



\$43 billion

The total economic benefit to Victorians in a compact city than in a dispersed city



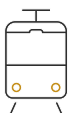
30,000 hectares

Amount of land saved in more compact cities, equal to over 12,000 times the Melbourne Cricket Ground



\$52 to \$105 billion

Housing benefits generated by more compact cities



25% more public transport use

in more compact cities



154,000 less cars

in a compact city than a dispersed city



70% less time in congested conditions

in more compact cities

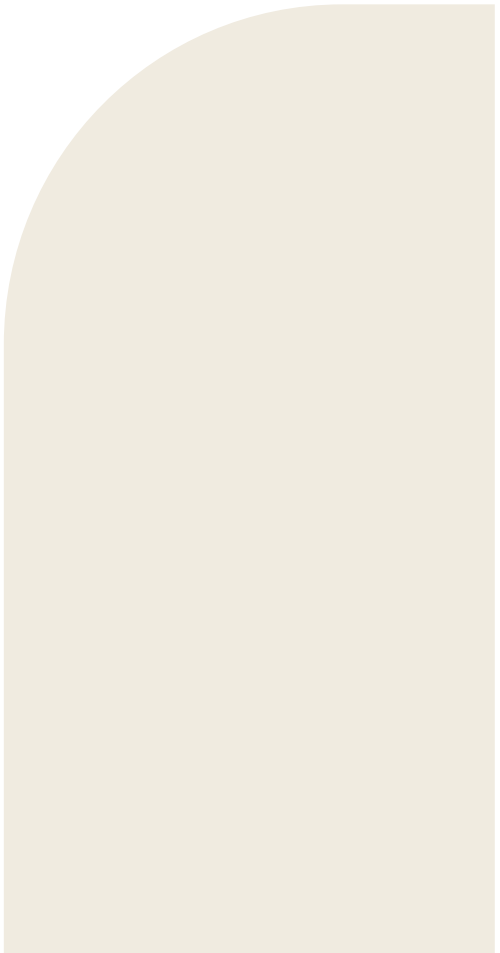


17.3 million tonnes

Less emissions from trucks and cars in a compact city than in a dispersed city



Victoria's choices will
shape its future



Victoria's choices will shape its future

Infrastructure Victoria has imagined 5 different futures for the places people might live and work. We used up-to-date data and undertook detailed modelling to compare the outcomes of these different scenarios to help Victorians understand the choices they face.

Nobody knows exactly what the future holds. But we can make informed estimates. The Victorian Department of Transport and Planning estimates 11.2 million people will live in Victoria by 2056, including around 9 million in Melbourne. Victoria's regions are also expected to grow to 2.3 million, with around half of regional growth projected to occur in the cities of Greater Geelong, Ballarat and Bendigo.³

These projections are informed by evidence, analysis and expert advice. But the COVID-19 pandemic demonstrated that reality can differ from projections. External factors can change where people want to live and work. So when people think about the future, they should not expect it will unfold exactly as predicted. If people, businesses and the government make different choices, the future will change too.

These choices have consequences. For example, if the government releases land for housing development far from jobs and services, the people living in those homes are likely to face long commute times and find it hard to access facilities and support.

Infrastructure is expensive. It takes time to plan, build and make it operational. It lasts a long time and is difficult to change or move afterwards. Decisions about the location of new homes affect choices about when and where to build new infrastructure. They also affect how much infrastructure the government might build, and how much it will cost. Ultimately, the Victorian community pays for this infrastructure, whether in the prices of their homes, the charges they pay for services, or the taxes they pay.

Inspiring coordinated urban policy choices

We undertook this research to generate insights and stimulate informed discussion on the shape of Victoria's urban growth and infrastructure. Current infrastructure and land use settings have produced rapid home building in Melbourne's outer growth areas, which has led to more dispersed development patterns. The Victorian Government's metropolitan planning strategy, *Plan Melbourne 2017–2050*, aspires to achieve more compact urban development, with 70% of growth occurring within established areas.

Constructing and analysing hypothetical scenarios can give decision makers an insight into the consequences of their choices, including the choice to 'do nothing'. Scenario analysis can also inspire governments, businesses and communities to coordinate their decisions to achieve an agreed urban structure, based on the outcomes different possibilities might generate.

We have used the findings of our scenario modelling to develop policy directions and recommendations for the Victorian Government to consider. We intend for this research to help state and local governments, decision makers and the wider community better understand the costs, impacts and trade-offs of different urban structures. It demonstrates how today's land use and infrastructure planning decisions can help achieve better future outcomes for Victorians.

We started this project 2 years ago, as a complementary piece of research to our report [*Our home choices: how more housing options can make better use of Victoria's existing infrastructure*](#). The Victorian Government has recently published *Victoria's housing statement*, a plan to address housing supply over the next 10 years. In this, the Victorian Government committed to a new plan for Victoria, updating *Plan Melbourne* and expanding it to cover the whole state. We intend for this research to help inform the next stages of its development.

Many factors drive urban development

Many forces influence where people live, work and move around in urban environments, driving the shape of Victoria's cities and towns. Urban development in Victoria has faced unprecedented uncertainties and challenges in recent years. Population growth, climate change, the COVID-19 pandemic, construction industry capacity issues and housing affordability are some of these challenges.^{4,5}

We researched historical patterns of urban development to gain insight into the drivers that influence different development patterns. We looked at examples of how other cities in the world make deliberate choices about the urban form they want, based on the outcomes that matter most to them.

Victoria can use these examples to identify the levers that make the biggest impact on where people choose to live and where businesses choose to locate.

Escalating home prices are one factor driving cities to keep expanding, because mostly the outer suburbs can supply an affordable housing product. Our previous report into greenfield housing demand, *Our home choices*, found that moderate income households in Melbourne had few affordable home options other than in Melbourne's growth areas.⁶ This research provides further evidence of the challenges that Victoria will face in the future if we do not address them now.

We used scenario planning to assess different impacts

Scenario planning is a method of long-term strategic planning. It involves creating representations of multiple possible futures.⁷ Policymakers and strategic land use planners often use scenario planning to analyse and compare potential outcomes of different decisions and actions, allowing them to make more informed choices.⁸

Our scenarios are stories about possible urban development outcomes.⁹ They allow us to make comparisons and better understand the advantages and disadvantages of each outcome. For example, some more compact living options might have good access to services and facilities including public transport, while more dispersed living options in outer Melbourne might have good access to open space, but longer commute times.

Our 5 future scenarios

Infrastructure Victoria imagined what Victoria might look like in 2036 and 2056. We developed 5 different scenarios with growth occurring in different places across the state. We then estimated how these different scenarios affected people, the environment and the economy. This allowed us to investigate the advantages and disadvantages of each.

Our 5 urban development scenarios are:

- **dispersed city:** Melbourne's growth areas have many more detached homes
- **consolidated city:** Melbourne's inner and middle areas have many more medium-density homes
- **compact city:** Melbourne's inner areas have many more high-density homes
- **network of cities:** regional centres have many more homes
- **distributed state:** regional towns and rural areas have many more homes.

We developed the scenarios to reflect the most plausible way each pattern of development might occur. For example, we imagined that for regional cities to have many more homes, it would be more likely that Victoria's existing regional cities would grow, rather than new cities appearing and growing faster than existing ones.

The scenarios are not equally plausible, but each represents a possible future if many forces converged to shape Victoria's development on a particular path. We examined how our different scenarios might affect infrastructure provision, and their implications for Victoria's people, environment and economy.

We did not aim to select a 'preferred' or 'best' scenario. Instead, we wanted to explore and present the different outcomes and choices offered by each.

We specifically wanted to identify:

- the levers the Victorian Government might use to make scenarios more or less likely to emerge
- the ways the government might facilitate positive aspects of each scenario
- the ways the government might avoid or reduce negative impacts.

The different scenarios were chosen to compare divergent potential outcomes.

The research is not intended to be a cost-benefit analysis of the different scenarios. We have measured a range of impacts and costs which cover many aspects of urban development. In undertaking the modelling we found that all scenarios have different costs, impacts and trade-offs and this showed clear differences in outcomes for each scenario.

We used a mix of research methods for our analysis

To generate and compare our scenarios, we used different research methods to make realistic comparisons. We used the most up-to-date data and undertook detailed modelling to gain insights into what the future might hold under different conditions.

We used the Victorian Government's population and employment projections from 2021, *Victoria in Future*, to estimate the future size and composition of Victoria's population in 2056.¹⁰ Since then new population projections have been released by the Victorian Government.¹¹ The slight differences between these forecasts over the longer term do not change the results of our modelling.

We commissioned SGS Economics and Planning to use these assumptions to estimate how population, dwelling type and employment would occur in each scenario. SGS analysed past development trends, drivers of future urban development patterns and state policy to inform the scenarios.

We commissioned The Centre for International Economics to estimate the amount of infrastructure required for each scenario and develop a detailed model to analyse the economic, social and environmental impacts of these scenarios.

The amount and location of infrastructure required varies by sector. Where infrastructure provision rates are directly linked to population, such as schools, kindergartens, open space and community infrastructure, the amount of infrastructure required was modelled based on maintaining the current level of accessibility, as population grows. This means that not all areas have the same access in future scenarios. Instead, we have modelled a reasonable infrastructure provision for each scenario. For example, in the distributed state scenario, it would be unreasonable to expect that every country town has a large scale aquatic centre.

This provided us with an order of magnitude cost to provide infrastructure to 2056 and an understanding of how costs varied across scenarios. Local infrastructure, such as utilities and local roads, that enable a new dwelling to be connected into existing infrastructure networks was costed based on data compiled by Infrastructure Victoria in 2018,¹² which varied based on dwelling type and location.

We used a different approach to model and cost the transport infrastructure needs in each scenario. We worked with Arup to model a consistent baseline scenario of transport projects and test its performance against the population and jobs distribution of each urban development scenario. Using the outputs from this first round of modelling, we adjusted the transport network in each scenario to provide reasonable, but not optimised, transport performance. We then costed the final transport network for each scenario.

The energy and water sectors are undergoing significant change to meet zero emissions targets and address climate change impacts. Our analysis provides an order of magnitude cost to provide infrastructure for these sectors to 2056.

Infrastructure sectors for which there is a limited connection between urban structure and infrastructure provision, or which have very large catchments were not costed. These include hospitals, courts, prisons, emergency services and ports. We also assumed that under all scenarios, social housing should be in areas of high accessibility and demand, rather than following population growth, so this has not been separately costed.

SGS Economics and Planning, Arup, WT Partnership and The Centre for International Economics each produced technical reports with more detail about our modelling and analysis. [These are available to download on our website.](#)

Historical patterns and drivers of urban development

Aboriginal and Torres Strait Islander peoples are known to have occupied mainland Australia for at least 65,000 years. It is widely accepted that this predates the modern human settlement of Europe and the Americas.¹³

Australia is now one of the most urbanised countries in the world.¹⁴ However, this hasn't always been the case. At the beginning of the 20th century, regional Australia had a greater share of population than the capital cities combined. In 1901, just over 1 in 3 Australians (1.3 million) lived in capital cities.¹⁵



As the national economy transitioned to a service-based economy, more people were attracted to live in cities. By the mid-20th century, the previous pattern had reversed. In 2021, Australia's capital cities accommodated 67% of the national population.

While the drivers of urbanisation had global origins, they were supported by government policy and infrastructure investment, which facilitated the concentration of jobs in the inner city and the suburbanisation of housing. Where the location of new housing had previously been anchored along tram and rail lines, cars unlocked opportunities for new development disconnected from existing public transit systems.¹⁶ Investments in freeways over the 1960s and 1970s facilitated Melbourne's expansion, supporting much lower densities and creating car-dependent suburbs.¹⁷

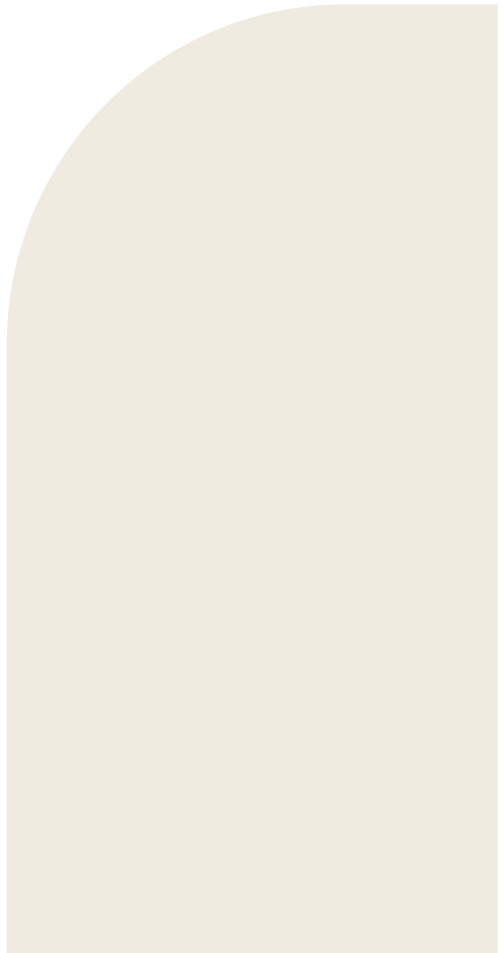
Throughout the 20th century, Melbourne accommodated population growth by expanding outwards, while jobs became increasingly centralised in the inner city. In 2021, 73% of all houses in Victoria were detached, 14% were semi-detached including townhouses, and 12% were apartments.¹⁸ Melbourne today has pockets of high density,¹⁹ like Box Hill, where 53% of homes are apartments.²⁰ However, Box Hill has much higher density than suburbs a similar distance from Melbourne, such as Reservoir, where only 4% of homes are apartments.²¹ In new suburbs, the share of detached homes is often much higher. For example, in Wyndham Vale, 96% of all homes in 2021 were detached.²² Victoria's growing regional cities have similarly grown through low density urban expansion. In Geelong, Victoria's second largest city, 60% of homes were detached in 2021.

In the face of this prevailing pattern, metropolitan plans have sought to redirect more housing to established areas with mixed success. Current trajectories show that new growth area development has delivered more of Victoria's new homes. Just 44% of new homes in Melbourne were built in established suburbs in 2021. This compares with over 60% in 2016.²³ *Plan Melbourne 2017–2050* defines an aspiration for 2050 where 70% of new housing is built in established areas and 30% in greenfield areas.²⁴

Stated urban policy objectives have not always been consistent with actual outcomes. Infrastructure Victoria's report, *Our home choices*, showed Victoria is not achieving the aspiration in *Plan Melbourne*. This is, in part, because policy decisions are not supporting achievement of this goal. For example, the Victorian Government has released large amounts of land in Melbourne's growth areas and offered a First Home Owner Grant that fuels demand for new homes in these areas.



Key findings



Key findings

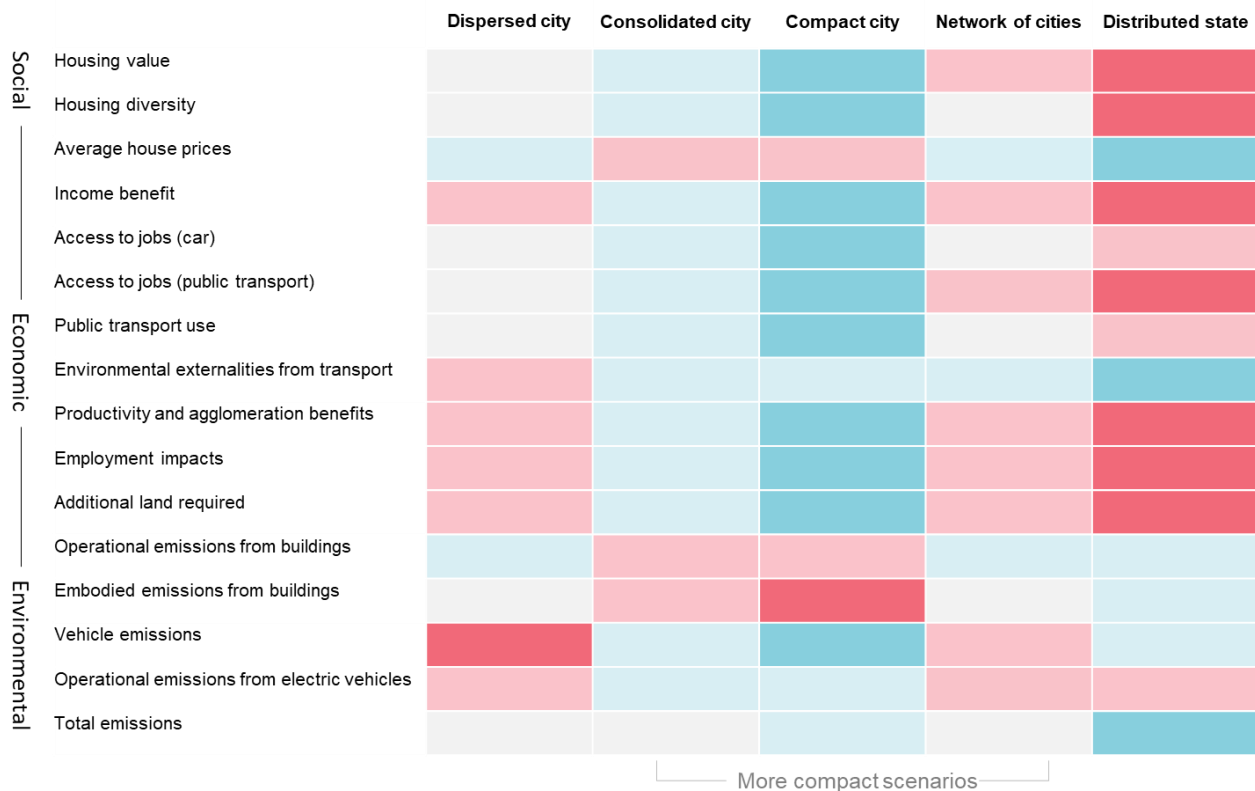
The future shape of Victoria's cities and regions will impact all Victorians

Our research assessed 15 social, economic and environmental impacts across each of the 5 scenarios (see Figure 1) such as the housing types available, and the jobs that can be accessed. This served to test the potential differences of each scenario on the quality of life of Victorians, the economy and the environment. We found the impacts of urban form vary significantly across scenarios. No scenario is ideal and there are trade-offs within each. However, there are stark contrasts between scenarios with more compact development in established areas and those with more dispersed growth beyond current suburbs in Victoria's capital and major regional centres.

The Victorian Government can implement policies that make a preferred scenario more likely to occur. Our research suggests that deliberately pursuing more compact scenarios will help to achieve better outcomes for Victoria.

Figure 1 summarises our assessment of the indicators for each scenario across social, economic and environmental impacts.

Figure 1: Overall assessment of economic, social and environmental impacts by scenario



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria*, 2023

Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios. Grey shading means a neutral outcome.

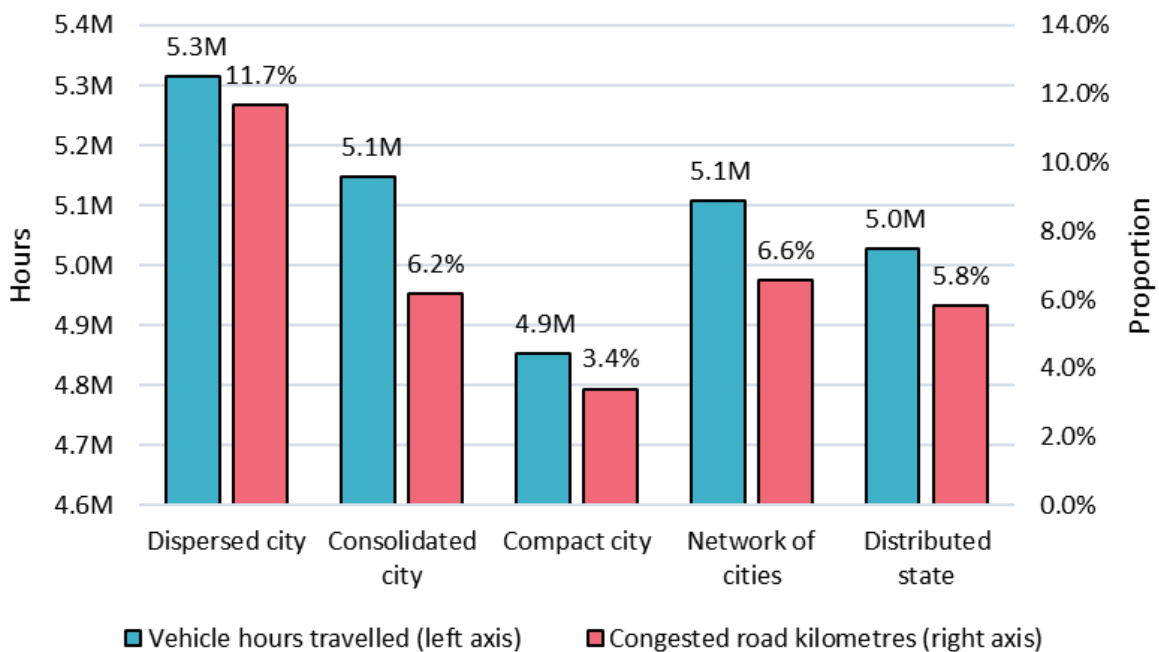
More dispersed development delivers worse outcomes

Our research shows that more dispersed scenarios would have worse impacts on the natural environment than more compact scenarios. This is because more people would drive longer distances, resulting in high transport emissions. Almost 30,000 more hectares of land would be required for residential development in a dispersed city, almost twice as much as is estimated for a compact city. This is over 12,000 times the field size of the Melbourne Cricket Ground. This would greatly reduce the amount of land currently used by agriculture and wildlife and impacts biodiversity.

Dispersed urban development would also result in lower social outcomes and economic benefits than more compact scenarios because population and jobs growth is dispersed. In a dispersed city, people live further from work, education, shops and services, so their level of accessibility would be much lower than in other scenarios. It would be hard for people to use public transport, cycle or walk to their destinations, so people would be more reliant on cars. As shown in Figure 2, our modelling shows that the total time spent travelling by car in the dispersed city scenario would be higher than any other scenario, as would congestion.

There would also be fewer high paying jobs available close to home, so people would have to travel further for work, or work in a job closer to home that does not match their skills. As a result, the total impacts on income would be up to \$43 billion lower in this scenario by 2056 compared to the compact city scenario. In 2056, our modelling estimates that in a dispersed scenario 47% of Victoria's jobs would be in Melbourne's inner and middle suburbs, but only 30% of workers would live there.

Figure 2: Total time spent travelling by car and proportion of road kilometres congested in 2056



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

These findings suggest that government should plan to avoid a future where a high proportion of growth is accommodated at the urban fringe. While some more growth within the existing urban boundary will be required, the Victorian Government will need to radically change planning and services for growth areas if Melbourne keeps growing according to current trends.

More compact urban development scenarios deliver better outcomes

Our research shows that more compact urban development scenarios, such as the consolidated city or compact city, would have better overall outcomes for people, the economy and the environment. Focusing population growth in established areas makes better use of existing infrastructure.

To assess social outcomes, we measured housing values. Housing value reflects the value of the location of the home, and the type of home, such as a detached house, townhouse, or apartment. It captures whether the homes match people’s desired home locations and home type preferences. We interpret higher housing values to mean the homes are better located, and better match people’s preferences.

More compact urban development scenarios would provide more housing where people would like to live. Our modelling estimated that more compact scenarios would have much higher housing values than dispersed scenarios and would generate \$52 billion to \$105 billion more in housing value by 2056. Most of these differences are because different scenarios have different levels of accessibility to infrastructure, as Figure 3 shows.

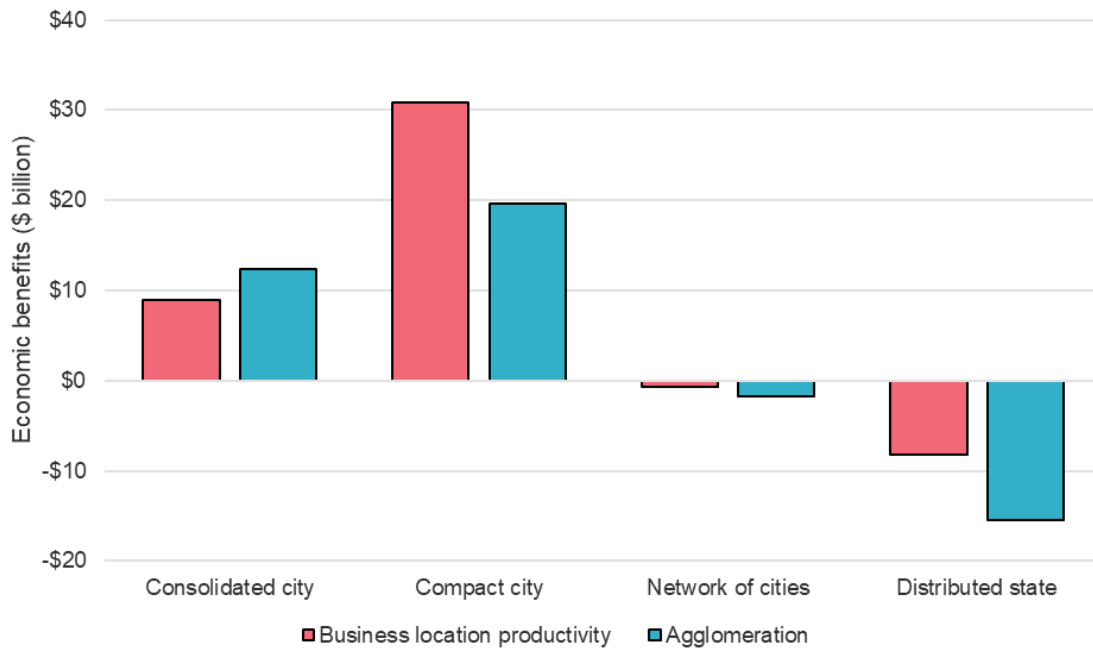
Figure 3: Comparison of housing value between dispersed city scenario and other scenarios, 2056



Data source: The Centre for International Economics, Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023

The ongoing consolidation of businesses and jobs in the central city and key precincts would result in greater economic and productivity benefits. Businesses would keep choosing locations in the city because they would be closer to other businesses, known as agglomeration, and would have a greater pool of employees to draw from. This would generate \$12 billion to \$20 billion more in agglomeration benefits in 2056 than compared to dispersed scenarios (see Figure 4). More people would have jobs and incomes would also be higher with more compact urban development because people have a greater variety of jobs available.

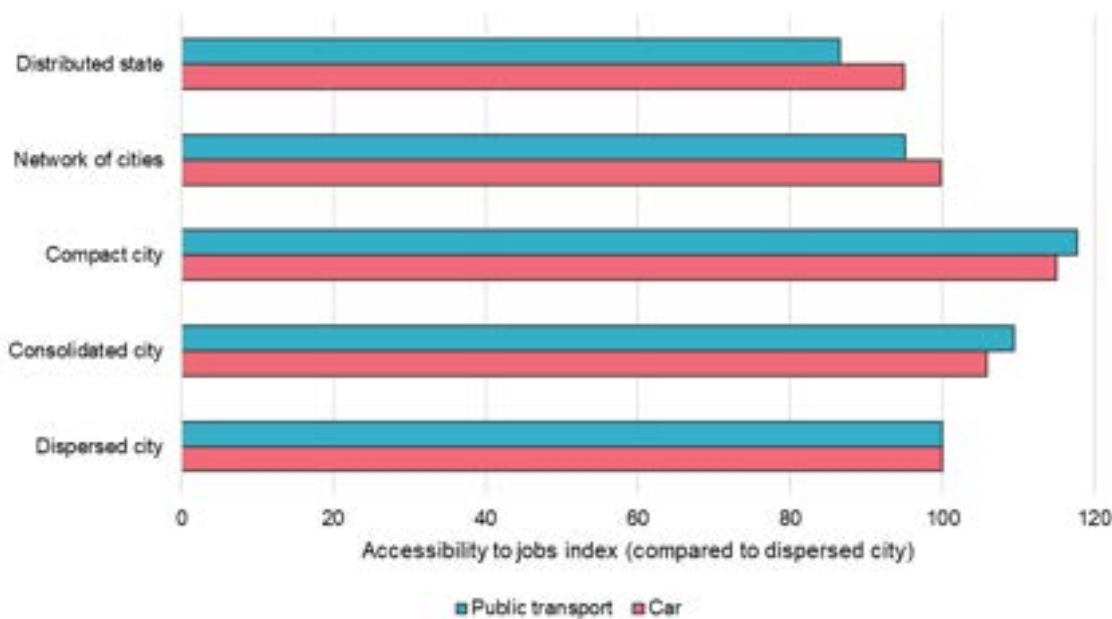
Figure 4: Comparison of productivity and agglomeration benefits between dispersed city scenario and other scenarios, 2056



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

More people living in established areas means Victorians would enjoy greater access to jobs, education, shops, services and existing transport infrastructure by both public transport and cars (see Figure 5). Over 25% more people would use public transport in the more compact scenarios (compact city and consolidated city), leading to less road congestion. The amount of time people spend driving in congested conditions would be more than 70% lower in more compact scenarios. As a result, there would also be much lower environmental emissions from transport, as people would not need to spend as much time driving.

Figure 5: Access to jobs index by car and public transport in 2056



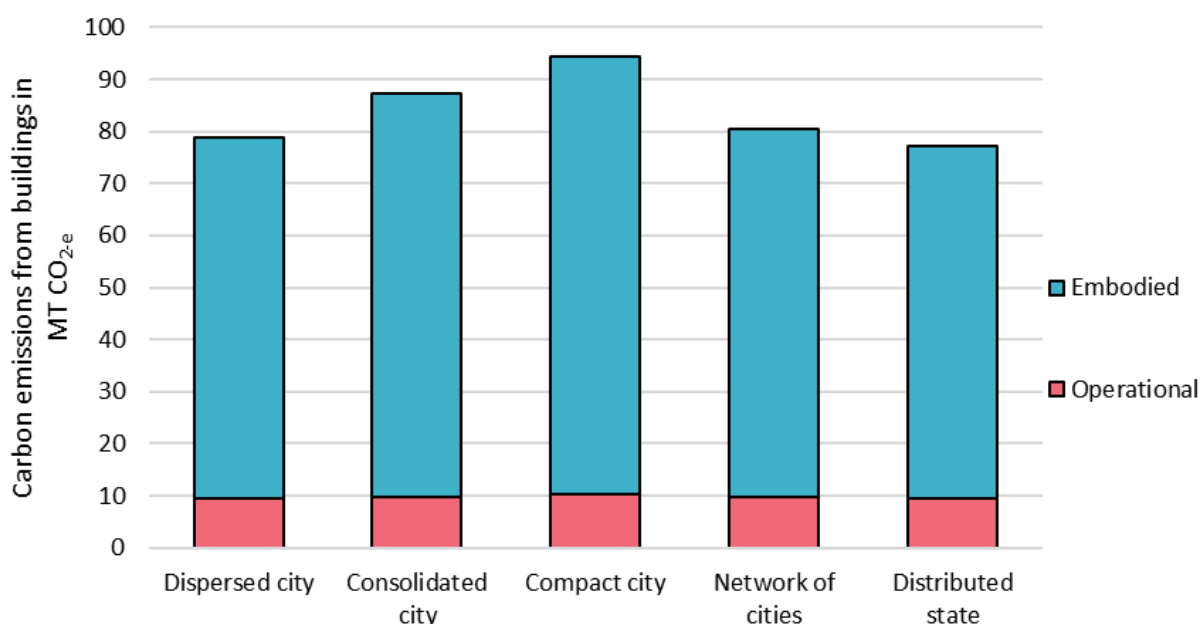
Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

More compact urban development would also have less impact on the natural environment. More compact scenarios would need less than half the amount of urban land than dispersed scenarios to accommodate more homes and infrastructure. This means that areas of biodiversity and natural habitats would be preserved, and agricultural land would remain in use.

However, our research also shows that more compact urban development could lead to higher embodied carbon emissions from the construction of buildings (see Figure 6). Embodied emissions are those produced by the construction, maintenance and disposal of infrastructure, including from the production and transport of the materials used in construction.

High-rise apartments have higher embodied energy than smaller dwellings because they have a higher concrete and steel content, which are currently difficult to produce without emitting carbon. Initiatives aimed at developing zero or low carbon materials and building methods in new buildings and infrastructure could help to reduce these impacts. Alternative construction methods used internationally provide examples for Victoria, such as using manufactured timber for high-rise apartments.

Figure 6: Estimated emissions produced by buildings from 2021–2056, by type



Data source: The Centre for International Economics, Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023

Infrastructure can serve more people in compact cities. But delivering infrastructure in established areas can also have higher construction costs. Because construction activities conflict with existing residents’ activities, changes must be made to infrastructure that is already operating, and land costs more for new builds. The Victorian Government may need to redefine how it plans for infrastructure like community facilities and open space for more compact scenarios. These scenarios benefit from cooperation between government and industry, and a coordinated approach to achieving growth in key precincts. Government can also use different planning and policy levers to deliver more housing in established areas of Melbourne and regional centres.

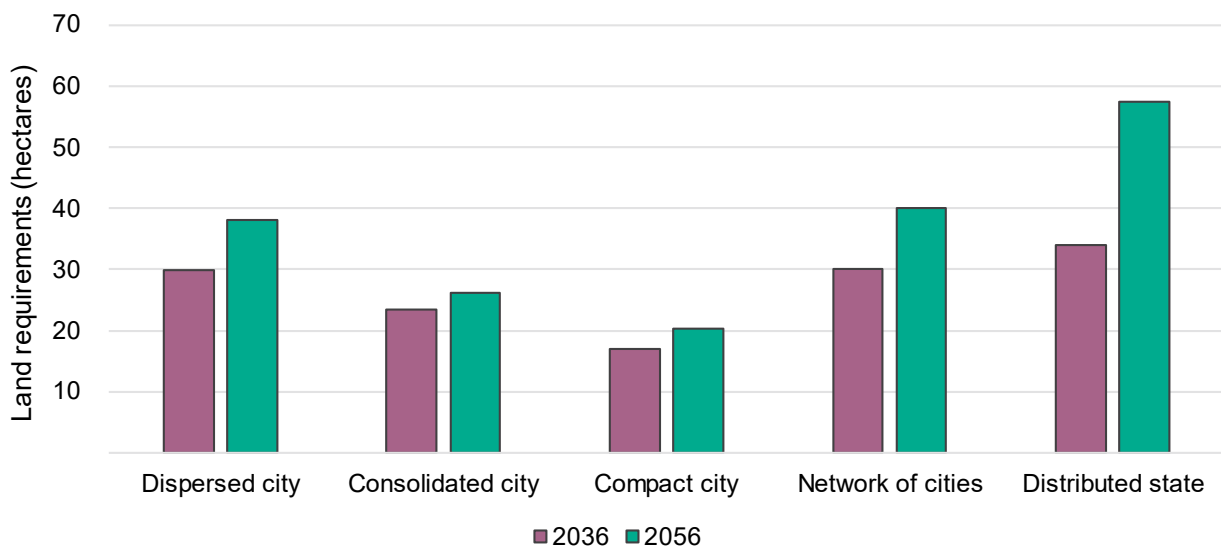
More compact living provides more housing choices to people. Building more compact cities does not mean that all new homes will be high-rise apartments. More compact cities could provide a broader range of medium density homes such as townhouses, terrace homes and low-rise apartments, as well as higher density apartments over 5 storeys. This would provide more options in the type of homes available to people, beyond detached houses.

Consolidating growth in regional cities offers better outcomes for regional Victoria

Our research shows that more compact scenarios in centres across regional Victoria would have better productivity, employment and environmental outcomes for residents than a widely dispersed population.

A dispersed regional scenario would have the greatest urban land requirements with people living across the state in low density housing (see Figure 7). This scenario would also have higher transport emissions as public transport would be used by less people per service, and more people would rely on their cars. Infrastructure would also need to have larger catchment areas, so people would need to travel greater distances to get to jobs and services compared to a regional growth scenario in which more people live in regional cities.

Figure 7: Land requirements for housing and local infrastructure



Data source: The Centre for International Economics, Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023

Residents in a distributed state scenario for regional Victoria would also be more susceptible to climate risk impacts, including bushfires and flooding. Victoria’s climate has become warmer and drier in recent decades. This increases the risk of bushfires, particularly for rural and regional areas.

Regional growth scenarios would require big changes in where people want to live and how they work. In particular, a dispersed regional growth scenario would require a big shift in how people access government services, such as schools, or how they get their electricity and water. These services would need to serve people in larger catchment areas. There would be less of a shift if growth occurs within regional centres, as some economies of scale could be achieved by upgrading existing infrastructure to serve a greater number of people.

Housing affordability is a pressing issue for Victoria and Australia more broadly.²⁵ Housing affordability is influenced by many factors. Infrastructure Victoria’s previous research *Our home choices: how more housing options can make better use of Victoria’s existing infrastructure* investigated these issues and options to improve housing choice and affordability.²⁶ This research has considered the impacts of urban form on affordability for renters and for home buyers. It shows, unsurprisingly, that housing will still be more affordable in regional areas because the land is cheaper and people are more likely to be willing to accept lower access to services and facilities for a lower priced home. Housing is also more affordable in regional areas today. However, many people choose to live in Melbourne to be closer to jobs and services.

For the more compact urban development scenarios, like the compact city, housing also becomes more affordable. This is because a lot more apartments and more diverse housing options are being provided, which keeps house prices lower. Apartment living is not for everyone, but limited choices to serve different

housing needs at a range of prices in established areas are putting additional pressure on housing availability and prices in growth areas.

While we did not model a scenario with more compact growth in both Melbourne and regional cities, a combination of these scenarios is likely to deliver the greatest benefits for Victorians. The results suggest that regional development should be focused on consolidating in regional centres. To achieve this outcome, the Victorian Government would need to support more deliberate planning for population and jobs growth in these centres, including focusing on upgrading and expanding local transport, utilities and digital infrastructure.

Infrastructure capacity and service standards

It is important to consider both current capacity and service standards when estimating the cost of infrastructure.

Current infrastructure capacity is the extent to which it can accommodate future growth. For example, existing school facilities need to be evaluated to determine if they can accommodate the projected increase in student numbers.

Service standards refers to consistent levels of quality in the provision of services and ensuring that the infrastructure can accommodate the needs of the community. For example, a lower average class size in schools requires more classrooms to be built, representing a higher infrastructure service standard.

There is a trade-off between existing capacity and service standards. Lowering a service standard allows existing infrastructure to support growth without modifications. For example, additional demand could be accommodated within existing school facilities through having larger class sizes. In this case the cost is the potential loss of value of smaller class sizes.

Our modelling approach has maintained current service standards across all scenarios. This is because it is difficult to place a value on changing service levels. Maintaining current service standards across all scenarios means that differences across Victoria in service standards remain in our scenarios in the future. For example, current service standards in growth areas are different to inner city areas and we assume these differences will remain in the future.

Source: The Centre for International Economics

Note: this relates to non-transport infrastructure only

Future population growth will need additional infrastructure under all scenarios

Over coming decades, many new homes will be in the same place regardless of the scenario. It is where we choose to locate some new homes in different places that drives the type and cost of infrastructure we will need.

Our previous research has shown that over the next decade, it is up to 4 times more expensive to provide infrastructure for new homes in greenfield areas than established areas where there is the capacity to leverage existing infrastructure.²⁷

This research has also found that infrastructure costs are higher in more dispersed scenarios and lower for more compact urban forms. In particular, every additional new home in a dispersed city scenario would incur about \$59,000 more infrastructure costs compared to a compact city as Figure 8 shows.

Figure 8: Cost per new relocated dwelling to 2056 compared to dispersed city scenario (\$)

	Dispersed city	Consolidated city	Compact city	Network of cities	Distributed state
Local infrastructure	0	-18,000	-37,000	-4,000	3,000
Education	0	0	16,000	-3,000	-10,000
Open space	0	4,000	18,000	-2,000	-5,000
Community facilities	0	4,000	10,000	1,000	-6,000
Electricity	0	-9,000	-12,000	0	-3,000
Gas	0	0	0	0	0
Water and wastewater	0	-3,000	-6,000	6,000	10,000
Transport	0	-5,000	-47,000	-13,000	-18,000
Total	0	-26,000	-59,000	-15,000	-29,000

Data source: The Centre for International Economics, Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023

Our research shows that the infrastructure required for each scenario is very different. But some infrastructure like major transport projects or electricity generation costs would be the same across all scenarios. This is because many Victorians already live in and around Melbourne and will continue to do so even with big changes in how the state grows.

The total cost for the infrastructure that is different across scenarios is shown in Figure 9. It shows that infrastructure for a more compact city could cost up to \$41 billion less than for a dispersed city.

Figure 9: Infrastructure impacts across scenarios to 2056 (\$ billions)

	Dispersed city	Consolidated city	Compact city	Network of cities	Distributed state
Local infrastructure	68	55	42	65	70
Education	23	23	34	20	15
Open space	6	9	18	4	3
Community facilities	6	9	13	7	2
Electricity	13	7	5	13	11
Gas	0	0	0	0	0
Water and wastewater	13	11	9	17	20
Transport	61	57	28	52	48
Total	190	172	149	179	169
Difference to dispersed city	0	-18	-41	-10	-20

Data source: The Centre for International Economics, Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023

In more compact scenarios our modelling shows more people would use public transport and so demand on the public transport network would be much greater than the dispersed city scenario. The more compact scenarios would need investment in upgrading existing public transport including providing greater priority to trams and buses on existing roads. The dispersed city scenario would require greater investment in new roads, rail extensions and the bus network to serve growth areas.

The utility networks that would be required in more compact scenarios compared to dispersed scenarios are also very different. While electricity generation is required in all scenarios, demand on the electricity transmission and distribution networks is different depending on where growth occurs. More dispersed scenarios would require extension of distribution networks, while more compact scenarios would need more upgrades to existing infrastructure. In more dispersed scenarios, recycled water is likely to be considered for broader use across inland and regional areas where it will be difficult for existing water sources to meet demand.

Developing infrastructure to support a desired urban development scenario would increase the value of this investment. It would save costs by enabling works to support population growth to be integrated with other maintenance and upgrade works. This is particularly relevant for the electricity sector, which is changing significantly to achieve net zero emissions. It would also enable coordination of works to support population growth such as utility services upgrades and streetscape improvements, reducing cost and disruption to the community.

Having a strategic and consistent approach to infrastructure planning and delivery would also ensure that there is not a misalignment of infrastructure investment with urban development which could lead to excess capacity or unmet demand, or lower and less reliable service levels.

Local infrastructure is another significant cost. However, a portion of this cost is met by developers, rather than funded by government or shared user costs. Local infrastructure consists of streetscape, utility connections into the existing network, storm water and civil works on the development site. For development in inner precinct areas, there will be additional local infrastructure costs to address flooding risk and progressively convert streetscapes from industrial to residential. How this cost is shared between government and developers is dependent on infrastructure contribution plans adopted and has been assumed as a developer cost in this analysis.

Electricity infrastructure is the third highest cost across all scenarios. This is driven by high costs involved with providing new infrastructure to achieve net zero emissions and expanding electricity networks to support future population growth.

Social infrastructure and open space provision and costs varied across scenarios. More compact urban development scenarios have higher social infrastructure costs than dispersed and regional development scenarios. These differences are mainly driven by higher land costs and the lack of capacity to expand existing infrastructure in established areas that will become higher density in the future. However, the cost of social infrastructure only represents between 10 and 15%, and open space 5% of total infrastructure investment. While more funding will be needed for schools, kindergartens, open space and community infrastructure in more compact development settings, this cost would be offset by the greater benefits of these scenarios.

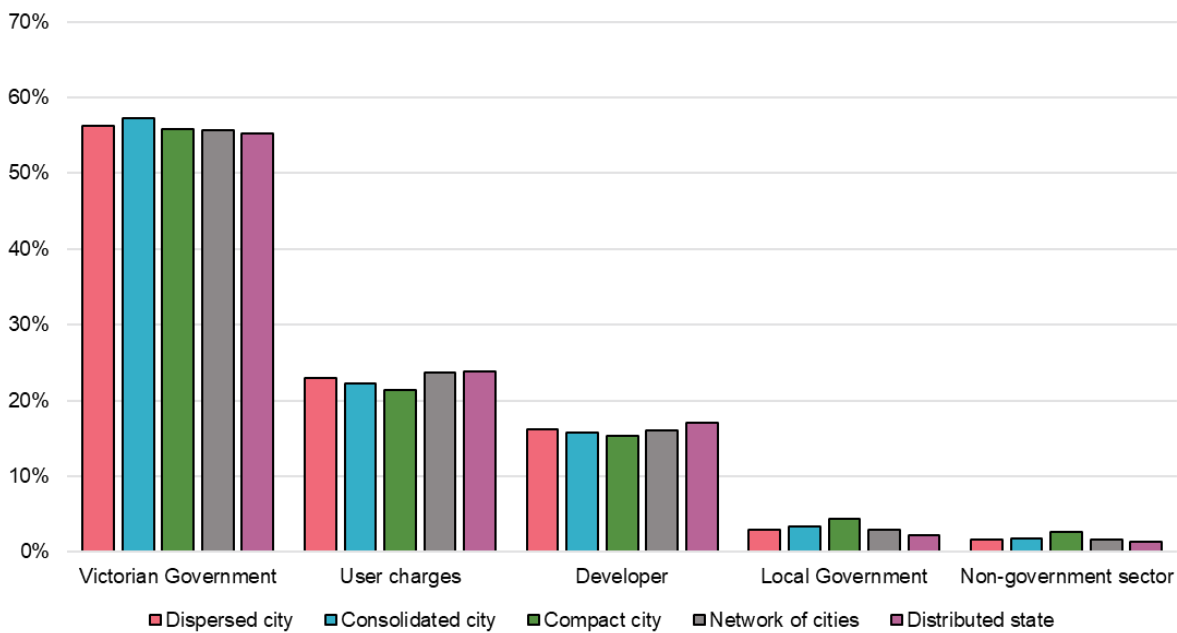
Local infrastructure costs, transport costs and utilities costs are lower for new dwellings in established suburbs compared to a greenfield area. Other costs, particularly for open space and education, are higher in established areas, but not enough to outweigh the lower costs for other infrastructure. We found that large transport projects are the highest cost driving urban development at 50% of infrastructure spend, so there is an important opportunity to make the best use of transport by locating new homes near existing services.

As we plan beyond the 2030s, the capacity of existing infrastructure in established areas to meet the demands of additional growth is likely to reach its limits. While more compact urban forms have lower transport infrastructure and utilities costs than dispersed cities, they will still require additional investment. And we will need to find new ways of providing schools and community facilities in established areas with high population growth where land is scarce.

The difference in value the community gets from infrastructure investment between dispersed and compact cities is significant. More compact urban development gets the most value from our infrastructure by underpinning achievement of better social, economic and environmental outcomes for Victorians. Infrastructure investment decisions should be prioritised to achieve better outcomes for the population, rather than pursuing cost savings.

Across all scenarios, we estimated the cost for infrastructure that varies with urban development, to be delivered by both the public and private sectors. Over half of the future infrastructure costs that we considered would be funded by the Victorian Government (see Figure 10). Our analysis showed that the cost to the Victorian Government under these scenarios was approximately \$11 billion per year.²⁸ This is consistent with current and historic infrastructure spend, which is expected to average \$15.4 billion annually from 2015 to 2027. Based on current policy settings, developers would be expected to provide funding for about 15% and user charges would provide funding for between 20 to 25% of the total cost.

Figure 10: Distribution of infrastructure costs by stakeholder that bears the cost



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

Note: some of the state and local government costs will be recovered from developers through the growth areas infrastructure contribution charge (GAIC) and other infrastructure contribution schemes, but as these are not uniformly applied across Victoria, we have reported them as government costs.

Comparison to previous Infrastructure Victoria research on infrastructure costs in different development settings

In 2018 Infrastructure Victoria released research into infrastructure provision in different development settings. The research considered the cost of infrastructure required to support new homes within metropolitan Melbourne, based on a 10 to 15-year outlook to 2030 and existing infrastructure responses.

Our previous research showed that over the next decade it is more expensive to provide infrastructure for new homes in greenfield areas than established areas where there is the capacity to use existing infrastructure.

This current project looks further to 2056, when some existing infrastructure may have exceeded its capacity because of population growth. This research also considers how infrastructure delivery will change to achieve broader social and environmental outcomes, focused on how we will deliver infrastructure to achieve net zero carbon emission by 2045.

Unlike our 2018 analysis, this current analysis allows for increased use of renewable electricity as an energy source, increased demand for energy to power electric vehicles and increased use of recycled water.

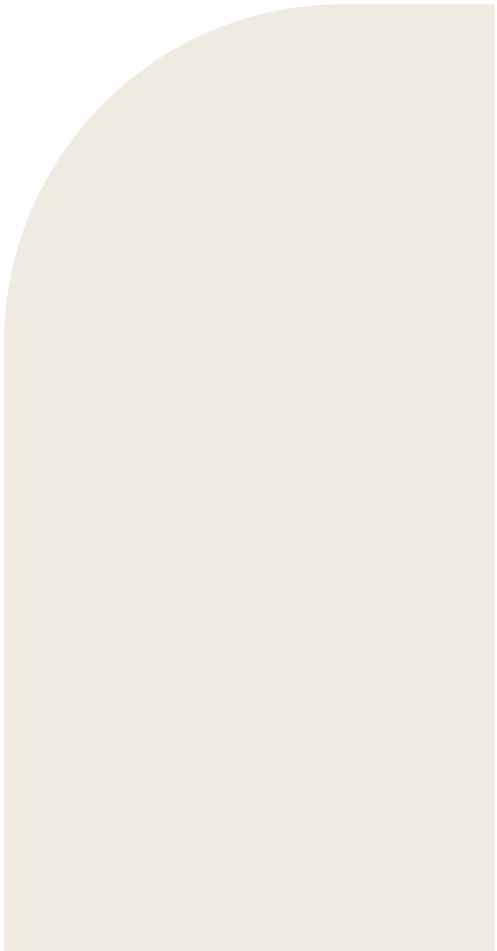
The capacity of existing infrastructure to support growth varies by location for each infrastructure sector. More work is required to determine the capacity of Victoria's existing infrastructure to support future population growth. In this research, we made assumptions based on current infrastructure capacity by sector. This research focused on sectors that were expected to have the highest costs, and areas where we should focus our long-term planning.

Although the 2 research projects focused on different factors, the high-level findings are consistent. These include:

- Trends in infrastructure costs across sectors and development settings are consistent between the 2 research pieces.
- Infrastructure to support new homes in more dispersed scenarios cost more per home than additional homes in more compact scenarios. This research found it could be about \$59,000 more expensive per home in a dispersed scenario compared to a compact city. A dispersed city could be up to \$41 billion more expensive than more compact one.
- Transport infrastructure is the highest cost item supporting urban development as it has both large capital and operational expenditure.
- Provision of new social infrastructure, such as schools and community facilities, is more expensive in higher density established areas. This is predominantly because a lack of surplus land leads to high land acquisition costs for new facilities. Options such as repurposing public land for social infrastructure, recycling existing facilities to make them fit for purpose, and the integration of shared use facilities, offer an opportunity to address this cost issue.
- We should plan our future urban growth to best use existing infrastructure. More work is required to understand the capacity of our existing infrastructure.



Recommendations



Recommendations

We recommend that the Victorian Government take these actions. Our research suggests that Victorians will be better off if the government adopts them.

- 1 Use a new plan for Victoria to reinforce established area growth, set regional city urban growth boundaries, and include housing targets for established areas of Victorian cities. Use these targets in land use framework plans, regional growth plans, and the Victoria Planning Provisions.**

Plan Melbourne 2017–2050 is the Victorian Government’s metropolitan planning strategy. It guides Melbourne and Victoria’s growth pattern for the next 30 years. It conveys Melbourne’s challenges of housing more people and managing the speed and cost of building new suburbs. It includes an aspiration for 70% of Melbourne’s new homes to be built in established suburbs. The government has committed to a new plan for Victoria, updating Plan Melbourne and expanding it to cover the whole state. A new plan for Victoria can better incorporate responses to climate change, housing affordability and transport priorities.

A new plan for Victoria should plan to build more homes closer to existing jobs, services and infrastructure within all Victorian cities. It should declare that all new homes must be built inside permanent urban growth boundaries around each Victorian city. The new plan should also set housing targets for the established areas of each city. This will encourage building new homes in places with good access to jobs, services and infrastructure, such as near public transport and commercial activity centres. The government should compel all other government strategic land use plans to reinforce the targets. This includes land use framework plans and regional growth plans.

Land use framework plans guide Melbourne’s land use and infrastructure development. The Victorian Government has published draft land use framework plans with dwelling redistribution scenarios for each metropolitan region. The dwelling redistribution scenarios set out the number of extra homes each local government area must accommodate to achieve the aspiration for Melbourne to build 70% of new homes in established suburbs. The final versions should set numerical housing targets for local government areas, decided in collaboration with local governments.

Regional growth plans guide land use and development in regional Victoria. The Victorian Government should update the regional growth plans to include the housing targets for regional cities. The government should also work with regional local governments to set urban growth boundaries around each regional urban area. These should be incorporated into the Victoria Planning Provisions.

The Victoria Planning Provisions are the framework for Victoria’s planning schemes. The provisions contain mandatory rules that all local governments must include in their local planning schemes. The government should include the new local government area housing targets in the provisions. This means local planning schemes must also include the targets. It would also mean that local governments must consider the targets when they decide development applications.

The Victorian Government should also report annual progress on delivering on commitments in their new plan for Victoria.²⁹ This allows the government to show the community that the planned changes are happening as promised. It can also show whether the changes are a success.

This recommendation draws on, and further articulates, the findings of Infrastructure Victoria research report *Our home choices*. That report proposed an option for the Victorian Government to set and monitor housing targets in each Melbourne local government area, in collaboration with local governments.

The Victorian Government should deliver this recommendation through constructive and collaborative conversations with communities, stakeholders and organisations about their preferences and aspirations for Victoria’s cities.

2 Develop and publish long-term plans for infrastructure sectors to meet the policies and targets set by a new plan for Victoria. Use these integrated land use and infrastructure plans to decide infrastructure project funding.

In this research, we found different city shapes need profoundly different amounts of each infrastructure type to function well. For example, a compact or consolidated city needs a different public transport network to a dispersed or regional city for people to move around easily. This is why governments should coordinate land use and infrastructure planning. But it requires governments to openly and transparently discuss future options, long before they make final commitments or budget decisions.

The Victorian Government should develop a plan for each infrastructure sector based on an agreed set of common, detailed, long-range population and land use forecasts. The forecasts should match the housing targets and other policies set by a new plan for Victoria. This resembles the approach that Queensland, New South Wales and the United Kingdom take. The infrastructure plans do not need to promise that the Victorian Government will build specific projects. Instead, they can show its strategic infrastructure intentions and options. Government agencies, businesses and not-for-profit organisations can then better align their decisions with the plans.

The government should require the plans to include the sequencing, assumptions, triggers and timelines for required decisions on investment over a 15- to 20-year period. They should support more compact future development in Melbourne and regional cities. Infrastructure Victoria made a similar recommendation in *Victoria's infrastructure strategy 2021–2051* to develop plans for priority infrastructure sectors.³⁰

The government should use the sector plans to decide infrastructure funding. They can use the plans when considering infrastructure funding proposals during their annual budget deliberations. For example, a year or so before an infrastructure project needs funding, the agency responsible can re-check whether the assumptions behind the project are still accurate. If so, it can prepare a business case for funding in the next budget. Ultimately, the government will determine its spending priorities in any given budget, however plans must have influence in decisions to be useful. The Victorian Government combined the planning and transport portfolios in the same department on 1 January 2023. This gives the government a new opportunity to integrate land use and transport infrastructure planning to inform sector plans.

Many governments publish integrated infrastructure and land use plans

Some governments might avoid publishing integrated infrastructure and land use plans due to concerns that people might think they are making promises to build an inflexible future pipeline of infrastructure. But other governments show they can successfully publish integrated infrastructure plans.

The Queensland Government published consultation drafts of the *Shaping Queensland 2023 update*,³¹ and the *State infrastructure supplement*.³² The draft infrastructure plans give South East Queenslanders a long term view of the housing and infrastructure that can support its future population. It lists newly built infrastructure, committed new projects, and infrastructure in planning stages in different sectors.

The New South Wales Government publishes the Greater Sydney Region Plan.³³ The government prepares this plan at the same time as Infrastructure NSW writes the State Infrastructure Strategy,³⁴ and Transport for NSW drafts the Future Transport Strategy 2056.³⁵ These plans form NSW's integrated long term plan to accommodate population growth. At a smaller scale, the government produces 5 separate, more detailed district plans to help deliver the region plan. The district plans help local governments deliver more housing, and inform local environmental plans, community strategic plans and the assessment of planning proposals.

The United Kingdom Government has a *National infrastructure strategy*.³⁶ The strategy sets out the government's plans to improve the quality of the UK's infrastructure and achieve net zero greenhouse gas emissions by 2050. The National Infrastructure Commission conducts a national infrastructure needs assessment every 5 years to inform the strategy.³⁷

The UK government also publishes the *National infrastructure and construction pipeline 2021*, which sets out its planned infrastructure investments, and the workforce needed to deliver them. The pipeline signals the likely timelines for major infrastructure construction and draws attention to any workforce shortfalls. This helps construction companies make longer-term strategic plans,³⁸ and helps reduce worker shortages that can delay projects or inflate their costs.

3 Reform infrastructure contributions, remove taxes and subsidies that fuel dispersed growth, and change planning rules to create more compact cities in Victoria.

Our research suggests that living in more compact cities will make Victorians better off. More compact cities in Victoria would use less land, make better use of infrastructure and have higher concentrations of jobs.³⁹ Schools, shops, workplaces and homes would be closer to public transport, so more people could use it. People could reach more destinations more easily, which would encourage them to walk or cycle more often.⁴⁰ This could keep people healthy. It could also reduce air pollution and greenhouse gas emissions.⁴¹

Our previous research report, *Our home choices*, showed that new homes built today in established suburbs are not always the type of homes Victorians want. That report set out 10 policy options for government to consider. The new research in this report supports many of those conclusions.

The Victorian and local governments collect infrastructure contributions on new development to help pay for infrastructure to support people living in new homes. But they only apply in Melbourne, and in some places and not others. They are collected through a complicated array of state and local government schemes. The Victorian Government should reform this convoluted approach to infrastructure contributions. A clear, efficient and transparent infrastructure contribution system can send a price signal that influences the location of new development. A revised scheme should consistently apply to all urban areas in Victoria, to fund any infrastructure upgrades needed to support people living in new homes, including in established suburbs.

The Victorian Government can also reform subsidies that distort people's choices when buying a home. First Home Owner Grant schemes do not actually increase home ownership or improve housing affordability. Homebuyers mainly use Victoria's First Home Owner Grant to buy homes in new suburbs. It is a subsidy that actively encourages urban sprawl. The Victorian Government should immediately end Victoria's First Home Owner Grant to remove any home price inflation it causes, which also distorts the housing market accurately reflecting the cost of providing different types of homes in different places.

Similarly, stamp duty discourages people from moving home and limits their housing options. To avoid paying stamp duty multiple times, they might buy a bigger home earlier than they need, rather than buying a small home first, and upsizing when their family grows.⁴² Stamp duty concessions for first home buyers and properties valued up to \$750,000 favour new suburbs rather than inner and middle Melbourne.⁴³ The Victorian Government should abolish stamp duty and replace it with a broad-based land tax.⁴⁴ This broad based land tax does not discourage people moving and can offer a more stable revenue stream for governments.⁴⁵ It could help incentivise more and denser residential development.⁴⁶

The Victorian Government should also change planning rules to encourage building more homes in established suburbs. As we outlined in *Our home choices*, the government should rezone more land using the Residential Growth Zone in places that have good public transport and social infrastructure. Doing this in inner and middle Melbourne suburbs can allow more low-rise apartments to be built there. Better standards for building location, size and scale, and amenity features could reduce community concerns about effects on neighbourhood character and property values.⁴⁷ The government should provide guidance on good design for low-rise apartment buildings in the Victoria Planning Provisions.

The Victorian Government should also introduce a dual occupancy and townhouse code to encourage well-designed small-scale development in established suburbs. It should apply in areas close to the city centre in

Melbourne and regional cities like as Geelong, Ballarat and Bendigo. The code will allow more small-scale townhouse redevelopments in established suburbs, which more homebuyers can afford. It can speed up planning approvals, reduce housing costs by saving time in the planning process, and incentivise well-designed homes.⁴⁸

The Victorian Government should reduce minimum parking requirements for developments located close to good public transport. Fewer parking spaces can boost the supply of homes in inner and middle Melbourne, reduce their cost and give developers more certainty. Parking spaces make homes more expensive and use up space that could otherwise be used for extra bedrooms.⁴⁹ Developers can always build more than the minimum parking requirements and home buyers can pay for more parking if they need it.⁵⁰

All of these changes would encourage more homes to be built in established areas of Victoria's cities, and fewer in new suburbs.

4 Plan for and deliver infrastructure that supports more people and jobs locating in established parts of major regional centres, including local transport, energy, water and digital infrastructure.

We compared different development scenarios for regional Victoria. People will be better off if new homes are mainly built in established parts of major regional centres, rather than being spread across small towns and rural areas. It means people would be closer to more jobs, services, and infrastructure, and have more home choices. The regional economy would be larger. Concentrating home building in regional centres would use up less land, helping preserve farmland and natural habitats. People already living in these centres could also benefit, especially if these new homes bring better transport and social services.

The Victorian Government should undertake long term strategic planning to support more compact urban development in major regional centres across Victoria. This should include policies that give people more regional housing choices, produce more regional jobs and deliver better local public transport connections. The government should establish regional housing targets in collaboration with local governments so new homes are built in places with good infrastructure access.

The Victorian Government should update its regional growth plans to plan for more homes in the established parts of regional centres. Regional local governments can then change their planning rules in these places to achieve the updated plans. For example, local governments can identify priority places to introduce the Residential Growth Zone in their regional centres to allow for more low-rise apartment development.

If the established parts of major regional centres accommodate more homes, those places will need better connections to regional jobs and services.⁵¹ Regional cities can benefit from better local public transport options. By collaborating with transport providers and local communities, the Victorian Government should help define regional public transport priorities. These can include travel around major regional centres, and for smaller communities to travel to them. It can then design and fund durable solutions, crafted specifically for the unique features of each location.⁵²

The Victorian Government should also work with local governments, energy companies, and water corporations to measure the infrastructure capacity in major regional centres. It can use this information to plan for energy and water infrastructure upgrades, so established suburbs will have enough infrastructure to accommodate more homes. This may require a step change in infrastructure provision, such as producing water from alternative sources, or increasing capacity of electricity distribution infrastructure.

The Victorian Government should also prioritise improving regional digital and transport connections for businesses, jobs and services. Regional infrastructure can link businesses to markets, producers and customers. Regional rail freight and regional roads need ongoing, long-term maintenance funding to support efficient freight logistics, minimise transport costs, improve road safety and keep regional Victoria economically competitive.⁵³

5 Plan for efficient and resilient electricity distribution infrastructure. Stimulate development and use of zero or low carbon materials and building construction and operation methods that reduce greenhouse gas emissions.

Victoria is transitioning to a zero-emissions energy system. We estimate that building new renewable energy generation and transmission networks will cost \$42 billion by 2056.⁵⁴ Building new electricity distribution infrastructure is cheaper in more compact or consolidated cities. But to build most efficiently, the government should plan new electricity distribution network upgrades that account for an area's future new homes, the speed of electrification, and exposure to climate risks. Otherwise, it risks the networks repeatedly being upgraded incrementally, at much higher cost.

Higher density homes use emissions-intensive construction methods and contain building materials that emit more greenhouse gases during their manufacture. But more compact cities also produce fewer transport emissions because people travel shorter distances. The opposite is true for less compact cities. Cities with more dispersed homes use lower emission materials, but produce more transport emissions because more people drive further. This includes emissions produced by generating electricity to charge electric vehicles, until the electricity grid achieves net zero emissions.

The Victorian Government should help commercial companies to develop zero or low carbon materials and building methods that will result in lower embodied carbon and operational emissions in all new buildings and other infrastructure. This can include investing in research and development to support introducing new low carbon materials into the construction sector. The government could consider a dedicated fund to support research, development and pilot programs for low carbon building materials and techniques.

The Victorian Government can use low carbon materials in public infrastructure projects to demonstrate their feasibility. It can also help develop and enforce building standards that require new homes to use low carbon materials, generate renewable energy, and be more energy efficient. These standards might be different for houses and apartments, as each has different opportunities to reduce emissions.

In March 2023, the Victorian Government requested Infrastructure Victoria's advice on opportunities to reduce greenhouse gas emissions of future public infrastructure investments the government will plan, own, or manage. The request asked us to consider how policies and guidelines can better account for greenhouse gas emissions produced in the design, investment, construction, maintenance, and decommissioning of Victoria's infrastructure. Implementation of that advice's recommendations will help reduce the greenhouse gas emissions of infrastructure and buildings identified by this research.



Detailed scenario analysis

Our detailed analysis describes the main characteristics of each urban development scenario in terms of population growth, housing type, jobs growth, and transport options.

It tells a story about what people might experience in each scenario in the year 2056. It uses the research data and modelling results to better understand some of the advantages and disadvantages.



Scenario impacts comparison table

This table compares the indicators for each scenario across social, economic and environmental dimensions. We discuss them in more detail in each scenario.

Figure 11: Scenario comparison table of estimated metrics

Indicator	Unit	Dispersed city	Consolidated city	Compact city	Network of cities	Distributed state
Net value of housing	\$b, present value relative to dispersed city	0	52	105	-55	-107
Of which: value of housing improved access to jobs	\$b, present value relative to dispersed city	0	47	100	-37	-80
Net value of housing per dwelling	\$000/relocated dwelling relative to dispersed city	0	75	152	-79	-155
Housing choice - share of all dwellings that are detached, 2056	Per cent	65	58	54	62	67
Share of dwellings for sale under \$750,000 (today's value)	Per cent	56	50	48	56	63
Share of dwellings available for rent under \$500 per week	Per cent	73	68	69	74	79
Accessibility to jobs (car 2036)	Ratio to dispersed city	100	104	110	101	101
Accessibility to jobs (car 2056)	Ratio to dispersed city	100	106	115	100	95
Accessibility to jobs (public transport 2036)	Ratio to dispersed city	100	104	110	98	96
Accessibility to jobs (public transport 2056)	Ratio to dispersed city	100	109	118	95	87
Public transport mode share (AM peak)	Per cent of trips	12.1	13.4	15	12	11.3
Environmental externalities from transport	\$b relative to dispersed city	0	-0.3	-0.5	-0.8	-1.5
Business location productivity	\$b relative to dispersed city	0	9	30.8	-0.6	-8.2
Agglomeration benefits	\$b relative to dispersed city	0	12.3	19.7	-1.8	-15.5
Employment impacts	\$b relative to dispersed city	0	5	12.1	0.2	-2.6
Additional land requirements	Km ² relative to dispersed city	0	-190	-313	20	241
Building operational GHG emissions	Million tonnes CO ₂ e relative to dispersed city	0	0.3	0.7	0.1	0
Building embodied GHG emissions	Million tonnes CO ₂ e relative to dispersed city	0	8	14.8	1.3	-1.8
Vehicle tailpipe GHG emissions	Million tonnes CO ₂ e relative to dispersed city	0	-7.6	-16.8	-1.5	-10.8
Operational emissions from electric vehicles	Million tonnes CO ₂ e relative to dispersed city	0	-0.2	-0.5	0	0.1
Total GHG emissions	Million tonnes CO ₂ e relative to dispersed city	0	0.5	-1.8	-0.1	-12.5

Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios. Grey shading means a neutral outcome.



Dispersed city



Dispersed city

Imagine that over the next 30 years, developers build many more large, detached homes on the outskirts of Melbourne. These new homes have plenty of open space nearby. But as the city expands into more new growth areas, road congestion increases, and people spend more time commuting.

Melbourne keeps expanding

In 2056, Melbourne is still a low density, dispersed city. Between 2021 and 2056, Melbourne accommodates over 75% of Victoria's population growth, or an extra 3 million people, with just over 2.3 million in its outer suburbs and new growth areas. There's also some population growth in Melbourne's inner and middle suburbs and in regional Victoria, as shown in Figure 12.

Melbourne reaches this scenario by keeping the policies of the early 21st century. Most new homes are built on the urban fringe, extending along Melbourne's road and rail corridors. Peri-urban towns around Melbourne rapidly build more homes.

Figure 12: Map of dispersed city scenario population growth

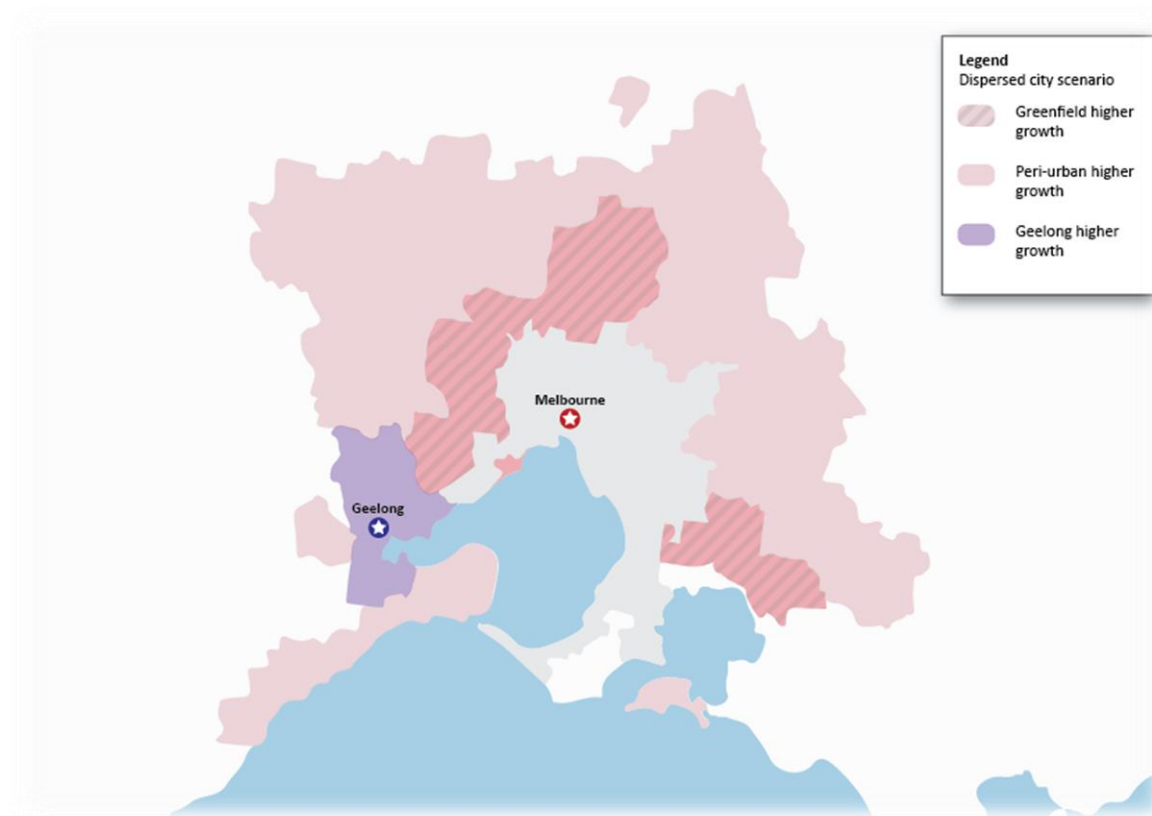
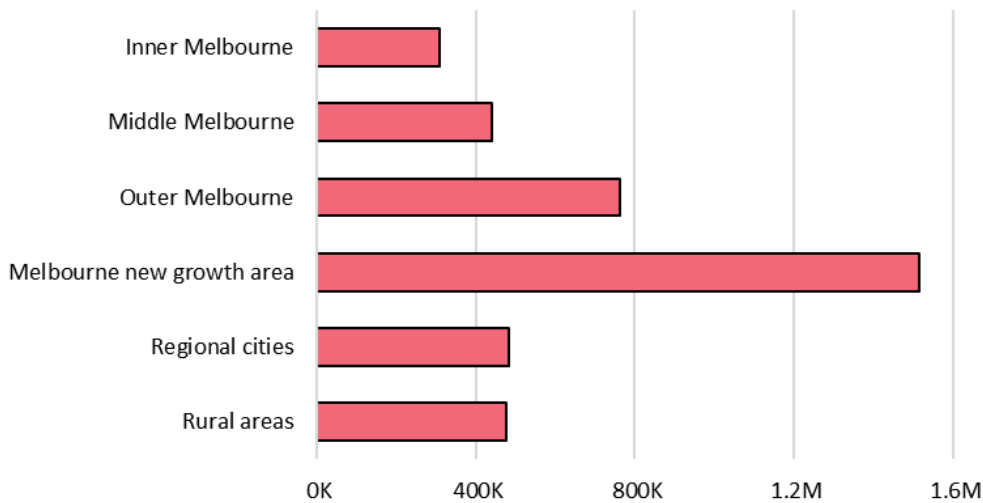


Figure 13: Dispersed city scenario population growth



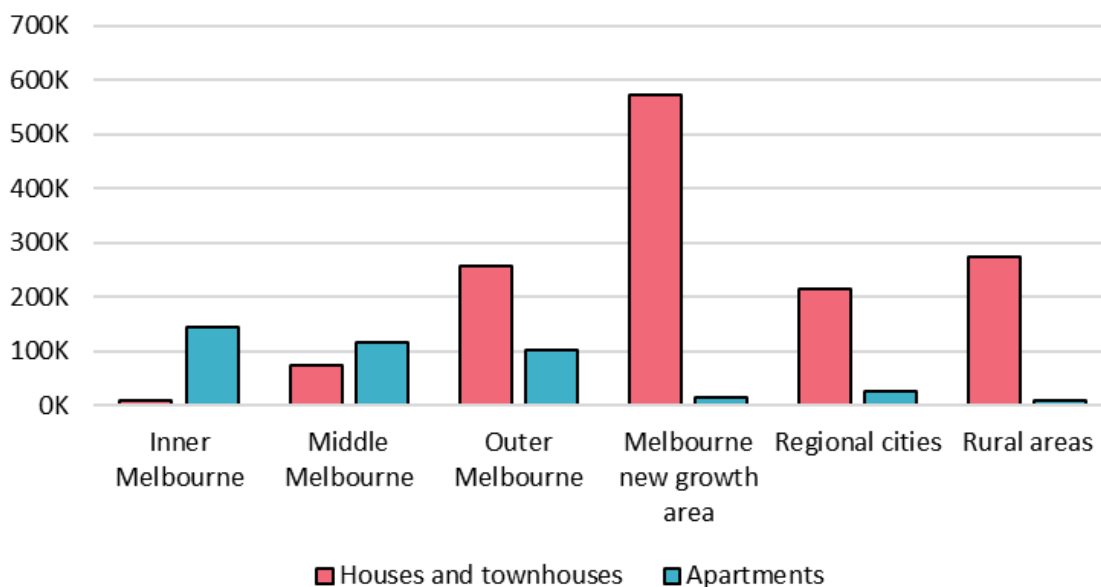
Data source: SGS Economics and Planning, *Urban development scenarios*, 2022

Melbourne plans more growth areas for extra homes

By 2041, developers exhaust all the land zoned for new housing estates in growth areas. This forces the government to allow development beyond the urban growth boundary to build more homes. The government develops precinct structure plans for more new growth areas. Developers build 270,000 detached homes in these extra growth areas to accommodate the demand for more homes.⁵⁵ These new suburbs push further into flood plains and grasslands, exposing people to higher risks of flood and fire. Victoria builds very few apartments outside Melbourne’s inner suburbs, as Figure 14 shows.

Developers also build more low density, detached homes in parts of regional Victoria close to Melbourne, primarily along road and rail corridors. Melbourne’s inner and middle suburbs build new homes only incrementally, and the populations of Melbourne’s outer suburbs grow rapidly. Regional cities and centres build more detached houses, meaning they also have more people, as Figure 14 also shows.

Figure 14: Dispersed city scenario forecast dwelling growth by type (2021 to 2056)



Data source: SGS Economics and Planning, *Urban development scenarios*, 2022

Spread-out suburbs favour lower paid local jobs, and long car trips

As more people move into the burgeoning new suburbs on Melbourne's fringes and in nearby towns, the government and businesses start new services for them, creating local jobs. This includes many jobs where people directly interact, like education, healthcare and community services, and retail jobs like supermarket work. The spread-out city tends to produce extra courier, transport, personal services, recreation, and other local services work, although these jobs are often not highly paid.⁵⁶ Other jobs that do not rely on serving people face-to-face, like finance and some professional services, still cluster in Melbourne's inner and middle suburbs, as Figure 14 shows. In 2056, Melbourne's inner and middle suburbs have 47% of Victoria's jobs, but only 30% of workers live there. In a dispersed city, many workers must travel from Melbourne's outer and new growth areas to inner areas to get to work.

Figure 15: Dispersed city employment growth by functional urban area (2021–2056)



Data source: SGS Economics and Planning, *Urban development scenarios, 2022*

Many office employees work from home a few days a week because their workplaces are so far from home. But certain businesses still strongly benefit from a central city location.^{57,58} It is the easiest place for workers living all over Melbourne to meet in person and the best place to meet clients in other businesses. But it also means workers in these businesses still need to live within a reasonable distance of central Melbourne. If they move too far away, they cannot get to work in a reasonable time, even if only for a couple of days a week. A dispersed city means many people are still making long journeys, causing congestion and delays on the roads and on public transport.

In 2056, the proportion of people using public transport does not change much from 2021. Public transport cannot easily cater to their travel patterns because people are so spread out, and their destinations are dispersed. The long distances mean they do not find walking and cycling attractive.

Because so many people rely on cars for transport, wider roads can help reduce congestion. But the government can only build wider roads in places with enough space, like Beveridge in Melbourne's north. The government cannot widen roads in built up areas, and wider roads also generate more traffic. The government also invests in longer metropolitan train services and new stations in growth areas to help people travel long distances to work.

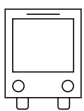
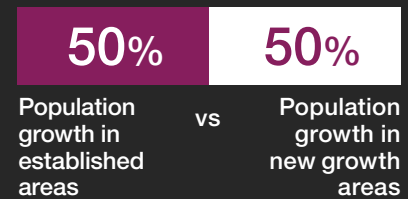
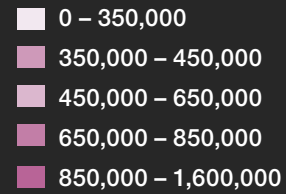
Rural towns near Melbourne grow rapidly

By 2056, another 350,000 people live in peri-urban towns, each now a bustling community surrounded by new housing estates. They also attract new local service jobs, but not nearly enough for their whole population. Coastal and rural towns do not grow as much, because the rising threat of climate change creates more extreme weather events, and fewer people and businesses are willing to take that risk.

Dispersed city

Choosing Victoria's future: 5 urban development scenarios

Population growth 2021–2056



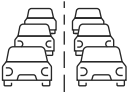
25% of jobs can be reached within a 60-minute public transport commute



-\$105bn net value of housing compared to compact city



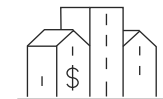
65% of homes are detached



12% of car travel is on congested roads



72,000ha required additional urban land



\$163bn impact on business location productivity compared to 2021



12% of travel is on public transport



1,162mil tonnes of greenhouse gas emissions



+\$59k cost of infrastructure per new home compared to compact city

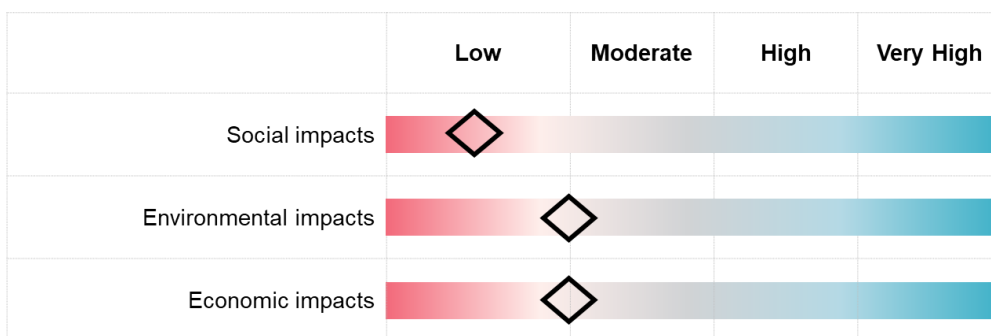
Impacts and costs of the dispersed city scenario

A dispersed city has worse social outcomes, less accessibility and people depend more on cars

The dispersed city has worse social impacts than our other scenarios, and moderate environmental and economic impacts.

We assessed different impacts, as presented in Figure 11 and described below. We gave scenarios very high scores when they performed better compared to other scenarios on the indicators in each social, environmental, or economic domain. We gave scenarios a low score when they performed worse compared to other scenarios. We gave scenarios moderate or high scores when they performed in between the other scenarios.

Figure 16: Dispersed city overall assessment



Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios.

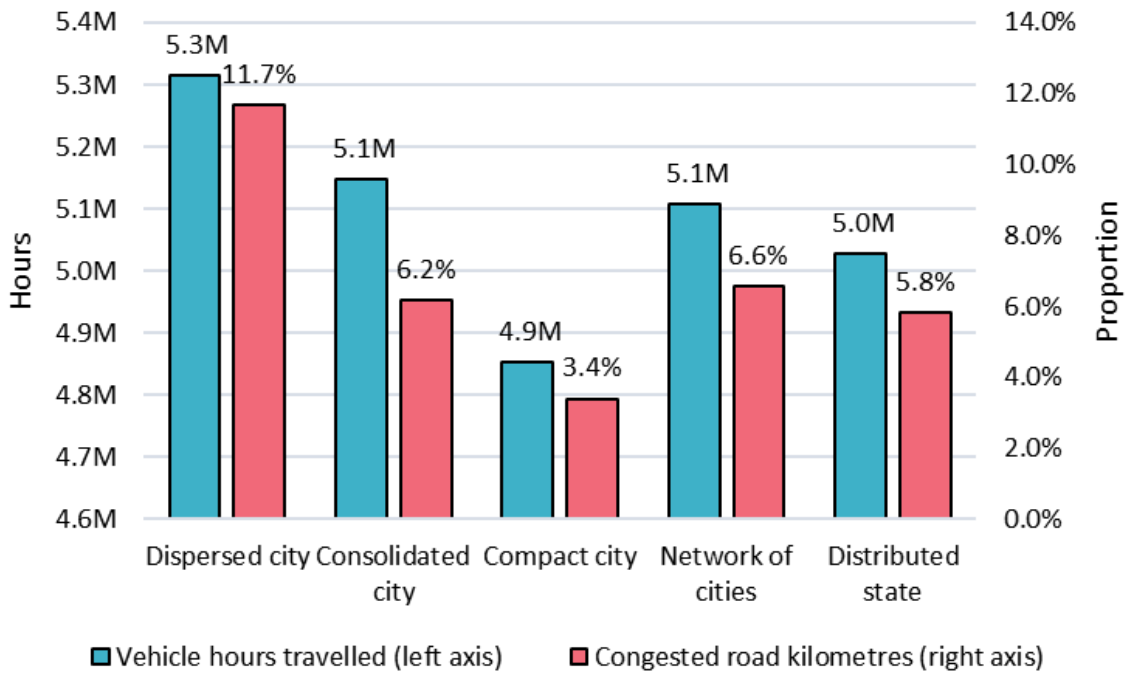
A dispersed city risks creating more disadvantaged places. People who live in neighbourhoods with inferior access to jobs, services and opportunities can experience locational disadvantage. This might mean they cannot get the help they need to change their life circumstances. It can lead to feelings of isolation and loneliness, particularly for people living alone.⁵⁹ In turn, this can affect people’s mental and physical health.^{60,61}

Melbourne’s outer and growth suburbs more commonly have these disadvantaged places. A dispersed city shape means more people live in suburbs with less access to jobs and services.⁶² This means more people might experience locational disadvantage and risks greater social inequality.

Of our 5 city shapes, a dispersed city has the highest car ownership. Our modelling forecasts it has 154,000 more cars than a compact city. This means people spend more time in their car (see Figure 17), the roads are more congested, and public transport is more crowded, than in any other city shape.⁶³ This risks producing a lower quality of life for people living in Melbourne’s outer suburbs and growth areas.

A dispersed city makes it harder to get to work. People can reach fewer jobs within a reasonable commuting time, compared with more compact or consolidated cities. This also means a dispersed city has a less productive economy and lower wages.

Figure 17: Total time spent travelling by car and proportion of road kilometres congested in 2056



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

People get less value from their homes in a dispersed city

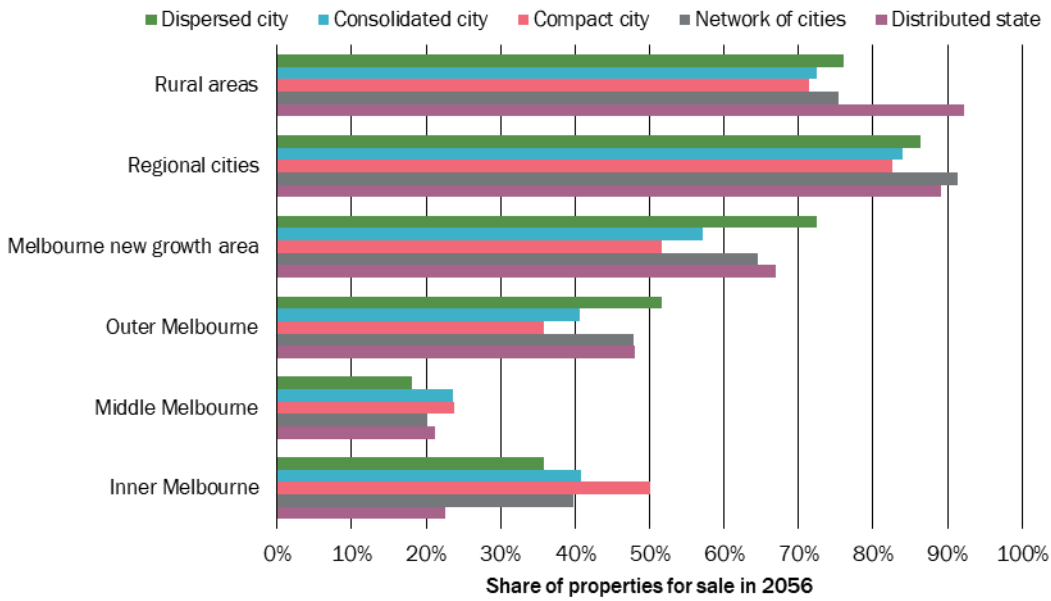
To assess social outcomes, we measured housing values. Housing value reflects the value of the location of the home, and the type of home, such as a detached house, townhouse, or apartment. It captures whether the homes match people’s desired home locations and home type preferences. We interpret higher housing values to mean the homes are better located, and better match people’s preferences.

People gain less value from their homes in a dispersed city than in compact or consolidated cities. We estimated that dispersed city homes produce \$52 billion less value than in a consolidated city, and \$105 billion less than in a compact city, in 2056.⁶⁴

A dispersed city produces less valuable homes because they are further away from valuable opportunities, like jobs and services. Dispersed cities build homes on cheaper land, but the benefit of this lower-cost housing is outweighed by their inaccessible locations.⁶⁵ We used our modelling to estimate the effects of different housing values on housing affordability. We found that the total share of affordable housing in Victoria was about the same in every city shape.

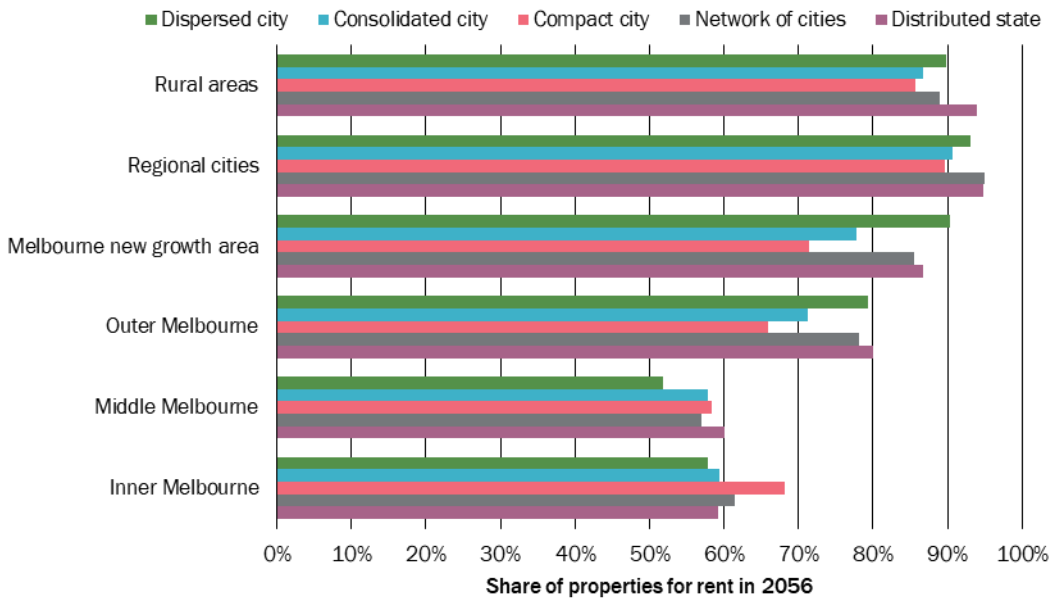
But city shape does affect where people can buy affordable homes. In a dispersed city, more of the available affordable housing is in the outer suburbs and growth areas, compared with other city shapes.⁶⁶ Of our 5 city shapes, a dispersed city has the lowest proportion of affordable homes available in the middle suburbs, and the second fewest in the inner suburbs. A dispersed city shape concentrates affordable housing in the outer suburbs and growth areas of Melbourne, which are the least accessible parts of the city. Figure 11, Figure 18 and Figure 19 show more detail about the location of affordable homes.

Figure 18: Share of properties for sale below \$750,000 in 2056, assuming no price growth



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

Figure 19: Share of rental properties below \$500 per week in 2056, assuming no price growth



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

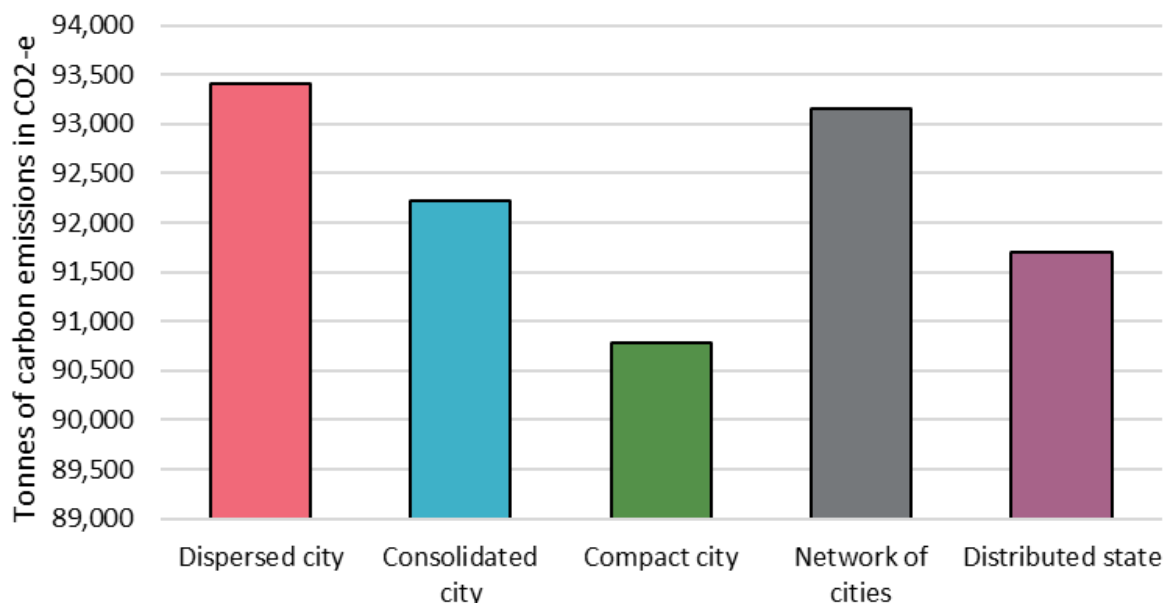
A dispersed city emits more greenhouse gases, and uses more land

The shape of cities can affect the environment. We measured different environmental impacts for our 5 city shapes. This includes the greenhouse gases emitted by homes and vehicles. We adjusted our measures to account for more people using electricity vehicles over time. We also measured the noise and air pollution transport vehicles produce, and the extra land used by different city shapes.

A dispersed city produces more greenhouse gases than any other city shape. Its transport emissions are higher because more people drive further, on more congested roads.⁶⁷ By 2036, a dispersed city generates

about 4 million more tonnes of greenhouse gas emissions from transport, compared to a compact city. For the same reason, the dispersed city also produces the most air and noise pollution.⁶⁸

Figure 20: Total daily CO₂ emissions produced by transport from 2021–2036



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

In a dispersed city, new growth areas use up more land to build new homes. Our dispersed city scenario uses more than 70,000 hectares of land for new development. This is almost twice as much as the compact city scenario, which uses only about 40,000 hectares. More land for housing means less land for wildlife and biodiversity.⁶⁹ Larger growth areas to create new suburbs on the fringes of Melbourne also means less land for farming, nature or industry.⁷⁰

Local infrastructure costs more in a dispersed city

By 2056, a dispersed city needs more local infrastructure because its new housing estates cover a much larger area. We estimated local infrastructure costs for a dispersed city at \$160 billion, which is the second highest of our 5 city shapes. Local infrastructure includes building the streetscape and installing basic services to each home. It includes:

- earthworks and local roads
- civil works including drainage
- electricity, gas, water, sewerage, and telecommunications connections
- conversion of street scapes.⁷¹

But not everything costs more in a dispersed city. Educational infrastructure, open space and community infrastructure is cheaper to build than in a compact or consolidated city. This is largely because land is cheaper in new growth areas. We costed community infrastructure that serves local communities in our costing. It includes:

- health and wellbeing hubs
- sport and recreation hubs and more aquatic centres
- art and cultural hubs.

Policies that could enhance or mitigate dispersed city outcomes

These policy directions are not our recommendations to the Victorian Government. Rather, they advise on ways the government could achieve better outcomes if it chooses to pursue this urban development pathway.

Our modelling shows a dispersed city has worse social impacts, less access to jobs, higher greenhouse gas emissions, lower productivity, and uses up more land than more compact or consolidated city shapes. The Victorian Government faces risks if it pursues this city shape. To avoid these risks, the Victorian Government should consider policies that limit new suburban development and instead support building more homes in established parts of Melbourne.

But if the Victorian Government chooses a development pathway toward a more dispersed city, it should manage Melbourne's expansion in a more considered way. These 4 policy directions could make this scenario work better for Victorians, and lower some of the risks.

Prioritise planning for population growth in Melbourne's growth areas, peri-urban and surrounding regional areas

A dispersed city needs about 600,000 more homes in Melbourne's grow areas by 2056.⁷² For the people living in these new homes, the Victorian Government can prioritise better planning and more infrastructure funding for the city's newest suburbs, and for peri-urban and surrounding regional areas.

To achieve a dispersed city, the government would need to expand the urban growth boundary, because the present boundary will not have enough room for all the new homes. The government can review its approach to identifying land for urban development,⁷³ including permanently protecting green wedge and peri-urban agricultural land from development.⁷⁴ The government can produce more Precinct Structure Plans (PSPs) for land use and infrastructure in new suburbs, peri-urban and regional towns. Growth Area Infrastructure Contributions (or other forms of developer funded infrastructure contributions) can apply to a larger geographic area and more transparently fund priority, strategic state infrastructure in these places.⁷⁵ Recommendation 3 to reform infrastructure contributions could help fund this new infrastructure.

It can take some time after people move into new suburbs for the Victorian Government, local government and businesses to build infrastructure, and provide social services, public transport, retail outlets, and other commercial services. This means people often must drive to nearby suburbs to reach them. For example, delivering bus services can take up to 10 or more years.⁷⁶ Establishing other services and facilities can take 4 or more years after the first residents move in.⁷⁷ To address this, the Victorian Government could offer financial incentives such as land tax relief to encourage retail and commercial development in new suburbs. Development Victoria could work in partnership with local government and the private sector to speed up commercial development by buying land for temporary shops and services or developing sites to sell for profit.⁷⁸

Good planning for delivery of social services and infrastructure can make a dispersed city more successful. If the government were to pursue a dispersed city, it could update the land use framework plans. The updated plans could show the new areas proposed for extra suburbs, and the accompanying revisions to planned major infrastructure and land uses.⁷⁹ The government could then prepare new precinct structure plans for the new areas. These new plans could have more infrastructure detail than present ones, and include more types of infrastructure, like community centres, libraries, sports facilities, and kindergartens. This can identify appropriate places for these facilities and encourage early zoning of land for these uses. Precinct structure plans can also help the Victorian and local governments identify appropriate land to buy for future infrastructure. By delivering the long term infrastructure plans outlined in recommendation 2, the Victorian Government can have a clearer blueprint for development and infrastructure in these new suburbs.

The government might change the way it delivers social services in a dispersed city. For example, it might deliver more services digitally. It might deliver face-to-face services from multi-purpose community hubs, designed to meet many different community needs. Many of Melbourne's growth areas have a large Aboriginal and Torres Strait Islander population. For example, the local government areas of Wyndham, Casey and Whittlesea have the largest number of Aboriginal and Torres Strait Islander people in Melbourne.⁸⁰ The Victorian Government can co-design a plan for Aboriginal community-controlled infrastructure in growth areas to meet their future social, economic and cultural needs.⁸¹

Invest in more growth area transport infrastructure

A dispersed city has high car ownership, long trips, heavy road congestion and high public transport crowding.⁸² For a dispersed city to have less transport congestion, the Victorian Government would need to invest in more transport infrastructure than we assumed for our modelling and costings. The government could also prioritise extending train lines into growth areas and invest in more bus services there.⁸³ It could deliver bus services earlier in new developments. It could give buses higher priority on roads, and improve other routes so buses are faster, more frequent, and reach more local destinations. It could also deliver bus rapid transit services as a cost-efficient mass transit in areas not well served by trains.⁸⁴

To reduce people's reliance on cars in new suburbs, the Victorian Government could work more closely with local governments to provide alternatives for short trips, like high quality walking and cycling paths.⁸⁵ Other options, including car share, e-scooters, e-bike hire schemes and end of trip facilities at train stations, could also help people travel from train stations to their homes.⁸⁶ It could also consider cheaper off-peak public transport fares to encourage more people on to public transport, as outlined in *Victoria's infrastructure strategy 2021–2051*.⁸⁷ A distance-based road user charge could help shift people to alternative transport options, such as train or bus services.⁸⁸

Work with the private sector to expand zero emissions vehicles' charging infrastructure

We estimate that a dispersed city will mean Victorians own at least 7.6 million cars by 2056, which is around 2.5 million more cars than in 2021.^{89,90}

The Victorian Government could keep supporting initiatives that accelerate the uptake of zero emissions vehicles (ZEVs). As this scenario has so many extra cars, this could help reduce the amount of greenhouse gases they produce. This might include policies and incentives that support a faster uptake of ZEVs, such as expanding the ZEV charging network in Melbourne and regional Victoria.

Our previous *Advice on automated and zero emissions vehicles infrastructure* and our report *Driving down emissions: accelerating Victoria's zero emission vehicle uptake* offer more detailed guidance on improving uptake of ZEVs and the infrastructure needed to support their operation.^{91, 92}

Address climate risks from using more urban land

The Victorian Government and community will face more hazardous climate risks in a dispersed city scenario. This scenario uses the most land for homes and local infrastructure in Melbourne's new suburbs.⁹³ Some of these areas are covered by the bushfire management overlay, meaning they have high bushfire risks.⁹⁴ As global warming escalates, Victoria's urban areas could experience around twice the number of very hot days⁹⁵ over 40 degrees each year by the 2050s, compared to the 1986–2005 average.⁹⁶ More frequent and intense heatwaves can lead to more illness and death, especially among at-risk and vulnerable people.⁹⁷ A dispersed city is more exposed to the repercussions of high temperatures and bushfires.

To reduce immediate bushfire risks, the Victorian Government could better manage vegetation, including by embedding Traditional Owners' cultural land management tools such as traditional fire management practices.⁹⁸ It can also support people at risk of heatwaves by working with local governments to deliver climate-adapted community facilities, which could be located in local libraries, leisure centres and town halls. These facilities are places that at-risk people can visit to remain cool during extreme temperatures when their homes are too hot, or to access filtered air to avoid breathing in smoke from large-scale or prolonged

bushfires.⁹⁹ The government could achieve this either by designing new facilities or upgrading and retrofitting existing ones.

New suburbs have less room for trees on private land, and those in Melbourne's north and western growth areas are on former grasslands that had little original vegetation cover.¹⁰⁰ More extensive tree canopy cover, including in public open space, can lower heatwave risks. Vegetation helps dissipate heat trapped in urban environments, contributes shade, and supports evaporative cooling. It also reduces water run-off, air pollution and ultraviolet radiation.¹⁰¹

International case studies of land use planning

Copenhagen's regional finger plan'

Copenhagen, Denmark is famous for its urban planning.¹⁰² The city government emphasises sustainability and encourages use of public transport. Its 'five finger' or 'regional finger plan' was first sketched in 1947. Ever since, it has facilitated development of major new housing areas along public transport corridors, and preserves large wedges of green space between the growth 'fingers'.¹⁰³

Copenhagen is an example of consistent urban planning producing beneficial outcomes for its people. For example, people cycle for over 40% of work and school trips, and they have good access to services, facilities and cycling infrastructure. Agricultural land uses are also encouraged in the green wedge areas between the fingers, which means farming produce is easily accessible from nearby urban areas.¹⁰⁴



Source: Blekinge Institute of Technology

Singaporean precinct development



Source: Urban Redevelopment Authority Singapore

For most of the 19th century and the first half of the 20th century, Singapore's physical growth was haphazard and largely unregulated.

Singapore only really began to use urban planning in the mid-1950s.¹⁰⁵

Singapore was planned as a series of partially self-sufficient precincts governed by 4 regional centres. This division of the region helps sustain Singaporeans high quality of life.

Singapore's government used strategies like providing quality affordable housing, integrating green spaces, enhancing mobility and transport services, sustaining a prosperous economy, and creating opportunities and room for growth for future generations.¹⁰⁶



Consolidated city



Consolidated city

Imagine that, by 2056, Melbourne's middle suburbs develop several high-density job precincts. The city builds many new homes in and around these precincts, often being townhouses or low-rise apartment complexes. People have good access to jobs and services within a reasonable distance from their homes.

Melbourne develops high-density precincts

Three new precincts emerge in middle Melbourne

By 2056, the Victorian Government strategically plans for and facilitates investment in 3 new precincts to the north, west and south-east of Melbourne's city centre. These precincts bustle with activity, with many new jobs, homes and services. Central Melbourne still functions as the main city centre and expands to include the nearby Arden and Fishermans Bend precincts. The government has completed the Suburban Rail Loop, which connects these new major growth precincts. In the consolidated city scenario, these precincts grow more than in any other scenario.

We chose these 3 specific precincts for illustrative modelling purposes, but we could have achieved a similar scenario by choosing different precincts. We selected the precincts to represent the general features of this type of city, rather than to propose that the government should prioritise these specific places.

Figure 21: Map of major precincts in the consolidated city

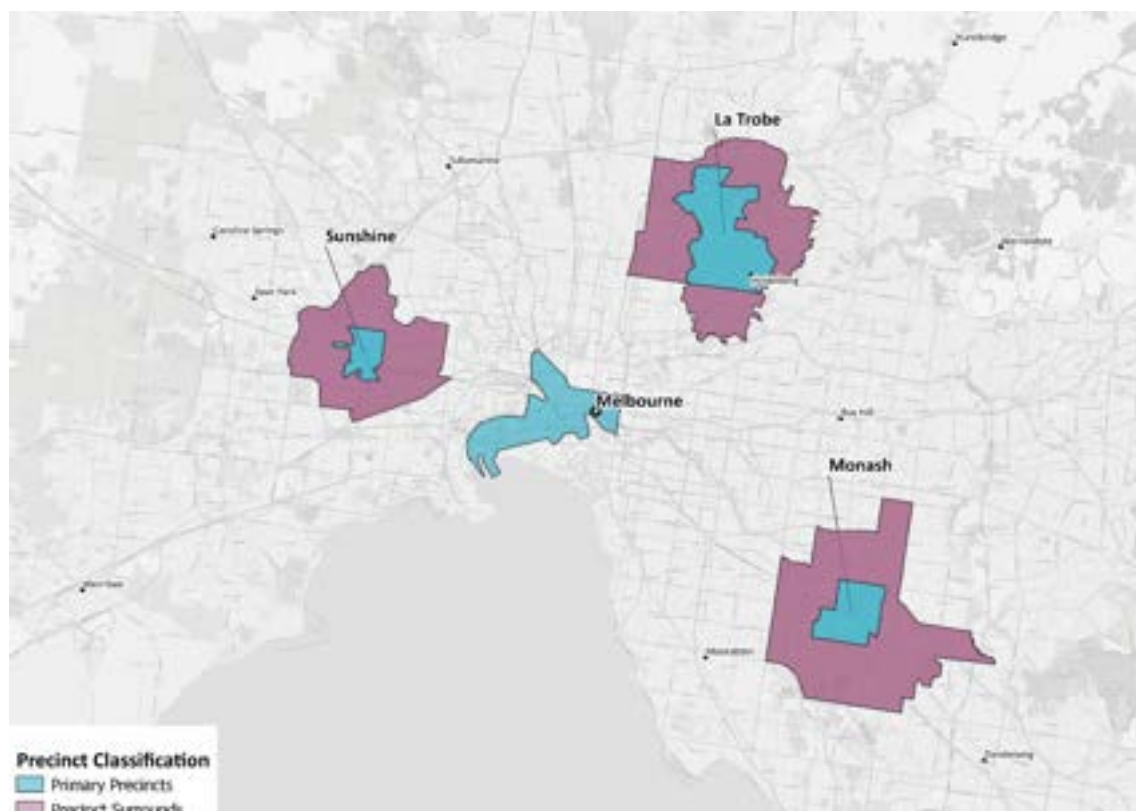
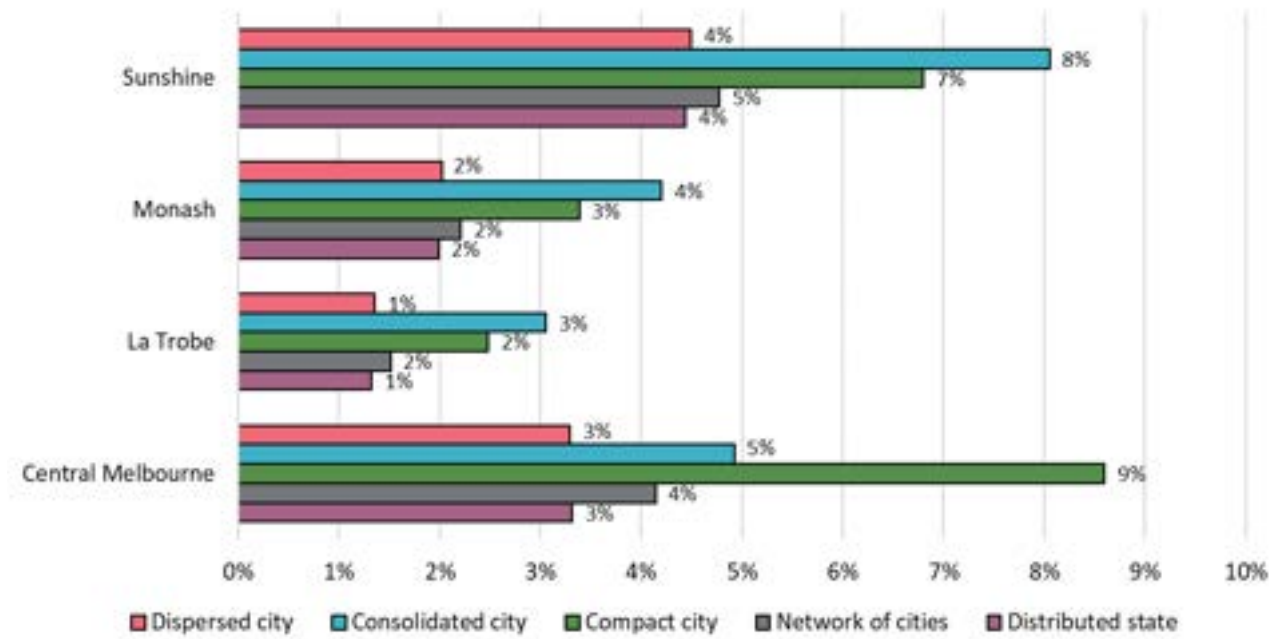


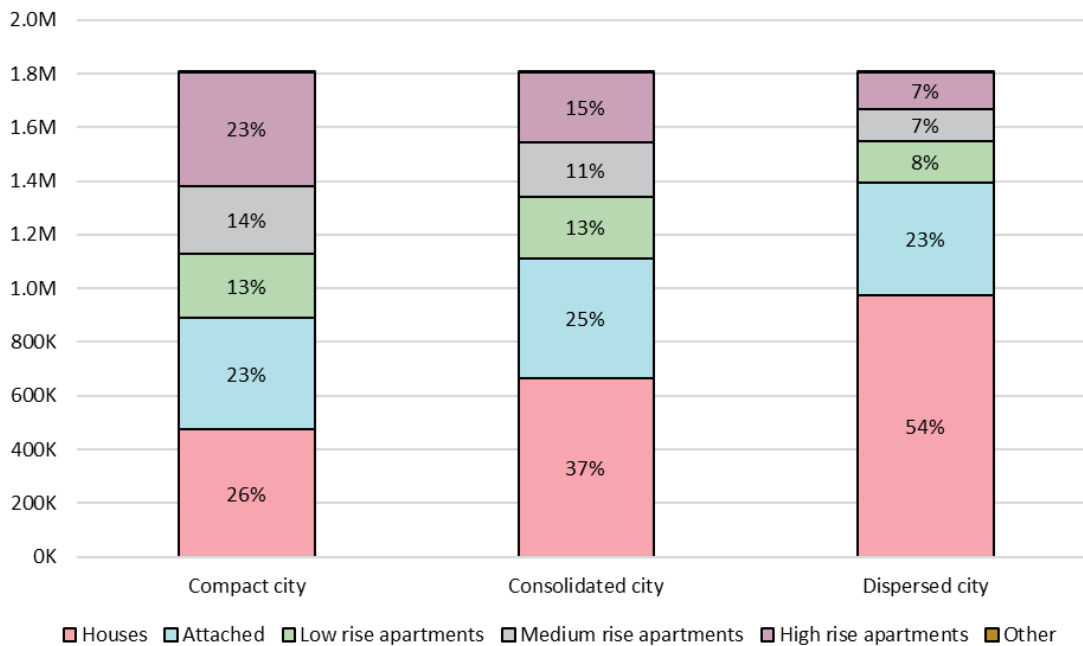
Figure 22: Annual population growth rates in precincts, 2021 to 2056



Data source: SGS Economics and Planning, *Urban development scenarios, 2022*

In the consolidated city scenario in 2056, 37% of Melbourne's homes are detached houses. This contrasts with 26% in our compact city scenario, and 54% in our dispersed city scenario. Developers built high-rise apartments in inner Melbourne and built townhouses, low-rise and medium-rise apartments in Melbourne's middle suburbs, as Figure 23 shows.

Figure 23: Dwelling growth forecast for compact city, consolidated city and dispersed city scenarios, 2021 – 2056



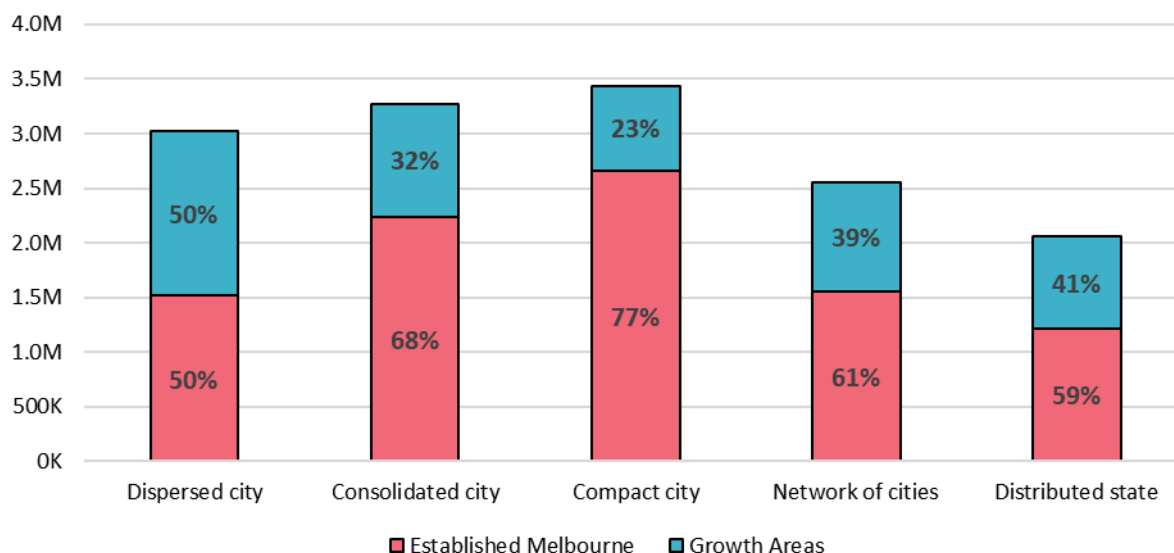
Data source: SGS Economics and Planning, *Urban development scenarios, 2022*

Homes and jobs grow rapidly in Melbourne’s new precincts

People and businesses benefit from locating in the new precincts. People living in them have good access to jobs and services. Businesses profit from their location in thriving commercial centres and can attract many productive workers and build strong commercial relationships there. Many major health and educational institutions are located in these precincts, and each precinct has its own identity and economic strengths.

In the consolidated city scenario, 68% of Melbourne’s population growth is in its established suburbs, while 32% is in growth areas, as Figure 24 shows.

Figure 24: Population growth share of metropolitan Melbourne (2021–56)



Data source: SGS Economics and Planning, *Urban development scenarios*, 2022

The precincts complement the city centre, which remains a major place for business, knowledge intensive services and related jobs. The precincts are knowledge hubs and thrive with successful new businesses built on advancements in clean energy, sustainability and healthcare. Melbourne’s middle suburbs generate an extra 800,000 jobs by 2056, while the inner suburbs have an extra 400,000.

Fishermans Bend and Arden reach their planned population and employment aspirations. This creates a larger central city and means it has a greater mix of jobs and services. Fishermans Bend is Australia’s largest urban renewal precinct, covering about 480 hectares. By 2050, it houses about 80,000 residents and offers jobs for up to 80,000 people.¹⁰⁷ The Metro Tunnel’s Arden Station is the heart of the Arden precinct. The precinct is a thriving new neighbourhood that accommodates 34,000 jobs and 15,000 residents. Development has transformed the area, and delivered community facilities, a primary school, and around 8 hectares of new green space, including local parks.¹⁰⁸

Each precinct has unique strengths

In 2056, the Monash precinct, in Melbourne’s east, has more jobs than any place outside the central city. Monash University boosts the precinct’s economic performance, as do the other health and research facilities nearby, including the Australian Synchrotron, Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Victorian Heart Hospital. It is also close to manufacturing businesses in Dandenong. Developers built medium and higher density apartments in the precinct and nearby, after the land was rezoned. The Suburban Rail Loop connects the Monash precinct to centres north of it, like Box Hill, and creates stronger demand for homes in it. Nearby suburbs attract many students and workers, helping stimulate demand for the many low-rise and medium-rise homes built there.

The northern La Trobe precinct (Heidelberg), is the main hub for jobs, education, research and health in Melbourne's north-east. The Darebin Creek and Yarra River border it, and it covers the largest area of our 3 major precincts. It contains La Trobe University, nearby parklands, and other green open spaces. People find the precinct attractive to live in, because it has a choice of townhouse and apartments for people seeking to live close to their jobs or the university.

In Melbourne's west in 2056, central Sunshine has transformed into a thriving precinct containing high-rise commercial offices and apartments. It has kept its culturally diverse communities and vibrant street life. The precinct centres on its railway station, which connects many different rail lines and bus routes. This means people living in Melbourne's western suburbs can easily get to it. People can also reach it using several regional rail lines or easily catch a train from the central city. Many new businesses locate in the precinct, especially because it is close to several large industrial areas that attract new advanced manufacturing businesses.

Melbourne builds a better connected public transport network

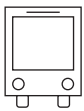
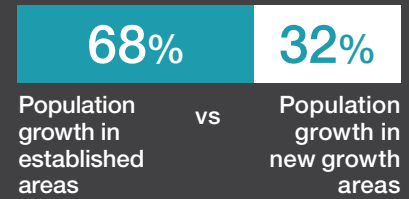
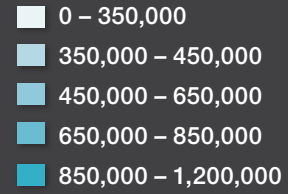
In 2056, Melbourne's has a busy train network, especially in the middle suburbs. The government completed Melbourne Metro Two, allowing cross-city trains to run from Werribee, through Fishermans Bend and the city centre, and out to Mernda. It also reconfigured the city loop to help more people travel more often across the city. Central Melbourne has more jobs and people, although not as many as in the compact city scenario.

Many people use the Suburban Rail Loop each day for many different purposes, not only to get to work. A larger, better connected train network means more people live in central Melbourne, and more business create jobs there. The government has also added more train and tram services that connect to Melbourne's suburban centres. It has added new bus lanes on arterial roads in Melbourne's middle and outer suburbs. The changes mean congestion increases on some roads, but many people use public transport instead of driving, because they find it is a great alternative. The Victorian and local governments have also improved walking and cycling infrastructure along major roads, which also helps people avoid driving in Melbourne's suburbs.

Consolidated city

Choosing Victoria's future: 5 urban development scenarios

Population growth 2021–2056



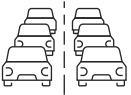
28% of jobs can be reached within a 60-minute public transport commute



+\$52bn net value of housing compared to dispersed city



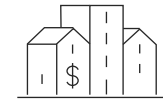
58% of homes are detached



6% of car travel is on congested roads



53,000ha required additional urban land



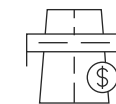
\$172bn impact on business location productivity compared to 2021



13% of travel is on public transport



1,163mil tonnes of greenhouse gas emissions

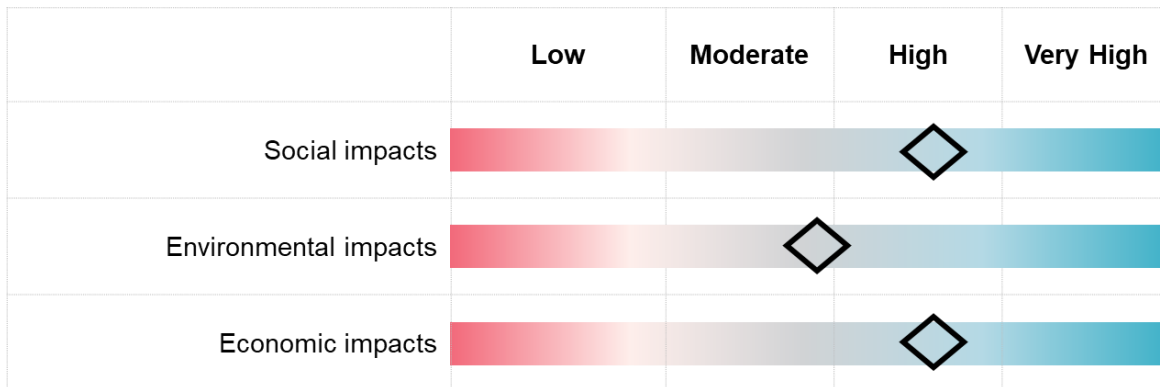


-\$26k cost of infrastructure per new home compared to dispersed city

Impacts and costs of the consolidated city scenario

The consolidated city has many positive social, economic and environmental impacts, with good access to infrastructure, services and facilities and more affordable housing rental options.¹⁰⁹ Figure 25 shows our summary of the impacts of this scenario.

Figure 25: Consolidated city overall assessment



Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios.

People have more housing choices

People living in the consolidated city have more housing choices in more places. Melbourne has built many townhouses and apartments surrounding the central city and the 3 major precincts. This means people have more options for the type of home they can buy, and more locations in which they can buy one. People have good access, because these homes are closer to places with plenty of jobs and services. Home construction and land costs are higher in established areas, but people have a better quality of life because they can easily reach everything they need. The consolidated city scenario has a value of housing about \$52 billion more than the dispersed city scenario.

A consolidated city uses less land and has fewer environmental impacts

In the consolidated city in 2056, Melbourne's established suburbs accommodated many new homes. This meant building those new homes used less land, and the extra residents could use the infrastructure already in those suburbs. The consolidated city uses 190 km² less land than the dispersed city scenario.

It also produces fewer greenhouse gas emissions from running buildings, and from driving cars and trucks. The consolidated city emits about 7.9 million tonnes fewer greenhouse gas emissions (carbon dioxide-equivalent) directly from cars and trucks between 2021 and 2056, compared to the dispersed city. That is equal to the average annual emissions of about 260 commercial aircraft.¹¹⁰

But home construction emits more greenhouse gases in this scenario. It has more 'embodied emissions', meaning the home construction methods and the materials used in them cause more greenhouse gas emissions to be released. This is mainly because apartments need more steel and concrete. Our modelling shows that the consolidated city releases 8 million tonnes more greenhouse gas emissions from buildings than the dispersed city. Despite these extra emissions, the consolidated city generates fewer emissions overall than the dispersed city, because of the other emission reductions.

A consolidated city has a stronger economy

Victorians living in the consolidated city scenario have good jobs and a larger economy. By 2056 this city shape generates \$9 billion (6%) more in economic activity, compared to the dispersed city. According to our

modelling, Victorians earn an extra \$5 billion in wages and profits in this scenario than in the dispersed city, because more Victorians have jobs.

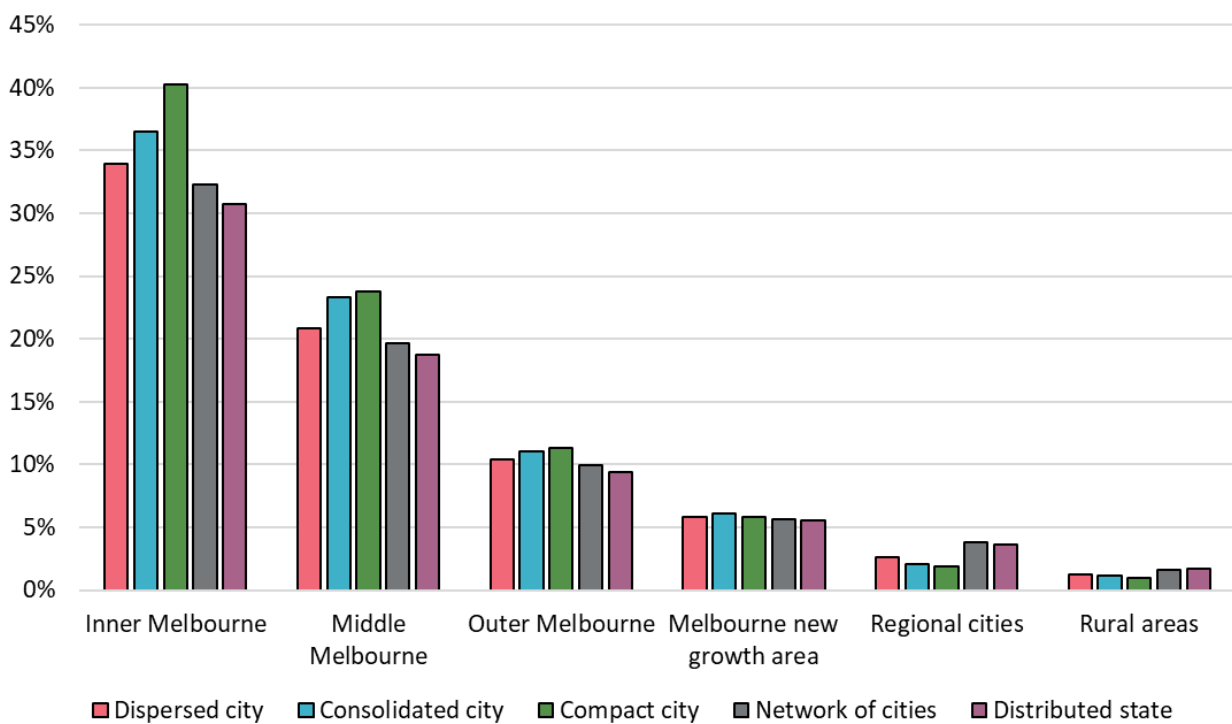
Our economic modelling calculated the ‘agglomeration’ benefits of the consolidated city. These calculations estimated the improvements in the city’s economic performance associated with differences in accessibility and land use, which traditional cost–benefit analysis does not capture.¹¹¹ Agglomeration benefits arise from businesses locating closer together, either by being physically closer, or having better transport connections to one another.

The compact city and consolidated city scenarios have the most agglomeration benefits. We estimate that the consolidated city produces about \$12 billion in agglomeration benefits between 2021 and 2056, compared to the dispersed city.¹¹²

People live closer to the places they need to go

Victorians living in the consolidated city can get to work more easily. As Figure 26 shows, people living in Melbourne’s middle and outer suburbs can more easily get to work using public transport, compared to the dispersed city scenario. This is because people live closer to jobs and good public transport services.

Figure 26: Proportion of all jobs in Victoria accessible using public transport within 60 minutes (AM peak 2056)



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

Accessibility explained

In this report, accessibility is the ease with which people can reach valuable destinations. It accounts for transport availability, and travel time, distance and cost.¹¹³ We included several indicators that relate to accessibility, such as:

- housing value
- access to jobs and services by car and public transport
- spatial distribution of housing affordability
- public transport mode share.

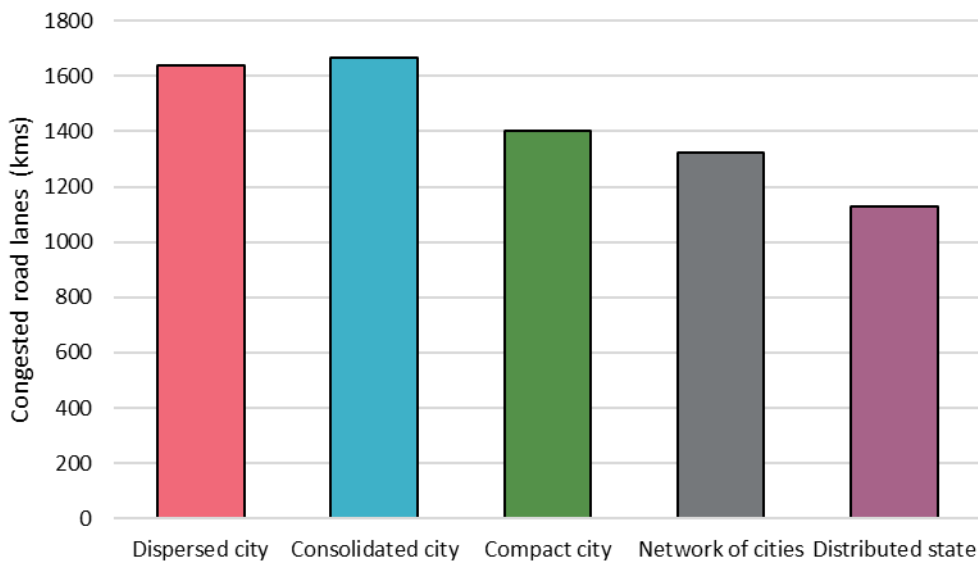
Better accessibility has other benefits. It encourages people to walk and cycle more often, including for local trips other than to their jobs. These trips include journeys to services, education, personal errands, and recreational and social activities, such as sport and shopping. They occur throughout the day, rather than just at peak times.¹¹⁴ This also mean people do not have to solely rely on their cars for transport.

A more active lifestyle has health benefits. Heart Foundation (Victoria) research identified better accessibility in a '20 minute city' included encouraging people to walk and cycle, which improved their heart health.^{115,116}

Research for *Plan Melbourne 201 –20 0* identified that if people walked instead for just half of their short car trips, it would save about 165 million a year in congestion, health, infrastructure and environmental costs.¹¹⁷

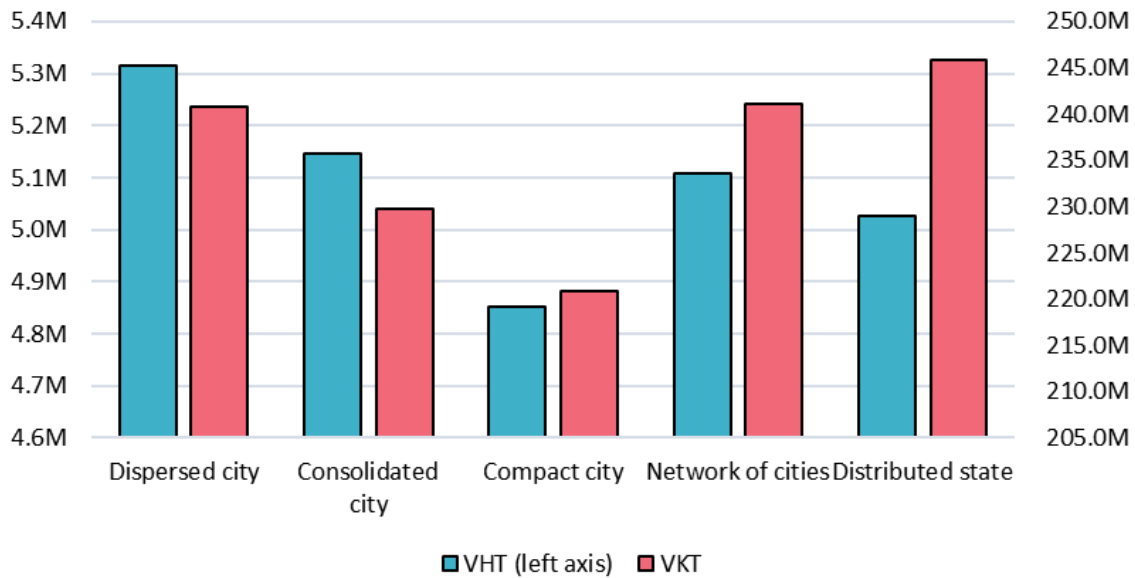
People live closer to the places they need to go in the consolidated city. Although it has more congested roads, because people live closer to work, they spend less time driving overall, as Figure 27 shows. People living in more consolidated or compact cities benefit from being located close to infrastructure, services, facilities, jobs and education, and spend less timing commuting.

Figure 27: Total kilometres spent in congestion in Victoria (daily)



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

Figure 28: Total hours and kilometres travelled in a private vehicle



Data source: Arup, *Urban development scenarios, strategic transport modelling, 2023*

Community and education infrastructure and open space cost more

In the consolidated city, community infrastructure costs \$3 billion (or 18%) more, and open space costs \$3 billion (or 22%) more, compared to the dispersed city. They cost more mainly because development is more complicated and land costs more in Melbourne’s inner suburbs. But people also use this infrastructure more intensively.

Policies that could enhance or mitigate consolidated city outcomes

Note that these policy directions are not our recommendations to the Victorian Government. Rather, they advise on ways in which the government could achieve better outcomes if it chooses to pursue this urban development pathway.

Of our 5 scenarios, the consolidated city uses the second least amount of land.¹¹⁸ It produces productivity benefits because jobs are closer together.¹¹⁹ The Victorian Government can collaborate with local government and industry to help achieve this scenario. They can co-ordinate the planning for new homes and businesses and the delivery of new infrastructure in the major precincts.

If the Victorian Government chooses to pursue a consolidated city, these 4 policy directions could make it deliver more for Victorians and avoid some of its risks.

Build more homes in Melbourne's middle suburbs

Melbourne's middle suburbs would need to build 425,000 more homes by 2056 to achieve our consolidated city scenario. Almost 70% of them would be townhouses and apartments.¹²⁰ The Victorian Government can change planning rules and deliver financial reforms to help developers and landowners to build more homes in middle Melbourne. These places already have some community infrastructure, but the Victorian Government would need to work with local governments to upgrade or build new multi-purpose facilities as more people move in.¹²¹

Local planning schemes use the Residential Growth Zone to encourage density in areas with good access to services and transport.¹²² If governments used it for more parts of Melbourne's inner and middle suburbs, it would allow construction of more low-rise apartments, closer to public transport, other infrastructure and services. By incorporating better standards for site layout, building massing and amenity could reduce community concerns about effects on neighbourhood character and property values.¹²³

Communities want development to have good quality urban design, meaning that higher density buildings integrate well into their local neighbourhood.¹²⁴ If developers built more high-quality townhouses, people might more readily accept more home construction in Melbourne's inner and middle suburbs. Infrastructure Victoria has previously proposed a dual occupancy and townhouse code to speed up planning approvals. This could reduce housing costs by reducing planning process times and incentivising well-designed homes.¹²⁵ Badly designed townhouses can cause problems for communities by creating more stormwater runoff, reducing the amount of private open space and trees, and producing urban heat effects.¹²⁶

Reducing residential car parking requirements can boost the supply of homes in inner and middle Melbourne, lower the cost of those new homes and provide more certainty for development approvals. Unnecessary parking spaces make homes more expensive and consume space that could home builders could use for other purposes, such as extra bedrooms.¹²⁷ The Victorian Government can reduce or remove parking requirements for new homes that are close to high frequency public transport services. Developers can build more than the minimum requirements and home buyers can pay for more parking if they need it.¹²⁸

Taxes can incentivise development in different places and at varying densities. Stamp duties can discourage people from moving house. People might buy a bigger home earlier than they need, rather than move and upsize as their family grows.¹²⁹ Stamp duty concessions for first home buyers and properties valued up to \$750,000 favour new suburbs rather than inner and middle Melbourne.¹³⁰ The Victorian Government can phase out stamp duties and consider a phased introduction of a yearly land tax. Land taxes do not discourage people moving and can offer a steadier income stream for governments.¹³¹ It could help incentivise more and denser residential development.¹³²

Stimulate precinct development in Melbourne's middle suburbs

Precincts are places with a mix of activities, businesses and public transport. Some places in Melbourne have room for more jobs, and more homes of different types and densities.¹³³ In the consolidated city scenario we modelled 3 suburban centres and central Melbourne including Fishermans Bend and Arden as examples of a small number of precincts where the Victorian Government can commit to infrastructure investment and precinct governance.

The Victorian Government can choose priority precincts for more residential projects, commercial development and upgraded community infrastructure. It can establish a prioritisation framework to identify the most suitable places for strategic and infrastructure planning. The government can focus its infrastructure investment in these places and pilot innovative, higher-density housing demonstration projects.¹³⁴ The Victorian Government can also work with local governments, energy companies and water corporations to measure the capacity of their infrastructure, and plan for upgrades to support more new homes and people in appropriate established suburbs.

Clear governance for precincts can include faster planning approval processes and an appropriate body to monitor infrastructure delivery.¹³⁵ These steps can help improve private sector confidence and catalyse the housing and office developments.¹³⁶ Major precincts are likely to be places with good access to health, social and economic support and services. This could make them suitable locations for new social housing. This housing could be funded in part by capturing the land value changes caused by precinct re-zoning.¹³⁷ Major precincts could also be priority locations for facilities and services identified in co-designed Aboriginal community-controlled infrastructure plans.¹³⁸

New residential and commercial development in Melbourne's precincts can be expensive and disruptive. It can also affect infrastructure immediately outside a precinct area.¹³⁹ We found that this scenario was the second most expensive in which to build extra community infrastructure. To help fund this, the Victorian Government could create a consistent and efficient contributions system for Victorian and local government infrastructure.¹⁴⁰ A broad-based infrastructure contributions system can better reflect true development costs in different development settings, such as major precincts.¹⁴¹ It could also help fund infrastructure upgrades to support more intensive land use in the precincts.¹⁴²

If the government provides infrastructure early in the cycle of precinct development, it can encourage developers and businesses to invest earlier and faster, meaning the precinct grows more rapidly, and delivers benefits sooner, like economic growth and job creation.¹⁴³ The Victorian Government can work with local governments and the private sector to plan the infrastructure needed to support economic activity in priority precincts.

Precinct development can also improve employment outcomes. Good transport connections to precincts can mean more people can access jobs, and boost workforce participation. People's education and skills also influence job outcomes.¹⁴⁴ The Victorian Government can build on the 2021 Victorian Universities Support Package to prioritise partnering with university campuses in a small number of precincts. It can evaluate the impact of Monash University and the Victorian Government's investment in the Monash Technology Precinct to show its relevance for other precincts.¹⁴⁵ Including local employers in these partnerships can more strongly connect the graduates from these educational institutions to the high skill job opportunities in the precincts.¹⁴⁶

Boost public transport to serve a more consolidated city

Our consolidated city scenario had 20% more frequent tram services to middle suburban activity centres to meet extra demand.¹⁴⁷ Compared to the other scenarios, the Suburban Rail Loop was most heavily used in the consolidated city, in part because our 3 modelled suburban centres all have a Suburban Rail Loop train station.¹⁴⁸ The Victorian Government can improve other transport connections to the Suburban Rail Loop train stations. This could include accessible and safe connections to buses, trams, cycling paths, end of trip facilities and pick up and drop off points for rideshares and taxis. The government could also consider planning Suburban Rail Loop station precincts so people can easily walk to the shops, services and open space already there.¹⁴⁹

The Victorian Government could consider supporting more medium density housing around the train stations on train corridors with capacity for more passengers. It can keep developing Suburban Rail Loop station precinct structure plans, using information and evidence from local communities about their priorities for housing density.¹⁵⁰

Our consolidated city scenario had the second longest morning peak travel times and second most public transport trips, compared to the other scenarios.¹⁵¹ To help manage demand on the public transport network, the government could provide faster and more reliable bus and tram services, to carry more people. Implementing tram and bus priority measures and bus rapid transit could also help. To support more cycling trips, the Victorian Government could deliver infrastructure for strategic cycling corridors,¹⁵² particularly to middle Melbourne and major precincts. Reallocating road space to active transport could help deliver the government's target of 25% of trips made by walking and cycling by 2030.¹⁵³

Our consolidated city scenario had the most congestion in Melbourne's middle suburbs during morning peak, compared to other scenarios.¹⁵⁴ To manage this risk, the Victorian Government could consider introducing transport network pricing methods to manage demand across the network. *Victoria's infrastructure strategy 2021–2051* recommended cheaper off-peak public transport fares, cheaper fares for buses at all times, and a congestion charge toll on private vehicles that entered a city cordon during peak travel times.¹⁵⁵ This would help manage peak period public transport demand, discourage optional private vehicle trips and encourage more walking, cycling and public transport trips.

Build electricity infrastructure that supports decarbonisation and denser housing

Under all our scenarios, Victoria builds more electricity infrastructure to achieve the transition to renewable energy.¹⁵⁶ To maximise the benefits of this investment, the Victorian Government can make sure new electricity infrastructure capacity suits the proposed future housing density. For a consolidated city, this means building energy distribution networks to support more density in the central city and suburban centres or, alternatively, supporting development of new technology to generate power locally in medium to high density residential environments. This could include more local energy generation, such as solar panels on medium and low-rise apartments and townhouses, and battery storage to help offset the growth in electricity use.¹⁵⁷

The Department of Transport and Planning is developing new environmentally sustainable development planning policies and standards.¹⁵⁸ The Victorian Government could consider fast tracking these policies and standards as part of pursuing a consolidated city. This would support medium density homes and streetscapes with more trees, open space and green roofs. These help dissipate heat trapped in urban environments, contribute shade, support evaporative cooling, and reduce water run-off, air pollution and ultraviolet radiation.¹⁵⁹



Compact city



Compact city

Imagine that by 2056, most new homes are built in Melbourne's established suburbs. Melbourne becomes a far more compact, high-density city. Businesses benefit from economies of scale. The Victorian Government has made large investments in educational infrastructure, community facilities and open space in the inner suburbs to accommodate its far larger population.

Melbourne is a compact, high-density city

Most new homes were built near the central city

In 2056, Melbourne's urban areas cover a similar land area as in 2021. Instead of expanding into new growth areas, new homes were built in the established suburbs close to the central city. Urban renewal precincts like Fishermans Bend and Arden reached their planned number of new homes and jobs. New homes were built in places less affected by climate change. Victoria's regions did not grow much, because the government concentrated on strategic planning and investing in infrastructure in Melbourne's inner areas.¹⁶⁰

In the compact city, more people live in townhouses and apartments. People chose to live in these homes because they were close to central Melbourne, and have great access to its jobs, shops, services and opportunities. They preferred this to living in large houses with a backyard and a garage, located far away from these valuable opportunities. The compact city offers more transport options for more people, including public transport, walking and cycling. People find these options more convenient because they live closer to their destinations, and so these trips are shorter and faster.

In our compact city scenario, the Victorian Government conducted extensive strategic planning in inner and middle Melbourne, and rezoned many places suitable for high density development. This generated many higher-density, mixed-use developments, which transformed Melbourne's inner suburbs. Many new homes are medium and high-rise apartments close to jobs, services and infrastructure.

Figure 29: Map of compact city scenario population growth

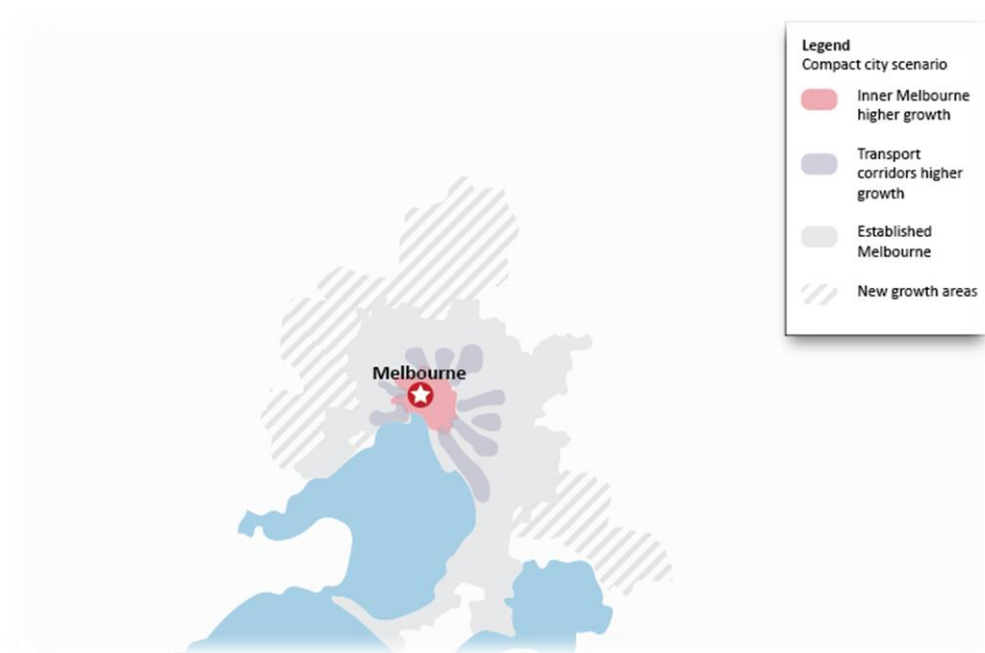
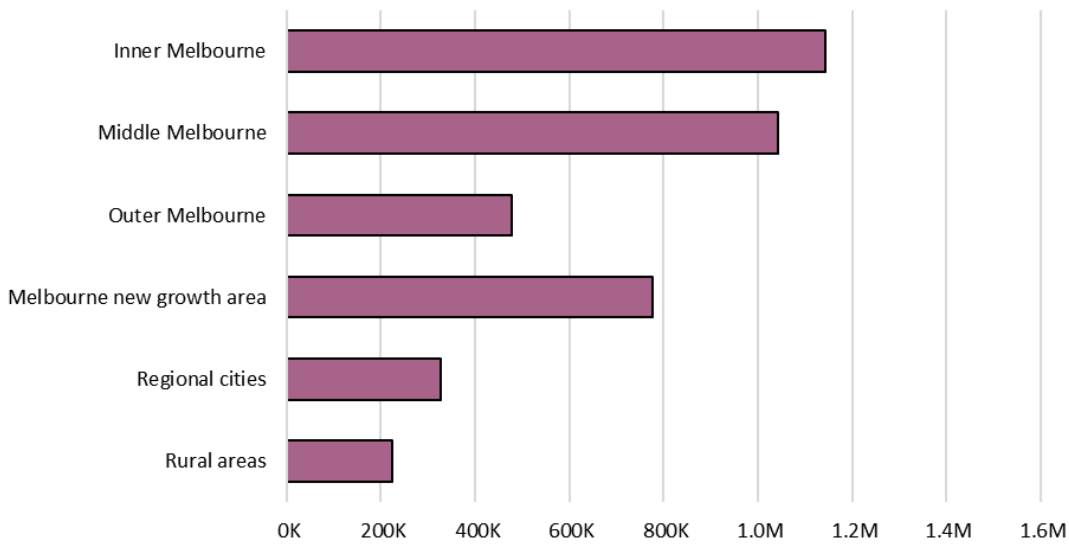


Figure 30: Compact city scenario population growth

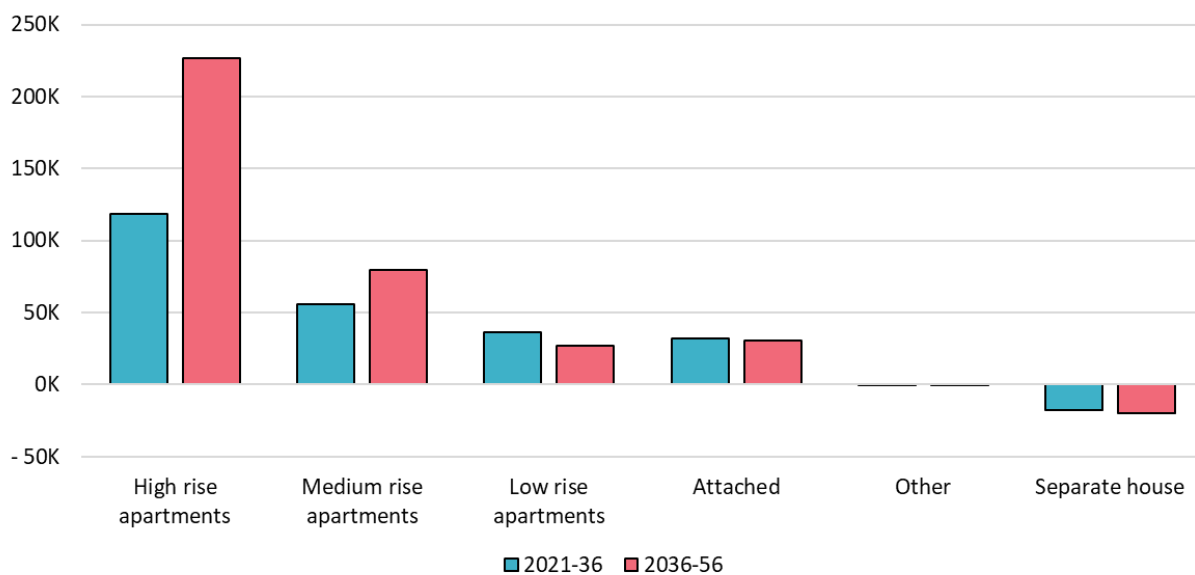


Data source: SGS Economics and Planning, *Urban development scenarios, 2022*

Melbourne’s established suburbs accommodate almost 80% of Victoria’s extra people

In our compact city scenario, almost 80% of greater Melbourne’s population growth is in established areas, and just over 20% is in new growth areas. Developers built more apartments in the inner suburbs, including many medium and high-rise apartment buildings, as Figure 31 shows. The central city has around 130 more high rise apartment buildings, and around 20 more medium rise apartment buildings. This is around double the number of medium and high-rise buildings in 2021. Architects designed more sustainable apartment buildings, which greatly enhances the quality of life for the people living in them.¹⁶¹

Figure 31: Inner Melbourne dwelling growth 2021–56 by dwelling type



Data source: SGS Economics and Planning, *Urban development scenarios, 2022*

Inner Melbourne generates many new jobs

In the compact city, inner Melbourne produces an extra 10,000 jobs each year. Train lines through Melbourne's middle suburbs provide easy access to these job opportunities, especially because the government invests in extra train services. Developers build more office towers in the central city, because employers demand more office space in this location as highly skilled workers can easily commute there. The central city incorporates the Fishermans Bend and Arden precincts. These places host another 114,000 jobs.^{162,163}

Knowledge intensive industries create many new jobs, such as in business and government services. Inner Melbourne has another 75,000 jobs in business and government services by 2056. The retail and hospitality industries add more than 95,000 extra jobs in inner Melbourne to support the extra people now living there. The concentration of jobs and people in inner Melbourne improves economies of scale for business. Governments have invested in better streetscapes and public spaces to support the additional population, helping make the inner suburbs more vibrant.¹⁶⁴

Jobs in Melbourne's new growth areas and outer Melbourne grow by 1.0% per year, compared to 1.6% in inner Melbourne. This is because fewer new homes are built in the outer suburbs and new growth areas, which means fewer people want extra services like retail, hospitality and local government services.

Melbourne's tram and bicycle network will need to adapt

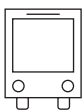
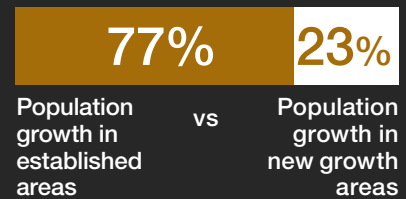
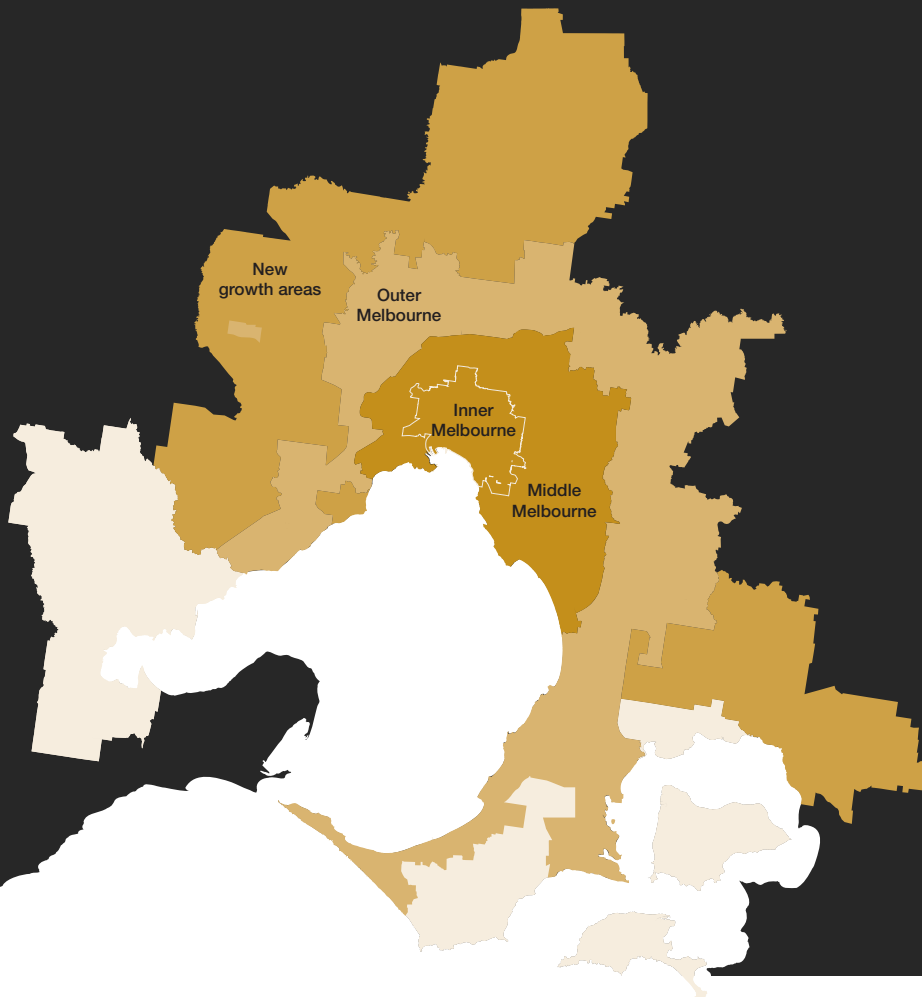
In the compact city, more people make good use of Melbourne's transport infrastructure. People use the transport network heavily in Melbourne's inner and middle suburbs. The Victorian Government responded to this by increasing tram and bus services, which helps people commute to inner Melbourne. Governments installed separate bicycle lanes and footpaths in the inner suburbs to facilitate walking and cycling. They re-purposed some road lanes to be dedicated tram and bus lanes in inner and middle Melbourne. These changes help make walking, cycling and using public transport easy for people, which means they can move around conveniently and do not need to own as many cars.

Compact city

Choosing Victoria's future: 5 urban development scenarios

Population growth 2021–2056

- 0 – 350,000
- 350,000 – 450,000
- 450,000 – 650,000
- 650,000 – 850,000
- 850,000 – 1,200,000



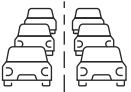
32% of jobs can be reached within a 60-minute public transport commute



+\$105bn net value of housing compared to dispersed city



54% of homes are detached



3% of car travel is on congested roads



41,000ha required additional urban land



\$193bn impact on business location productivity compared to 2021



15% of travel is on public transport



1,160mil tonnes of greenhouse gas emissions

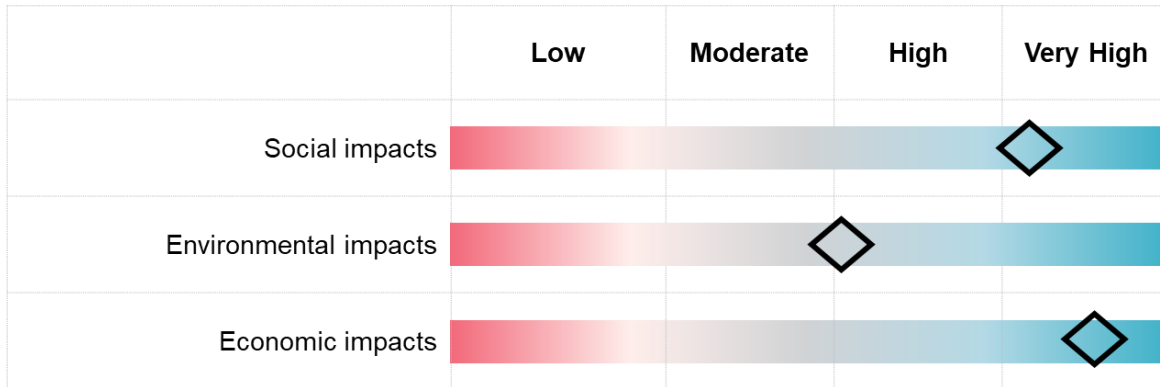


-\$59k cost of infrastructure per new home compared to dispersed city

Impacts and costs of the compact city scenario

The compact city has very positive social and economic impacts, and moderately good environmental impacts, compared with other scenarios. Figure 32 shows our summary of the impacts of this scenario.

Figure 32: Compact city overall assessment



Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios.

People have great access and valuable homes

In our compact city scenario, people find it easier to access jobs, infrastructure and services. People live closer to their jobs and can use nearby public transport to get to them. People walk and cycle more often, which reduces emissions from vehicles.¹⁶⁵

People's homes are more valuable in this scenario, compared with all the others. This is partly because the value of good access is capitalised in land values. While home construction and land costs more, people are better off because they can access more opportunities. On average, people can reach more valuable opportunities from their homes more easily than in any of our other scenarios. Home values in our compact city scenario are \$105 billion higher than in our dispersed city scenario.¹⁶⁶

The compact city produces some affordable homes in inner Melbourne for renting and buying. This is because it produces more apartments and smaller home options. But some other scenarios, like the consolidated and dispersed cities, produce more affordable housing overall.

Fewer transport emissions, but more construction emissions

We estimate that the compact city produces the fewest greenhouse gas emissions from transport of all our scenarios. This is largely because more people use public transport and have shorter commutes. Cars and trucks produce 17.3 million fewer tonnes of greenhouse gas emissions (carbon dioxide equivalent) than the dispersed city by 2056.

All our scenarios assume that Victoria can generate electricity with near zero greenhouse gas emissions by 2056. This means that the emissions produced by running buildings show few differences between scenarios in 2056. But during this transition to renewable energy, the compact city scenario produced the fewest 'operational emissions' from running buildings.

Operational and embodied emissions from buildings

Operational emissions refers to the greenhouse gas emissions associated with energy used to run a building, such as for heating, cooling or producing hot water. This type of emission is recurring throughout the building’s lifecycle.

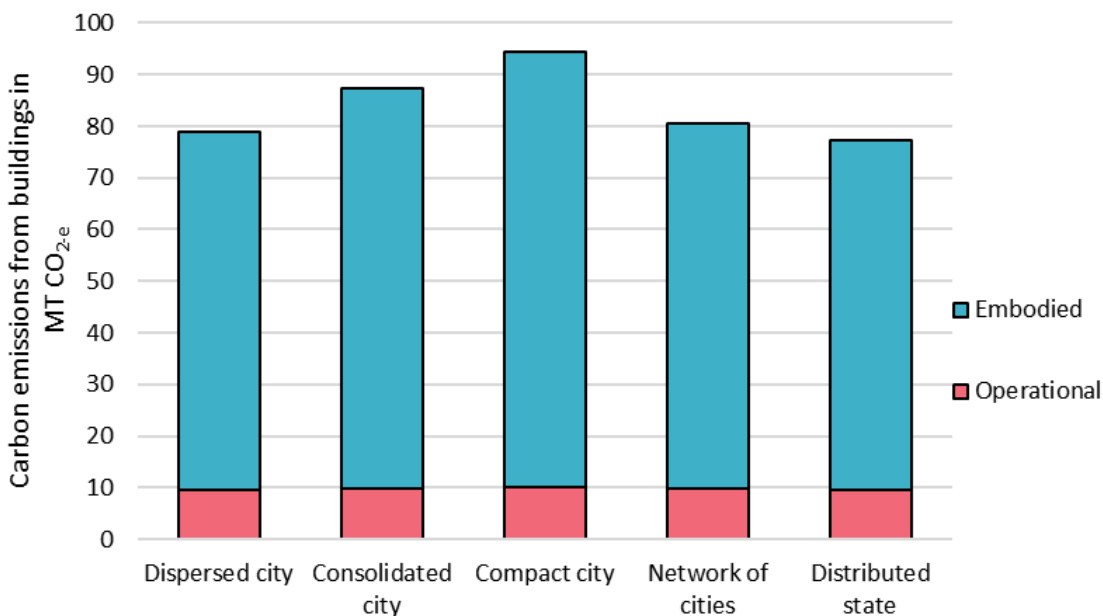
Embodied emissions refers to the emissions generated by the physical creation process of the building. This includes creation and transport of materials, the actual construction of the building, and demolition.¹⁶⁷

The greenhouse gas emissions from building construction are higher under the compact city scenario because there are more high-rise apartments, as Figure 33 shows. High-rise apartments have more ‘embodied emissions’ than other dwellings because they contain more concrete and steel, which are difficult to make without emitting carbon. Our compact city scenario emits 14.8 million tonnes more greenhouse gases (carbon dioxide equivalent) in 2056 than the dispersed city scenario.

As Victoria generates more renewable electricity, and retires coal-fired power stations, operating buildings will produce fewer greenhouse gas emissions. But this does not necessarily apply to embodied emissions. Over time, they account for a larger proportion of greenhouse gas emissions from buildings, because electricity use is not their only source of emissions. Only by changing construction methods, using different materials, or changing manufacturing methods (such as making ‘green steel’) can construction reduce embodied emissions.

Government and industry initiatives that help develop and use zero or low carbon materials and building methods in new buildings and infrastructure now could help to decarbonise construction in the future.

Figure 33: Estimated emissions produced by buildings from 2021–2056, by type



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria*, 2023

The compact city uses less land

The compact city uses the least land of all our scenarios for residential and local infrastructure purposes, as Figure 34 shows. This means it leaves the most land available for other purposes, including agriculture and related industrial uses.

Figure 34: Total residential and local infrastructure land requirements by scenario 2021–2056 (hectares)

	Dispersed city	Consolidated city	Compact city	Network of cities	Distributed state
Residential and local infrastructure	67,963	49,534	37,275	70,041	91,292
Non-residential	1,549	939	735	1,782	2,533
Open space	2,789	2,841	3,031	2,451	2,566
Total hectares	72,301	53,314	41,041	74,274	96,391
Difference to dispersed city	0	-18,987	-31,260	1,972	24,090

Data source: The Centre for International Economics, Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023

The compact city has a stronger economy and more people work

In the compact city in 2056, Victoria would have a stronger economy and more people can get jobs. This is because business and government service jobs consolidate more in central Melbourne. In the compact city, businesses are willing to pay extra for commercial office space in the inner city because they can attract more skilled workers and be closer to more clients and customers. This scenario would generate over \$30 billion (20%) more in business location productivity impacts than in the dispersed city.

More people find a job in the compact city, because they can reach more workplaces from their homes. We estimated that this scenario generates an extra \$12 billion by 2056 from higher labour force participation compared to the dispersed city scenario.

In the compact city scenario, governments have prioritised development of Melbourne’s inner and middle suburbs. That means regional Victoria does not develop as quickly, potentially increasing the difference in job availability between Melbourne and regional Victoria.

More people take public transport, walk and cycle in a compact city

In the compact city, more people live closer to jobs, education and other facilities. This proximity helps support an efficient public transport system, because many people make similar trips, and can travel together on the same services. Similarly, this proximity makes walking and cycling a more convenient option for people. The compact city scenario has the highest proportion of walking, cycling and public transport trips of all our scenarios, as Figure 35 shows.

Because more people want to use public transport, our scenario presumes the Victorian Government has added more public transport services and reserved some traffic lanes specifically for public transport. This makes public transport journeys more time competitive compared to driving, which encourages more people to use it.

People, communities and the environment are healthier in the compact city, because they walk and cycle more, particularly in urban areas. Governments could develop and deliver many different strategies to

encourage people to walk, cycle and catch public transport.¹⁶⁸ For example, they can provide enough safe walking and cycling infrastructure and connect it to local destinations and facilities.

Figure 35: Car, public and active transport trips each day in 2056

Metric	Dispersed city	Consolidated city	Compact city	Network of cities	Distributed state
Absolute values					
Private vehicle trips	31,576,000	30,820,000	29,651,000	31,355,000	31,713,000
Public transport trips	2,757,000	3,097,000	3,493,000	2,758,000	2,577,000
Active transport trips	5,450,000	5,830,000	6,491,000	5,622,000	5,452,000
Proportions					
Private vehicle trips	79.4%	77.5%	74.8%	78.9%	79.8%
Public transport trips	6.9%	7.8%	8.8%	6.9%	6.5%
Active transport trips	13.7%	14.7%	16.4%	14.1%	13.7%

Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

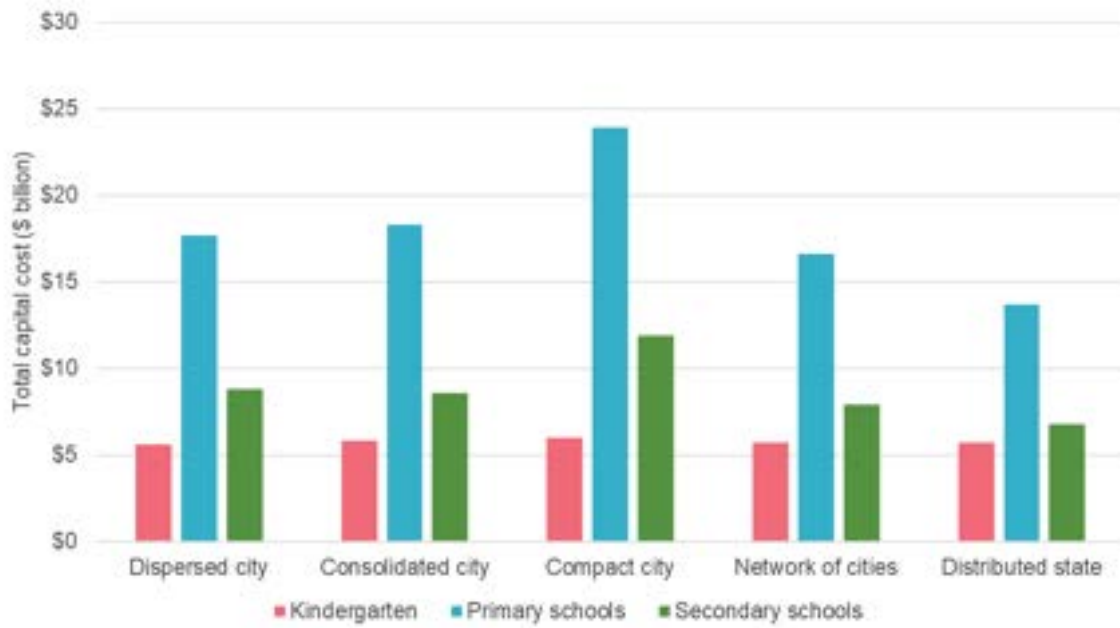
High land values make some types of infrastructure more expensive

Land is more expensive in a compact city. This affects the cost of providing schools infrastructure, community facilities and open space. For example, our modelling estimates that in the compact city, educational infrastructure costs \$11 billion more, community facilities cost \$7 billion more, and open space costs \$12 billion more, compared to a dispersed city. In contrast, we expect local infrastructure to cost less, because new housing developments can use existing infrastructure. This remains true even after including a \$21,000 premium for each new home in inner city development precincts to address flooding and convert industrial streetscapes into residential streetscapes.¹⁶⁹

To manage the higher costs of some infrastructure, the government can change the way it plans for it, and consider options to deliver it using less land. For example, it can design multi-purpose community facilities, improve the quality of open space, and build vertical schools. In more compact or consolidated cities, that have better access and many transport options, people would use good infrastructure and facilities intensively.

We also estimate that a compact city would need more new schools compared to some other scenarios, as Figure 36 shows. This is largely because middle and outer Melbourne and regional schools would have spare capacity for more students, but inner city schools could not take more.

Figure 36: Total capital costs for kindergarten, primary and secondary school requirements by 2056 by scenario



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

Note this includes the total Victorian school requirements, including government and non-government schools. Total capital cost includes land costs.

Policies that could enhance or mitigate compact city outcomes

Note that these policy directions are not our recommendations to the Victorian Government. Rather, they advise on ways in which the government could achieve better outcomes if it chooses to pursue this urban development pathway.

People in the compact city have the best access to valuable destinations from its transport system.¹⁷⁰ But it would need more investment in education, open space and community facilities, compared to the other scenarios.¹⁷¹ If people didn't support the construction of new high-rise apartments, pursuing a compact city risks not supplying enough homes. Similarly, if not enough people wanted to live in these apartments, the compact city could become unaffordable because too many people would try to buy fewer low-rise or detached homes. The Victorian Government would need to significantly intervene to achieve the rapid change this scenario requires.

If the Victorian Government decides to pursue a compact city scenario, these 5 policy directions could help this scenario function more effectively and reduce some of the risks.

Increase housing density in Melbourne's inner and middle areas

The Victorian Government could consider other ways to accommodate another 2 million people living in almost a million new homes in inner and middle Melbourne by 2056.¹⁷² These could include reviewing planning zones and design standards for medium and high-density homes, reducing residential car parking requirements, and building more social and affordable housing. The Victorian Government can also work with local governments, energy companies and water corporations to measure the capacity of their infrastructure and plan to upgrade it so more new homes can be built in established suburbs.

Melbourne's planning zones and overlays affect the number of new homes that can be built in established suburbs. The Victorian Government can change zoning rules or their application to different areas. Infrastructure Victoria has proposed that the government could use the Residential Growth Zone in more places with good access to public transport, infrastructure and services.¹⁷³

The Victorian and local governments have applied different land use planning zones to Melbourne's inner suburbs, which restrict the number of homes that people can build there. For example, the Neighbourhood Residential Zone allows very limited development. In contrast, the Residential Growth Zone allows low-rise apartment development, and the Capital City Zone allows much taller apartment buildings. The Victorian Government could use the Capital City Zone to allow the large number of high-rise apartments present in this scenario. Inner city neighbourhoods might need less restrictive zoning to accommodate the large number of new homes and jobs. The Victorian Government can also investigate using more of the Mixed Use or Commercial 1 zones in Melbourne's inner suburbs. Good strategic planning beforehand can help preserve places with significant heritage and character.¹⁷⁴

Better apartment design can encourage more Melburnians to choose to live in high-rise apartments. The Victorian Government can keep monitoring and updating the Better Apartment Design Standards, and consider our option to extend the standards to make apartments more accessible, versatile and safer for households with children.¹⁷⁵ Our past research shows that more people would choose to live in apartments if they were available at a price similar to homes in new suburbs.¹⁷⁶ Changes to apartment building quality standards can improve people's willingness to buy apartments but might also make them more expensive.¹⁷⁷

Requiring apartments to build unnecessary car parks also makes them more expensive.¹⁷⁸ The Victorian Government can reduce or remove off-street parking required for new homes that are close to public transport services in inner and middle suburbs. These places already have good quality and high frequency transport services, which means people are less likely to own cars.¹⁷⁹

The Victorian Government can also consider other approaches to improving housing affordability. Our 30-year infrastructure strategy recommended that the government set targets to grow social housing, as evidence shows that Victoria has far too few to meet people's housing needs.¹⁸⁰ In inner Melbourne, social housing residents can access the health, social and economic support and services they need. Capturing the land value changes from re-zoning in inner Melbourne can help fund low-income housing.¹⁸¹

Slow residential development in Melbourne's newest suburbs

In a compact city, fewer people want new homes on the edge of the city. Reforming home subsidies that stimulate demand for these homes can help achieve a more compact city shape. If fewer people want to live in those suburbs, the Victorian Government can keep its urban growth boundary and consider slowing infrastructure projects and home building in Melbourne's growth areas.

Government grants influence people's decisions to buy a home.¹⁸² The First Home Owner Grant's conditions means more people use it in areas where homes are less expensive. The top 10 postcodes for grant applications in the year to 30 June 2021 were all in new suburbs in Melbourne or Geelong.¹⁸³ Infrastructure Victoria previously proposed that the Victorian Government end this grant.¹⁸⁴ Instead, the Victorian Government could target the Victorian Homebuyer Fund to specific places to encourage people to buy homes in established suburbs. This can help stimulate supply in those places.¹⁸⁵

Green wedges and agricultural land surround Melbourne's urban growth boundary. The Victorian Government can complete its work on permanently protecting those areas from urban development.¹⁸⁶ It can also tighten restrictions on urban development in Rural Conservation Zones to support the supply of new homes in established suburbs in Melbourne. These actions can help remove any pressure to relocate the urban growth boundary.

Melbourne's other 34 Precinct Structure Plans for growth areas can stage development and sequence to line up with delivery of major local and state infrastructure. Local governments can then decide if subdivision applications have enough infrastructure to support their development.¹⁸⁷ The Victorian Government can also prioritise funding for road upgrades, including building interchanges and duplicating arterial roads, in growth areas with existing rather than proposed development.¹⁸⁸

Local governments in Melbourne's growth areas can slow or stage their approval of residential subdivisions and building permits for completed Precinct Structure Plan areas. They can develop criteria for permit approvals in partnership with the Victorian Government, including considering the distance from public transport and the frequency of those services. Governments can prioritise infrastructure delivery over a 10 year horizon using development contribution plan implementation programs.¹⁸⁹ Local governments can also use these programs to show where they will not approve subdivisions if infrastructure does not exist for new residents.¹⁹⁰

Invest in transport alternatives, and manage demand with transport pricing

A compact city scenario makes good use public and active transport. People take over 125,000 more public transport trips in Victoria during the morning peak, compared to a dispersed city.¹⁹¹ People walked and cycled most in our compact city scenario. Walking and cycling comprised 16.4% of transport trips in 2056.¹⁹² The Victorian Government can achieve these levels by prioritising investment in trams, buses, cycling and walking paths. This can include working with local governments to improve the amenity and connectivity of cycling and walking paths.¹⁹³

If people chose to walk instead of drive for short trips (less than one kilometre), the Victorian economy could save about \$165 million each year in fewer congestion, health, infrastructure and environmental costs.¹⁹⁴ The government could also consider prioritising investment in public transport, like buses and trams, to help people use alternatives for these shorter trips. It could also reduce off-peak public transport fares, which can also reduce public transport crowding and make public transport more reliable.¹⁹⁵

A compact city has the least state-wide congestion in morning peak travel times, compared to other scenarios.¹⁹⁶ But for inner Melbourne, morning peak congestion was the highest in a compact city.¹⁹⁷ To

reduce this problem, the Victorian Government could consider a road user charge for inner Melbourne and reduce public transport fares in off-peak periods. *Victoria's infrastructure strategy 2021–2051* recommended trialling of a congestion charge or toll on private vehicles entering central Melbourne during peak travel times.¹⁹⁸ This would reduce congestion in inner Melbourne by discouraging people from driving into the central city during peak periods, and encourage them to use alternatives, like walking, cycling or public transport.

Governments can redesign inner Melbourne's streets to help people move around more easily. Doing this could speed up travel by tram, bus, scooter or bicycle. This means people could get to work faster and improve the reliability and efficiency of public transport services that use roads. It could also improve the vibrancy, character and inclusivity of the central city and inner suburbs. Cyclists and pedestrians would also be safer.¹⁹⁹

Deliver more schools, open space, and community infrastructure

We estimated that our compact city scenario would need an extra \$6.2 billion spent on new primary schools and an extra \$3.1 billion on new secondary schools by 2056 compared to the dispersed city. Other scenarios need less investment because many schools can accommodate more students in their existing facilities, or can build extra classrooms on the same school site. A compact city also means more families with school-aged children live in inner and middle Melbourne. If the Victorian Government chooses to pursue a compact city, it will need to rapidly plan, design and build new schools in established suburbs. New schools in established areas are costly. Large blocks of land are expensive and difficult for government to buy.

A compact city will need an extra 3,000 hectares of open space across Victoria by 2056, if it was provided at current benchmarks.²⁰⁰ This is almost equivalent to the entire land area of the City of Melbourne local government area.²⁰¹ Because more people live in apartments in a compact city, they have less outdoor space at home and need more public open space.²⁰² We measured the amount of open space needed purely by land area. But the form and quality of open space also matters. In *Victoria's infrastructure strategy 2021–2051*, we recommended that the Victorian Government create an interconnected open space network in Melbourne and extend the urban tree canopy. The Victorian Government can prioritise buying land for connections and use financial contributions for links and planting.²⁰³

In our compact city, community facilities are the most expensive, compared to the other scenarios.²⁰⁴ Acquiring extra land can be complex and costly to build new schools, open space and community facilities.²⁰⁵ The Victorian Government could consider incorporating schools, open space and community infrastructure into multi-use facilities on shared sites to reduce these costs.²⁰⁶

Accelerate decarbonisation as inner Melbourne becomes denser

Victoria needs significant new electricity infrastructure to transition to renewable energy.²⁰⁷ As this is built, the Victorian Government could make sure the capacity of this infrastructure also suits the future housing density in inner Melbourne. This means building energy distribution networks to have the capacity for many more homes in inner Melbourne, or alternatively, supporting installation of new technology that generates power locally. This could include more local energy generation such as solar and battery storage to help provide energy to the extra homes.²⁰⁸

The Victorian Government could consider ways to reduce 'embodied emissions' in the construction of government-funded infrastructure including social housing, hospitals, vertical schools and transport infrastructure. This could include prioritising alternatives to building new infrastructure, such as better using existing infrastructure, or modifying it to meet the community's changing needs. The government could also consider supporting industry research, testing alternative materials, or adopting performance-based standards to help accelerate development and adoption of zero or low emissions solutions.



Network of cities

Network of cities

Imagine that Victoria's regional cities grew rapidly until 2056, including Ballarat, Bendigo and Geelong. They have more affordable housing and better access to jobs. But reaching this scenario would require people to be far more willing to live in regional Victoria, and might mean they do not receive the same quality of infrastructure.

Victoria's 3 largest regional cities grow rapidly

Regional cities accommodate more than a third of Victoria's population growth

In 2056, Ballarat, Bendigo and Geelong account for more than 25% of Victoria's population growth. Ballarat has reached 370,000 people and Bendigo's has 350,000 people. Geelong has reached about 720,000 people by 2056. Figure 39 shows the population growth in these 3 cities between 2021 to 2056.²⁰⁹

After the COVID-19 pandemic, people kept moving from Melbourne to regional cities for many decades. People were attracted to their amenity, with excellent access to cultural institutions, national parks and distinctive natural landscapes. In this scenario, Victoria's regional cities have good transport connections to each other, but governments have prevented new housing development occurring on agricultural and in cities' hinterlands. Instead, developers built some new townhouses and apartments close to the regional city centres.

Home builders constructed many detached houses in regional cities, towns and rural areas in this scenario. Between 2036 and 2056, regional cities build more than 15,000 homes each year. This is around 2,000 more than constructed in inner Melbourne during its recent building boom between 2016 and 2021.²¹⁰

This scenario represents managed and contained regional growth. Governments strategically plan and extensively rezone the established parts of regional cities and centres to facilitate growth in appropriate locations, but still protect significant heritage and environmental sites.

For this scenario, we modelled rapid population growth in Ballarat, Bendigo and Geelong. But the scenario generally represents growth and consolidation in Victoria's regional cities. We only intend our selection to represent a 'network of cities' outcome. It does not predict regional growth patterns or indicate a preference for certain cities.

Figure 37: Map of network of cities scenario population growth

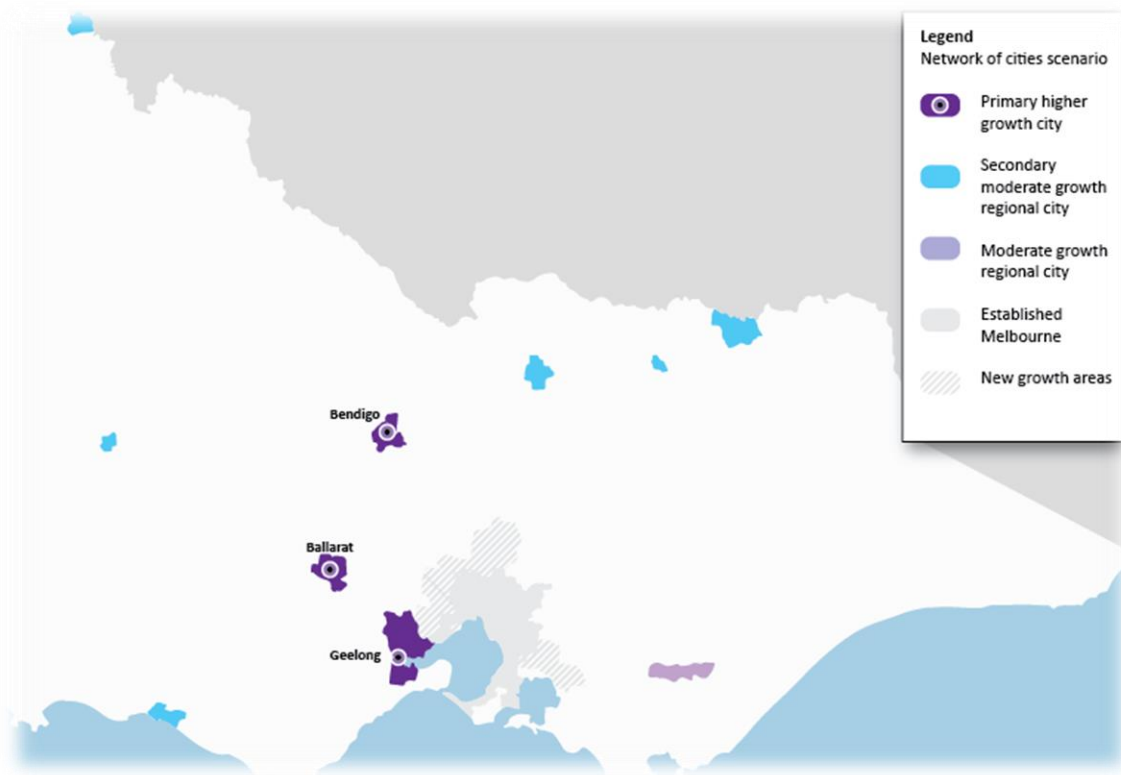
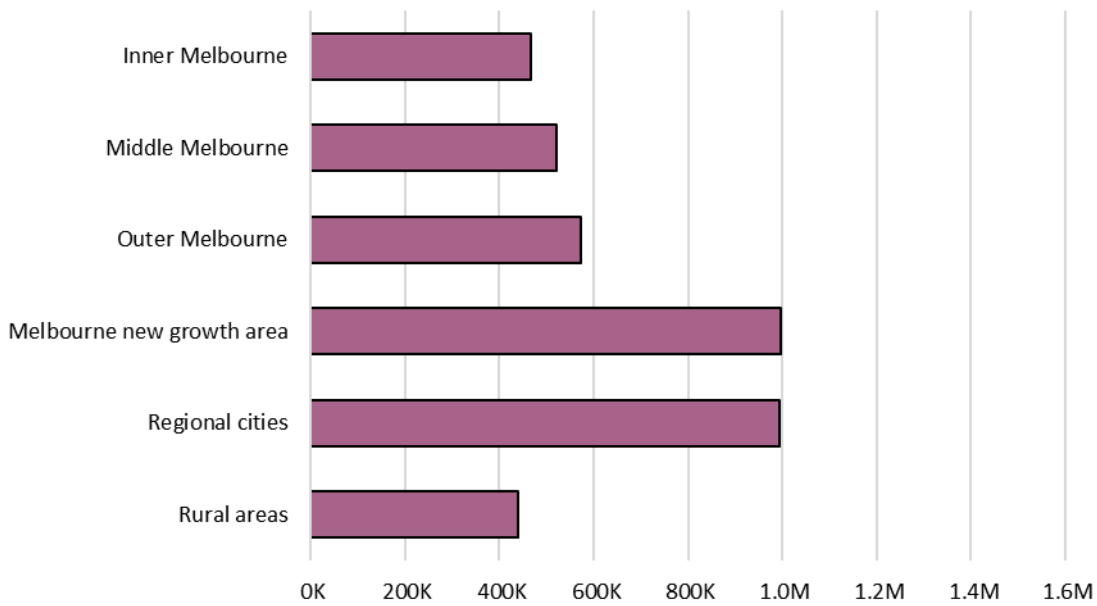
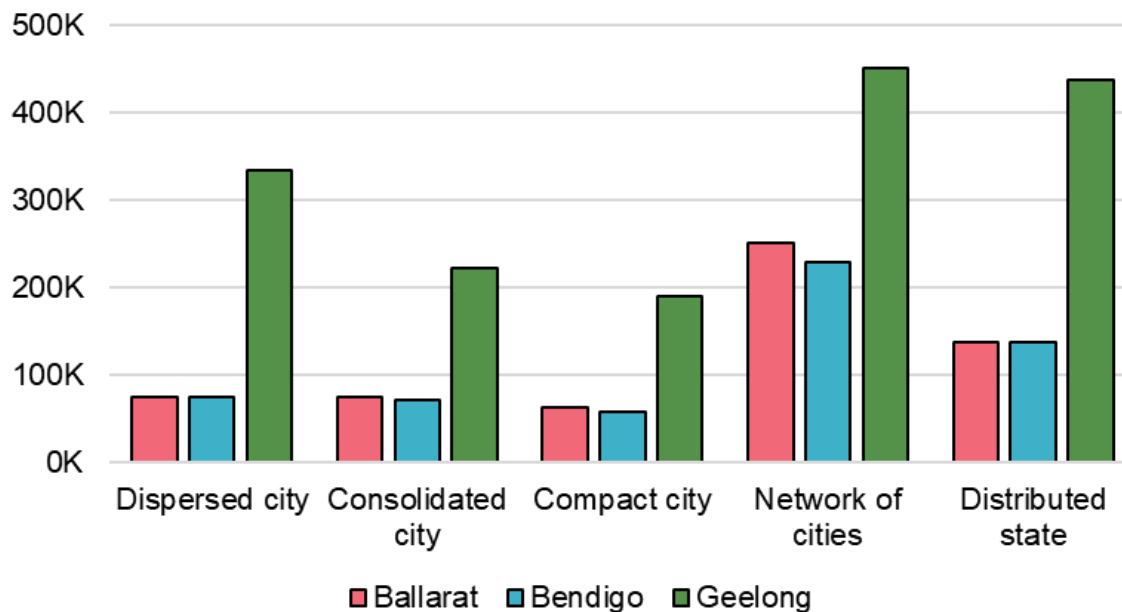


Figure 38: Network of cities scenario population growth



Data source: SGS Economics and Planning, *Urban development scenarios*, 2022

Figure 39: Population growth in regional cities, 2021 to 2056



Data source: SGS Economics and Planning, *Urban development scenarios*, 2022

Regional jobs growth matches the population increase

By 2056, the 3 regional cities have become diverse economic hubs, supported by major institutions like hospitals and universities, and have strong agricultural and clean energy sectors.

More students have chosen to study and live in the regions, which contributes to economic growth and helps create vibrant city centres. The network of regional cities has good transport connections between the 3 cities, and to Melbourne. Governments invest in sustainable transport infrastructure and services in each city, which means more people living there travel more often by cycling, public transport and walking.

This scenario has major growth in the agriculture, service and construction sectors. Employment began to grow in regional cities from the mid-2020s, at just over 2% per year between 2021 and 2056. This represents a much faster rate of job creation than historical trends. It is similar to growth rates in inner Melbourne between 2006 and 2021.²¹¹

In part, more people move to regional Victorian cities because they can often work from home. Many companies boost this incentive by establishing regional offices so workers can avoid commuting to Melbourne on occasions when they must be physically present.²¹² In this scenario in 2056, few workers need to commute to Melbourne. Melbourne also achieves some jobs growth, albeit at a slower rate than in all our other scenarios.

Regional cities have more train services to Melbourne

In our network of cities scenario, the government delivers extra train services between the major regional cities and Melbourne. We did not include building passenger rail services between Geelong, Ballarat and Bendigo, but included a more frequent inter-city bus network. The government also builds extra road lanes on outer suburban arterial roads of regional cities to reduce traffic congestion. It also runs more bus services, operating for longer hours into the evening, which gives people better access to jobs and services. The government builds more bicycle lanes in regional centres, which people use intensively.

Network of cities

Choosing Victoria's future: 5 urban development scenarios

Population growth 2021–2056

- 0 – 350,000
- 350,000 – 500,000
- 500,000 – 650,000
- 650,000 – 850,000
- 850,000 – 1,000,000

Rural areas

Regional cities

New growth areas

Outer Melbourne

Inner Melbourne

Middle Melbourne

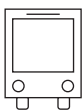
61%

Population growth in established areas

vs

39%

Population growth in new growth areas



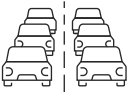
24% of jobs can be reached within a 60-minute public transport commute



-\$55bn net value of housing compared to dispersed city



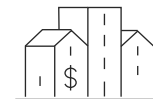
62% of homes are detached



7% of car travel is on congested roads



74,000ha required additional urban land



\$162bn impact on business location productivity compared to 2021



12% of travel is on public transport



1,162mil tonnes of greenhouse gas emissions

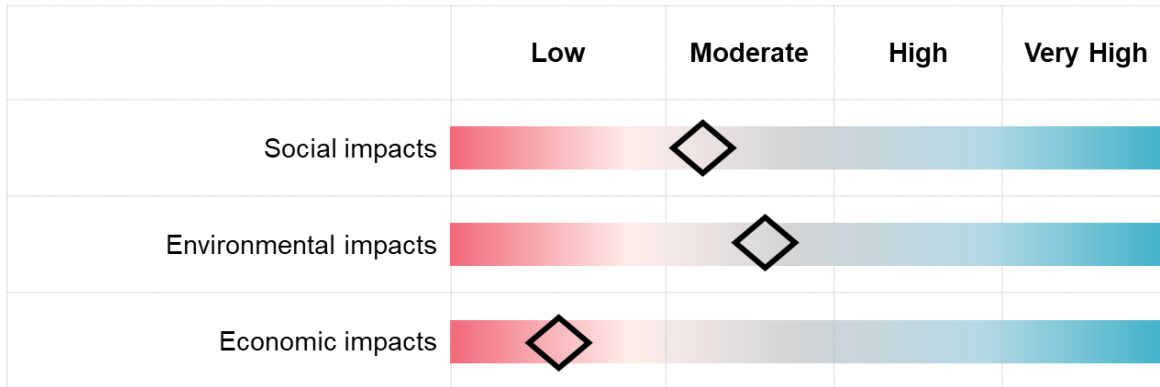


-\$15k cost of infrastructure per new home compared to dispersed city

Impacts and costs of the network of cities scenario

A network of cities scenario has worse jobs and transport access, and moderately good environmental impacts, compared to other city shapes. Figure 40 shows our summary of the impacts of this scenario.

Figure 40: Network of cities overall assessment

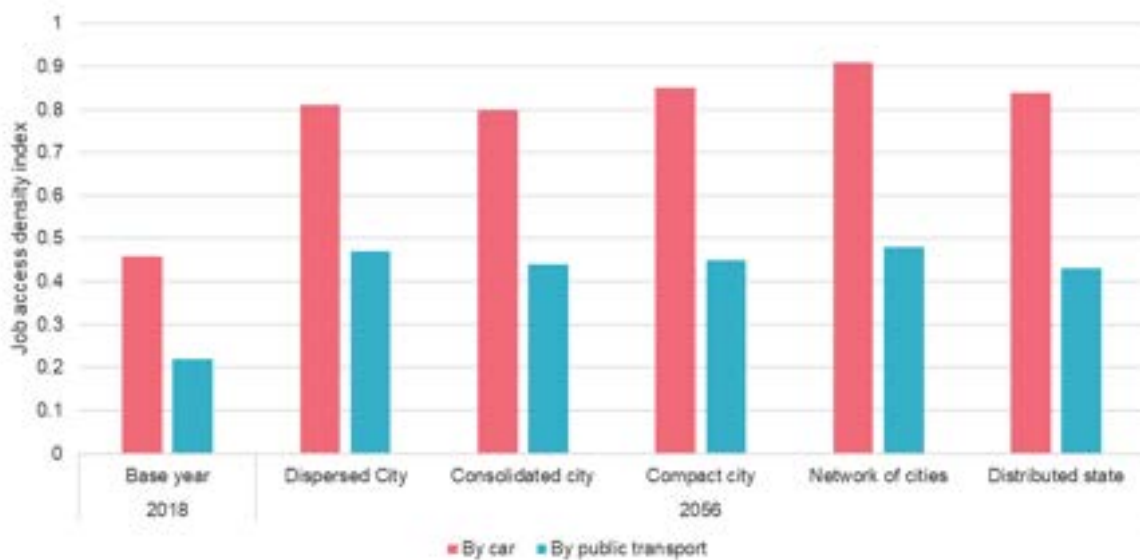


Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios.

Regional Victorians have better access to jobs and services

In the network of cities scenario, most Victorians cannot access jobs and services as easily as in the dispersed, consolidated or compact city scenarios. But it is better for people living in regional cities. As Figure 41 shows, in the network of cities scenario, people living in regional cities have the best access to jobs by both car and public transport, compared to any other scenarios. This is because Geelong, Ballarat and Bendigo have more people and jobs, located closer together.

Figure 41: Access to jobs index for regional cities



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria*, 2023

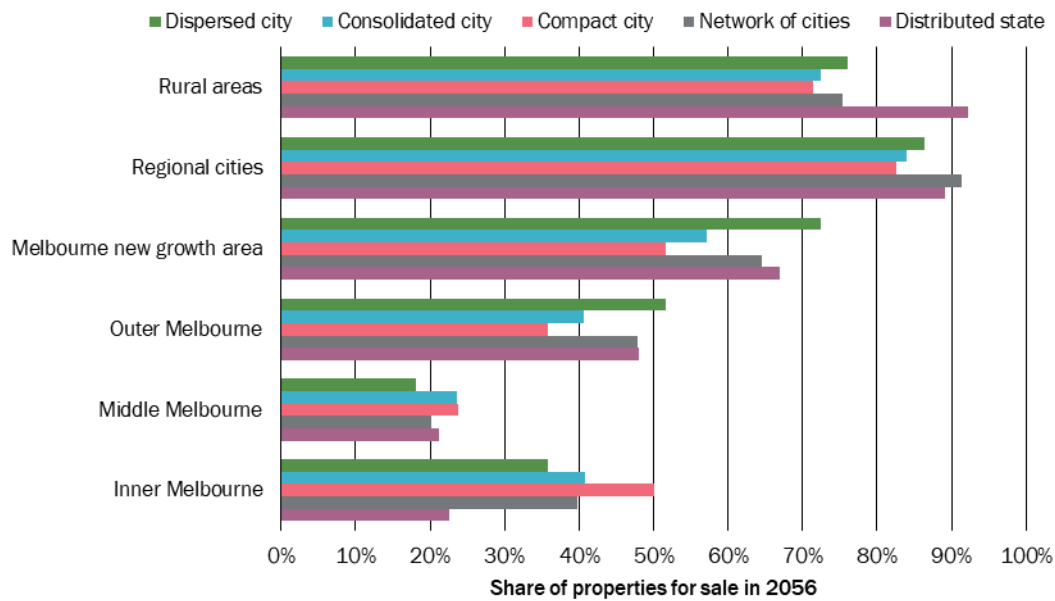
People can afford more homes in Victoria's regions

Cheaper land in regional areas, and building some apartments and townhouses there, keeps prices lower in a network of cities scenario. This makes housing more affordable in the regions.

The share of properties for sale under \$750,000 to 2056 and for rent under \$500 per week differs significantly across scenarios (in today's dollars). A network of cities scenario offers more affordable properties both for sale and for rent in regional cities. This scenario produces nearly twice as many homes for purchase below \$750,000 in regional cities compared to outer Melbourne, as Figure 42 shows.

But homes are more affordable because housing values are lower in the regions. More homes are in places where fewer people want to live, at least according to people's current preferences. The network of cities scenario has a housing value that is \$55 billion lower than the dispersed city scenario in 2056.

Figure 42: Share of properties for sale below \$750,000 in 2056, assuming no price growth



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

The Victorian economy is not as strong

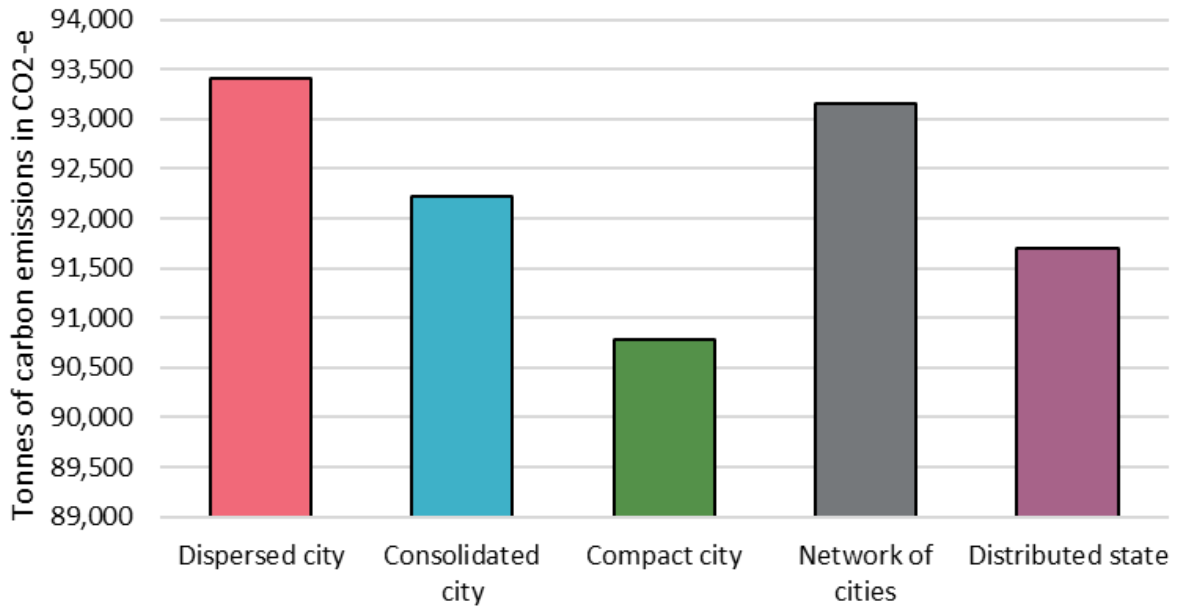
A network of cities scenario does not perform as well economically compared to our dispersed, consolidated or compact city scenarios. Businesses are not as productive, and we estimate this reduces total Victorian income by \$0.6 billion in 2056, compared to the dispersed city scenario. If we compare the economies of the network of cities and the consolidated city, the effect is much greater. The network of cities generates \$9.6 billion less in total Victorian income in 2056.

More greenhouse gas emissions from more car use

The network of cities scenario generates the second highest amount of greenhouse gas emissions from transport, as Figure 43 shows. Compared with the compact city scenario, a network of cities produces about 15 million more tonnes of carbon dioxide from transport by 2056. This is because more people travel longer distances by car.

The roads of regional cities are congested, as are the roads between Melbourne and the regional cities. It gets worse during peak hours.

Figure 43: Total daily CO₂ emissions produced by transport from 2021 – 2036



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

Land is cheaper but water infrastructure is more expensive

By 2056, open space infrastructure costs (\$13 billion) are half of that the compact city (\$26 billion). Education and community facility costs are also a quarter less than the compact city. Lower land costs and easier expansion of existing infrastructure explain these differences.

But other infrastructure costs more compared to other scenarios, including water, wastewater and local infrastructure. For the network of cities, water and wastewater costs are \$6 billion higher, or 17% more than the consolidated city scenario. Investment in local infrastructure requires \$10 billion or 7% more. Water and wastewater infrastructure costs are high because dammed water sources are unlikely to meet demand for water in inland areas. This means turning to other solutions, such as using more recycled water. We expect wastewater transport and treatment costs to be higher in regional areas because the water needs more intensive treatment for release into river systems.

The Victorian Government spends more on transport infrastructure in this scenario. They deliver rail and road projects to link the regional cities to Melbourne, and run more bus services in the regional centres, at a cost of around \$30 billion.

Policies that could enhance or mitigate network of cities outcomes

Note that these policy directions are not our recommendations to the Victorian Government. Rather, they advise on ways in which the government could achieve better outcomes if it chooses to pursue this urban development pathway.

A network of cities scenario dramatically changes some of Victoria's regional centres. Victorians living there will experience rapid development in their neighbourhoods. New people will move in for work and study, including interstate and overseas migrants and some former Melbourne residents. Government intervention alone cannot achieve this scenario. It would need changes in Victorians' housing, work and lifestyle preferences. It would also need changes in the economy, including the willingness of the private sector to invest in regional areas.

More population growth in Victoria's regional cities brings complexities. In our previous research, *Infrastructure priorities for the regions*, we explored the unique character of each Victorian region and illustrated the extent to which different regions have similar infrastructure needs. In that work we documented each region's specific problems and opportunities. Governments cannot necessarily apply solutions designed for Melbourne or a single region to all the others.²¹³

In the network of cities scenario, the Victorian Government would still need to plan for infrastructure in Melbourne, which keeps growing. It still has more than 60% of Victoria's population growth to 2056. The Victorian Government can consider policy directions identified for previous scenarios to achieve good outcomes in Melbourne.

Our policy directions for a network of cities scenario outline government actions that can make this scenario work more effectively and lower some of its risks.

Scale up planning for population growth in regional cities

The Victorian Government can do more regional strategic planning in partnership with local governments to prepare their major regional centres for more people and jobs. This can include developing infrastructure sector plans and changing planning zones to build more homes in suitable regional locations.

In the network of cities scenario, regional cities gain more than one million people. The Victorian Government can work with regional local governments to clearly define the locations of new residential and commercial development in cities like Ballarat, Bendigo and Geelong. New homes should be close to jobs.²¹⁴ Urban growth boundaries around regional centres would help to encourage more townhouses and apartments in suburbs that have plentiful open space and community infrastructure.²¹⁵ The Victorian and local governments should work together to upgrade infrastructure and build multi-purpose hubs where new facilities are needed.

Victorian infrastructure plans for priority sectors can also help identify the best locations for new development. The Victorian Government can update regional growth plans, conduct early engagement with local government and its agencies, and these organisations can work together to align infrastructure priorities and funding decisions.²¹⁶ For example, this can include planning for more social housing in regional centres, close to locations with good access to public transport and services. People experiencing poverty and unemployment need more social housing in regional Victoria, but it should be in accessible places like established suburbs in Ballarat, Bendigo and Geelong.²¹⁷

The best places to build more homes are places that already have good local transport options, like bicycle paths, bus routes and footpaths. Our modelling shows local infrastructure improvements are expensive in this scenario. More people will use local roads and new homes need more drainage, sewerage and utilities. The Victorian and local governments can develop a townhouse code and use the residential growth zone to

guide residential development in places that already have this infrastructure.²¹⁸ In doing so, governments can protect any heritage or environmental sites.

Victoria's Aboriginal and Torres Strait Islander population is projected to grow twice as fast as the general population in the decade to 2028, with even higher growth in Ballarat, Bendigo and Geelong.²¹⁹ Our modelling did not specifically estimate Aboriginal and Torres Strait Islander population growth to 2056. But in a network of cities scenario, the Victorian Government can still make sure the needs of Aboriginal and Torres Strait Islander peoples are met by co-designing Aboriginal community-controlled infrastructure plans to meet future social, economic and cultural needs.²²⁰

Invest in utilities and facilitate digital connectivity in regional centres

A network of cities requires a different approach to infrastructure planning. Because more Victorians living in regional centres, utilities will need to be upgraded and expanded to meet higher demand.

Under all scenarios, our research estimates it will cost about \$42 billion to install new renewable energy power capacity and transmission networks.²²¹ As Australia changes its energy networks to meet its net zero emissions targets, the Victorian Government should ensure energy capacity suits the planned housing density. For a network of cities, this means building energy capacity to support more density in Ballarat, Bendigo and Geelong.

Our research shows that the network of cities and distributed state scenarios would have higher water provision costs of \$6 billion compared to other scenarios.²²² As current and future dams are unlikely to meet demand for water in inland areas, recycled water is likely to be needed.²²³ It is currently only used for non-drinking purposes in Victoria,²²⁴ but could change. The Victorian Government would need to plan for different water treatment infrastructure and help communities discuss the viability of alternative water sources.²²⁵

Communities distant from Melbourne have the most to gain from reliable digital connectivity. Many regional areas do not have reliable and cost-effective business-grade broadband.²²⁶ Infrastructure Australia identified digital connectivity gaps for all of Victoria's regional areas in their *Regional strengths and infrastructure gaps 2022* report. The Barwon and Gippsland regions had an average digital inclusion index score of 64, well below the state average of 72.²²⁷ The Victorian Government could keep delivering regional digital connectivity improvements, in partnership with the private sector and local governments.²²⁸

Prioritise investment in local transport connections within Ballarat, Bendigo and Geelong and between regional centres and Melbourne

People have better access to jobs, education and services in our network of cities scenario, compared to our distributed state scenario.²²⁹ This is because the regional cities have bigger populations more local jobs nearby in the scenario. We included some transport projects in our model that increase frequency and capacity of regional rail and bus services, and added new road infrastructure. The Victorian Government could consider more local public transport infrastructure in Ballarat, Bendigo and Geelong. *Victoria's infrastructure strategy 2021–2051* recommended designing regional public transport for regional circumstances, and not simply replicating Melbourne's city-style model.²³⁰

Our modelling shows that people in regional cities had quicker public transport trips in the morning peak in a network of cities scenario compared to other scenarios.²³¹ This was because Geelong, Ballarat and Bendigo have more local job opportunities²³² and their buses run more frequently. The Victorian Government and local governments could also consider using modern technologies for integrated local transport options that respond to local needs, such as e-scooters and e-bikes or micro-mobility.²³³

Regional train services were the most crowded in the network of cities scenario, compared to the other scenarios.²³⁴ More frequent rail services to Melbourne may make living in regional centres more attractive. The Victorian Government could consider decarbonising regional rail to achieve net zero emissions. Electrifying the V/Line network is a costly option.²³⁵ The government can also look at hydrogen powered trains or other emerging technologies such as bi-modal or tri-modal powered trains. Bi-modal trains are

hybrid trains powered either by diesel and electricity or by batteries and electricity. Tri-modal trains are powered by diesel, batteries and electricity.

Higher population and job density in Ballarat, Bendigo and Geelong will require many new regional road upgrades not previously considered by the government.²³⁶ To achieve a network of cities scenario, the government can plan increased capacity and improved safety on roads in regional centres. It will need to invest in more frequent road maintenance and upgrades to freeways and arterials which provide access to Ballarat, Bendigo and Geelong.

Lower the risk of lower economic growth

A network of cities scenario has fewer economic benefits than other scenarios. This scenario has the second worst business location productivity and agglomeration.²³⁷ Business location productivity is estimated to be \$9.6 billion lower in the network of cities scenario compared to the consolidated city scenario, and \$0.6 billion lower than the dispersed city scenario in 2056. However, local employment opportunities can assist a regional centre's economic development. They provide opportunities for people, especially women, who experience underemployment because they face long commute times and have caring responsibilities.²³⁸

Our previous research highlighted the unique opportunities and challenges facing each of Victoria's regions.²³⁹ Ballarat's economy is based on services like health, education and manufacturing.²⁴⁰ Bendigo is an agricultural processing and services hub for central Victoria.²⁴¹ Geelong is the main driver of regional Victorian economic activity, including the Port of Geelong and Avalon Airport.²⁴² In partnership with local governments, the Victorian Government could support regional cities to develop their own economic strengths and points of difference to make them more attractive. This could be based on their strengths or opportunities to develop emerging industries such as renewable energy and recycling.²⁴³ They can build more regional TAFEs and university facilities to help create jobs and education opportunities. Knowledge economy jobs may also cluster around health facilities.

Increasing digital infrastructure in regional cities can also help achieve a network of cities scenario. *Victoria's infrastructure strategy 2021–2051* recommends reducing regional Victoria's digital connectivity gaps.²⁴⁴ This would also increase virtual access to jobs and education that might otherwise be difficult to reach.



Distributed state



Distributed state

Imagine, in the year 2056, that many more people live in rural areas and in small towns dotted around Victoria. Many more people work remotely, and live close to nature, surrounded by trees and open space. But they have difficulty travelling to work when necessary and find basic services hard to reach. Victoria produces far less food and fibre, because rural housing developments have used much of the best land.

Many more people live in dispersed rural areas

Rural populations grow rapidly

By 2056, Victoria's rural population has ballooned dramatically, but Melbourne has grown only slowly. Victoria's population is now more dispersed, reversing the trend towards urbanisation that defined settlement patterns in the late 20th century. Regional areas have accommodated about half of Victoria's population growth.²⁴⁵ Governments have not sought to manage this, producing dispersed, low-density development.

Regional towns and cities grew through the 2030s and 2040s, attracting young households, entrepreneurs and retirees seeking a quieter lifestyle away from the activity and congestion in the city. Developers build large new estates on the edges of regional cities, meaning places like Geelong and Ballarat expand beyond current urban areas. Smaller regional towns also accommodated some of the growth, because people wanted larger homes with access to open space.

Figure 44: Map of distributed state scenario population growth

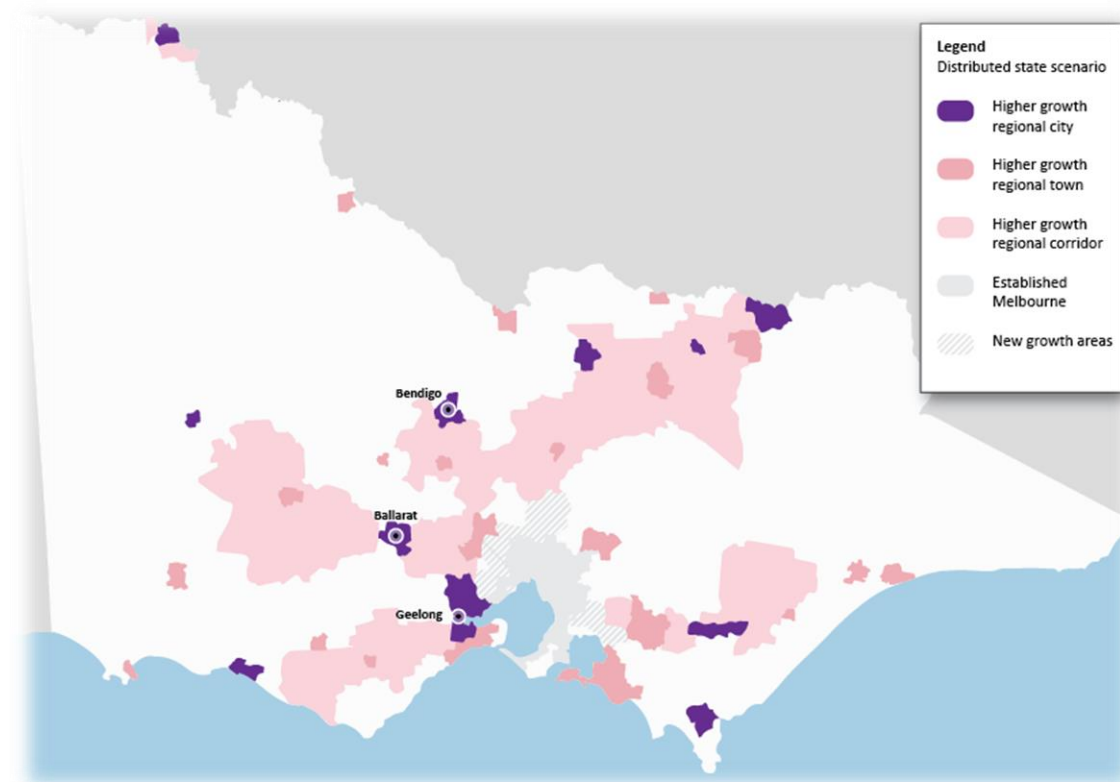
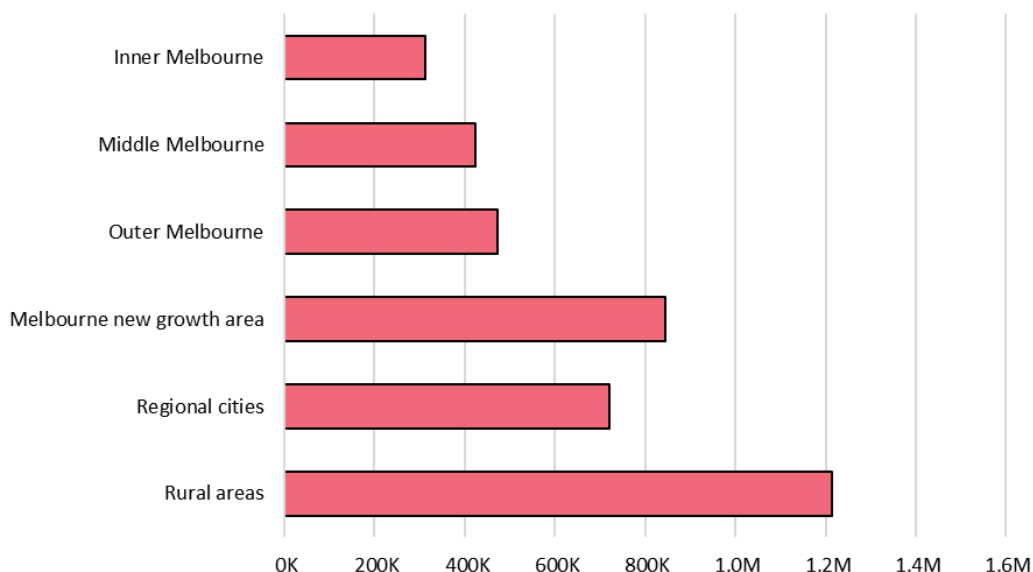


Figure 45: Distributed state scenario population growth



Data source: SGS Economics and Planning, *Urban development scenarios*, 2022

Jobs have been distributed throughout the state

Technology, communication advancements and working from home all supported this population dispersal. Many people who can work from home now choose to live further from their physical workplaces. Local produce and services boom in the distributed state creating new businesses and jobs in regional Victoria.

Central Melbourne is still the most desirable location for most knowledge economy jobs. Some people therefore still need to travel to access work. For some workers, this is a small trade off to access housing that meets their preferences for more open space and privacy. However, the government found it difficult to prioritise public transport investment in places where people lived far apart from one another. Another 167,000 people rely on cars for travel in this scenario compared to the compact city.²⁴⁶ They make proportionally fewer trips using public and active transport. The dispersed nature of the population also reduces economies of scale for businesses.

Victoria's road network will need to adapt

The government built new road infrastructure to cater for this dispersed population. Motorists experience congestion on roads in major regional towns, as more people use them. This includes the Geelong Ring Road, the South Gippsland Highway and the Princess Highway towards Gippsland. This means the government must build extra road lanes and spend more maintaining them. In the distributed state scenario, the government must expend considerable effort minimising road safety risks to try to achieve zero deaths by 2050.²⁴⁷

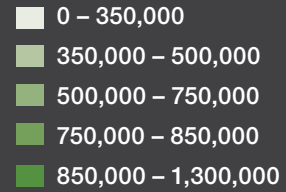
Regional Victoria has more rail and bus services between regional cities to cater for inter-regional trips, for example, between Warrnambool and Geelong. The number of passengers on the Warrnambool train line more than doubles in the distributed state compared to the dispersed city.

Because more people are reliant on travelling longer distances by car, this scenario may give an opportunity for the government to facilitate early adoption of automated vehicles to help people make these trips. Infrastructure Victoria's previous research on automated and zero emissions vehicles demonstrated that this would require the Victorian Government to update transport regulations to allow automated vehicle operation on the road network. It would also require our roads to have the right infrastructure to support the needs of automated vehicles, such as lines and signs and roadside information and communications technology.²⁴⁸

Distributed state

Choosing Victoria's future: 5 urban development scenarios

Population growth 2021–2056



Rural areas

Regional cities

New growth areas

Outer Melbourne

Inner Melbourne

Middle Melbourne

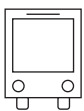
59%

Population growth in established areas

vs

41%

Population growth in new growth areas



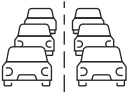
23% of jobs can be reached within a 60-minute public transport commute



-\$107bn net value of housing compared to dispersed city



67% of homes are detached



6% of car travel is on congested roads



96,000ha required additional urban land



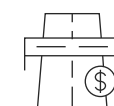
\$154bn impact on business location productivity compared to 2021



11% of travel is on public transport



1,150mil tonnes of greenhouse gas emissions

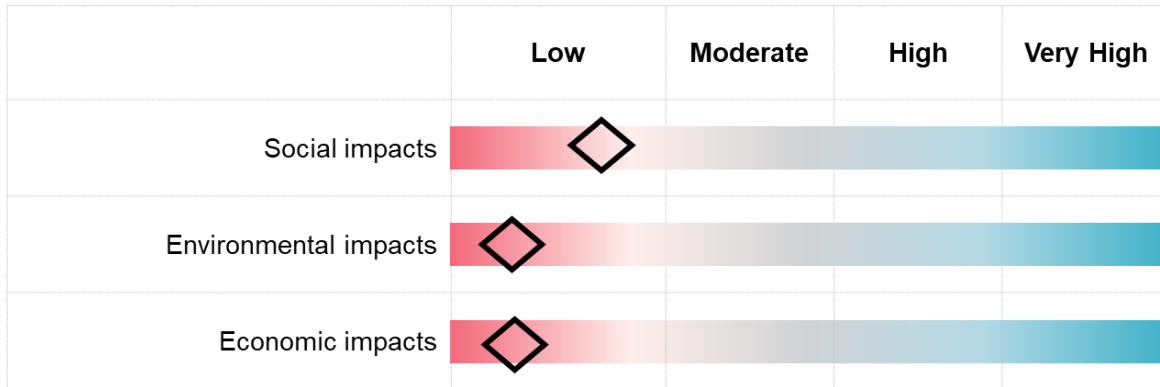


-\$29k cost of infrastructure per new home compared to dispersed city

Impacts and costs of the distributed state scenario

Figure 46 shows our summary of the impacts of this scenario. The distributed state has fewer social, economic and environmental benefits when compared to the other scenarios.

Figure 46: Distributed state overall assessment



Note: blue shading indicates a more positive outcome and red indicates a more negative outcome, relative to all other scenarios.

People have less access to services and jobs but housing is more affordable

Because people are spread across Victoria, they find it hard to get to jobs, services and infrastructure, by both public transport and car. Figure 47 shows only 6% of jobs in Victoria are accessible within 60 minutes by car for people living in rural areas.

In the distributed state scenario, more people would need to travel further to get to work, increasing commute times. Although many people would live in regional centres and cities, some would still need to travel to middle and inner Melbourne for work.

The distributed state scenario could create significant locational disadvantage. Difficulty reaching jobs and services can be a source of disadvantage, as well as feelings of isolation and loneliness, particularly for older single people.²⁴⁹ This, in turn, can affect people's mental and physical health.^{250,251}

Figure 47: Proportion of jobs in Victoria that are accessible within 60 minutes by car (AM peak 2056)

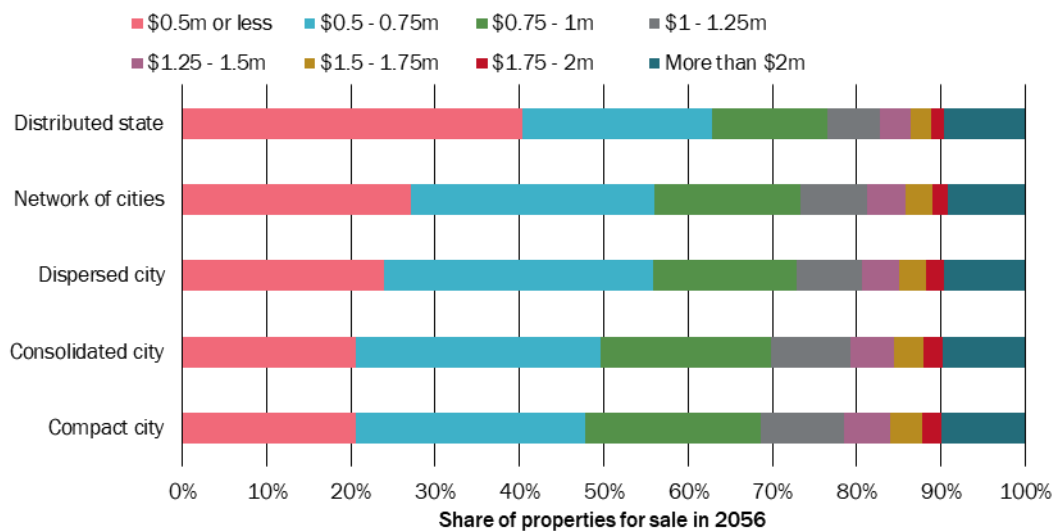


Data source: Arup, *Urban development scenarios, strategic transport modelling, 2023*

Because people find it hard to reach jobs and services, this scenario has a much lower value of housing. More homes are in locations that people desire less. The value of housing in this scenario is \$107 billion less than to the dispersed city, and \$212 billion less than the compact city.

Housing is still more affordable in regional areas. The difference in housing affordability between scenarios is substantial in 2056. People can afford homes in regional areas because the land is cheaper and people are more willing to accept worse access to services and facilities. Almost twice as many dwellings would be available for sale under \$500,000 in this scenario compared to both the compact and consolidated city scenarios, as Figure 48 shows. This scenario would also see almost twice as many properties for rent between \$200 and \$300 per week compared to the consolidated city.

Figure 48: Distribution of properties for sale by price in 2056 by scenario



Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria, 2023*

More urban land is required for the distributed state

More land has been taken up to facilitate new development under the distributed state than any other scenario. This scenario will require 34,000 hectares, which is nearly twice as much land as the compact city scenario.

As the urban footprint increases, this reduces the land available for wildlife and biodiversity.²⁵² Land available for agricultural and related land uses in these rural areas is also reduced.²⁵³ This is a dilemma for this scenario with many people seeking jobs in agriculture and related industries nearer to where they live.

Residents in a distributed state are also more susceptible to climate risk impacts. Victoria's climate has become warmer and drier in recent decades. This increases the risk of bushfires, particularly for rural and regional areas.²⁵⁴ Such conditions and events are anticipated to become more frequent and severe with climate change. Such change also brings an increased threat to Victoria's water quality.²⁵⁵

Greenhouse gas emissions are lower for the distributed state

The distributed state generates fewer greenhouse gas emissions overall compared to all scenarios. We estimate it produces 12.5 million fewer tonnes of carbon dioxide equivalents than the dispersed city. This is because it constructs homes more slowly than other scenarios up until 2036. Other scenarios build more apartments and townhouses before the transition to net zero was complete.

Residents in this scenario would also experience the least noise and air pollution from transport because regional areas have less transport pollution, compared to scenarios with population concentrated in Melbourne. However, these aspects are largely offset by the environmental impacts from using large amounts of land for residential development.

First Peoples' involvement in land use and infrastructure planning

Victoria's infrastructure strategy 2021–2051 acknowledges that the approach to planning infrastructure for First Nations Peoples needs to adapt. The Victorian Government has made self-determination the cornerstone of its Aboriginal and Torres Strait Islander policy. It has formally legislated a Treaty process between the Victorian Government and Victoria's First Peoples and is committed to supporting self-determination in decision making in the National Agreement on Closing the Gap. Applied to infrastructure, self-determination empowers Aboriginal and Torres Strait Islander peoples to own, design and control infrastructure for their communities' social, economic and cultural needs.²⁵⁶

Traditional owners in Victoria – Native Title considerations

Native title was first recognised in the Australian legal system in 1992 in the historic Mabo decision. The principles of this decision were then consolidated in the *Native Title Act 1993* (Cth). Native Title can exist where traditional connection to land and waters has been maintained and where previous activity by the government has not removed it.²⁵⁷ Native Title requirements may need to be considered particularly for development scenarios that require more land.

Victoria currently has 5 determinations of Native Title which cover much of the state. These are the Yorta Yorta peoples; the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk peoples of the Wimmera; the Gunditjmara peoples; the Gunaikurnai peoples; and the Gunditjmara and Eastern Maar peoples.²⁵⁸

Cultural Heritage Management Plans

A Cultural Heritage Management Plan is a written report prepared by a heritage adviser. It includes results of an assessment of the potential impact of a proposed activity on Aboriginal and Torres Strait Islander cultural heritage. It outlines measures to be taken before, during and after an activity to manage and protect Aboriginal and Torres Strait Islander cultural heritage in the activity area.

A Cultural Heritage Management Plan is required when a 'high impact activity' is planned in an area of 'cultural heritage sensitivity'. These terms are defined in the Aboriginal Heritage Regulations 2018.²⁵⁹ For development scenarios that have greater land requirements, it is expected that relevant authorities would need to conduct a more detailed assessment before these areas were determined as acceptable for new development.²⁶⁰

The figure to the right demonstrates the extent of the Cultural Heritage Management Plan overlay through Craigieburn and surrounds north of Melbourne as an example.



A distributed state has lower productivity and employment outcomes

People will experience the negative effects of a weaker economy in the distributed state scenario, relative to the dispersed city scenario. It has less productive businesses, which we estimate reduces total Victorian income by \$8.2 billion in 2056, compared to the dispersed city scenario. This is because population and jobs are very dispersed, which means that businesses do not get benefits from locating close together. Compared to the consolidated city scenario, the difference is greater. Total Victorian income is \$24.8 billion less in 2056 compared to the consolidated city.

The distributed state has fewer economies of scale

This scenario produces fewer economies of scale, and hence does not enhance the productivity of businesses. For example, several factors influence the viability of recycling, such as the value of commodities, economies of scale, contamination and the total distance waste must be transported.²⁶¹ It is likely that recycling and other similar services would be more expensive or require alternative management options.

Figure 49: Economic indicators for scenarios, (2021–2056), relative to dispersed city

Economic indicators	Dispersed city	Consolidated city	Compact city	Network of cities	Distributed state
Business location productivity (\$b)	0	9.0	30.8	- 0.6	-8.2
Agglomeration (\$b)	0	12.3	19.7	-1.8	-15.5
Employment impacts (\$b)	0	5.0	12.1	0.2	-2.6
Total impacts on income (\$b)	0	14.0	42.9	-0.4	-10.8

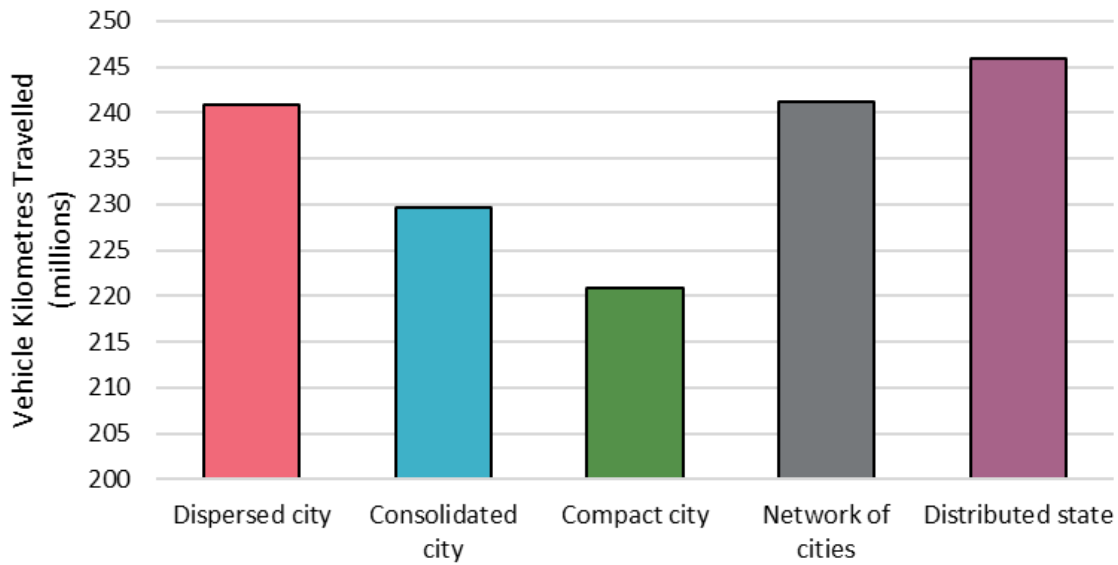
Data source: The Centre for International Economics, *Economic, social, and environmental impacts of alternative urban development scenarios for Victoria*, 2023. Note total impacts on income exclude agglomeration benefits as this measurement overlaps with the business location productivity measure.

People commute further, but encounter the least amount of congestion

In the distributed state scenario, vehicles travel the most kilometres of all scenarios, as Figure 50 shows. This is because jobs, education and other places of interest are further away from where people live. People collectively travel about 25 million more kilometres each day in the distributed state scenario, compared to the compact city. That equates to travelling around the earth about 625 times.²⁶²

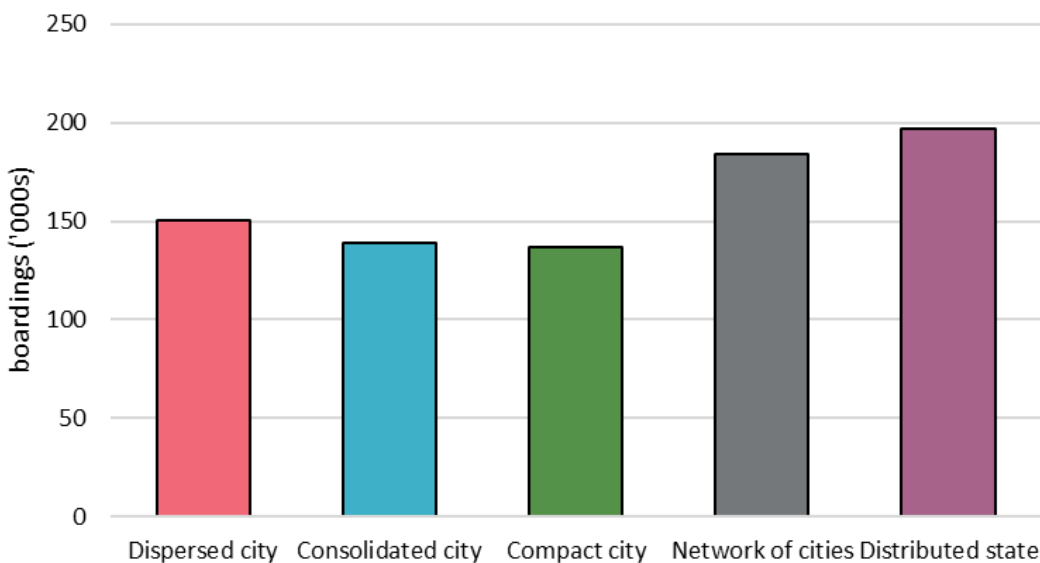
People use public transport least in the distributed state scenario. But V/Line services do have the most boardings, as Figure 51 shows. This shows that some people in this scenario travel to major regional cities and towns to access some services.

Figure 50: Vehicle kilometres travelled per day, state-wide total (2056)



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

Figure 51: V/Line train boardings in regional areas, daily state-wide total (2056)



Data source: Arup, *Urban development scenarios, strategic transport modelling*, 2023

Infrastructure costs are lower overall but people cannot reach facilities easily

Infrastructure delivery costs, including to build community facilities, open space and education are lower overall in the distributed state compared to other scenarios, because land is cheaper, and the community expects a lower standard of public services. People find infrastructure hard to access because they have few transport options and face long travelling distances.

Water and wastewater delivery costs would be expensive in regional areas because they require high levels of treatment. Wastewater treatment plants would need buffers from sensitive uses (residential land uses) because they process higher volumes of water.²⁶³ Water authorities might need to consider alternative management options to facilitate this scenario effectively.

Local infrastructure would also be expensive. Because the extra population is distributed across the state, the government would need to build a lot of new infrastructure. Local infrastructure costs are significant and comprise about one fifth of the total infrastructure costs in this scenario.

Policies that could enhance or mitigate distributed state outcomes

Note that these policy directions are not our recommendations to the Victorian Government. Rather, they advise on ways in which the government could achieve better outcomes if it chose to pursue this urban development pathway.

The government would deliver services and infrastructure differently in a distributed state. Because more people are living in dispersed places, and assuming governments have a fixed budget and provide infrastructure in similar ways, then people will have less access to services and infrastructure will be less reliable. Like a network of cities scenario, government intervention alone cannot achieve this scenario. It requires a combination of changes in Victorians' housing, work and lifestyle preferences, the economy, private sector investment and government policies to occur.

More population growth in Victoria's regional areas has other complexities. In our previous research, *Infrastructure priorities for the regions*, we highlighted problems and opportunities specific to regional areas. Solutions designed for Melbourne do not always translate to the regions.²⁶⁴

The Victorian Government would also have to make sure that it plans for Melbourne's infrastructure as the city keeps growing. It can consider using policy directions from other scenarios to get good outcomes.

These policy directions outline infrastructure needs in a distributed state scenario and risks for the Victorian Government to be aware of, if pursuing this scenario.

Reform delivery of government services and infrastructure

The Victorian Government cannot deliver the same level of services and infrastructure for a distributed state as it would in other scenarios.²⁶⁵ To achieve a distributed state, the growing population will have to be more self-sufficient, accepting less access to and reliability of services. This could include alternative service delivery models including more local networks for electricity, water and sewerage, and hub and spoke approaches to service delivery for health services and policing.²⁶⁶ Hub and spoke models can also change how and where infrastructure in regional areas is used, such as more multipurpose facilities with high-speed internet access.

A distributed state scenario has less access to jobs, education and other people compared to the other scenarios.²⁶⁷ For people who do not have access to a private vehicle and rely on public transport, less access can also lead to social exclusion. From our previous work we found the people most likely to experience social exclusion include young people, single parents and families with young children, older people, Aboriginal and Torres Strait Islander peoples and people with a disability.²⁶⁸

The Victorian Government could consider more targeted community infrastructure spending for community facilities and support services in remote areas. The government might need to be more creative about services for a dispersed population such as providing more digital access to services, rationalising and updating facilities,²⁶⁹ and building more multi-purpose community hubs that have services that meet many community needs.²⁷⁰ Community infrastructure can also be climate-adapted to help manage the health effects of extreme heat and bushfire smoke.²⁷¹

Coordinate planning for rural living

In this scenario, there are larger regional urban areas and smaller regional towns grow as more people live in larger homes. This will affect land uses around those urban areas. The Victorian Government could work with local governments to update regional growth plans, and then identify land that is appropriate for more homes in regional Victoria. It can protect Melbourne's peri-urban agricultural land.²⁷² This could consider how close residential development can be to facilities like chicken farms, abattoirs, sawmills and renewable energy infrastructure such as wind or solar farms. The Victorian Government could use the new Buffer Area Overlay so noise, odours, dust or other hazards do not affect homes and other sensitive land uses.²⁷³

Local infrastructure costs are highest in this scenario. The Victorian Government could consider encouraging more new homes in the Township Zone where people can be closer to existing infrastructure in small towns.²⁷⁴ This can lower infrastructure costs if people use existing local roads, sewerage and drainage.

Electricity and water treatment costs are relatively high in this scenario, but the Victorian Government could encourage decentralised approaches where individual homes have on-site responsibility for these services. The Rural Living planning zone defines site size and home setback requirements for on-site wastewater management where reticulated sewerage is not available.²⁷⁵ This can make homes less affordable as they each need more land and equipment, but government's infrastructure and servicing costs are lower.²⁷⁶

More development in and around small towns in regional Victoria might also affect biodiversity. Land clearing for new homes can affect threatened species. The Victorian Government can restart its yearly progress reporting on *Protecting Victoria's environment – biodiversity 2037* and consider adding performance metrics that directly measure liveable and climate-adapted communities in regional Victoria.²⁷⁷ It can consider more restrictions on new homes in the Rural Conservation Zone so this zone can better protect and enhance the natural environment.²⁷⁸

Prioritise transport investment in regional Victoria

A distributed state scenario depends more on cars. People take 80% of their trips using private vehicles in 2056.²⁷⁹ Because more people drive on regional roads, road safety becomes an increasing challenge. Regional and rural roads have more deaths and serious injuries than other places.²⁸⁰ The Victorian Government could consider better road maintenance and safety upgrades on high speed roads and intersections.

In a distributed state scenario people drive less in congested conditions each day, compared to the other scenarios.²⁸¹ This is positive for freight movements which collect and supply goods across a more distributed Victoria. To support the demands on the freight network, the Victorian Government could consider road and bridge strengthening to better use existing roads. It can also work with businesses and regional local governments to identify priority locations for distribution hubs, using its experience with Inland Rail intermodal hub development.²⁸²

A distributed state scenario also has the fewest public transport trips. It has 900,000 fewer daily public transport trips than in a compact city scenario. The Victorian Government can consider redesigning regional public transport services so different modes connect and have a source of sustainable funding.²⁸³ This could include removing regulatory barriers to allow bus fleets to operate with innovative service models,²⁸⁴ and more park and ride facilities near bus interchanges and train stations.

Because more people depend on cars and more freight transported on roads, the Victorian Government could support more rapid uptake of zero emission vehicles. Our previous *Advice on automated and zero emissions vehicles infrastructure* and our report *Driving down emissions: accelerating Victoria's zero emission vehicle uptake* offer more detailed guidance on improving uptake.^{285,286}

Automated vehicles can help achieve a distributed state. They can bring faster travel times, safer roads and improved access to services in regional areas.²⁸⁷ This can include freight and passenger vehicles. Our previous advice found that some proactive changes to machine-readable stickers or other solutions could help. Automating freight vehicles would not lead to increases in the weight of heavy vehicles and could be driven on existing roads.²⁸⁸

Deliver climate adaptation measures to reduce the impact of climate risks

The Victorian Government could respond to the significant climate risks that a distributed state creates. A distributed state uses the most land of any scenario.²⁸⁹ More people live in areas prone to bushfires and flooding.²⁹⁰

The government can act to ease these climate risks. *Victoria's infrastructure strategy 2021–2051* recommended investing in protection and adaptation for Victoria's coasts to reduce the effects of further climate change.²⁹¹ Long term investment could deliver funding security and stability to safeguard coasts, homes and infrastructure.

The Victorian Government can also consider better fuel management planning and strategic bushfire management planning by private land managers and fire agencies.²⁹² It could clear vegetation near towns and communities to reduce the risks of losing homes and businesses. Because more people live in regional Victoria, the government could keep restricting new developments and subdivisions in areas with highest risk of flood and fire.²⁹³

In areas with existing homes with unacceptably high risk of bushfires, the Victorian Government can also consider a retreat and resettlement strategy that encourages people living in those areas to move.²⁹⁴

Facilitate investment in digital connectivity

Increasing digital infrastructure in regional Victoria can help achieve a distributed state scenario. This scenario assumes people are more self-reliant. This includes that more Victorians access work, education, shops and services online. This can only be done with reliable high-speed internet. *Victoria's infrastructure strategy 2021–2051* recommends closing regional Victoria's digital connectivity gaps.²⁹⁵ The Victorian Government could also consider the Australian Government's role in digital connectivity. It could bring all levels of government together and support private sector investment.

Improving digital connectivity can improve safety and has social benefits. The 2019–20 summer bushfires showed that unreliable telecommunication infrastructure can cause real harm. It can prevent rapid information sharing with communities at risk and between government agencies in multiple jurisdictions. The Victorian Government can consider improving critical infrastructure information flows and embed resilience.²⁹⁶ Improved digital connectivity in a distributed state also means people can remotely access jobs and services such as telehealth.

References

- ¹ City of Greater Geelong, [Settlement Strategy 2020 - City of Greater Geelong \(geelongaustralia.com.au\)](#), 2020, accessed 28 August 2023.
- ² City of Ballarat, [Ballarat Strategy 2040 | City of Ballarat](#), Ballarat Strategy 2040 | City of Ballarat, Today tomorrow together: the Ballarat strategy, 2015, accessed August 2023.
- ³ Department of Transport and Planning, Victoria in Future 2023: Population projections 2021 to 2051, <https://www.planning.vic.gov.au/guides-and-resources/data-and-insights/victoria-in-future>, accessed September 2023
- ⁴ Department of Treasury and Finance, [2022 Victorian Economic and Fiscal Update](#), accessed 14 June 2023
- ⁵ Department of Transport and Planning, [COVID-era population change](#), April 2022, accessed June 2023
- ⁶ Infrastructure Victoria, [Our home choices](#), How more housing options can make better use of Victoria's infrastructure March 2023,, p21 accessed 5 June 2023
- ⁷ R Goodspeed, Scenario planning for cities and regions. Managing and envisioning uncertain futures. Lincoln Institute of Land Policy, 2020, p.ix
- ⁸ Sage Journals, [The use of scenarios in land use planning](#), December 2003, accessed 16 June 2023
- ⁹ International Monetary Fund (IMF), [IMF guidance notes, How to Implement Strategic Foresight \(and Why\): IMF guidance notes, How to Implement Strategic Foresight \(and Why\)](#); United States Department of Transportation Federal Highway Administration, Supporting Performance-Based Planning and Programming through Scenario Planning, accessed online
- ¹⁰ Department of Environment, Land, Water and Planning, Victoria in Future: Population projections 2016 to 2056, 2021
- ¹¹ Department of Transport and Planning, Victoria in Future: Population projections 2021 to 2051, September 2023, <https://www.planning.vic.gov.au/guides-and-resources/data-and-insights/victoria-in-future>
- ¹² Infrastructure Victoria, [Infrastructure Provision in Different Development Settings](#), 2018
- ¹³ National Museum Austria, 2022 [Evidence of first peoples | National Museum of Australia \(nma.gov.au\)](#), accessed 19 July 2023
- ¹⁴ Martinez-Fernandez, C, Weyman, T, Fol, S, Audirac, I, Cunningham-Sabot, E, Wiechmann, T, & Yahagi, H. 2016. 'Shrinking cities in Australia, Japan, Europe and the USA: From a global process to local policy responses'. *Progress in Planning*, 105(C), 1–48
- ¹⁵ Australian Government, The evolution of Australian towns, Department of Infrastructure and Regional Development, 2014, https://www.bitre.gov.au/sites/default/files/report_136_CHAPTER_7_WEB_FA.pdf
- ¹⁶ Newman, P. and Kosonen, L. and Kenworthy, J. 2016. Theory of urban fabrics: Planning the walking, transit/public transport and automobile/motor car cities for reduced car dependency. *Town Planning Review*. 87 (4): pp. 429–458.
- ¹⁷ Infrastructure Victoria, Learning from the past, A history of infrastructure planning in Victoria February 2016, [Learning-from-the-past-1.pdf \(infrastructurevictoria.com.au\)](#), [Learning-from-the-past-1.pdf \(infrastructurevictoria.com.au\)](#), accessed 26 July 2023
- ¹⁸ Australian Bureau of Statistics, Census All persons QuickStats, 2021, <https://www.abs.gov.au/census/find-census-data/quickstats/2021/2>
- ¹⁹ Infrastructure Victoria, Growing Victoria's Potential, 2019, p.22, accessed July 2023
- ²⁰ Australian Bureau of Statistics, Box Hill – Census All persons QuickStats, 2021, <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL20314>
- ²¹ Australian Bureau of Statistics, Reservoir – Census All persons QuickStats, 2021, <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL22161>
- ²² Australian Bureau of Statistics, Wyndham Vale – Census All persons QuickStats, 2021, <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL22883>
- ²³ Department of Transport and Planning, Redevelopment land supply 2021, DTP website, 26 July 2022, accessed 7 September 2023.
- ²⁴ Department of Environment, Land, Water and Planning, [Plan Melbourne: 2017–2050](#), 2017, p. 47.
- ²⁵ Lilia Anderson, The Australia Institute, May 2023, [Housing Affordability: A Missed Opportunity for Serious Reform - The Australia Institute](#), accessed June 2023
- ²⁶ Infrastructure Victoria, [Our home choices](#), How more housing options can make better use of Victoria's infrastructure, [Our home choices - Infrastructure Victoria Our home choices - Infrastructure Victoria](#) March 2023 , accessed 8 August 2023
- ²⁷ Infrastructure Victoria, IPIDDS
- ²⁸ The Centre for International Economics (CIE), [Economic, social and environmental impacts of alternative urban development scenarios for Victoria](#), 15 August 2023, Table 4.9.
- ²⁹ Department of Transport and Planning, Plan Melbourne Implementation Plan [Implementation \(planning.vic.gov.au\)](#), 2017, accessed 14 August 2023
- ³⁰ Infrastructure Victoria, [Victoria's infrastructure strategy 2021–2051](#), 2021, accessed 8 August 2023

- ³¹ Queensland Government, Draft Shaping SEQ South East Queensland Regional Plan 2023, August 2023, https://hdp-au-prod-app-dsdilgp-shapingseq-files.s3.ap-southeast-2.amazonaws.com/1116/9095/7538/DSDILGP_DRAFT_ShapingSEQ_2023_Update_Regional_Plan.pdf, accessed 15 August 2023
- ³² Queensland Government, Draft SEQ Infrastructure Supplement 2023, August 2023, https://hdp-au-prod-app-dsdilgp-shapingseq-files.s3.ap-southeast-2.amazonaws.com/7916/9089/8775/DRAFT_SEQIS_FINAL.pdf, accessed 15 August 2023
- ³³ NSW Government, A Metropolis of Three Cities, <https://www.planning.nsw.gov.au/plans-for-your-area/a-metropolis-of-three-cities#inPageNav-1>, accessed 16 August 2023
- ³⁴ Infrastructure NSW, State Infrastructure Strategy 2022–2043, <https://www.infrastructure.nsw.gov.au/media/lq3nrt4m/chapter-10-integrate-infrastructure-land-use-and-service-planning.pdf>, accessed 16 August 2023
- ³⁵ Transport for NSW, Future Transport Strategy, <https://www.future.transport.nsw.gov.au/documents/future-transport-strategy>, accessed 16 August 2023
- ³⁶ HM Treasury, National Infrastructure Strategy November 2020, <https://www.gov.uk/government/publications/national-infrastructure-strategy>, accessed 15 August 2023
- ³⁷ National Infrastructure Commission, National Infrastructure Assessment 2021, <https://nic.org.uk/studies-reports/national-infrastructure-assessment/>, accessed 15 August 2023
- ³⁸ HM Treasury and Infrastructure and Projects Authority, 13 September 2021, <https://www.gov.uk/government/publications/national-infrastructure-and-construction-pipeline-2021>, accessed 15 August 2023
- ³⁹ Nygaard, S Parkinson and M Reynolds, *Agglomeration effects and housing market dynamics*, Australian Housing and Urban Research Institute Limited, 2021, accessed 18 January 2023
- ⁴⁰ SE Bibri, J Krogstie and M Kärrholm, 'Compact city planning and development: emerging practices and strategies for achieving the goals of sustainability', *Developments in the built environment*, 2020, vol 4.
- ⁴¹ B Giles-Corti, K Ryan and S Foster, *Increasing density in Australia: maximising the health benefits and minimising harm*, National Heart Foundation of Australia, Melbourne, 2012; LD Frank and G Pivo, 'Impacts of mixed use and density on utilization of three modes of travel: single-occupant vehicle, transit, and walking', *Transportation research record*, 1994, vol 1466, pp 44–52
- ⁴² Reserve Bank of Australia, *Submission to the inquiry into housing affordability and supply in Australia*, House of Representatives Standing Committee on Tax and Revenue, 2021, accessed 3 January 2023; National Housing Finance and Investment Corporation, *Stamp duty reform: benefits and challenges*, 2021, accessed 3 January 2023
- ⁴³ Premier of Victoria, *Millions in stamp duty savings for first home buyers*, Premier of Victoria website, 20 August 2020, accessed 4 January 2023; State Revenue Office Victoria, *Annual review 2019–20*, 2020, accessed 4 January 2023
- ⁴⁴ Infrastructure Victoria, *Our home choices*, How more housing options can make better use of Victoria's infrastructure, [Our home choices - Infrastructure Victoria](#) [Our home choices - Infrastructure Victoria](#) March 2023, accessed 8 August 2023
- ⁴⁵ M Malakellis and M Wartlers, *The economic costs of transfer duty: a literature review*, NSW Treasury, 2021, accessed 16 January 2023.
- ⁴⁶ HS Banzhaf and N Lavery, 'Can the land tax help curb urban sprawl? Evidence from growth patterns in Pennsylvania', *Journal of urban economics*, 2010, 67; V Taranu and G Verbeek, 'Property tax as a policy against urban sprawl', *Land use policy*, 2022, Vol 122.
- ⁴⁷ Infrastructure Victoria, *Our home choices*. How more housing options can make better use of Victoria's infrastructure. March 2023, p. 43; A Whittemore and T BenDor, 'NIMBY: The demographics, politics, and geography of opposition to high-density residential infill', *Journal of urban affairs*, 2019, vol 41, no 4, pp 423–442; EJ Taylor, 'Do house values influence resistance to development? A spatial analysis of planning objection and appeals in Melbourne', *Urban policy and research*, 2013, vol 31, no 1, pp 5–26.
- ⁴⁸ Infrastructure Victoria, *Our home choices*. How more housing options can make better use of Victoria's infrastructure. March 2023, p. 49, accessed 8 August 2023
- ⁴⁹ Infrastructure Victoria, *Measuring home price differences: how features, location and infrastructure affect Melbourne's home prices*, 2023; N Bertram, LA Khor, O Sainsbury, R Power and M Stevens, *CoDev townhouse model: design research report*, Monash University, 2020, accessed 10 January 2023
- ⁵⁰ Infrastructure Victoria, *Our home choices*. How more housing options can make better use of Victoria's infrastructure. March 2023, p. 50–51
- ⁵¹ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p.213, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](#), accessed 8 August 2023
- ⁵² Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p.230, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](#), accessed 8 August 2023
- ⁵³ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p.216, 218–219, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](#), accessed 8 August 2023
- ⁵⁴ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 39
- ⁵⁵ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, p170, accessed June 2023
- ⁵⁶ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ⁵⁷ City of Melbourne, *City of Melbourne staff to return to CBD workplaces*, Media release, Wednesday 24 February 2021, <https://www.melbourne.vic.gov.au/news-and-media/Pages/City-of-Melbourne-staff-to-return-to-CBD-workplaces.aspx>

- ⁵⁸ Infrastructure Victoria, The post pandemic commute, The effects of more working from home in Victoria, [The post-pandemic commute \(infrastructurevictoria.com.au\)](https://infrastructurevictoria.com.au), November 2021, accessed 7 August 2023
- ⁵⁹ Australian Institute of Health and Welfare, 2021, [Social isolation and loneliness - Australian Institute of Health and Welfare \(aihw.gov.au\)](https://aihw.gov.au), accessed 28 August 2023
- ⁶⁰ Australian Psychological Society 2018. Australian loneliness report: A survey exploring the loneliness levels of Australians and the impact on their health and wellbeing- external site opens in new window. [Australian loneliness report: A survey exploring the loneliness levels of Australians and the impact on their health and wellbeing- external site opens in new window](https://www.apso.org.au). Melbourne: APS.
- ⁶¹ Australian Institute of Health and Welfare, 2021, [Social isolation and loneliness - Australian Institute of Health and Welfare \(aihw.gov.au\)](https://aihw.gov.au), accessed 28 August 2023
- ⁶² The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.99, 7 July 2023
- ⁶³ Arup, Urban Development Scenarios, Strategic Transport Modelling, June 2023, p.13, accessed 14 June 2023
- ⁶⁴ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023
- ⁶⁵ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023
- ⁶⁶ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023
- ⁶⁷ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.99, 7 July 2023
- ⁶⁸ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.87, 7 July 2023
- ⁶⁹ [Dr Ian Cresswell, Dr Terri Janke and Professor Emma Johnston AO FTSE FRSN Australia State of the Environment Report People | Australia state of the environment 2021 \(dceew.gov.au\)](https://www.dceew.gov.au), accessed 20 June 2023
- ⁷⁰ [Urban sprawl, food security and agricultural systems in developing countries: A systematic review of the literature - ScienceDirect](https://www.sciencedirect.com) November 2019, accessed 20 June 2023
- ⁷¹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.32, 7 July 2023
- ⁷² SGS Economics and Planning, *Urban Development Scenarios: Part A: Land Use Scenarios*, 31 October 2022, p. 69
- ⁷³ Minister for Planning, Amendment VC68, Planning and Environment Act 1987, Victoria Planning Provisions, Explanatory report, 2010; Growth Areas Authority, Growth Areas Logical Inclusions Review Process 2011
- ⁷⁴ <https://www.planning.vic.gov.au/guides-and-resources/guides/all-guides/green-wedges-and-peri-urban-agriculture>
- ⁷⁵ Victorian Auditor-General's Office, Managing Development Contributions, Independent assurance report to Parliament, 2019–20: 11, March 2020, pp.9–10
- ⁷⁶ RMIT University, Precinct Structure Planning in Melbourne's Growth Areas: Initial Thoughts on Processes and Trade-offs, 2018, accessed 28 August 2023
- ⁷⁷ Victorian Auditor General's Office, 2013, [Developing Transport Infrastructure and Services for Population Growth Areas | Victorian Auditor-General's Office](https://www.auditor.vic.gov.au), accessed 28 August 2023
- ⁷⁸ Development Victoria, What we do, 26 May 2023, [What we do - Development Victoria](https://www.development.vic.gov.au), accessed 8 August 2023
- ⁷⁹ Victoria Planning Authority, Growth Corridor Plans, [Growth Corridor Plans - VPA Growth Corridor Plans](https://www.vpa.vic.gov.au), June 2012, -, accessed 8 August 2023
- ⁸⁰ Australian Bureau of Statistics, Victoria: Aboriginal and Torres Strait Islander population summary: Census 2021, <https://www.abs.gov.au/articles/victoria-aboriginal-and-torres-strait-islander-population-summary>, accessed 28 August 2023
- ⁸¹ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 188
- ⁸² Arup, Urban Development Scenarios: Strategic Transport Modelling, 23 June 2023, p. 4, accessed 8 August 2023
- ⁸³ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 206, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](https://www.infrastructure.vic.gov.au), accessed 8 August 2023
- ⁸⁴ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 158, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](https://www.infrastructure.vic.gov.au), accessed 8 August 2023
- ⁸⁵ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 119, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](https://www.infrastructure.vic.gov.au), accessed 8 August 2023
- ⁸⁶ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 80, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](https://www.infrastructure.vic.gov.au), accessed 8 August 2023

- ⁸⁷ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 134, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](#), accessed 8 August 2023
- ⁸⁸ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 141, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](#), accessed August 2023
- ⁸⁹ Arup, *Urban Development Scenarios Strategic Transport Modelling July 2023*, accessed August 2023
- ⁹⁰ Department of Infrastructure, Transport, Regional Development, Communications and the Arts, *Road Vehicles, Australia, January 2023*, [Road Vehicles, Australia, January 2023 | Bureau of Infrastructure and Transport Research Economics \(bitre.gov.au\)](#) [Road Vehicles, Australia, January 2023 | Bureau of Infrastructure and Transport Research Economics \(bitre.gov.au\)](#), accessed 8 August 2023
- ⁹¹ Infrastructure Victoria, *Advice on automated and zero emissions vehicles infrastructure*, October 2018, p. 22, [Advice on automated and zero emissions vehicles infrastructure - Infrastructure Victoria](#), accessed 8 August 2023
- ⁹² Infrastructure Victoria, *Driving down emissions: accelerating Victoria's zero emission vehicle uptake*, August 2021, accessed 7 September 2023
- ⁹³ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 16 June 2023, p. 76
- ⁹⁴ Department of Transport and Planning, *Bushfire*, [Bushfire \(planning.vic.gov.au\)](#) [Bushfire \(planning.vic.gov.au\)](#), accessed 7 July 2023
- ⁹⁵ Australian Government, Bureau of Meteorology [Australian climate extremes analyses \(bom.gov.au\)](#), 2023, accessed August 2023
- ⁹⁶ Department of Environment, Land, Water and Planning, *Victoria's Climate Science Report 2019*, p. 8, [Victorias-Climate-Science-Report-2019.pdf \(climatechange.vic.gov.au\)](#), accessed 8 August 2023
- ⁹⁷ Infrastructure Victoria, *Infrastructure Priorities for the Regions*, December 2020, p. 100, [Infrastructure Priorities for the Regions – Infrastructure Victoria](#), accessed 8 August 2023
- ⁹⁸ Department of Energy, Environment and Climate Acton, 2023, *Victoria's Bushfire Management Strategy*, <https://engage.vic.gov.au/download/document/32178> <https://engage.vic.gov.au/download/document/32178>, p.7, accessed August 2023
- ⁹⁹ Infrastructure Victoria, *Infrastructure Priorities for the Regions*, December 2020, p. 100, [Infrastructure Priorities for the Regions - Infrastructure Victoria](#), accessed 8 August 2023
- ¹⁰⁰ Australian Bureau of Statistics, *Average Floor Area of New Residential Dwellings, 2023*; [Average Floor Area of New Residential Dwellings | Australian Bureau of Statistics \(abs.gov.au\)](#) [Average Floor Area of New Residential Dwellings | Australian Bureau of Statistics \(abs.gov.au\)](#), Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 211, accessed 8 August 2023
- ¹⁰¹ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 211, [Victoria's Infrastructure Strategy 2021–2051 - Home - Infrastructure Victoria](#), accessed August 2023
- ¹⁰² Ami Mody, *Rethink The Future, 8 Cities in the World, Famous for their Urban Planning, 2023*, [8 Cities in the world, famous for their Urban Planning - RTF \(re-thinkingthefuture.com\)](#), accessed 21 July 2023
- ¹⁰³ Danish Ministry of the Environment, *The Finger Plan 2015* accessed 21 July 2023, https://danishbusinessauthority.dk/sites/default/files/fp-eng_31_13052015.pdf, accessed 23 July 2023
- ¹⁰⁴ James Thoen, *Copenhagenize, 2023*, [What makes Copenhagen the world's most bicycle friendly capital? | VisitCopenhagen](#), accessed August 2023
- ¹⁰⁵ Chew Valerie, 2016 [History of urban planning in Singapore | Infopedia \(nlb.gov.sg\)](#), accessed 23 July 2023
- ¹⁰⁶ Ami Mody, 2022, [10 Newly planned cities and their innovative urban designs - RTF \(re-thinkingthefuture.com\)](#), accessed 23 July 2023
- ¹⁰⁷ Victoria State Government, Department of Transport and Planning, *Fishermans Bend Urban Renewal Project*, [Fishermans Bend - Fishermans Bend - Fishermans Bend](#), 2023, accessed 28 August 2023
- ¹⁰⁸ Victoria Planning Authority, *Arden Precinct - VPA* [Arden Precinct - VPA](#), Arden Structure Plan, 2022, accessed 28 August 2023
- ¹⁰⁹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.116, 7 July 2023
- ¹¹⁰ Daniel Bressler, [The mortality cost of carbon | Nature Communications](#), July 2021, accessed 1 September 2023
- ¹¹¹ Commonwealth of Australia, Australian Transport Assessment and Planning, [Wider economic benefits | Australian Transport Assessment and Planning \(atap.gov.au\)](#) [Wider economic benefits | Australian Transport Assessment and Planning \(atap.gov.au\)](#), January 2023, accessed 22 August 2023.
- ¹¹² The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.84–85, 7 July 2023
- ¹¹³ Angus Reoch and Kyle Thomson, 2018, Australian Government, Department of Infrastructure, Regional Development and Cities, Bureau of Infrastructure, Transport and Regional Economics, [BITRE staff paper-What is Access.pdf](#), accessed 1 September 2023
- ¹¹⁴ Department of Transport and Planning, State Government of Victoria, [Plan Melbourne - 20 minute neighbourhoods](#) [Plan Melbourne - 20 minute neighbourhoods](#), 2016, accessed 12 July 2023
- ¹¹⁵ Mark Baljak, [The 20-minute city, associated health benefits and expand... \(urban.com.au\)](#), 2017, accessed 12 July 2023
- ¹¹⁶ The Heart Foundation, *Designing an Active Healthier Victoria* [Home | The Heart Foundation](#) [Home | The Heart Foundation](#), 2017, accessed 15 June 2023

- ¹¹⁷ Badawi, Y, Maclean, F, and Mason, B, (2018). [The-Economic-Case-for-Investment-in-Walking-FINAL.pdf \(victoriawalks.org.au\)](#) The economic case for investment in walking, Victoria Walks, Melbourne. [The-Economic-Case-for-Investment-in-Walking-FINAL.pdf \(victoriawalks.org.au\)](#) The economic case for investment in walking, Victoria Walks, Melbourne. Accessed 12 July 2023
- ¹¹⁸ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 90
- ¹¹⁹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, p.84–85, 7 July 2023
- ¹²⁰ SGS Economics and Planning, *Urban Development Scenarios: Part A: Land Use Scenarios*, 31 October 2022, p. 53
- ¹²¹ Infrastructure Victoria, *Growing Together*, 2020, p. 22, [Growing together - December 2020 - Infrastructure Victoria](#), accessed 1 August 2023
- ¹²² Department of Transport and Planning, *Victoria Planning Provisions – 32.07 Residential Growth Zone*, 2018, accessed 28 December 2022.
- ¹²³ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria’s infrastructure*. March 2023, p. 43; A Whittemore and T BenDor, ‘NIMBY: The demographics, politics, and geography of opposition to high-density residential infill’, *Journal of urban affairs*, 2019, vol 41, no 4, pp 423–442; EJ Taylor, ‘Do house values influence resistance to development? A spatial analysis of planning objection and appeals in Melbourne’, *Urban policy and research*, 2013, vol 31, no 1, pp 5–26.
- ¹²⁴ RPS Group, *Infrastructure Victoria 30-year strategy engagement report*, Infrastructure Victoria, 2020, accessed 12 February 2023.
- ¹²⁵ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria’s infrastructure*. March 2023, p. 49, accessed 8 August 2023
- ¹²⁶ SGS Economics and Planning, *Wider costs of medium density development*, report prepared for Department of Planning, Lands and Heritage (WA), May 2020, p.4, accessed 1 August 2023
- ¹²⁷ Infrastructure Victoria, *Measuring home price differences: how features, location and infrastructure affect Melbourne’s home prices*, 2023; N Bertram, LA Khor, O Sainsbury, R Power and M Stevens, *CoDev townhouse model: design research report*, Monash University, 2020, accessed 10 January 2023
- ¹²⁸ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria’s infrastructure*. March 2023, p. 50–51
- ¹²⁹ Reserve Bank of Australia, *Submission to the inquiry into housing affordability and supply in Australia*, House of Representatives Standing Committee on Tax and Revenue, 2021, accessed 3 January 2023; National Housing Finance and Investment Corporation, *Stamp duty reform: benefits and challenges*, 2021, accessed 3 January 2023
- ¹³⁰ Premier of Victoria, *Millions in stamp duty savings for first home buyers*, Premier of Victoria website, 20 August 2020, accessed 4 January 2023; State Revenue Office Victoria, *Annual review 2019–20*, 2020, accessed 4 January 2023
- ¹³¹ M Malakellis and M Wartters, *The economic costs of transfer duty: a literature review*, NSW Treasury, 2021, accessed 16 January 2023.
- ¹³² HS Banzhaf and N Lavery, ‘Can the land tax help curb urban sprawl? Evidence from growth patterns in Pennsylvania’, *Journal of urban economics*, 2010, 67; V Taranu and G Verbeeck, ‘Property tax as a policy against urban sprawl’, *Land use policy*, 2022, Vol 122.
- ¹³³ Department of Jobs, Skills, Industry and Regions, *Precincts and suburbs*, DJSIR website, n.d., accessed 14 January 2023; Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022
- ¹³⁴ Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022
- ¹³⁵ Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022
- ¹³⁶ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria’s infrastructure*. March 2023, p. 40
- ¹³⁷ Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022, p. 117
- ¹³⁸ Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, p. 188
- ¹³⁹ Robinson and C De Gruyter, ‘Financing infrastructure through user-pays development contributions: an assessment of Australian practice’, *Australian planner*, 2017, vol 54, no 3, pp 165–176.
- ¹⁴⁰ Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022
- ¹⁴¹ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria’s infrastructure*. March 2023, p. 31, accessed 1 August 2023
- ¹⁴² Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria’s infrastructure*. March 2023, p. 31, accessed 1 August 2023
- ¹⁴³ Infrastructure Victoria, *Victoria’s infrastructure strategy 2021–2051*, 2021, accessed July 2023
- ¹⁴⁴ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*. Prepared for Infrastructure Victoria. July 2023, p. 83
- ¹⁴⁵ Government of Victoria and Monash University, 2021, *Partnership Agreement*, accessed July 2023
- ¹⁴⁶ Department of Education and Training and Victorian Skills Authority, 16 May 2022, [submission-23---det-and-vsa---16052022.pdf \(parliament.vic.gov.au\)](#), accessed 11 July 2023
- ¹⁴⁷ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 37
- ¹⁴⁸ State Government of Victoria - Victoria’s Big Build, “Suburban Rail Loop”, Victorian Government, 12 July 2023, [Suburban Rail Loop - Victoria’s Big Build](#), accessed 13 July 2023,

- ¹⁴⁹ State Government of Victoria - Victoria's Big Build, "Suburban Rail Loop", Victorian Government, , [Project benefits – Victoria's Big BuildProject benefits – Victoria's Big Build](#), 2023, accessed 2 August 2023
- ¹⁵⁰ State Government of Victoria - Victoria's Big Build, "Suburban Rail Loop", Victorian Government, , [Project benefits – Victoria's Big BuildProject benefits – Victoria's Big Build](#), 2023, accessed 2 August 2023
- ¹⁵¹ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 41
- ¹⁵² Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 120; Department of Transport and Planning, *Strategic Cycling Corridors*, <https://dtp.vic.gov.au/getting-around/walking-and-cycling/strategic-cycling-corridors>
- ¹⁵³ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 123; Department of Energy, Environment and Climate Action, *Transport Pledge*, https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0030/522795/Transport-sector-pledge-full-colour.pdf
- ¹⁵⁴ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 47, p. 53
- ¹⁵⁵ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 140
- ¹⁵⁶ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 39
- ¹⁵⁷ Infrastructure Victoria, *Growing together: The case for better integration of land use and infrastructure planning in established areas*, December 2020, p. 40, accessed 2 August 2023
- ¹⁵⁸ Department of Environment, Land, Water and Planning, *Environmentally sustainable development of buildings and subdivisions: A roadmap for Victoria's planning system*, 2020
- ¹⁵⁹ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 211
- ¹⁶⁰ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, p.9, accessed June 2023
- ¹⁶¹ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ¹⁶² Victoria State Government, Department of Transport and Planning, 2023, Urban Renewal Project, [Fishermans Bend - Fishermans BendFishermans Bend - Fishermans Bend](#), accessed 28 August 2023
- ¹⁶³ Victoria Planning Authority, Arden Structure Plan, 2022, [Arden Precinct - VPA, Arden Precinct - VPA](#), accessed 28 August 2023
- ¹⁶⁴ Designing New York – Streetscapes for Wellness 2022 [PDC StreetscapesForWellness.pdf \(nyc.gov\)](#), accessed July 2023
- ¹⁶⁵ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023
- ¹⁶⁶ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023
- ¹⁶⁷ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 92
- ¹⁶⁸ Public Health Association of Australia [Active Transport \(phaa.net.au\)Active Transport \(phaa.net.au\)](#), [Policy at a glance – Low emissions & Active Transport Policy, September 2014](#), accessed July 2023
- ¹⁶⁹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*. Prepared for Infrastructure Victoria. July 2023, p. 140-141
- ¹⁷⁰ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 56, accessed July 2023
- ¹⁷¹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 27
- ¹⁷² SGS Economics and Planning, *Urban Development Scenarios: Part A: Land Use Scenarios*, 31 October 2022, p. 37
- ¹⁷³ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria's infrastructure*. March 2023, p. 43
- ¹⁷⁴ S Rowley, *The Victorian planning system: practice, problems and prospects*, 2nd edn, The Federation Press, Annandale, 2023, p. 266
- ¹⁷⁵ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria's infrastructure*. March 2023, p. 52
- ¹⁷⁶ Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria's infrastructure*. March 2023, p. 29
- ¹⁷⁷ Cladding Safety Victoria, *Research analysis on issues and risks associated with balcony defects*, October 2022, [Research analysis on issues and risks associated with balcony defects | Victorian Government \(www.vic.gov.au\)Research analysis on issues and risks associated with balcony defects | Victorian Government \(www.vic.gov.au\)](#), accessed 13 July 2023,
- ¹⁷⁸ Infrastructure Victoria, *Measuring home price differences: how features, location and infrastructure affect Melbourne's home prices*, 2023.
- ¹⁷⁹ De Gruyter, LT Truong and EJ Taylor, 'Can high quality public transport support reduced car parking requirements for new residential apartments?', *Journal of transport geography*, 2020, vol 82.
- ¹⁸⁰ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022, p. 190, accessed 2 August 2023
- ¹⁸¹ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022, p. 117, accessed 2 August 2023
- ¹⁸² Infrastructure Victoria, *Our home choices. How more housing options can make better use of Victoria's infrastructure*. March 2023, p. 33
- ¹⁸³ State Revenue Office Victoria, *First homeowner grant statistics*, SROV website, 8 December 2021, accessed 30 December 2022

- ¹⁸⁴ Infrastructure Victoria, Our home choices. How more housing options can make better use of Victoria's infrastructure. March 2023, p. 34
- ¹⁸⁵ Infrastructure Victoria, Our home choices. How more housing options can make better use of Victoria's infrastructure. March 2023, p. 35
- ¹⁸⁶ <https://www.planning.vic.gov.au/guides-and-resources/guides/all-guides/green-wedges-and-peri-urban-agriculture>
- ¹⁸⁷ Planning Panels Victoria, *Victorian planning authority projects standing advisory committee – referral no. 4 Craigieburn west precinct structure plan advisory committee report*, June 2021, accessed 13 July 2023
- ¹⁸⁸ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 210
- ¹⁸⁹ Wyndham City Council, Planning Committee Meeting Minutes, 13 July 2021, [Minutes of Planning Committee Meeting - 13 00 2021 \(wyndham.vic.gov.au\)](#), accessed 1 August 2023.
- ¹⁹⁰ Wyndham City, The Wyndham Plan, Draft, November 2022, p. 53, accessed 1 August 2023
- ¹⁹¹ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 40, accessed July 2023
- ¹⁹² Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 41, accessed July 2023
- ¹⁹³ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 119, [Victoria's infrastructure strategy - Infrastructure Victoria](#), accessed July 2023
- ¹⁹⁴ Badawi, Y, Maclean, F, and Mason, B, (2018). [The-Economic-Case-for-Investment-in-Walking-FINAL.pdf \(victoriawalks.org.au\)](#) The economic case for investment in walking, Victoria Walks, Melbourne. [The-Economic-Case-for-Investment-in-Walking-FINAL.pdf \(victoriawalks.org.au\)](#) The economic case for investment in walking, Victoria Walks, Melbourne. Accessed 12 July 2023
- ¹⁹⁵ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 132, [Victoria's infrastructure strategy – Infrastructure Victoria](#), accessed August 2023
- ¹⁹⁶ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 47, accessed July 2023
- ¹⁹⁷ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 23 June 2023, p. 46, accessed July 2023
- ¹⁹⁸ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 140
- ¹⁹⁹ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 120
- ²⁰⁰ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 36
- ²⁰¹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 36
- ²⁰² The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 36
- ²⁰³ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 118, [Victoria's infrastructure strategy - Infrastructure Victoria](#), accessed 2 August 2023
- ²⁰⁴ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 34
- ²⁰⁵ Infrastructure Victoria, *Growing together: The case for better integration of land use and infrastructure planning in established areas*, December 2020, p. 3, accessed July 2023
- ²⁰⁶ Infrastructure Victoria, *Growing together: The case for better integration of land use and infrastructure planning in established areas*, December 2020, p. 34, accessed July 2023
- ²⁰⁷ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 39
- ²⁰⁸ Infrastructure Victoria, *Growing together: The case for better integration of land use and infrastructure planning in established areas*, December 2020, p. 40
- ²⁰⁹ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ²¹⁰ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ²¹¹ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ²¹² SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ²¹³ Infrastructure Victoria, *Infrastructure Priorities for the Regions: Key findings to inform Victoria's 30-year infrastructure strategy update*, December 2020, p. 17
- ²¹⁴ Ballarat Planning Scheme 16.01-1S Housing supply. Strategies. p. 97
- ²¹⁵ Kim, Jae Hong. "Exploring the Determinants of Variations in Land Use Policy Outcomes: What Makes Urban Containment Work?" *Journal of Planning Education and Research*, vol. 43, no. 1, 2023, pp. 182–95.
- ²¹⁶ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022, p. 107
- ²¹⁷ <https://www.planning.vic.gov.au/guides-and-resources/strategies-and-initiatives/regional-growth-plans>; Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, accessed 2 December 2022, p. 248

- ²¹⁸ Infrastructure Victoria, Our home choices. How more housing options can make better use of Victoria's infrastructure. March 2023
- ²¹⁹ Victorian Aboriginal Community Service Association, Submission to Victoria's draft 30-year infrastructure strategy, 2021, www.infrastructurevictoria.com.au/wp-content/uploads/2021/05/S073-Victorian-Aboriginal-Cossociation-VACSAL-Redacted.pdf
- ²²⁰ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 188, [Victoria's infrastructure strategy – Infrastructure Victoria](#), accessed July 2023
- ²²¹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 39
- ²²² The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 43
- ²²³ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 42
- ²²⁴ Melbourne Water, *Producing recycled water*, 7 December 2022, accessed 1 August 2023, <https://www.melbournewater.com.au/water-and-environment/water-management/sewerage/producing-recycled-water>
- ²²⁵ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 60
- ²²⁶ Department of Jobs, Skills, Industry and Regions, Regional Development Victoria, 2022, [Regional Digital Plans - Regional Development Victoria \(rdv.vic.gov.au\)](#) Regional Digital Plans - Regional Development Victoria (rdv.vic.gov.au), accessed 28 August 2023
- ²²⁷ Infrastructure Australia, Regional Strengths and Infrastructure Gaps, Regional Analysis: Victoria, December 2022 https://www.infrastructureaustralia.gov.au/sites/default/files/2022-11/8.%20RSIG_Regional%20Analysis_VIC_1122.pdf, accessed 28 August 2023 https://www.infrastructureaustralia.gov.au/sites/default/files/2022-11/8.%20RSIG_Regional%20Analysis_VIC_1122.pdf, accessed 28 August 2023
- ²²⁸ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 232
- ²²⁹ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 7 July 2023, p. 4
- ²³⁰ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, 2021, p. 230
- ²³¹ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 7 July 2023, p. 4
- ²³² SGS Economics and Planning, *Urban Development Scenarios: Part A: Land Use Scenarios*, 31 October 2022, p. 85
- ²³³ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 80
- ²³⁴ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 7 July 2023, p. 57
- ²³⁵ Sunbury Electrification Project benchmark, https://ancr.com.au/sunbury_electrification_project.pdf accessed September 2023. As an example, this project was estimated to cost \$18 million/km in 2010, which would be estimated to cost around \$26 million/km in 2023 dollars.
- ²³⁶ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 7 July 2023, p. 32
- ²³⁷ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, p. 5
- ²³⁸ SGS Economics & Planning, Whittlesea gender equity employment analysis, accessed 27 July 2023, <https://sqsep.com.au/projects/whittlesea-gender-equity-in-employment-analysis>
- ²³⁹ Infrastructure Victoria, *Infrastructure Priorities for the Regions: Key findings to inform Victoria's 30-year infrastructure strategy update*, December 2020, p. 17
- ²⁴⁰ Infrastructure Victoria, *Regional priorities: Victoria's infrastructure strategy 2021–2051 – Central Highlands summary*, August 2021, p. 4
- ²⁴¹ Infrastructure Victoria, *Regional priorities: Victoria's infrastructure strategy 2021–2051 – Loddon Campaspe summary*, August 2021, p. 4
- ²⁴² Infrastructure Victoria, *Regional priorities: Victoria's infrastructure strategy 2021–2051 – Barwon summary*, August 2021, p. 4
- ²⁴³ Infrastructure Victoria, *Regional priorities: Victoria's infrastructure strategy 2021–2051 – Loddon Campaspe summary*, August 2021, pp. 4, 9
- ²⁴⁴ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 232
- ²⁴⁵ SGS Economics and Planning, *Urban Development Scenarios, Part A: Land Use Scenarios*, October 2022, accessed June 2023
- ²⁴⁶ Arup, *Urban Development Scenarios: Strategic Transport Modelling*, 7 July 2023, p. 90, accessed 23 August 2023
- ²⁴⁷ Victorian Government, Saving lives and road safety, May 2023, [Saving lives and road safety | Victorian Government \(www.vic.gov.au\)](#), [Saving lives and road safety | Victorian Government \(www.vic.gov.au\)](#), accessed 14 August 2023
- ²⁴⁸ Infrastructure Victoria, *Advice on automated and zero emissions vehicles infrastructure*, [Advice on automated and zero emissions vehicles infrastructure - Infrastructure Victoria](#), Oct 2018, accessed 24 August 2023
- ²⁴⁹ Australian Institute of Health and Welfare, 2021, [Social isolation and loneliness - Australian Institute of Health and Welfare \(aihw.gov.au\)](#), accessed 28 August 2023
- ²⁵⁰ Lim, Michelle; Australian Psychological Society, 2018. Australian loneliness report: A survey exploring the loneliness levels of Australians and the impact on their health and wellbeing- external site opens in new window. Melbourne: APS. [Swinburne Research Bank | Swinburne University of Technology](#), accessed 19 July 2023

- ²⁵¹ Australian Institute of Health and Welfare - Social isolation and loneliness, September 2021 - Australian Institute of Health and Welfare (aihw.gov.au), accessed 19 July 2023
- ²⁵² Dr Ian Cresswell, Dr Terri Janke and Professor Emma Johnston AO FTSE FRSN Australia State of the Environment Report People | Australia state of the environment 2021 (dceew.gov.au), accessed 20 June 2023
- ²⁵³ Assem Abu Hatab, Maria Eduarda Rigo Cavinato, August Lindemer, Carl-Johan Lagerkvist, Urban sprawl, food security and agricultural systems in developing countries: A systematic review of the literature - ScienceDirect, 2019, accessed 19 July 2023
- ²⁵⁴ Natural Environment Climate Change Adaptation Action Plan 2022, Climate change impacts (environment.vic.gov.au), accessed 15 July 2023
- ²⁵⁵ How climate change impacts Victoria's water, Climate Change and the Water Sector, 2022, accessed 15 July 2023
- ²⁵⁶ Infrastructure Victoria, Infrastructure Victoria Strategy 2021–2051, 1.-Victorias-infrastructure-strategy-2021–2051-Vol-1.pdf (infrastructurevictoria.com.au), accessed July 2023
- ²⁵⁷ Australians for Native Title and Reconciliation Victoria, Local Nations — ANTaR Victoria, 2023, accessed July 2023
- ²⁵⁸ Australians for Native Title and Reconciliation Victoria, Local Nations — ANTaR Victoria, 2023, accessed July 2023
- ²⁵⁹ First Peoples State Relations Victoria, Cultural Heritage Management Plans | First Peoples - State Relations (firstpeoplesrelations.vic.gov.au), accessed 24 July 2023
- ²⁶⁰ Victorian State Government, Cultural Heritage Management Plans, 2023 ACHRIS <https://achris.vic.gov.au/#/onlinemap>, accessed 19 July 2023
- ²⁶¹ Sustainability Victoria, 2018, Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP) | Sustainability Victoria, accessed June 2023
- ²⁶² Wikipedia Encyclopedia, Earth's circumference - Wikipedia, August 2023
- ²⁶³ Environment Protection Authority Victoria, 2013, Publication:1518: Recommended Separation Distances for Industrial Residual Air Emissions – Guideline | Environment Protection Authority Victoria, accessed 19 July 2023
- ²⁶⁴ Infrastructure Victoria, Infrastructure Priorities for the Regions: Key findings to inform Victoria's 30-year infrastructure strategy update, December 2020, p. 17
- ²⁶⁵ The Centre for International Economics (CIE), Economic, social and environmental impacts of alternative urban development scenarios for Victoria, 7 July 2023.
- ²⁶⁶ Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, 2021, p. 89, Victoria's infrastructure strategy – Infrastructure Victoria, accessed July 2023
- ²⁶⁷ Arup, Urban Development Scenarios: Strategic Transport Modelling, 7 July 2023, p. 4
- ²⁶⁸ Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, p. 225, Victoria's infrastructure strategy - Infrastructure Victoria, accessed July 2023
- ²⁶⁹ Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, p. 244, Victoria's infrastructure strategy - Infrastructure Victoria, accessed July 2023
- ²⁷⁰ Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, p. 242, Victoria's infrastructure strategy - Infrastructure Victoria, accessed July 2023
- ²⁷¹ Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, p. 245, Victoria's infrastructure strategy - Infrastructure Victoria, accessed July 2023
- ²⁷² Department of Transport and Planning, Green wedges and peri-urban agriculture (planning.vic.gov.au), 2023, accessed July 0223
- ²⁷³ Department of Transport and Planning, PPN92: Managing buffers for land use compatibility (planning.vic.gov.au), March 2021, accessed July 2023
- ²⁷⁴ Victorian State Government, Department of Transport and Planning, August 2023, Chapter 1: Planning schemes, accessed August 2023
- ²⁷⁵ Department of Transport and Planning, Victoria Planning Provisions, Rural Living Zone, 2023 35.03 RURAL LIVING ZONE Victoria Planning Provisions Planning Scheme - Ordinance
- ²⁷⁶ Productivity Commission, Australia's urban water sector, Commonwealth of Australia, 2011, p. 57, www.pc.gov.au/inquiries/completed/urban-water/report/urban-water-volume1.pdf
- ²⁷⁷ Victoria, State Government, Protecting Victoria's Environment – Biodiversity 2037, 2017, p. 32; VAGO, Protecting Victoria's Biodiversity, 2021
- ²⁷⁸ Department of Transport and Planning, Victoria Planning Provisions, Rural Conservation Zone, 35.06 RURAL CONSERVATION ZONE Victoria Planning Provisions Planning Scheme - Ordinance
- ²⁷⁹ Arup, Urban Development Scenarios: Strategic Transport Modelling, 7 July 2023, p. 49
- ²⁸⁰ Department of Transport, Victorian Road Safety Action Plan 2021–2023, p. 6
- ²⁸¹ Arup, Urban Development Scenarios, Strategic Transport Modelling, July 0223, accessed August 2023]
- ²⁸² Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, p. 178
- ²⁸³ Infrastructure Victoria, Victoria's infrastructure strategy 2021–2051, p. 230, Victoria's infrastructure strategy – Infrastructure Victoria, accessed July 2023

- ²⁸⁴ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 230
- ²⁸⁵ Infrastructure Victoria, *Advice on automated and zero emissions vehicles infrastructure*, October 2018, p. 22, accessed July 2023
- ²⁸⁶ Infrastructure Victoria, *Driving down emissions: accelerating Victoria's zero emission vehicle uptake*, August 2021, accessed September 2023
- ²⁸⁷ Infrastructure Victoria, *Advice on automated and zero emissions vehicles infrastructure*, October 2018, p. 4, accessed July 2023
- ²⁸⁸ Infrastructure Victoria, *Advice on automated and zero emissions vehicles infrastructure*, October 2018, p. 140, accessed July 2023
- ²⁸⁹ The Centre for International Economics (CIE), *Economic, social and environmental impacts of alternative urban development scenarios for Victoria*, 7 July 2023, pp. 87, 90
- ²⁹⁰ Department of Transport and Planning, *Bushfire*, [Bushfire \(planning.vic.gov.au\)](http://planning.vic.gov.au), accessed 7 July 2023,
- ²⁹¹ Infrastructure Victoria, *Infrastructure Priorities for the Regions: Key findings to inform Victoria's 30-year infrastructure strategy update*, December 2020, p. 56, accessed July 2023
- ²⁹² Inspector-General for Emergency Management, *Inquiry into the 2019–20 Victorian Fire Season: Summary report – Phase 1 – Community and sector preparedness for and response to the 2019–20 fire season*, October 2020, p. 25, accessed July 2023
- ²⁹³ Victorian Bushfires Royal Commission, *Final Report: Summary*, July 2010, p. 32, [2009 VBRC – Final Report – Summary – Interactive Version \(royalcommission.vic.gov.au\)](http://royalcommission.vic.gov.au), accessed July 2023
- ²⁹⁴ Victorian Bushfires Royal Commission, *Final Report – Volume 2: Planning and Building*, 2009, [2009 VBRC - Final Report - Vol 2 - Planning and Building \(royalcommission.vic.gov.au\)](http://royalcommission.vic.gov.au), accessed July 2023
- ²⁹⁵ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 232, [Victoria's infrastructure strategy - Infrastructure Victoria](#), accessed July 2023
- ²⁹⁶ Infrastructure Victoria, *Victoria's infrastructure strategy 2021–2051*, p. 73, [Victoria's infrastructure strategy - Infrastructure Victoria](#), accessed July 2023

Sustainability note

Infrastructure Victoria is committed to reducing its impact on the environment. This report is available in accessible version online or in PDF format only.

This publication may be of assistance to you, but Infrastructure Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence that may arise from you relying on any information in this publication. You should seek appropriately qualified advice before making any decisions regarding your particular project.

Published by Infrastructure Victoria
October 2023

© Copyright Infrastructure 2023

Except for any logos, emblems, trademarks, figures and photography, this document is made available under the terms of the Creative Commons Attribution 3.0 Australia licence. It is a condition of this Creative Commons Attribution 3.0 licence that you must give credit to the original author, who is Infrastructure Victoria.

This document is also available in PDF and accessible HTML or Word format at www.infrastructurevictoria.com.au

ISBN 978-1-925632-94-1
(PDF/online/MS word)

