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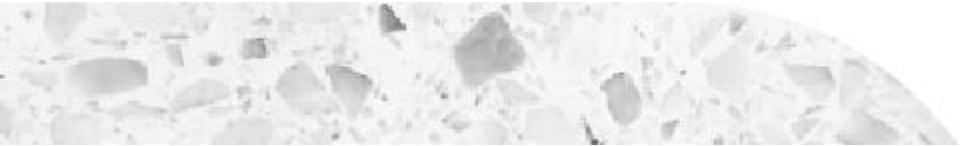
Growing together

The case for better integration of land use and infrastructure planning in established areas



INFRASTRUCTURE VICTORIA

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1. Executive summary

Until the recent COVID-19 pandemic, Victoria was growing faster than at any other time in the state's history and Melbourne was forecast to become Australia's most populous city. However, the *2020-21 Australian Budget* forecasts Australia's population growth will slow to its lowest rate in over one hundred years, falling from 1.2 per cent in 2019-20 to 0.2% in 2020-21 and 0.4% in 2021-22.[1] While it is too early to tell the long-term impacts of COVID-19 in Victoria, the changes to where people choose to live and work may persist, and the 2020-21 update to *Victoria's 30-year Infrastructure Strategy* accounts for a range of future population growth and land use scenarios. Post-COVID-19 behavioural and population changes are likely to have an enduring impact on the need for public infrastructure, including transport and housing. As such, even if Victoria doesn't return to its pre-pandemic growth trajectory, there are still benefits to be had from ensuring that population growth occurs in areas where it can be most readily accommodated to optimise both the liveability of these areas and contribution to Victoria's productivity.

Victoria's population growth has placed considerable demands on infrastructure, from increased traffic congestion and fuller trains and trams, to crowded sports fields and greater need for temporary classroom space. The disruptive impact of COVID-19 presents an opportunity to take a more strategic approach to managing Victoria's population growth and thrive in a competitive global market for human and investment capital. Realising this opportunity will require deliberate planning and careful management and an integrated approach to land use and infrastructure planning can help achieve this.

Previous work by Infrastructure Victoria has explored the benefits of integrated land use and infrastructure planning, which include:

- optimising the task of network infrastructure by providing it where it can meet both existing and potential future needs, leading to more efficient investment and better supporting people, employment and industries and their locational choices
- supporting higher productivity, greater social interaction and capital, environmental and health benefits from reduced car dependence, higher rates of subjective wellbeing with good access to social infrastructure, improved mental health through contact with nature (with planning for open space and enhancing connections) and better planning to reduce urban heat island effects
- reducing duplication of effort (and subsequent cost) across government
- supporting greater certainty for public and private investment by providing clearer state government policy direction about priority places for investment and when state infrastructure is likely to be provided.

This paper aims to support better integration of land use and infrastructure planning by consolidating and contextualising recent work by Infrastructure Victoria and others on this topic. The focus of this paper is on how infrastructure that is needed to serve growing populations can be more effectively planned and delivered in the context of renewal and population growth in established urban areas.

We know from our research that, in most cases, accommodating additional population growth in established urban areas leads to more efficient use of existing infrastructure. This is due to the ability to use or incrementally expand existing assets which often have the capacity to support growth, as demonstrated in our work *Infrastructure provision in different development settings*. However, this research also shows that where additional land is required for things like new schools, open space and community facilities, the constrained nature of established areas can make land acquisition costly. As such, to fully realise the benefits of growing established urban areas while maintaining the liveability and amenity of these areas, new approaches to planning and delivering infrastructure for growing populations will be needed.

Increasing population density in established areas can be controversial. However, our deliberative community engagement on *Density done well,* found that a diverse sample of Victorians who have actual experience of such changes supported increasing housing density in established areas. These community members were supportive of increasing population density in established suburbs so long as infrastructure and land use settings maintain the amenity and liveability of the area. They identified good access to public transport, quality urban design, plenty of green open

[1] Commonwealth of Australia (2020) *Budget 2020-21 Budget Strategy and Outlook Budget Paper No. 1*

space, and walking and cycling options to be particularly important. We also expect that demand for a diverse mix of housing, such as apartments and semi-detached townhouses, will continue – reflecting the appetite for some additional density that was expressed by the community members Infrastructure Victoria engaged with.

This poses a challenge for the Victorian Government as to how the infrastructure most needed by a growing community to create liveable places can be delivered when faced with the limited availability and increased cost of land in established urban areas. This challenge is exacerbated by responsibility for planning and delivering infrastructure being split between the Victorian Government, local governments and the private sector. This report identifies specific opportunities to make better use of existing infrastructure when developing in established areas, while still maintaining liveability and addressing existing residents' concerns about activity to increase density. These opportunities include:

- upgrading existing infrastructure to encourage sharing and more intensive use
- co-locating services or providing new social and open space infrastructure in community hubs
- making better use of existing social infrastructure and open space
- increasing provision of social housing
- new approaches to school planning and delivery.

A mix of public and private sector organisations have key roles to play in developing established areas. This includes setting the strategic planning framework that guides development, delivering infrastructure, and undertaking local service planning and delivery. Working together with shared and transparent assumptions is key to getting the most out of the work that is being done by different stakeholders. Doing so reduces duplication, provides greater certainty for investors and ensures services are fit for purpose as the population grows and changes. Better integration of land use and infrastructure planning is central to this, as it enables infrastructure and service delivery to reflect changes in land use settings. This is particularly the case given local governments are often responsible for planning, delivering and maintaining key pieces of population-serving infrastructure in their local areas, while the Victorian Government sets the overarching policy that influences where people choose to live and work.

This report also identifies some of the real challenges involved in planning for and delivering infrastructure in established urban areas. Traditional approaches used in greenfield development plans, such as calculating infrastructure requirements and provision rates based on per-capita benchmarks, can be too simplistic for the complexities of established areas with unique development histories, legacy infrastructure, and changing and diverse community needs. Local governments are often best placed to understand the demand for services in their areas and the capacity of existing infrastructure. Collaboration between local governments and the Victorian Government in land use and infrastructure planning for established urban areas can ensure that the right infrastructure is delivered in a timely fashion.

Government has made progress in this area, but there are still opportunities for improvement. Our *Draft 30-year infrastructure strategy* includes draft recommendations for consultation that are intended address these challenges. For more detail on these, refer to www.infrastructurevictoria.com.au.

2. Key findings

Throughout this report, we identify both opportunities and challenges associated with better integrated infrastructure and land use planning. In light of these, we think there are some actions that the Victorian Government should consider to maximise the likelihood of capturing these opportunities.

Actions the Victorian Government should consider

Encouraging housing in established areas can enable better use of existing infrastructure while also delivering productivity and liveability benefits to Victoria and Victorians. It can support broader benefits such as higher productivity, greater social interaction and capital, and a more sustainable urban footprint. The use of Land Use Framework Plans will assist to identify new priority locations in established suburbs for residential intensification to better use existing infrastructure, and our draft strategy makes draft recommendations about their use (see draft recommendation 35).

Decisions about land use planning, infrastructure investment and service delivery are often made across multiple portfolio agencies with limited coordination. If agencies do not know what others are planning, they cannot work together to align their decisions. Only when agencies make their ideas transparent to others can the process of integrating decisions begin. Sharing these plans would facilitate the integration of land use and infrastructure planning. Integrated land use and infrastructure and integrated planning can optimise network infrastructure by providing infrastructure where there is demand; reduce duplication of effort; support greater certainty for investment; and assist with inter-departmental planning for delivery of co-located services.

Our draft strategy makes draft recommendations that long-term infrastructure plans are developed and published for priority infrastructure sectors, including sequencing and timelines for investment (draft recommendation 32). Similarly, publishing Victoria's integrated transport plan, and requiring the transport and land use plans to align with each other, would help to coordinate planning and investment (see draft recommendation 33). Further, empowering an appropriate government body to monitor infrastructure delivery in new growth areas and priority urban renewal precincts, and proactively advise on delivery sequencing and funding, would help ensure not only the planning but delivery of coordinated infrastructure (see draft recommendation 68).

Reliable and consistent funding sources for infrastructure is necessary if the infrastructure we plan for is to be delivered. While there is a public commitment to extend the Infrastructure Contribution Plan (ICP) program to strategic development areas within existing urban areas that are planned or become available for significant growth and change there have been significant delays in implementation. There is also no Growth Area Infrastructure Charge (GAIC) equivalent to contribute towards the cost of state infrastructure for established areas of Melbourne. This is why our draft recommendation is to undertake a review of Victoria's many infrastructure contribution schemes, to create a consistent and efficient system that contributes to local and Victorian Government infrastructure costs, in particular one that can apply in established suburbs (see draft recommendation 34).

3. Growth in established areas can provide a range of benefits

3.1 Introduction

Encouraging housing growth in established suburbs can bring substantial benefits beyond cost efficiencies when matched with the right land use settings and infrastructure. It can improve liveability and amenity, reduce public infrastructure costs and alleviate pressure on valuable agricultural and environmental land for development. Building more homes near public transport and employment centres can improve physical activity levels by encouraging walking and cycling. It can also increase housing options for different people and families. Neighbourhoods catering to people of all ages and abilities can help create a sense of safety and belonging.

Building more homes in well-located areas can also generate broader productivity effects, connecting people and businesses more readily. Closer connections mean businesses can more easily find customers, access more workers and share more knowledge and resources. Concentrated, specialised and diverse businesses compete more fiercely, adapt more quickly to economic shocks, and generate fertile ground for innovation in ideas and technologies. These drivers create more jobs and businesses, improve productivity, and give people more opportunities to find jobs suiting their talents.

Most Australians live in cities. Australia is one of the most urbanised countries in the world, with over 85% of the population living in urban areas near the coast.[2] Victoria's patterns of population growth reflects this trend. Most of the population growth in Victoria over the past 30 years has been in Melbourne, with Greater Melbourne accounting for approximately 77% of Victoria's total population in 2019.[3] Collectively, the urban areas of Melbourne, Geelong, Ballarat and Bendigo make up 87% of Victoria's population.[4]

In the lead up to the COVID-19 pandemic, designated growth areas on the outskirts of Melbourne were experiencing rapid population growth, encouraged by relatively affordable land and housing in new suburbs built under Precinct Structure Plans (PSPs).[5] Victoria in Future (VIF) population projections show that Melbourne's new growth areas, including parts of Cardinia, Casey, Hume, Melton, Mitchell, Whittlesea and Wyndham local government areas, are expected to grow at a faster rate than anywhere else in Melbourne. Rates of growth across these areas are projected to range between 3.6% and 9.0% each year, with up to 975,000 extra people being added to these areas between 2018 and 2036.[6] While it is too early to fully understand the long-term effect of COVID-19 on Victoria's demography, this general trend in new growth areas is likely to continue.

In our 30-year infrastructure strategy for Victoria, released in 2016, we recommended increasing densities in established areas and around employment centres to make better use of existing infrastructure. This recommendation aligns with the Victorian Government's stated objective in *Plan Melbourne 2017-2050* that "Melbourne provides housing choice in locations close to jobs and services". Reflecting this objective, *Plan Melbourne* has an aspirational target for new

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[2] 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

[3] Australian Bureau of Statistics *Cat no. 3218.0 Regional population Growth, Australia*

[4] Ibid

[5] *SGS Economics, Economic, Social and Environmental Profile: Inter-Regional Report [report for Infrastructure Victoria], Melbourne, VIC, 2019, p.4, www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/SGS-Economic-social-andenvironmental-profile-Metropolitan-Inter-Regional-Report-April-2019.pdf*

[6] Modelling based on pre-COVID population trends, impact of COVID-19 on population growth not reflected in this modelling.

dwellings in established areas versus greenfield areas of 70/30. This is an increase on the existing ratio projected by VIF of around 65/35, showing the Victorian Government's increased policy emphasis on development in established areas.

The directions and policies of *Plan Melbourne* are significant as, over the last fifteen years, much of Melbourne's residential development has not concentrated in places with best access to jobs, services and public transport. The Department of Environment, Land, Water and Planning's (DELWPs) Housing Development Data (2005-2016) and Urban Development Program (2018) show that when the City of Melbourne and growth area councils are excluded, 75% of residential development in Melbourne has occurred outside of Plan Melbourne's designated activity centres (metropolitan, major and local).[7] Progress towards residential intensification close to existing infrastructure has been slow. As such, it is important that the Victorian Government adequately plans and regulates to further encourage residential intensification.

Infrastructure in established areas

Established areas often have relatively high levels of infrastructure provision. However, local governments across Victoria have told us that much of this legacy infrastructure is often no longer fit for purpose, not being used as efficiently as possible, not accessible, or not meeting changing community needs. Facilities can often be single-purpose rooms which are not designed flexibly to meet the needs of diverse users, or for use seven days a week. Where this is the case, there is a significant opportunity to encourage better use of these facilities to reduce the need for additional infrastructure.

Upgrading existing infrastructure to make it fit for purpose, encouraging greater use of shared facilities and open space, developing integrated facilities, building in flexibility to adapt to technology and other changes offers an opportunity to further mitigate some of the costs associated with delivering infrastructure in constrained urban environments. This means that all levels of governments need to work better together to plan, design and deliver infrastructure to maximise the outcomes from the investment.

Infrastructure and established areas defined

Throughout this report, we refer both to 'infrastructure' and 'established urban areas' frequently. While these are largely self-explanatory terms, we think it is important to clarify what we mean when we use these terms in the context of this report.

Infrastructure – in this report refers to population-serving infrastructure provided by the Victorian Government and local governments, as well as the private sector. This includes schools, libraries, community facilities, open space, sports grounds, swimming pools, social housing and utilities. When referring to transport infrastructure, such as roads and rail, this will be explicitly stated.

Established areas – refers to existing urban areas of Melbourne that are not undeveloped greenfield sites. It includes neighbourhoods, activity centres and transport corridors in Melbourne, as well as urban renewal areas. Although much of the focus is on Melbourne itself, the principles of this work could be applied to regional Victorian cities, such as Geelong, Ballarat and Bendigo etc., where infill development is occurring.

3.2 Infill development can boost liveability, amenity and productivity

To maximise the value from Victoria's infrastructure, the right policy settings must be complemented by informed decisions about where to accommodate growth and the type of infrastructure put in place to support this growth. The challenge is to find the right alignment between population and infrastructure. This means focusing on where existing infrastructure can be leveraged. Areas with higher population density are typically able to sustain greater levels of service provision, including infrastructure, as the costs of infrastructure and service provision can be spread over a larger user base.[8]

In 2019, Infrastructure Victoria released a report, *Infrastructure provision in different development settings*, that compared the feasibility and comparative cost of placing additional homes in greenfield development areas and existing established areas.[9] In established areas, the report considered three different levels of housing density for infill development. We found that the majority of existing infrastructure supporting residential development can be developed incrementally in order to not constrain anticipated housing growth in the near future and potentially for the next 15 years. The majority of infrastructure supporting residential development can be designed and delivered within a three to five-

[7] Infrastructure Victoria analysis of Department of Environment, Land, Water and Planning, *Housing Development Data, 2005-2016; Urban Development Program*, 2018

[8] Nakamura, K. & Tahira, M (2008) *Distribution of Population Density and the Cost of Local Public Services: The Case of Japanese Municipalities,* Faculty of Economics, University of Toyama

[9] Infrastructure Victoria (2019) *Infrastructure Provision in Different Development Settings – Volume 1 Technical Paper*

year period, enabling it to keep pace with housing development, subject to funding being allocated in a timely manner. Transport and stormwater infrastructure in established areas are the two exceptions. Transport infrastructure has longer timelines for development and stormwater infrastructure constructed in areas established prior to the 1970's has been provided to a lower standard, limiting areas where development can take place and requiring stormwater to be retained within new developments.

However, our *Infrastructure provision in different development settings* research did not consider precinct scale development in established areas due to lack of available public data. Precincts often lead to a significant step change increase in population and land use. As such, while existing infrastructure can still be leveraged to accommodate the growth in demand for it, the scale of demand tends to exceed existing capacity to a greater extent than infill developments. This means a step change in infrastructure provision is more likely to be needed in precinct scale developments, rather than incremental expansion. This is especially the case when industrial areas are transitioning to residential areas, as there will be limited provision of social infrastructure and other existing infrastructure needs to be repurposed, rather than leveraged in its current form. For example, the Fishermans Bend streetscape will need to transition from supporting trucks to supporting multiple modes of active transport. Precinct scale redevelopment does however provide the opportunity to enhance the amenity of an area. This can be through replacing aged infrastructure with new infrastructure that offers greater social and environmental benefits, such as adopting integrated water management approaches, supporting active transport and adopting integrated flexible social infrastructure hubs.

In looking at cost, our research produced new evidence specific to Melbourne based on current day infrastructure provision. We found that infrastructure capital costs vary significantly both within and across different development settings in Melbourne based on many factors. However, we were able to identify that the cost of infrastructure in established areas to support infill housing was typically two to four times lower than greenfield housing development, due to the ability to leverage existing infrastructure. A significant cost in established areas is land acquisition for new schools, open space and community facilities when existing facilities can no longer accommodate demand from population growth. Recycling existing facilities to make them fit for purpose, and the integration of schools and other public spaces and community facilities, offers an opportunity to address this cost issue through better use and changing behaviours. These opportunities are discussed further in section 5.

3.3 Melbourne is a low-density city

In considering Melbourne's density, context is important. In our earlier paper *Growing Victoria's potential,* released in mid-2019, we examined Melbourne's population density in comparison to other global cities and found that Melbourne has a significantly larger footprint than cities with much greater populations, such as Madrid, Toronto and Mexico.[10] As such, Melbourne is a low-density city by global standards, with a relatively dense urban centre and radial lines of relative population density extending along transport corridors, interspersed with lower density areas which are largely car-dependent and lacking in mass transit.[11] Inner Melbourne areas have high densities despite heritage overlays and traditional housing stock with one to two storeys. However, this is often achieved because of adjacent spines of high-rise apartments including social housing towers, as well as small lot sizes.

These high-density areas also tend to be immediately adjacent – or close – to regional-scale parks such as the Royal Botanic Gardens, Albert Park and Royal Park, as well as other areas of significant open space such as Fitzroy Gardens, Carlton Gardens and Flagstaff Gardens. This scale of open space is a driver of the liveability of these areas and cannot easily be replicated when developing in all established areas. As we discuss in greater detail later in this report, providing additional open space in constrained urban environments is especially challenging and potentially costly.

Even when Melbourne's population is projected to reach 7.9 million in 2050, most Melburnians would still be living at densities lower than most Londoners.[12] As such, there is considerable potential for Melbourne to increase population densities, with all the liveability and amenity benefits that can bring, while remaining a relatively low density city by global standards.

3.4 The community supports density, if done well

Increasing housing density in established areas can, at times, be controversial for existing residents and communities. However, our research has shown that communities within Melbourne can be supportive of density, if it is done well. Providing the necessary infrastructure when needed is a key part of doing this well. In established areas, where land can be at a premium, better use of existing infrastructure is an opportunity to renew old infrastructure to meet the needs of

[10] *Demographia (2018)* World Urban Areas 14th Annual Edition
[11] Spencer, A, Gill, J & Schmahmann, L (2015) *Urban or suburban? Examining the density of Australian cities in a global context*, State of Australian Cities Conference
[12] *Growing Victoria's Potential*

growing populations at relatively low cost, and our research has shown opportunities to plan and deliver services in different ways.

Infrastructure Victoria undertook community engagement in the form of deliberative focus group workshops in late 2019 where we asked residents from three established inner-Melbourne suburbs: 'what makes an area a great place?' Residents from the suburbs of Heidelberg, Camberwell and Footscray were invited to share their views to help inform our understanding of density done well.[13] We chose these locations as they currently have relatively good infrastructure provision, are reasonably close to central Melbourne, have a mix of residential densities and are where future density increases may be considered.

In a deliberative process, the group is given agency to ask questions and seek information.[14] This introduced transparency and accountability, as the group could demand that information be made available for interrogation and consideration.[15]

The groups were brought together in several meetings to consider and interrogate the issues and, importantly, to work as a group. This process allowed participants to share outcomes from all focus group sessions on what makes a great place, discuss the differences and similarities in their approach, test and refine principles, and build a collective view on increasing density and what is required to make it work.

Two types of participant groups were selected for each of the three locations: one randomly selected group, and one 'self-selected' group where participants were aware of the focus group's engagement topic and responded to advertising. Participants, who were selected, represented a range of ages, gender and housing status (owners and renters) but were not a representative sample.

The deliberative focus group workshops revealed that residents are willing to embrace more residential density if the area has good access to public transport, quality urban design, plenty of green open space, and walking and cycling options. A range of housing options, accessibility, inclusion and safety for all were also named as necessary to supporting healthy, thriving communities in higher-density, urban areas.

Participants in the three suburbs developed and agreed on nine themes with underpinning principles to guide the concept of 'density done well'. They also identified these in terms of relative importance, as outlined below.

1. **Quality urban design:** the thoughtful design of new and existing buildings and public space that provides benefits for the whole community.
2. **Public transport:** Good public transport connections mean the service is frequent, reliable, affordable and safe. Participants discussed the balance of increased density around public transport corridors in relation to congestion and servicing demand during peak times.
3. **Housing affordability and choice:** the need for housing options to cater for different people and lifestyles both in relation to size and affordability.
4. **Good public environment:** The provision of green, open space in the precinct is the most important consideration for participants when thinking about a good public environment.
5. **Pedestrian friendly:** pedestrian-friendly spaces for all abilities are important when considering density done well. Walking and cycling tracks that are functional and well-lit, and green-lined paths to encourage safe movement during the day and night were highly valued by focus group members.
6. **Accessible places:** Access to good jobs, schools, transport, health care and essential services. This includes being able to walk easily and safely to services and facilities without having to rely on cars.
7. **Community safety:** Well-lit public places that utilised renewable energy i.e. solar lighting, would encourage more people to walk more often through their neighbourhoods, which would in turn create a sense of passive surveillance and safety in numbers approach to better planning.
8. **Inclusion:** Inclusive communities that feel safe and are welcoming to different people with different needs. Social isolation was seen as a risk of increased density which did not specifically plan to create places and spaces that encouraged and supported people to connect with each other in a diversity of ways.
9. **Mix of uses/diversity of things to do:** A variety of activities and things to do including attractive and welcoming, multi-purpose communal spaces in which people can gather, relax and participate in community activities were identified as important throughout all three locations. Participants responded with alternative

[13] RPS for Infrastructure Victoria (2020) *Infrastructure Victoria 30-Year Strategy Engagement Report (Stage One And Two)*

[14] Ibid p. 3

[15] Ibid p. 7

uses for community facilities including community hubs, childcare, sport exercise facilities, rock climbing, innovation hubs and swap meets.

The results from this engagement suggest that infrastructure planning and delivery is key when developing in urban renewal areas. The community specifically identified the importance of delivering open space and a good public environment, transport infrastructure that keeps up with increased density along transport corridors, and pedestrian-friendly public realm infrastructure to make places safe, accessible and inclusive.

Addressing these priority principles when planning for development can potentially encourage community support for increasing density and mitigate against poorer outcomes when developing in established areas.

Integrated land use and infrastructure planning modelling

In preparing the *Draft 30-year infrastructure strategy* and to inform its problem definitions and recommendations, we undertook transport and land use modelling. The modelling was conducted using the Victorian Land Use and Transport Integration (VLUTI) model, developed by Victoria University and ARUP, consulting in partnership with Infrastructure Victoria. This modelling helped better understand how changes to policy settings could deliver increased density, and what effect this would have on the way Melbourne's transport network operates.

Encouraged by the findings from our earlier community engagement on '*Density done well*', and reassured that there was community appetite for increased density in the right circumstances, one of the scenarios we tested was a scenario in which more housing development is allowed around transport corridors and activity centres within metropolitan Melbourne. This scenario showed that with the right land use settings in place, there is likely to be greater demand and population growth in places that have better overall access to jobs and services and amenity (transport corridors and activity centres). Specifically, our modelling showed that inner and middle areas of Melbourne would see strong population growth between 1% and 7%.[16] The Melbourne, Stonnington, Port Phillip, Yarra, Moreland, Darebin, Boroondara and Glen Eira local government areas could be more desirable places to live under this scenario. This suggests that people are drawn to the employment opportunities and amenity from infrastructure that inner and middle areas have to offer. The modelling also showed that overall economic productivity and people's welfare will improve through changing land use settings, as more people will be able to live in or near jobs and activities and thriving places.

If people have the opportunity to live in areas with better access and amenity, this could reduce also pressure on the transport network system and population serving infrastructure.[17] When we modified land use planning settings, our modelling suggested that about 40,000 more people could live in higher amenity and accessible locations in the mid-2030s. The modelling showed that, on a typical weekday, people took around 45,000 fewer private vehicle and public transport trips than in comparable scenarios, as residents in these areas are more likely to walk or cycle. Even though total public transport trips fell, people in these particular areas took about 15,000 more trips as more people living in areas with good public transport services can increase its use. The modelling suggested that those trips were shorter and on trams which reduced overall public transport crowding; people had the opportunity to live closer to their destinations and could get there using less crowded public transport.

[16] The modelling scenario assumes that overall population numbers in Victoria remains the same

[17] Arup and AECOM (2020) *Strategy Update: Problem Definition Modelling Outcomes*, prepared for Infrastructure Victoria

Estimating land use changes and welfare impacts using VLUTI

The modelling underlying transport planning studies in Victoria has largely avoided the direct interaction of land use and transport assumptions. The tools have simply not been developed to facilitate performant simulations of this nature. Over the past two years, we have collaborated closely with Victoria University (VU), Arup and AECOM to combine the Victorian Integrated Transport Model (VITM) and a Spatial Computable General Equilibrium model of Victoria's economy (SCGE) model into a single, integrated process – referred to in this report as the 'VLUTI model' . The SCGE model is capable of combining generalised travel costs (GTCs) with demographic and zoning datasets to predict the resulting distribution of employment and workers throughout the state. This can then be used to infer broader demographic distributions. The GTCs themselves are generated using VITM.

Individually, the VITM and SCGE models are well-tested and respected. In constructing the VLUTI model, both models have been integrated with minimal adjustment to their internal mechanisms. Iteratively running both the VITM and SCGE in sequence would allow the true benefits of induced land use change to be realised, resulting in a more realistic assessment outcome.

The VLUTI model provides spatially distributed economic productivity and welfare effects linked to changes in accessibility across different parts of Melbourne and regional Victoria. The model which is based on profit and utility maximising decisions by firms and by consumers, estimates the direct and indirect impacts of transport accessibility changes on the wider economy. The overall economic productivity and welfare effect in the model is measured by relative variations in household expected utility, population, and contributions of each primary factors of production including labour, capital and both residential and commercial lands.

Population weighted averages of expected utility for both working and non-working households in the model are decomposed into contributions from commuting cost savings, housing and non-housing prices, real income effects and changes in residential amenity. This modelling shows housing development around transport corridors and activity centres has a positive effect on household-weighted expected utility.

Firms' productivity in the model is an increasing function of the effective density of workers in their location. Our comparative static modelling results suggest that housing development around transport corridors and activity centres has a direct positive impact on labour productivity due to reducing travel time and costs for people. A proportion of the increase in overall economic productivity and welfare is directly attributable to population growth in those places with better accessibility. Our modelling results also suggest that for other factors of production, net contribution to overall economic productivity from business travel savings, non-structured capital and both residential and commercial lands is positive.

4. Integrated infrastructure and land use planning can be difficult

Planning and delivery of development in established urban areas is complex due to challenges in the coordination of land use and infrastructure planning both within the Victorian Government and between Australian, Victorian and local governments. Progress is being made in some areas but some challenges remain, particularly with regard to using shared assumptions around the outcomes to be achieved for places, agreeing an approach to how to plan and deliver new infrastructure, and taking a more consistent approach to the timing and funding of infrastructure provision in established urban areas. Infrastructure Victoria's draft strategy includes draft recommendations for consultation about adopting shared sector plans (draft recommendation 32) and implanting an infrastructure monitoring body to oversee the delivery of infrastructure plans (draft recommendation 68).

4.1 Current approaches to planning and delivery

A key objective of Victoria's planning policy is the timely provision of services and infrastructure to communities through orderly development. The Victorian Government has multiple departments and agencies responsible for planning or place-based coordination that requires some level of integration between land use and infrastructure planning. However, the arrangements that support coordinated planning and implementation are not clear in established areas. It is not always clear what hierarchy of responsibility exists between each department and agency or which Minister therefore is ultimately the lead Minister.

In 2017 VAGO noted that there is no mechanism to require key Victorian Government agencies to fully participate in the integrated land use planning process or to fulfil any commitments they make through these plans.[18] The Victorian Government has pursued a partnership model with local council and communities and across Victorian Government portfolios, rather than developing formal governance models to ensure integration between land use, economic development and infrastructure planning. *Plan Melbourne* requires growth areas to be sequenced contiguously with previously approved precincts and staged to better link infrastructure delivery to land release. This can help minimise infrastructure costs. But there is not a clearly identified agency tasked with providing ongoing leadership, responsibility and accountability to ensure timely, coordinated and sequenced delivery of infrastructure and services.

4.1.1 There is no consistent approach to planning for established areas

The Victorian Government comprises multiple portfolios served by different departments and agencies. Each department is responsible for planning and delivering services within its own portfolio area. As a result, decisions about land use planning, infrastructure investment and service delivery tend to be made across multiple portfolio agencies, often with limited coordination. The Department of Jobs Precincts and Regions (DJPR) brings a single-agency approach to planning for some priority precincts, but silos remain as there is no single agency lead for areas outside of priority precincts.

However, encouraging population growth in urban areas goes beyond those priority precincts, and takes in key transport corridors and activity centres across inner, middle and outer Melbourne. The Government has various planning approaches to individual places, but no overarching approach for established areas. This tailored approach can have some benefits, as it considers the local context, roles and needs of places. However, at a higher level, a consistent approach or set of principles that can inform land use and infrastructure planning in established urban areas, like

[18] Victorian Auditor-General Office, *Effectively Planning for Population Growth*, Melbourne, VIC, Victorian Auditor-General's Office, 2017, www.audit.vic.gov.au/sites/default/files/2017-08/20170823-E_ffectively-Planning-for-Population-Growth.pdf

Precinct Structure Plans (PSPs) for new suburbs, would support better integration of land use and infrastructure planning.

PSPs consider infrastructure needs for new developments, including roads, schools, shops, parks, utilities and public transport, and aim to encourage more integrated decisions about land use patterns, transport, the environment and other investments. The PSP process encourages forward planning, but still has challenges. While the Victorian Planning Authority (VPA) can encourage cooperation, no one entity is responsible for providing leadership, nor accountable for the delivery of timely infrastructure and services.[19] Individual government agencies can choose the extent to which they include their own infrastructure and service planning in PSPs. This means the Victorian Government can find it difficult to ensure the timely, coordinated and sequenced delivery of infrastructure and services.[20]

4.1.2 There is a lack of coordination between Victorian Government and local governments

Currently, there is no consistent approach to the Victorian Government partnering with local governments where the State wants to lead significant changes and urban renewal. Local governments are uniquely equipped to understand an area, including its particular challenges or opportunities. Without a partnership from the outset, opportunities may be missed. DELWP is developing Regional Land Use Framework Plans (LUFPs), which aim to inform service and infrastructure planning, provide detail on how the growth in established areas will be distributed across each metropolitan government region, based on VIF projections, and to guide local government housing strategies.

In New South Wales, the Place-based Infrastructure Compact provides an example of this focus on bringing together government agencies and local councils, “to consider holistically what infrastructure and services are needed” where growth is going to occur in an area.[21] Victoria does not currently have an equivalent program which focuses on partnership in infrastructure planning. As such, there is an opportunity for Victoria to consider a similar approach.

Learning from New South Wales’ Place-based Infrastructure Compacts

New South Wales is piloting a new collaborative approach to place-based infrastructure planning and provision. Overseen by the Greater Sydney Commission, Place-based Infrastructure Compacts (PICs) bring together the many types of infrastructure needed to achieve better place-based outcomes. The pilot focuses on the Greater Parramatta and Olympic Precinct, one of the fastest growing areas in Greater Sydney.

The PIC set out different scenarios for the precinct’s future, from a ‘business-as-usual’ scenario with minimal change, to a ‘visionary’ scenario where the precinct experiences a step change and becomes a ’30-minute city’. Crucially, short, medium and long-term projections of population, homes and jobs were completed for each scenario. The Commission worked collaboratively with relevant agencies to identify all the necessary infrastructure needed to support each scenario. This included documenting the most cost-effective timing and sequencing of growth, and the responsible agencies, costs and potential funding sources for the supporting infrastructure. Infrastructure types included transport, justice, housing, education, cultural infrastructure and green infrastructure.

The PIC provides a blueprint to guide the future development of the precinct, and transparently sets out the costs associated with achieving different outcomes. It uses collaboration and rigorous evaluation to identify places where growth can be accommodated cost-effectively and provides greater certainty and better coordination. Building off the findings of the pilot, a draft Strategic Business Case was prepared, proposing 10-year service and infrastructure priorities to respond to current, emerging and future needs within budgetary limits.

Victoria can learn from the ideas in the Place-based Infrastructure Compacts and adapt them for use here. Service planning needs to be advanced to inform infrastructure requirements, and how growth occurs needs to be continuously monitored to inform service and infrastructure planning. Critically, they require a credible body who can facilitate collaboration across the many different stakeholders in a place.

[19] Victorian Auditor-General Office, *Effectively Planning for Population Growth*, Melbourne, VIC, Victorian Auditor-General’s Office, 2017, pp.ix, 15, 23, www.audit.vic.gov.au/sites/default/files/2017-08/20170823-Effectively-Planning-for-Population-Growth.pdf

[20] Ibid, p. 21

[21] Greater Sydney Commission (2019) *PIC – Place-based Infrastructure Compact*, p. 2, https://gsc-public-1.s3.amazonaws.com/s3fs-public/pic_-_model_summary_paper.pdf

Similarly, the new approach adopted by the Queensland State Government also demonstrates new ways for state governments to plan across portfolios.

Queensland Social Infrastructure strategy

The Queensland Government has a new approach to whole of government social infrastructure planning which could be applied in the Victorian context. The strategy assumes that human services planning has already occurred before the consideration of place-based infrastructure response are developed.

The strategy provides a framework for the planning, design, location and use of Queensland's social infrastructure. It aims to achieve more integrated, accessible, well-located, multi-functional and cost- effective social infrastructure. It requires departments and agencies to:

- make better use of existing infrastructure to deliver broader services and community benefits
- use every new infrastructure investment as an opportunity to deliver more integrated outcomes for inclusive communities.

Effective cross-government systems and governance are essential to support the strategy and ensure broader outcomes can be achieved. The key components of the strategy include:

Enhanced cross-agency collaboration – applied to areas where multiple agencies have identified infrastructure needs that may realise improved social infrastructure outcomes through strategies such as co-location, sharing facilities, or coordinating delivery.

Flexible land management – a whole of government approach to land acquisition and management.

Overarching governance – a place-specific social infrastructure champion in the Infrastructure Minister and a Social Infrastructure Ministerial Committee to prioritise place-specific social infrastructure investment.

Early engagement in strategic planning – adopting a place-specific approach to social infrastructure planning further improves.

4.1.3 Consistent planning inputs can be helpful, but can have limitations

Victoria in Future (VIF) is the official Victorian Government projection of population and households, produced by the Department of Environment, Land, Water and Planning and is informed by demographic and land use trends. VIF is a projection that is made at a point in time and takes into account current government policy measures that affect the size and distribution of future populations.[22] Future government commitments and planned interventions over time can change the underlying assumptions that the VIF projection was initially relying on.

The VIF projections are used by decision makers across a range of government agencies, as well as by developers and businesses to analyse potential markets. With so many different parts of government involved in planning for Victoria's future, a consistent set of population assumptions is helpful, to ensure alignment across portfolios. It also reduces duplication, provides greater certainty for investors and ensures the needs of growing and changing populations are met.

However, for some departments or agencies, it may also be necessary to consider other data in addition to VIF. For example, an urban renewal project in a precinct may increase the projected population numbers and a precinct will need to accommodate more people. This may result in changes in VIF, either through population increases because of increased movement to Victoria or merely a spatial redistribution of existing populations. Where population is redistributed, a large population increase in a precinct may not lead to the need to increase infrastructure across Victoria. Instead, it is necessary to consider the broader network of infrastructure that is and will be available to people within that precinct. For example, the Department of Education and Training (DET) gives consideration to a network approach in planning for schools, looking at capacities and demands of not only individual schools but surrounding schools.

4.1.4 Benchmarks are one part of a broader toolkit

Planning for future infrastructure in growing and changing areas is a complex task. Governments and planners need to understand projected future demand for services and infrastructure against the capacity of existing infrastructure to meet future service needs. They then must integrate the preferred location and land requirements for future infrastructure within a longer-term strategic land use plan.

[22] Department of Environment, Land, Water and Planning, *Land use and population research* [website], *Victoria in Future, FAQs, https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future (accessed 15 October 2020)*

One of the infrastructure planning tools used to tackle this complex task is the application of infrastructure benchmarks or provision ratios. For example, planners may forecast that for every additional 10,000 people in a precinct or planning area an additional sports field or community centre would be required.

Currently in Victoria there are some benchmarks (planning provision ratios) derived for greenfield PSPs.[23] These ratios support the planning of greenfield areas where there is only a small existing residential population and limited community infrastructure. Similar planning provision ratios have never been developed for established areas of Melbourne. The application of the greenfield planning provision ratios to an established area is not useful and may overestimate the land and infrastructure required in established areas, where excess capacity within existing infrastructure is not always captured. The complexities posed by established areas which cannot be appreciated by planning provision ratios include:

- Established areas have existing community infrastructure of varying supply levels and quality. Rather than providing additional infrastructure, legacy infrastructure may be upgraded to continue serving the growing community.
- Existing community infrastructure may not be in a location that is accessible to where the expected population growth will occur. It may be poorly located and only accessible by car, or interventions may be needed to improve accessibility.
- Service planning is needed to inform infrastructure requirements, and this needs to consider the changing demographics of an area. For example, the existing community may be ageing or experiencing poor health outcomes, or in the future the community may become more culturally diverse or have an influx of singles and students living in apartments, or young families.

It may be perceived to be a simple solution to apply off-the-shelf benchmarks, but in established areas they should be used only as a tool as part of a wider analysis. It is critical to undertake a more detailed and localised investigation of the likely service needs of current and future populations, and the role that existing infrastructure can play to meet these service needs.

Examples of benchmarks / provision ratios

- **Provision rates or ratio per person:** which prescribes a level of facility provision for a specified number of people (for example one indoor sports centre is needed per 10,000 people). This may be based on an industry standard, or by applying **existing provision rates** to future populations. For example, if a local government already provides one library per 40,000 people, they may choose to maintain this provision rate as population grows). It can also use **existing participation rates**, e.g. taking current sports participation trends and projecting them into the future.
- **Provision by area:** where a prescribed area of space is needed for a specific number of people or size of development (for example 400 m2 of spaces dedicated to arts and cultural services is needed for 15,000 people, or a certain percentage of developable area needs to be allocated to open space).
- **Provision by distance or catchment area:** where something must be provided within a certain geographic area (for example all households need to be located within 1.5km of an indoor sports facility, or within 400m of open space).

Identifying long-term service needs, and then aligning infrastructure planning and funding with those identified needs, can generate better value for taxpayers and better services. Priority investments should be informed by evidence-based service planning, including projections of infrastructure demand, and aim to address people's needs as early, quickly and inexpensively as possible.

Application of off-the-shelf benchmarks will not address these complexities. Victorian and local government planners need to work with service providers to understand service need, preferred future service models, asset condition and the accessibility of existing infrastructure, to plan for community infrastructure that is integrated with land use plans. Examples of where local governments have prepared community infrastructure plans that reflect their unique local context and service needs are the *Fishermans Bend Community Infrastructure Plan* and the *City of Brimbank Services and Infrastructure Plan*.

[23] Australian Social & Recreation Research (2008) *Planning for Community Infrastructure in Growth Areas,* p. 120, https://vpa-web.s3.amazonaws.com/wp-content/uploads/2016/07/Planning-for-Community-Infrastructure-in-Growth-Areas-%E2%80%93-April-2008.pdf

4.1.5 Planning for infrastructure through accessibility analysis

When planning for infrastructure for higher density neighbourhoods, rather than applying per capita infrastructure provision ratios, embedding principles for active and public transport accessibility can improve liveability of these neighbourhoods. The '20-minute neighbourhood' principle is incorporated into Victorian Government policy through *Plan Melbourne*. The principle establishes that most everyday needs should be accessible within a 20-minute walk, cycle or local public transport trip of home.[24]

Some types of infrastructure have regional catchments and cannot be viably provided within walking distance from every home. These include aquatic centres and regional sports facilities. These regional facilities could be better integrated with the Principal Public Transport Network. This would include locating these facilities within 800 m (10 min walk) of train stations, tram and/or bus stops.[25]

However, because Victoria does not have a transparent transport plan, transport planning intentions are not clear. Other agencies, local government and the private sector cannot use it to co-ordinate their investments. For example, local governments cannot deliver significant local transport infrastructure properly without knowing its connection to the wider transport network, such as in delivering local streets, and walking and cycling infrastructure. A transport plan also helps government agencies determine the best locations for facilities, such as schools, hospitals and community centres, and indicates possible locations for more intensive development.[26]

An example that demonstrates how accessibility mapping can identify gaps in infrastructure networks is the data included in the VPA's Metropolitan Open Space Network portal maps. The maps show the existing open space network throughout the Melbourne metropolitan area, and includes a 400m walkable access layer to demonstrate gaps in accessibility to open space; see Figure 1. When planning for established area growth, understanding accessibility gaps and the relationship to where growth is happening, or expected to happen, can be a useful tool to identify where additional infrastructure may be needed in future. Where space constraints limit the ability to provide additional infrastructure to improve accessibility, particularly for open space, improved connectivity can be beneficial. This is discussed further in section 1.1.1.

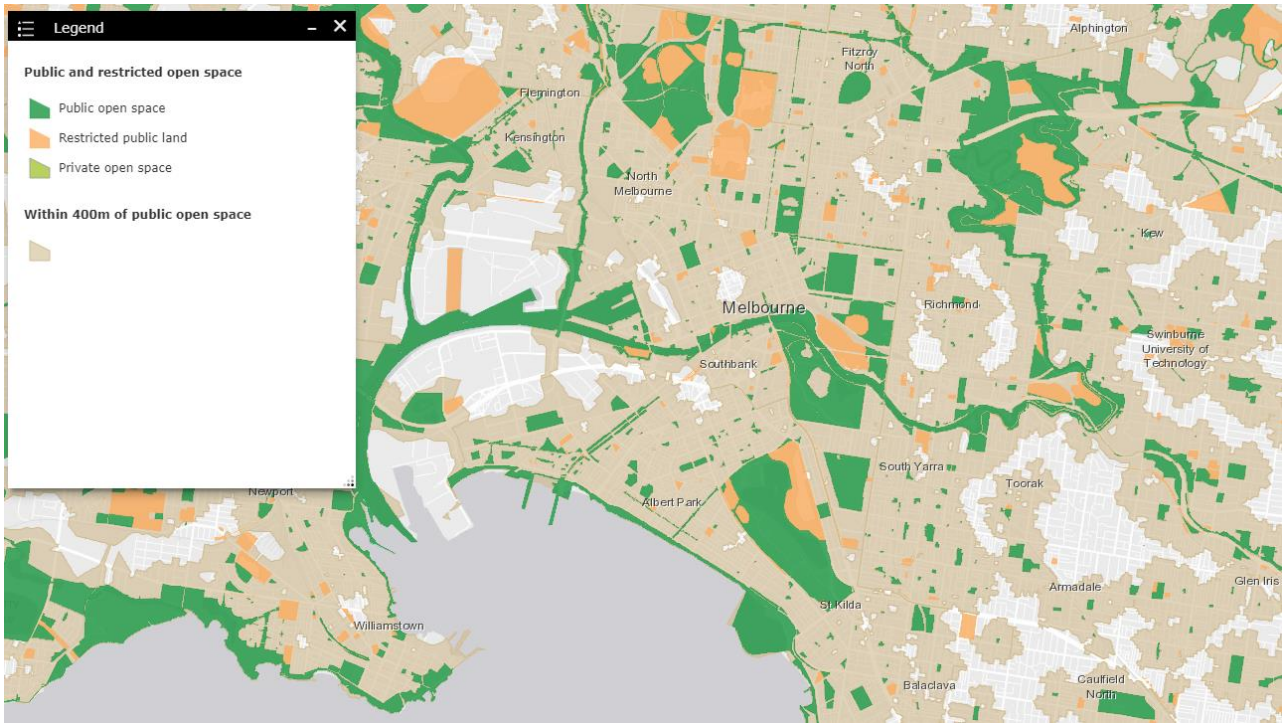
[24] Department of Environment, Land, Water and Planning, *Policies and Initiatives, 20-minute neighbourhoods* [website], https://www.planning.vic.gov.au/policy-and-strategy/planning-for-melbourne/plan-melbourne/20-minute-neighbourhoods *(accessed 15 October 2020)*

[25] This distance (800m) has been selected based on what is considered to be "walkable" (an able-bodied adult can walk 800m in ten minutes, and 1600m in 20 minutes). See Commonwealth of Australia (2013) *Walking, riding and access to public transport: supporting active travel in Australian communities ministerial statement*.

This is also based on research indicating that physical activity is increased where community facilities are located within 800m-1200m of a person's home. See King, T.L., et al. (2015) *Does the presence and mix of destinations influence walking and physical activity?* International Journal of Behavioral Nutrition and Physical Activity; Gunn, L. D. et al (2016) *Identifying destination distances that support walking trips in local neighborhoods*. Journal of Transport & Health

[26] See Infrastructure Victoria (2020) Victoria's Draft 30-Year Infrastructure Strategy, draft recommendation 33

Figure 1: 400m walkable access to open space, Melbourne



Source: VPA Metropolitan Open Space Network portal maps

4.1.6 Delivering infrastructure for worker populations

Many established area precincts will transform over time to become mixed-use precincts, where workers and residents coexist, such as Docklands. When planning for infrastructure in a renewal and/or mixed-use precinct, how the future worker population will use infrastructure must also be considered. Worker populations will place different demands on infrastructure compared to the residential population. It is important to plan for this demand, particularly where social infrastructure already exists, so that both groups' access to infrastructure is not compromised.

For example, if a public swimming pool currently exists in a precinct then incoming workers are likely to place additional demand on the pool during lunchtimes or before and after work. However, if the pool is not located in a growing jobs precinct there should not be an expectation for delivery of a public pool to support workers. If there is enough demand, it may be met by the private sector.

Some research has been done on the impact of worker demand on locally provided social infrastructure across different Australian jurisdictions.[27] This considers what social infrastructure workers rely on, and quantifies this demand based on population numbers or workers compared to residents.

This research demonstrates an understanding that worker populations are likely to have an impact on childcare, libraries, open space, sports and recreation infrastructure and primary health care. However, there are inconsistencies in the literature about the scale of this impact, and it can vary depending on the type of infrastructure and the type of employment workers are engaged in. For example, the demands of commercial areas and business parks will be different to industrial areas, partly because of different demographics of workers such as gender,[28] but the existing literature on provision rates does not describe how these rates may vary.

At a high level, the following observations can be made about the key infrastructure types affected by worker demands:

- **Gyms, primary healthcare and retail:** will be impacted, but will be provided by the private sector.
- **Non-government childcare:** The NSW *City of Parramatta Draft Community Infrastructure Strategy* notes an "accepted industry rate" of one Long Day Care (LDC) facility per 75 workers. Where workers require access to LDC

[27] For example, see: *City North Study Area Community Infrastructure Assessment, Final Report*, K2 Planning, 2 May 2011; *Central to Eveleigh Urban Transformation and Transport Program, Community Infrastructure and Social Issues Review*, GHD, Urban Growth NSW, September 2015; *City of Sydney Development Contributions Plan 2015*, City of Sydney, 1 July 2016, available at https://www.cityofsydney.nsw.gov.au/development-contributions/city-of-sydney-development-contributions-plan-2015

[28] *Community Facilities and Open Space Assessment, Marsden Park Industrial Precinct*, Elton Consulting, 27 July 2009, p. 26, https://www.planning.nsw.gov.au/-/media/Files/DPE/Reports/marsden-park-industrial-community-facilitie-and-open-space-assessment-2009-07-27.pdf

for their children, the non-government sector can respond. This does not need to be a requirement for local governments to provide.

- **Libraries:** a library can meet the needs of workers in a precinct with digital hubs, co-working spaces, meeting rooms and theatrettes. Usage by workers will depend on the location and context. In the City of Melbourne, most people who attend the City Library work in the city. Both City Library and Docklands Library are utilised by city and Dockland workers during lunch time. It is anticipated that 20 per cent of Fishermans Bend workers will use the library facilities.[29]
- **Open space, sports and recreation:** demand by workers on open space and recreation will largely depend on local context and current supply of facilities.

4.2 Infrastructure funding approaches are inconsistent

While it is more cost-effective to develop infill housing in existing areas and increase infrastructure capacity incrementally, it is not cost neutral. In addition, this is only the case when the existing infrastructure in established areas has the capacity to support additional dwellings without major upgrade, augmentation or land acquisition for expansion.

There is a range of established developer contribution schemes in Victoria for levying and collecting contributions towards the provision of Victorian and local government infrastructure in Melbourne's growth areas (through GAIC, DCP and ICP programs). Development contributions are payments or in-kind works, facilities or services that developers and landowners provide towards the supply of infrastructure. The Victorian Government and councils use several tools to collect development contributions. The Victorian Government oversees these tools.

There are currently three programs and one legal instrument for recovering costs:

- Growth Areas Infrastructure Contributions (GAIC), which allow the Victorian Government to obtain funds from developers to help deliver state infrastructure in Melbourne's fringe suburbs.
- Development Contributions Plans (DCP), which allow any council to obtain funds from developers to help deliver local infrastructure.
- Infrastructure Contributions Plans (ICP), which allow seven councils in defined growth areas to help deliver local infrastructure.
- Voluntary agreements that councils and developers enter on a project-by-project basis under section 173 of the *Planning and Environment Act*.

While there is a public commitment to extend the ICP program to strategic development areas within existing urban areas that are planned or become available for significant growth and change, there have been significant delays in implementation. ICPs were established in 2015 and VAGO has identified that it is unlikely ICPs will be in place for councils that want to access the program before 2021[30], a six-year delay. There is also no GAIC equivalent to contribute towards the cost of state infrastructure for established areas of Melbourne.

However, it should be noted that the VAGO report released in March 2020, *Managing Development Contributions*, concluded that Victoria's development contributions are not delivering the infrastructure needed by growing communities to support their quality of life. A recent AHURI report on apartment residents and neighbourhoods similarly noted that "Local Government Areas (LGAs) undergoing densification will need more funding to provide the necessary infrastructure to cater for all residents; developer contributions and voluntary agreements are too uncertain to ensure good results."[31] Victorian Government agencies have not managed development contributions tools strategically to maximise their value and impact. Instead, they manage the tools in isolation, with overlapping roles and no overarching strategy, goals or plan to drive and measure their collective success[32].

Recently, the Victorian Government has been progressing the implementation of ICPs in nominated precincts in established areas and greenfield growth areas. Given that more growth in dwellings and population is occurring across established areas beyond nominated precincts, an improved and less complex infrastructure contribution scheme needs to be applied across Melbourne's entire established areas. Without a practical developer contributions scheme, some areas will be financially contributing to improvements to local and Victorian Government infrastructure whereas others will not. It may also send distorted signals to the market; areas not contributing to infrastructure improvements may be

[29] Department of Environment, Land, Water and Planning (2017) *Fishermans Bend Community Infrastructure Plan,* p. 19, available at https://www.fishermansbend.vic.gov.au/__data/assets/pdf_file/0018/31671/Community-Infrastructure-Plan_-FB-Taskforce_Sep-2017.pdf

[30] Victorian Auditor-General's Office, *Managing Development Contributions*, Victorian Government, 2020, www.audit.vic.gov.au/sites/default/files/2020-03/20200318-Development-Contrib-report_0.pdf

[31] Easthope, H., Crommelin, L., Troy, L. , Davison, G., Nethercote, M., Foster, S., van den Nouwelant, R., Kleeman, A., Randolph, B., and Horne, R. (2020) *Improving outcomes for apartment residents and neighbourhoods*, AHURI Final Report No. 329, Australian Housing and Urban Research Institute Limited, Melbourne, p. 4, https://www.ahuri.edu.au/research/final-reports/329 , doi:10.18408/ahuri-7120701

[32] Victorian Auditor-General's Office, *Managing Development Contributions*, Victorian Government, 2020, www.audit.vic.gov.au/sites/default/files/2020-03/20200318-Development-Contrib-report_0.pdf

those not as well placed to accommodate growth compared to those that do have developer contributions. In addition, communities in established areas that are growing more quickly are missing out on funding contributions to upgrade their local and state infrastructure to keep up with this growth.

5. Opportunities in infrastructure planning and delivery

Integrated land use and infrastructure planning is the transparent, multidisciplinary planning undertaken across portfolios to achieve jointly developed and agreed outcomes for a place, neighbourhood, community or city. Integrated land use and infrastructure planning is an essential feature of effective urban and regional planning. It is particularly important in cities such as Melbourne that have been experiencing high levels of population growth and change (although such growth is likely to temporarily slow due to COVID-19), where compact city form, housing affordability, high amenity, provision of essential infrastructure and good connectivity can be beneficial. Integrated land use and infrastructure planning can better manage change in communities and unlock greater benefits. It can deliver a shared aspiration for a city or region and help coordinate investments and policy reforms to achieve that vision.[33] It can support broader benefits such as higher productivity, greater social interaction and capital, and a more sustainable urban footprint.

Integration of land use and infrastructure is beneficial but can be challenging. Government is set up on a portfolio basis, with a focus on sectors and is not necessarily set up structurally for integration. Weak coordination across agencies or unclear roles and responsibilities can have several implications including:

- inconsistent efforts resulting in increased time and cost
- decisions not being made in a timely manner resulting in project risk
- reputational risks resulting in decreased public trust
- poor access to education, employment and services
- reduced amenity and liveability from poor infrastructure provision.

5.1.1 Benefits of integrated land use and infrastructure planning

Previous work by Infrastructure Victoria has explored the benefits of integrated land use and infrastructure and integrated planning, which include:[34]

- optimising the task of network infrastructure by providing infrastructure where there is demand that can meet existing and potential future needs, leading to more efficient investment and supporting people, employment and industries and their locational choices;
- supporting broader benefits, such as higher productivity, greater social interaction and capital, environmental and health benefits from reduced car dependence, higher rates of subjective wellbeing with good access to social infrastructure, improved mental health through contact with nature (i.e. can plan for open space/enhance connections) and better planning to reduce urban heat island effects;
- reducing duplication of effort (and subsequent cost) across government; and
- supporting greater certainty for investment. By providing clearer Victorian Government policy direction about priority places for investment and when state infrastructure is likely to be provided, the private sector, local government and the community has greater certainty for complementary investments.

[33] Transport and Infrastructure Council, *Australian Transport Assessment and Planning Guidelines - F0.2 Integrated Transport and Land Use Planning*, Canberra, Commonwealth of Australia, 2016, p.6, www.atap.gov.au/sites/default/files/f02_integrated_transport_and_land_use_planning.pdf

[34] Infrastructure Victoria (2019) *Growing Victoria's Potential*, p. 40, www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Growing-Victorias-Potential-April-2019.pdf

Integrated land use and infrastructure planning is particularly important in established areas. When paired with a focus on better use of existing infrastructure, it can reduce the need for additional investment and support better service delivery, amenity and liveability while minimising the need for additional infrastructure. Although this paper identifies the lack of clear and consistent approach to guide infill development in Victoria, there are examples of close collaboration and integrated land use and infrastructure planning in Melbourne. These tend to be based around major transport projects, such as the Melbourne Metro Tunnel. Planning for the Arden precinct is one example of this.

Integrated land use and infrastructure planning in practice at Arden

Located just 2km from Melbourne's central business district, the Arden Precinct is a state significant urban renewal opportunity to deliver an exemplar mixed-use innovation precinct with up to 34,000 jobs and 15,000 residents by 2051. At its heart will be an innovation district catalysed by the Metro Tunnel from 2025, connecting the life sciences, digital and education sectors to grow Victoria's knowledge economy.

Significantly, 13 hectares within the central area of Arden are in government ownership. This provides government the opportunity to curate a complementary offering to other central city precincts including Parkville and Fishermans Bend. This will be vitally important as part of Victoria's COVID-19 economic recovery.

To assess the potential for Arden to leverage the Government's investment in the Metro Tunnel, the State's landholding and Arden's connectivity to existing knowledge infrastructure, several economic policy studies were undertaken. The focus for the innovation precinct on life sciences, education and digital technologies was established to drive knowledge economy productivity and outcomes. A Strategic Value Creation and Capture Plan has also been completed to inform future government investment decisions to support precinct development.

Building on the Arden Vision (2018), structure planning for Arden is being undertaken as a partnership between the Victorian Government and the City of Melbourne.

The Draft Structure Plan was released for consultation from June to August 2020. The Draft Plan embeds the key directions for the renewal area and infrastructure planning including open space, water, public and active transport, community infrastructure, schools, affordable housing, sustainability and waste management. The plan has been informed by detailed technical studies and supports the preparation of a Planning Scheme Amendment and development contribution plan, alongside the development strategy. This precinct structure planning process reflects a positive example of partnership between the State and local government levels and the necessary cross agency approach to planning and delivery for urban renewal. A wide range of Victorian Government departments and agencies have worked together for more than five years alongside the City of Melbourne.

There are a number of land use and integrated infrastructure planning lessons that can be drawn from this work for other precincts. These include:

- the value of developing a shared and specific vision for the precinct to enable government and stakeholders to work together and planning in partnership with key agencies
- the benefit of clearly established transport intentions (Metro Tunnel)
- the opportunity to leverage government land surrounding the station to achieve policy objectives
- the importance of having an evidence based economic policy underpinned by sector engagement to provide confidence to progress the precinct planning and development strategy
- the opportunity to integrate work with land use planning being led by the City of Melbourne in the adjoining Macaulay precinct and adjacent neighbourhoods of Parkville and North Melbourne
- considering the complementary opportunities to improve the amenity and health of Moonee Ponds Creek
- aligning statutory planning and development strategy decisions where possible to enable a robust spatial plan that reflects infrastructure needs and the value creation and capture framework
- creating an environment that enables private sector investment confidence through clear information and engagement and conducting early investment engagement and attraction to shape the precinct.
- coordinating development sequencing and understanding the lead-in times to mobilise development.
- working with existing landowners and businesses who either wish to remain or transition from the precinct as urban renewal changes land uses.
- considering how staged infrastructure delivery supports placemaking.

5.2 Better use of existing infrastructure, and new approaches to delivering infrastructure

Established areas are more likely to have relatively high levels of existing community infrastructure provision than greenfield or brownfield sites. This can come with challenges; existing infrastructure may need to be renewed, upgraded, and made available to meet wider community need. The quality of infrastructure in established areas is likely to be variable. Some infrastructure can be high quality while other infrastructure will be older and developed under outdated delivery models and may no longer be fit-for-purpose. Community infrastructure, and the services delivered from it, can be provided by governments, community organisations or the private sector.

Many established suburbs will often have older community infrastructure and single-purpose buildings such as old church halls, scout halls or senior citizens clubs, as well as low-quality open spaces. These facilities may not be used to their full potential. For example, halls and community centres that are used infrequently by one group, or sports pavilions used by one or two clubs on weekends that are vacant throughout the week. Similarly, utilities infrastructure such as water, sewerage, and communications networks in older established suburbs may not be suitable for current day needs, limiting its ability to be incrementally upgraded to meet additional demand. As established areas of Melbourne continue to develop, the demographic characteristics and needs of the communities are likely to change over time and this in turn is likely to create additional infrastructure costs through asset refurbishment and repurposing.

Where new infrastructure is needed in established urban areas, these areas face the challenge of constrained urban environments in which land is scarce. This means that using traditional approaches to infrastructure delivery, such as single-use facilities to meet demand for services derived from provision benchmarks, can prove problematic. Also, as land values increase due to increased demand for land, government will need to invest wisely in land and infrastructure and better use of these assets will become critical.

Making better use of existing infrastructure is a key pillar of Infrastructure Victoria's approach. Co-location, shared use and joint use of facilities are all opportunities for efficiently expanding and improving population-serving infrastructure within existing facilities. While this approach requires a more complex and integrated approach to service planning and infrastructure delivery, it can ensure that the needs of the population continue to be met without significant additional infrastructure investment even the population increases.

Table 1 illustrates the range of better use approaches that can be considered in future planning for infrastructure, which are considered in further detail throughout this section. The Victorian Government is already pursuing some of these opportunities, such as co-locating kindergartens on school sites, and expanding existing school capacity, but more work can be done in making better use of community and sports and recreation infrastructure.

Table 1: Better Use changes to provision models by infrastructure type

	Changes to provision model for better use
Early Years	• Existing facilities upgraded or put to greater use • New kindergartens delivered within privately provided or community based Long Day Care • Co-location of kindergartens on new and potentially upgraded school sites • Co-location or integration with other community facilities
Schools	• New integrated/ shared community facilities at existing and new schools, and / or opportunities for schools to share public open space / sports facilities • Expanding existing school capacity • Changes to school size and building higher-density schools • Planning for accessibility when planning new schools
Community Infrastructure	• Update, repurpose and retire outdated community infrastructure • Deliver multi-purpose shared community infrastructure • Use of flexible spaces
Sport & Recreation Infrastructure	• Indoor, high-capacity multipurpose courts • Infrastructure that enables both incidental and planned physical activity through the provision of walking and cycling networks • Open space as part of a green infrastructure network that includes community sporting and recreational facilities • Integration of sport facilities within mixed-use sites where development is well-located and the land size is sufficient

	• Adopt an integrated water management approach (see discussion in 5.5.1)
Open Space & Green Infrastructure	• Identifying opportunities to upgrade and improve existing open spaces and facilities • Improving access to open space, particularly adding linear open spaces which can produce a connected network of open spaces • Making use of public spaces that are not currently publicly accessible to the community • Adopt an integrated water management approach (refer utility section)
Utility & Streetscape Infrastructure	• Identifying and allocate land within or adjacent to the precinct for centralised utility infrastructure that create noise and odour • Adopting an integrated water and energy systems in precinct developments • Jointly planning all pavement, landscaping and utility upgrades to reduce disruption

5.2.1 Early Years Facilities

Upgrades to meet the need of growth and increased participation by three-year-olds

The Victorian Government is currently implementing funded three-year-old kindergarten for all children.[35] While the Victorian Government traditionally has a limited role in the provision of kindergarten infrastructure, its policy to extend kindergarten services so that children can have two years of pre-schooling will have implications for infrastructure requirements. Many existing kindergartens are likely to require modification and expansion to meet future enrolment demand from both three-year-old and four-year-old kindergarten requirements. To this end, the Victorian Government has committed to invest $1.68 billion in early childhood infrastructure over 10 years.[36]

In established older suburbs, there can be many older kindergartens with single-room facilities and limited flexibility to provide additional kindergarten sessions or integrated early years services. There is limited publicly available data to show the extent of aging infrastructure. However, in 2018 the Municipal Association of Victoria (MAV) conducted a survey that provided an overview of the current local government capital investment in kindergarten, maternal and child health and integrated early years facilities.[37] The survey found that the current value (in 2018) of council-owned early years infrastructure was approximately $1.9 billion. Councils' early childhood facilities are now an average age of 70 years. MAV estimated that approximately $500 million was needed by councils to cater for growth and modernisation of facilities.[38]

There are a range of Kindergarten and Long Day Care providers, and increasingly private providers of Long Day Care are delivering government funded kindergarten sessions. Approximately 25% of children are accessing kindergarten programs through Long Day Care centres.[39]

To prepare for the rollout of three-year-old kindergarten, the Department of Education and Training (DET) will be preparing Kindergarten Infrastructure Service Plans (KISPs) with each Victorian local government. KISPs will describe the entire local market's forecast supply and demand over a 10-year roll-out period. KISPs will be the foundation for investment decisions, to ensure that co-investing in projects will equitably and effectively address infrastructure needs across Victoria.[40] This will be a positive step to support councils to better plan for early years infrastructure, to improve functionality of older kindergarten facilities, as well as meet the increasing demand from three-year-olds, and additional demand from population growth. This joint planning will support councils to plan for increased capacity of existing facilities. Many of the established suburbs' legacy single room stand-alone kindergartens will need to be transformed to become larger, integrated children and family facilities over time.

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[35] Department of Education and Training (2020) *Three-Year-Old Kindergarten* [website], https://www.education.vic.gov.au/about/programs/Pages/three-year-old-kinder.aspx (accessed 15 October 2020)

[36] Department of Education and Training *Building Blocks: Three-Year-Old Kindergarten Infrastructure Strategy* available at *https://www.education.vic.gov.au/Documents/childhood/providers/funding/20-%20053%20Building%20blocks%20-3YO%20infrastructure%20V8.pdf*

[37] Municipal Association of Victoria, *Early years infrastructure planning and funding* [website], https://www.mav.asn.au/what-we-do/policy-advocacy/social-community/children-youth-family/early-years-children-0-8-years/early-years-infrastructure-planning-and-funding (accessed 15 October 2020)

[38] Municipal Association of Victoria, *Early years infrastructure planning and funding* [website], https://www.mav.asn.au/what-we-do/policy-advocacy/social-community/children-youth-family/early-years-children-0-8-years/early-years-infrastructure-planning-and-funding (accessed 15 October 2020)

[39] Metropolitan Planning Authority (2015) *Kindergarten Infrastructure Needs Assessment in Greenfield Growth Areas, A Revised Benchmark*, https://vpa-web.s3.amazonaws.com/wp-content/uploads/2016/07/Kindergarten-Infrastructure-Needs-Assessment-in-Greenfield-Growth-%E2%80%93-April-2015.pdf (accessed 15 October 2020)

[40] Department of Education and Training (2020) *Building Blocks: The Victorian Government's Three-Year-Old Kindergarten Infrastructure Strategy*, https://www.education.vic.gov.au/Documents/childhood/providers/funding/20-%20053%20Building%20blocks%20-3YO%20infrastructure%20V8.pdf (accessed 15 October 2020)

Early years co-location on school sites

The Victorian Government has made commitments to provide a kindergarten on or next door to each new school site it builds. This will assist councils and other providers of kindergarten programs to meet the increased demand from the rollout of government funded three-year-old kindergarten and provides an opportunity to better use Victorian Government assets to deliver early years services. It can also produce a challenge, as potential new schools in inner and middle suburbs are often land constrained. The design of early years facilities on or adjacent to school sites will require innovation and a partnership approach.

A recent example of the development of an older primary school site, to both modernise the school learning spaces and integrate early years education and care, is the Carlton Primary School. This site, with only approximately 1.1ha of space, needed a gymnasium or sports court. In the planning stages, the needs of the local community as well as the school were considered, and it was decided that they didn't need an enclosed court. Instead, they designed an open space to allow for permeability, to allow the community in and the school to go out.[41] This space can facilitate weekly markets, sport, informal after school play (see Figure 2). A Maternal Child Health facility and early learning centre are also incorporated on the site. The project was achieved through a close partnership between the Victorian Government and the City of Melbourne.[42]

Where upgrades and expansions of older schools are required in areas, they provide opportunities for the provision of integrated early years and school hubs. Early engagement between the Victorian Government and councils is key to ensuring joint service and infrastructure planning can occur.

Figure 2: Carlton Primary School Covered Outdoor Learning Area

[41] MPavilion (2020) *MTalks – From School to Community Hub: Transforming Carlton Primary*, [recording] https://soundcloud.com/mpavilion/mtalksfrom-school-to-community-hub-transforming-carlton-primary (accessed 15 October 2020)

[42] Victorian School Building Authority (2020) *Carlton Primary School* [website], https://www.schoolbuildings.vic.gov.au/schools/Pages/CarltonPrimarySchool.aspx (accessed 15 October 2020)

Source: Carlton Primary School, http://carltonprimaryschool.vic.edu.au/2019/11/design-award-carlton-primary-school

5.2.2 Schools as community facilities

In our 2016 strategy, we recommended the use of schools as community facilities. New government schools can be designed as community facilities, and existing government schools should progressively transition during major scheduled upgrades. DET has been progressively updating schools in established areas to expand their enrolment capacity and ability to support non-education services. DET has advised that, to date, nine communities have been invested in and there is a pipeline of future investment planned. Government schools have the potential to integrate kindergartens, Long Day Care and other family services, provide spaces for community education, share arts facilities, sports facilities and libraries, depending on the needs of local communities. DET has made some positive policy changes and programs over the last five years that have directly tackled this issue. For example, all new and upgraded schools have competitive-grade indoor facilities, and schools are not allowed to charge community groups more than cost recovery for access.

Depending on their site size, building configuration and age, government schools can potentially offer additional public open space for community use. While DET policy encourages partnering with local councils, community organisations and business organisations to share school facilities, the school itself (that is, the School Council and Principal) is the key decision maker regarding the potential sharing of school facilities. [43] There is no explicit Victorian Government policy requiring the sharing of school sites with local communities. This presents an opportunity to formalise and strengthen existing approaches to sharing school facilities that are already in place across Victoria.

Shared school sites can meet a range of community needs

For government schools, sharing school facilities creates access to additional revenue streams, which is a key benefit of community use. Schools have increasingly identified and pursued opportunities to generate revenue that can be reinvested into the school. In May 2019, DET released guidelines to support the preparations of joint use agreements of schools.[44] Schools may be able to provide facilities such as a library, halls, open space, playgrounds, meeting rooms and art spaces that can be shared with the wider community. Similarly, local government and other providers can provide schools with access to their facilities like open space, sport facilities and libraries for student use. Schools may be able to rent or hire these facilities and ensure the most efficient use of facilities.

When DET is considering new school locations in established areas, it should continue to identify strategic locations for schools adjacent or close to existing infrastructure of these types. Likewise, when local government and other providers are considering locations for new facilities and open space, they could consider how co-location with, or building close to, schools could facilitate the sharing of facilities. New or upgraded schools can also integrate community facilities on site,

[43] Victorian School Building Authority, *What are 'shared facilities'?* available at *https://www.schoolbuildings.vic.gov.au/blog/Pages/What-are-shared-facilities.aspx*

[44] Department of Education and Training (2019) *Instructions and Explanatory Notes for Completing a Community Joint Use Proposal,* https://sport.vic.gov.au/__data/assets/pdf_file/0018/150255/Instructions-and-Explanatory-Notes-for-Completing-a-CJU-Proposal.pdf (accessed 15 October 2020)

such as early learning centres and Maternal and Child Health centres, to create a range or hub of community services that local communities can access. These initiatives can enable greater provision of services while minimising the need for additional infrastructure.

As a recent example, the City of Port Phillip and the Victorian Government jointly purchased an 8,000 m^2 parcel of open space opposite the new South Melbourne Primary School, to meet the needs of a growing community and to be used by school students.[45]

Figure 3: New open space parcel next to South Melbourne Primary School

Source: Department of Jobs, Precincts and Regions, https://www.fishermansbend.vic.gov.au/media/work-begins-on-new-park-for-fishermans-bend

Barriers to delivery of schools as community facilities

In its submission to the 2020 *Parliamentary Inquiry into Managing School Infrastructure*, MAV highlighted that the devolved model of asset management means that negotiations are left to individual school councils or principals. [46] This model can present an opportunity, where the principals and school councils having responsibility for their school can facilitate partnerships being formed with local government or other community groups, which can lead to cooperative sharing of facilities. However, it can also create challenges if the individual school's priorities, pressures and support change over time, or when people and roles at the school change.

For councils, challenges in negotiating joint use agreements can occur, particularly where a 15-year lease does not always give councils long term security for the significant investment they have made. The MAV also noted the disconnect between Victorian and local government planning and budget processes.

In its submission, the MAV argued for a dedicated DET officer to plan and deliver integrated and co-located infrastructure. This could ensure clear communication and negotiation from early planning to development and implementation, and then ongoing governance and management. In greenfield areas, PSPs provide transparency about future schools and community facilities. Coordination of services can and does begin from the PSP stage. In established areas there is less transparency unless a future school site is identified in a land use plan. There is also less transparency around the timing for new schools and major school upgrades in established areas. Where schools are sharing their facilities, upfront consideration must be given to funding and leasing arrangements so that they provide equitable and ongoing financial benefits to the school. In recent years, there has been a focus on improvements made to early engagement, with DET engaging as early as possible with councils when building new schools. This is particularly important to ensure delivery of DET's commitment that every new school from 2021 will include a kindergarten, either on site or next door.[47]

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[45] Department of Jobs, Precincts and Regions (2020) *Work begins on new park for Fishermans Bend* [website] *https://www.fishermansbend.vic.gov.au/media/work-begins-on-new-park-for-fishermans-bend (accessed 15 October 2020)*

[46] Municipal Association of Victoria (2020) *Public Accounts and Estimates Committee Parliamentary Inquiry into Managing School Infrastructure MAV Response,* available at *https://www.parliament.vic.gov.au/publications/fact-sheets/985-paec/managing-school-infrastructure-inquiry-into-auditor-general-s-report-no-253-2014-17*

[47] Department of Education and Training (2020) *Building Blocks: The Victorian Government's Three-Year-Old Kindergarten Infrastructure Strategy*, p. 4, https://www.education.vic.gov.au/Documents/childhood/providers/funding/20-%20053%20Building%20blocks%20-3YO%20infrastructure%20V8.pdf (accessed 15 October 2020)

Administrative, policy and facility planning barriers need to be overcome before integration and sharing of facilities can be achieved. These include:

- Concerns about risk (including potentially for student safety) and insurance.
- School principals and councils have variable willingness or capacity to negotiate rates and agreements with external parties.
- Proposals to co-locate with existing facilities require analysis of impact and existing use of that facility. For example, locating a government school near existing open space or a sports ground needs to consider and analyse proposed loss of community access to those existing facilities and open space.[48]

These barriers will need to be overcome to allow for consistency in approach and to ensure broader strategic education goals are achieved. The Government could consider requiring of government assets (such as schools) particularly in urban renewal areas where the Government is making a significant investment in the precinct. DET has advised that in general, almost all government school playgrounds and outdoor spaces are available at no cost for out-of-school-hours casual use. This is not often explicitly understood by the wider community, and therefore not always included or considered to be a part of the wider network of open space.

A number of non-government schools share school grounds and make sporting facilities available for hire. This should also be encouraged, and mechanisms to ensure this can occur more systemically could potentially be tied to the capital funds that DET provide to non-government schools.

Changing models of school provision: higher density schools in high density areas

Jurisdictions across Australia have adopted new approaches to school planning and design to respond to the challenge of population growth and provision of schools in higher density areas. Recent examples of higher-density and vertical schools in Victoria include South Melbourne Primary School, Prahran High School, and Richmond High School. Victoria has also looked to interstate examples for further innovative approaches and lessons in delivering schools in higher density areas.

The VPA's precinct structure planning guidelines for greenfield sites identifies standard site sizes for primary and secondary schools of 3.5 ha and 8.4 ha respectively. This level of land consumption for new schools in established areas is likely to be impractical given constraints on available land. DET has different parameters for new schools in established areas, which account for the different availability of space in these areas. There is an opportunity to formalise these consistent with PSP Guidelines, however DET recognises the need for greater flexibility in planning in these areas.

New inner-city schools such as South Melbourne Primary, Prahran High and Richmond High Schools are demonstrating the possibility of building schools on smaller sites, in areas where land values are high.[49] Other existing land constrained inner-city schools are already sharing sports and other facilities located nearby. For example, Albert Park Secondary College uses the nearby Melbourne Sports and Aquatic centre (MSAC) and Gasworks Parks for regular use during school hours. The newly constructed Prahran High School has limited outdoor space, students regularly travel by tram to MSAC to access sports facilities. Richmond High School is co-located with existing council indoor and outdoor sports facilities. As land values in the middle and outer suburbs increase, replication of similar inner-city school models will enable the efficient use of state and local government facilities.

Having now delivered a number of new inner urban vertical schools on small inner city sites, it is timely for the Victorian Government to evaluate these schools to understand how site size has provided opportunities or challenges in the delivery of education and the ability to share facilities with the wider community. This would include the need to look at how the network of inner-city schools work together. Traditionally, government schools use relocatable classrooms to manage student enrolment demand peaks; the new inner-city schools do not have enough land size to accommodate relocatable classrooms. This change to demand management should also be evaluated. For government land use and infrastructure planners, it is important to have certainty about the minimum site size that is required, to ensure the best possible education and community outcomes.

Integrating school planning with public transport planning.

There is the potential to better plan for secondary students to access secondary schools via active transport (walking and cycling) and public transport. There are significant health benefits for students to use these modes of transport to school, as well as reducing peak traffic congestion if fewer parents are driving students to school. Victorian Integrated

[48] For example, Inner Melbourne Action Plan (IMAP) councils (Port Phillip, Melbourne, Yarra, Stonnington and Maribyrnong) note a number of challenges where inner city schools use council facilities located near by without contribute to the cost of maintenance of these facilities. See IMAP (2020) *Regional Sport & Recreation Facility Planning Study*, p. 5, http://imap.vic.gov.au/uploads/Meeting%20Agendas/2020%20March/Att%206_Recreation%20Final%20report%20Combined%20Filev1_6%20March%202020.pdf (accessed 15 October 2020)

[49] Department of Education and Training (2020), *New Richmond school delivers world class facilities* [website], https://www.education.vic.gov.au/about/news/Pages/stories/2018/stories_richmondhighschool.aspx *(accessed 15 October 2020)*

Survey of Travel and Activity (VISTA) data from 2018 shows that 50% of Melbourne's secondary students travel to school by car.[50] If more schools were located within walking distance of the principal public transport networks, and integrated with pedestrian and cycle linkages, this could be a positive step towards increasing opportunities for secondary students to travel by active or public transport to school.

Infrastructure Victoria has made a draft recommendation for consultation in its Draft 30-year infrastructure strategy (2020) for the Victorian Government to publish a transport plan (draft recommendation 33). This would support government and non-government school planners to consider any proposed changes to the transport system when planning for new or upgraded schools. Where secondary schools are planned with high levels of public transport accessibility, it could result in increased demand for these schools from a wider catchment area. Consideration should be given to how these schools should be planned and designed as part of the surrounding network of schools.

5.2.3 Sports and recreation infrastructure

Sport and recreation infrastructure supports participation in physical activity, which is vital for the promotion of good physical and mental health outcomes. This infrastructure can be designed to support "formal sport" (structured, competitive activity), "active recreation" (non-competitive physical activities such as walking, jogging, gym activities, swimming and cycling)[51] and "passive recreation" (activities not about physical movement, such as being in nature, reading or having a picnic).[52]

Sport and recreation infrastructure can include sports fields, aquatic centres, indoor stadiums, indoor courts, walking paths, bike paths, sporting fields and reserves. It also includes associated infrastructure such as playing surfaces (ovals, courts, synthetic), lighting, and community facilities such as changerooms, storage and club facilities. The provision of sport and recreation facilities has a significant overlap with open space infrastructure, both through large sporting fields contributing to wide open space, but also smaller open space and green linkages which facilitates active recreation. This facilitates some of the most popular forms of adult exercise, such as walking, jogging and dog walking.[53]

Sports fields require significant parcels of land. Providing sports fields at the same provision rate as populations increase will be increasingly difficult due to the scarcity and high value of land.

The Inner Melbourne Action Plan (IMAP) has been prepared by the inner-Melbourne local government areas of Port Phillip, Stonnington, Yarra, Maribyrnong and Melbourne, in response to the challenge that their sport facilities are at capacity and demand will significantly increase over the next 20 years. The plan recognises that as sports facilities are already at capacity, and demand is set to double over the next 20 years, investment as well as innovation are needed to ensure people do not miss out, or else health and wellbeing will be impacted.

A key intervention noted in the report is the importance of programming such as increasing more daytime use and making changes to how training schedules are run, looking at non-formal-sport forms of active recreation, and how to utilise programming to allow for those activities.

The IMAP report explores the complexities of measuring capacity and future demand for sports and recreation infrastructure, and the detailed inputs that are needed including data about supply and capacity of existing facilities, spatial / accessibility gap analysis of existing facilities, and future demand projections based on participation levels and changing demographics.

Inner-city established areas have already started to adapt to respond to these challenges. For example, Fishermans Bend's community infrastructure planning has adopted the following principles for future trends of sports and infrastructure provision:

- Facilities will need to be high-capacity, multiuse venues.
- Infrastructure will enable both incidental and planned physical activity through the provision of walking and cycling networks, open space as part of a green infrastructure network and community sporting and recreational facilities.
- The integration of sport facilities within mixed-use sites will be considered where development is well-located, and the land size is sufficient.

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[50] Department of Transport, *Victorian Integrated Survey of Travel & Activity (VISTA) [website], https://public.tableau.com/profile/vista#!/vizhome/VISTA-JourneytoeducationAccess/JTE-methodoftravel*

[51] Department of Health and Human Services (2017) *Active Victoria*, https://sport.vic.gov.au/__data/assets/pdf_file/0018/55602/download.pdf (accessed 15 October 2020)

[52] IMAP (2020) *Regional Sport & Recreation Facility Planning Study*, http://imap.vic.gov.au/uploads/Meeting%20Agendas/2020%20March/Att%206a_IMAP%20January%202020%20Regional%20Sport%20and%20Recreation%20Facility%20Planning%20Study.pdf (accessed 15 October 2020)

[53] SportAus (2019) *Australia's top 20 sports and physical activities revealed*, https://www.sportaus.gov.au/media-centre/news/australias_top_20_sports_and_physical_activities_revealed (accessed 15 October 2020)

- Due to the high value of land and limited opportunities to provide sport ovals and large active open spaces in Fishermans Bend, indoor multipurpose courts will deliver the sport and recreation activities in this area. Each of the four Fishermans Bend precincts include provisions for one multi-court indoor centre of around 6,000m^2 for an expected residential population of around 20,000.

Using multipurpose courts is being explored in the planning of the Fitzroy Gasworks Sports Centre, which is for a sports centre facility that is combined and co-located with a multi-level school. The proposed facility is comprised of six-indoor-courts, as well as a rooftop terrace outdoor court, that will serve both the school and the local community. Both Fishermans Bend and the Fitzroy Gasworks site show the potential opportunities associated with more intensive use of infrastructure.

Case Study: Maribyrnong Secondary College Joint Use Agreements

Maribyrnong Secondary College has two indoor courts which are currently used after school hours mostly by sporting clubs from other municipalities. The City of Maribyrnong, in partnership with MSC, is currently working on a joint use agreement to ensure access to these courts for local users. While the initial beneficiary of the joint use agreements will be local basketball clubs, the college also has facilities for hockey, soccer (synthetic pitch), tennis, netball and a gymnasium. Council owned land adjacent to the college is being redeveloped to create a high-quality oval. The joint use agreement will optimise shared use between the college and council with regards to sports fields, indoor courts, and an aquatic and wellbeing centre creating a sports hub within the municipality.

Source: IMAP Regional Sport & Recreation Facility Strategy, page 51

5.2.4 Open space and green infrastructure

Open space, as a form of population-serving infrastructure, can deliver a large range of social, environmental and economic benefits to communities by improving community health and wellbeing, protecting urban biodiversity and enhancing the city's climate change resilience. From our *Density done well* consultation with local communities in densifying suburbs, safe, adaptable, multi-functional spaces and green space are essential in managing the impacts of greater residential densities.[54]

In order to plan for open space as an interconnected network, the following approaches should be adopted:

- Improve accessibility to open space;
- Upgrade and improve existing open spaces and facilities, expanding their functions and increasing vegetation;
- Increase access to (the ability to use) publicly owned land that currently has restricted access, followed by access to private land that receives public funding; and
- Prioritise building the network when creating any new additional open spaces.

These priority steps are expanded on below. Our draft strategy makes the draft recommendation of providing direct funding and reforming the developer open space contribution scheme in order to create an interconnected open space network and extend Melbourne's urban tree canopy (see draft recommendation 37).

Improving accessibility to open space is more efficient than creating more

A more explicit focus on improving access helps to address equity of proximity to open space, which is an indicator of quality rather than only quantity.[55] The *Fishermans Bend Public Space Strategy* is a good example of open space network planning, which focusses open space along connected corridors, serving multiple functions, including active transport. [56] Figure 4 illustrates how large and small parks are planned to be connected throughout the precincts with linear parks and street greening. Placing and designing for street trees can also increase canopy cover and provide cooler, shaded corridors to support active transport.[57] This approach demonstrates how to both provide access to open space and take into consideration other factors such as greening.

Population growth and development are reducing private open space, gardens and tree canopy cover in established suburbs.[58] More well-designed, accessible public open space with improved vegetation cover can help compensate for this loss.[59] Connected patches and corridors of open space provide opportunities for recreation and active travel, and provide habitat connectivity, reducing the risk of genetic diversity loss in isolated wildlife populations.[60] [61]

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[54] RPS for Infrastructure Victoria (2020) *Infrastructure Victoria 30-Year Strategy Engagement Report (Stage One And Two)*

[55] Benton-Short, L., Keeley, M., & Rowland, J. (2019) *Green infrastructure, green space, and sustainable urbanism: Geography's important role,* Urban Geography: Geographic Perspectives on Urban Sustainability, 40(3), pp. 330-351

[56] Planisphere (2017) *Fishermans Bend Public Space Strategy,* prepared for the Fishermans Bend Taskforce.

[57] Infrastructure Victoria, *Infrastructure Provision in Different Development Settings: Metropolitan Melbourne Technical Paper Volume 1, Melbourne,* Infrastructure Victoria, 2019, p.3, *www.infrastructurevictoria.com.au/wp-content/uploads/2019/08/IPIDDS-Metro-Melbourne-Vol-1-Technical-Paper-Aug2019.pdf.pdf*

[58] J. Brunner and P. Cozens, *'Where Have All the Trees Gone? Urban Consolidation and the Demise of Urban Vegetation: A Case Study from Western Australia'*, Planning Practice & Research, vol.28, no.2, 2013, pp.231-255; J. Byrne and N. Sipe, *Green and Open Space Planning for Urban Consolidation – A Review of Literature and Best Practice*, Brisbane, Griffith University, 2010, https://research-repository.griffith.edu.au/bitstream/handle/10072/34502/62968_1.pdf ; T. Hall, *'Goodbye to the Backyard? —The Minimisation of Private Open Space in the Australian Outer-Suburban Estate'*, Urban Policy and Research, vol.28, no.4, 2010, pp.411–433; A. Sivam, S. Karuppannan and M. Mobbs, *'How "Open" Are Open Spaces: Evaluating Transformation of Open Space at Residential Level in Adelaide – A Case Study'*, Local Environment, vol.17, no.8, 2012, pp.815–836

[59] J. Byrne and N. Sipe, *Green and Open Space Planning for Urban Consolidation – A Review of Literature and Best Practice*, Brisbane, Griffith University, 2010, https://research-repository.griffith.edu.au/bitstream/handle/10072/34502/62968_1.pdf

[60] J. Beninde, M. Veith and A. Hochkirch, *'Biodiversity in Cities Needs Space: A Meta-Analysis of Factors Determining Intra-Urban Biodiversity Variation'*, Ecology Letters, vol.18, no.6, 2015, pp.581-592; J. Hejkal, T. Buttschardt and K. Klaus, 'Connectivity of Public Urban Grasslands: Implications for Grassland Conservation and Restoration in Cities', Urban Ecosystems, vol.20, no.2, 2017, pp.511-519

[61] *R. Forman,* Land Mosaics: The Ecology of Landscapes and Regions*, Cambridge, Cambridge University Press, 1995*

Figure 4: Fishermans Bend open space network planning

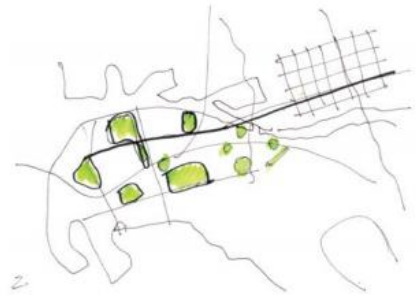

FIGURE 4: Grand Spaces

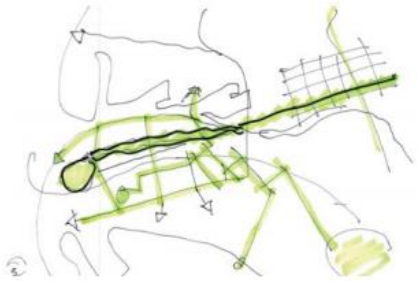

FIGURE 5: Linear Parks

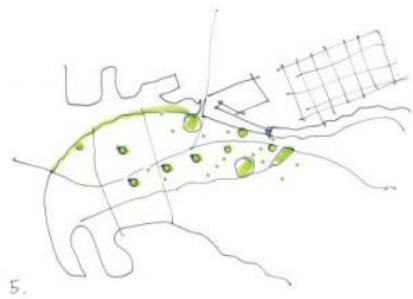

FIGURE 7: Pocket and Neighbourhood Public Open Spaces

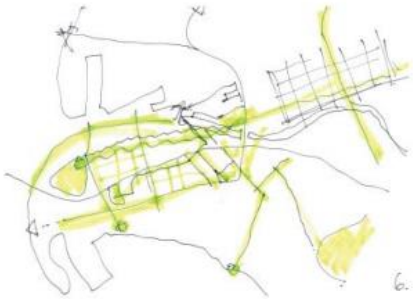

FIGURE 8: Greening

Source: Fishermans Bend Public Space Strategy, pp 39-40

Upgrading and improving existing open spaces and facilities can enhance their utilisation

The priority for upgrading and improvements should be for open spaces that are particularly close to areas likely to experience residential density and new commercial uses. This approach also recognises the current challenge for local governments.

When making upgrades and improvements to existing open space, these improvements should ensure that, where appropriate, open spaces are multi-purpose. This could include upgrading or locating new outdoor sporting facilities on open space, broadening a space's function beyond a playground, and providing land for community facilities such as kindergartens. Many existing open spaces – and particularly the larger ones – also accommodate sport and recreation facilities, which supports organised sport participation as well as active and passive recreation.

Planting vegetation is an important upgrading and improvement approach. Given the length of time for vegetation establishment, and increasing tree canopy, planting in all open spaces should be considered an immediate action.

Another option for upgrading and improvements is for better stormwater management in open spaces, which has benefits for reducing localised flooding and pollutant runoff into waterways. For example, the planned revitalisation of the Moonee Ponds Creek in the Arden precinct is intended to create a new green spine for Melbourne, serving recreational, biodiversity habitat and active transport functions, and linking Arden and neighbouring urban renewal precincts.[62]

Public and private open spaces also provide opportunities to plant more trees and vegetation, helping reduce urban temperatures and reduce local flooding impacts. Efforts to use the existing open space contribution system to improve Melbourne's urban forest are not well-coordinated across local government boundaries, with no unified approach to enhancing the urban forest.[63]

All these upgrading and improvement approaches will require funding. Three possible mechanisms are worth exploring further: developer financial contributions, commercial uses on open space and special rates or charges.

Currently, planning laws allow local councils to specify open space contributions when developers subdivide land, to compensate for reduced private open space in subsequent residential densification. These were adopted in 1966 but

[62] Victorian Planning Authority, *Draft Arden Structure Plan June 2020*, p. 6 https://vpa-web.s3.amazonaws.com/wp-content/uploads/2020/06/Draft-Arden-Structure-Plan-June-2020.pdf

[63] The Nature Conservancy and Resilient Melbourne, *Living Melbourne: Our Metropolitan Urban Forest Technical Report,* Melbourne, The Nature Conservancy and Resilient Melbourne, 2019, p.125, https://resilientmelbourne.com.au/wp-content/uploads/2019/06/LivingMelbourneTechnicalReport_onlineLR.pdf

have never been reviewed by the Victorian Government.[64] A 2008 Victorian Government Parliamentary Inquiry recommended developing more effective, enforceable and transparent developer open space contributions, and ensuring cash-in-lieu contributions are used to both buy and improve open space.[65]

Increasing access to publicly-owned land can deliver additional open space at lower cost

As precincts and established areas experience increased residential densities, larger populations and more jobs, pressure will grow on existing open spaces. Where the ability to expand open space is limited, it is important to consider opportunities to maximise the use of existing Government-owned land, or how the quality of open spaces can be improved.

Significant overlap exists between open space and other population-serving infrastructure. Sports and recreation infrastructure such as sports fields and ovals can contribute to open space provision in an area, and green linkages can serve as recreation corridors for active recreation such as walking and cycling. 'Green infrastructure', which we define in this report as vegetation, exists on both public and private land and can address air pollution and urban heat island effects, while access to nature contributes to mental health and wellbeing.[66] Community spaces and schools can also contribute to open space provision through joint use agreements and adaptable design of spaces. This overlap highlights the multiple functions and purposes open space can play.

There is approximately 9,000ha of publicly owned land with restricted access across metropolitan Melbourne. This space is currently used for a range of purposes, including schools, parks and gardens, public housing reserves and transport reservations.[67] Each of the categories of open space in Table 2 have different access challenges. In general, increasing access to and making quality improvements to publicly owned land that currently has limited access should be a short to medium term priority, with immediate attention to open spaces that are close to likely increased residential density. Publicly-owned but privately-leased or occupied land, and land with uses that receive government funding should be considered as additional long-term additions to open space.

Table 2: Definition of access types (VPA Open Space Access)

Access type	Definition	Example of type of space
Open access	Freely accessible by the public all the time	Public parks and gardens, playgrounds, sports fields
Limited access	Access is free of charge but may be managed in some way, such as designated opening days / hours	Government schools, cemeteries, tertiary institutions
Highly limited access	Access is more significantly restricted by fees and charges and / or barrier fencing	Public golf courses, services and utilities reserves
Closed access	Access is not possible by the public most of the time	Non-government schools, private golf courses, private sports fields

Source: Victorian Planning Authority, Open Space Types and Categories, https://vpa.vic.gov.au/wp-content/uploads/2017/06/Metropolitan-Open-Space-Strategy-Open-Space-Category-Definitions.pdf

Depending on their site size, building configuration and age, government schools can potentially offer additional public open space as well as playgrounds. Maximising use of Victorian Government owned school sites means that schools should be open for community use outside school hours for 52 weeks a year. While DET policy encourages partnering with local councils, community organisations and business organisations to share school facilities, the school is the key decision-maker regarding the potential sharing of school facilities.[68] There is no explicit Victorian Government policy requiring the sharing of open space on school sites with local communities.

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[64] *Local Government Amendment Act 1966* (Vic), s.34, http://www.austlii.edu.au/cgi-bin/viewdb//au/legis/vic/hist_act/lga1966182/

[65] Select Committee of the Legislative Council on Public Land Development (2008) *Final Report,* p.10, available at *https://www.parliament.vic.gov.au/archive/council/publicland/Reports/Final%20Report.pdf*

[66] Beyer KM, Kaltenbach A, Szabo A, Bogar S, Nieto FJ, Malecki KM (2014) *Exposure to neighbourhood green space and mental health: evidence from the survey of the health of Wisconsin*. Int J Environ Res Public Health

[67] Victorian Planning Authority (2017) *Metropolitan open space distribution,* p. 10, available at *https://vpa.vic.gov.au/wp-content/uploads/2018/02/Open-Space-Network-Provision-and-Distribution-Reduced-Size.pdf*

[68] Victorian School Building Authority, *What are 'shared facilities'?* available at *https://www.schoolbuildings.vic.gov.au/blog/Pages/What-are-shared-facilities.aspx*

Case Study: Yarra Primary School

The play area at Yarra Primary School was ready for an upgrade and the school was barely able to maintain the ageing facility when Yarra City Council proposed a joint use agreement (JUA) with DET and the School Council. The JUA led to a $380,000 improvement to the school's play area, with Yarra City Council contributing $290,000 and the school, $90,000.

In return for the council's investment, the JUA guarantees community access to the facility outside school hours for an initial term of 25 years, with an option for a 10-year extension. The landscape works included additional play features, BBQ and picnic facilities, a turf playing area and table tennis table. On completion, Yarra City Council accepted selected maintenance services at the site, while the school continues to carry other services. While no capital works occurred on the basketball court, the playing area is covered by the JUA and the facility is well used by the broader community.

The JUA also identifies asset replacement responsibilities over the life of the agreement. Having previously investigated the acquisition of new land in Richmond at approximately $5 million (plus improvements) the investment at Yarra Primary adds to the local network of recreational facilities at a fraction of the cost.

Source: IMAP Regional Sport & Recreation Facility Strategy, page 50

Prioritise building the network and connectivity

Connecting open green spaces can both provide an overall greater quantity where any new additions add to the network's connectivity, and thus also improve people's access to these spaces. Linear spaces have a particularly crucial role for human, plant and animal populations by acting as access and biodiversity corridors, enabling the movement of people and wildlife. New open spaces that create connections should be a priority.

A short-term improvement to the open space network would be to increase greening on local streets. While streets are not considered conventional open spaces, they are publicly owned and with increased tree canopy cover, can provide interim greener corridors to link open spaces. Priority should be given to streets which could fill gaps in the existing open space network, with adequate, separated and shaded space allocated for pedestrians and cyclists. This can provide shading benefits to residents and workers walking and improve biodiversity through increasing habitat.

5.3 New approaches to service delivery: shared facilities, co-location and community hubs

5.3.1 Transitioning from single purpose to multi-purpose infrastructure

Where better-use options for existing infrastructure have been exhausted, and new infrastructure is required to respond to demands from increased populations in renewal precincts, established areas face the challenge of having constrained urban environments in which land is scarce. This means that using traditional approaches to infrastructure delivery can prove problematic. As land values also increase, government will need to invest wisely in land and infrastructure and better use of existing land and infrastructure will become critical. Co-location of types of infrastructure can be an efficient way to provide a community with more infrastructure, while increasing the benefits that can be felt by the community.

Co-location of a variety of social infrastructure facilities is already happening through Victoria and Australia, with many examples of infrastructure and services being integrated within stand-alone facilities, or clustered within 200m walking distance of each other. We have used existing research and case studies to explore the benefits of co-location, what services have complementarity and work efficiently in a co-located environment, as well as key learnings and steps Government can take to adopt co-location practices.

The *Fishermans Bend Community Infrastructure Plan* identified community infrastructure hubs as a solution to meeting demand in constrained urban environments while also delivering other benefits from co-location such as ease of access and more efficient use of space. The benefits associated with maximising the use of scarce space, which can make these facilities a more cost-effective solution for service providers, and improve accessibility for residents, have the potential to offset higher initial capital costs in the long run.

5.3.2 Why co-locate services in hubs?

The clustering, co-location and integration of facilities can be more complex to plan for and be more expensive to deliver than single use facilities. However, it can also be a cost-effective solution for service providers and can be a more efficient use of land, particularly when considering vertical layouts. It also provides benefits from multipurpose trips and additional synergies from providing services within easy reach of each other. Other benefits and advantages of co-locating different infrastructure and services include:

- **Land use efficiency:** efficiently deliver multiple services to a growing community where land is scarce or increasing in value.
- **Reduced establishment and ongoing costs:** Cost-sharing with diversified revenue sources and delivering infrastructure in a financially efficient mode with reduced capital costs can help maximise the Government's investments. A longer-term benefit of co-location is reduced operating costs. For example, services may operate through a shared reception and share administrative services.
- **Place-making and increased community engagement:** Hubs can be part of place-making. A centrally located "hub" in an activity centre can increase the visibility and accessibility of services. This can create a community anchor where people can meet and socialise, which can build community identity. Integrating or clustering with commercial facilities such as cafes and stores can also create increased value for the private sector with increased foot traffic.
- **Improved accessibility to services:** If in an accessible and convenient location, hubs can reduce the need for multiple trips. This can decrease barriers to access associated with travelling and attending services. For example, those with limited options for mobility have improved access to more spaces and services. Increasing visitor numbers can also enhance safety and perception of safety in public spaces, and together with passive community surveillance, can allow for longer opening hours.
- **Community targeted response and improved outcomes:** Well planned and designed hubs can provide a targeted response to particular needs of communities and create efficiencies for individuals who are accessing services. For example, co-locating Maternal and Child Health centres with other services needed by young families such as primary schools, libraries, and playgroups can reduce the number of destinations they need to visit, while also increasing visibility for the other services that they may need to use. Opportunities to engage first-time users of new programs may also increase.
- **Flexible design allows for changes over time:** Best-practice examples of hubs adopt flexible designs to future-proof facilities. This allows hubs to have different services which can grow and contract as trends, demographics and needs of a particular community change over time. For example, flexibly designed commercial spaces that can accommodate extra capacity for schools when they are under pressure and allow the school to then reduce their space use if enrolment numbers go down.

5.3.3 Challenges of co-location

Several barriers and challenges need to be overcome before a co-location approach can succeed. Different stakeholders brought together in this process should include different service providers, people who will be accessing services, and the existing local community surrounding a site. Potential partners may be reluctant to consider sharing facilities if they do not have experience with the process or sufficient guidance on how it will be done.

Regulatory and funding requirements may pose significant barriers for integration and co-location. Different service providers may have siloed and inflexible regimes, be planned and funded by different levels of government or delivered by the non-government sector. This is relevant for upfront capital funding and for funding necessary ongoing operational and maintenance costs. Upfront agreements must sufficiently specify the agreed arrangement, addressing the requirements of all parties, how ongoing costs will be divided and where income will come from.

Our 2016 strategy noted that a necessary first step is to reform funding, governance and planning arrangements for facilities, increase the role for local government and other co-investors as partners in the management of shared assets.

Integrated land use and infrastructure planning requires a willingness to openly and transparently discuss future options, long before final commitments or budget decisions are made. Only when agencies make their ideas transparent to others can the process of integrating decisions begin. If agencies do not know what others are planning, they cannot work together to align their decisions. To ensure the integration of land use and infrastructure planning, Infrastructure Victoria recommends the Victorian Government could consider releasing long-term plans for priority infrastructure sectors over the next five years (Draft 30-Year Infrastructure Strategy 2020, draft recommendation 32).

Community infrastructure provision in Fishermans Bend

In Victoria, community infrastructure planning for Fishermans Bend provides a key example of planning for co-located or shared facilities, and the adoption of hubs to provide community infrastructure, in an urban renewal context. The *Fishermans Bend Community Infrastructure Plan* proposes four key categories of co-located service hubs: Education and Community; Health and Well-being; Art and Cultural; and Sport and Recreation. Needs assessment for the Fishermans Bend precincts' community hubs will be based on the following assumptions:

- Each hub is founded on one core (primary) community facility and developed by other complementary potential services and facilities.
- Multipurpose community rooms provide the spaces for a variety of programs and activities. These spaces can be used for community gatherings, art programs, sport and recreation or health and wellbeing activities.

The amount of existing population-serving infrastructure in the specific established area being developed must be considered when applying the Fishermans Bend hub approach. As a large brownfield urban renewal area, Fishermans Bend had relatively little and, in some cases, no population-serving infrastructure. This presented both a challenge and an opportunity to design a best-practice approach to infrastructure and service delivery. It meant that state and local government needed to work together to ensure that any new community hubs could provide spaces for delivery of Victorian Government, local government and other services. This needed to be done at a very early stage of precinct delivery, before there was a clear understanding of the emerging community needs.

Some established areas may have considerable amounts of existing infrastructure, much of which will already have an important role for communities. The Fishermans Bend approaches may not suit all areas, as each precinct will have its own distinct needs, and potential benefits from different hub approaches. The challenges for the Fishermans Bend community infrastructure planning process were numerous, but the work culminated in a sequencing plan for indicative hubs and a required floor area for each precinct and is a good practical model for other renewal areas.

5.4 Delivering social housing infrastructure

For disadvantaged individuals, social housing can improve access to economic resources, social capital, education and health resources. Long term, secure housing options improve social outcomes for individuals as it allows them to access

housing which the private rental market may not provide. Short term support can help individuals while they access other services. Social housing is effective at preventing homelessness and its income-linked rents prevent housing stress.[69]

A high need for additional social housing exists across Melbourne. We estimate Victoria had 3.3 social housing dwellings for every 100 households in June 2019,[70] compared with the national average of 4.5.[71] Business as usual investment, including incremental annual project funding, has not been producing enough extra social housing in Victoria. In the 2020/21 Budget, the Victorian Government made a significant investment in social housing as part of its $5.3 billion Big Housing Build program, including more than 9,300 new social housing dwellings. It also commits to developing a 10-year strategy for social and affordable housing and introducing reforms to deliver the strategy.

To maximise its benefits, social housing should be in places with good access to transport and services; areas with high amenity and good public transport should have more social housing than less well serviced areas. The accessibility and amenity benefits provided by the developing precincts present an opportunity to significantly improve equity outcomes for vulnerable Victorians who currently lack access to affordable housing that is also close to transport, employment and educational opportunities.

Social housing, like other infrastructure, needs time for careful design, planning, regulatory approvals and procurement. Delivering social housing at scale requires a rolling construction program over several years. Like other infrastructure spending, social housing can have stimulatory economic effects, especially for the residential construction sector.

In addition to having primary responsibility for funding and providing social housing, the Victorian Government also influences housing supply through planning regulations, such as inclusionary zoning. The Australian Government has traditionally offered loans or grants to state governments for the provision of social housing, while local governments can also play a key role in planning for and facilitating social housing, through planning controls such as inclusionary zoning or brokering partnership deals between local providers and community-based groups. They may also directly invest in the supply of affordable housing.[72]

An opportunity exists for the Victorian Government to leverage its investment in urban renewal precincts and announced social housing investments by providing or encouraging the provision of social housing in an area with good access to employment and education opportunities. This will help maintain a social mix in the area, and ensure some people experiencing disadvantage can access the opportunities there.

To complement its announced increased investment, the Victorian Government could consider inclusionary zoning for new developments. Inclusionary zoning can meet the twin objectives of building extra homes in good locations and providing affordable homes to people on very low incomes. However, universal application of inclusionary zoning could, in some places, make the cost of compliance greater than the value generated, meaning no extra homes, affordable or otherwise, are built at all. Instead, its use should be targeted to places generating significant value uplift, with the proportion of affordable rental housing for very low-income tenants varying depending on the site. Urban renewal precincts are highly likely to fit these criteria. Given the significant Victorian Government investment in improving accessibility, and likely changes to land-use settings within the precinct areas, there is likely to be significant uplift in land values within and adjacent to the precincts. Inclusionary zoning provides an opportunity for the Victorian Government to capture some of the value generated by its investment.

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[69] *D. Prentice & R. Scutella, 'What are the impacts of living in social housing?' [report for Infrastructure Victoria], Melbourne, VIC, May 2018, www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Infrastructure-Victoria-Technical-Paper-%E2%80%93-What-are-theimpacts-of-living-in-social-housing-May-2018.pdf* D. Prentice & R. Scutella (2018) *What are the impacts of living in social housing* Report for infrastructure Victoria

[70] Infrastructure Victoria calculations based on: Department of Health and Human Services, *Housing assistance, Additional service delivery data 2018-19,* p.8 www.dhhs.vic.gov.au/housing-assistance-additional-service-deliverydata-2018-19 and Department of Environment, Land, Water and Planning, *Victoria in Future 2019*, www.planning.vic.gov.au/__data/assets/excel_doc/0027/424386/VIF2019_Pop_Hholds_Dws_ASGS_2036.xlsx

[71] Infrastructure Victoria calculations based on: Steering Committee for the Review of Commonwealth/State Service Provision, *Report on Government Services 2020, Part G: Housing and Homelessness, Housing Data Tables,* Table 18A.3, Productivity Commission www.pc.gov.au/research/ongoing/report-on-government-services/2020/housing-and-homelessness/housing/rogs-2020-partgsection18-data-tables.xlsx and Australian Bureau of Statistics, *Household and Family Projections, 2016 to 2041, Data Cube: Projected number of households, Household type – 2016 to 2041*, https://www.abs.gov.au/ausstats/abs@.nsf/mf/3236.0

Infrastructure Victoria calculations based on: Department of Health and Human Services, Housing assistance, Additional service delivery data 2018-19, p.8 www.dhhs.vic.gov.au/housing-assistance-additional-service-deliverydata-2018-19 and Department of Environment, Land, Water and Planning, *Victoria in Future 2019*, www.planning.vic.gov.au/__data/assets/excel_doc/0027/424386/VIF2019_Pop_Hholds_Dws_ASGS_2036.xlsx

[72] Spiller, M. (2019) *Three ways local government can bolster affordable housing,* available at *https://www.sgsep.com.au/publications/insights/three-ways-local-government-can-bolster-affordable-housing*

5.5 Utilities infrastructure in established areas

5.5.1 Water Infrastructure

Water infrastructure has traditionally been planned and delivered by separate infrastructure networks and organisations. Organisations that have a role in the provision of urban water infrastructure in Melbourne are noted in Table 3. The Victorian water industry has recently evolved to adopt a more integrated approach to delivering water services, in order to create more sustainable and liveable communities. This is known as integrated water management (IWM), which brings together all facets of the water cycle to maximise social, environmental and economic outcomes. As a result of this, planning is becoming more integrated across the three subsectors, particularly in greenfield developments and precinct scale redevelopments in established areas. This section addresses water infrastructure under traditional methods, then provides discussion on integrated water management.

Table 3: stakeholders providing urban water infrastructure

Organisation	Role
Local Government	• Manages local stormwater infrastructure and floodplain functions within their jurisdiction • Manages development planning for drainage schemes
Melbourne Water (MW) (trunk infrastructure network)	• Treats and supplies drinking and recycled water to the water corporation's distribution network • Removes and treats most of the sewerage from the water corporation's distribution network • Manages waterways and major drainage systems across the Port Phillip and Westernport water catchments (all of Melbourne) • Manages most Development and Precinct Structure Planning for drainage infrastructure in Manages the licencing and diversion of stormwater for non-potable uses such as agriculture, industry and parks/gardens
Urban Water Corporations (distribution infrastructure network)	• Distribute drinking and recycled water from the MW trunk network to customers • Removes and transfers most of the sewerage from the customer to the MW trunk networks • Locally recycles some sewerage and distributes recycled water to customers or waterways

Water Supply & Sewer Networks

Water and sewer infrastructure has been progressively constructed in urban areas from the early 1900s, with significant investment made in the period of 1970's to 2000. Since that time, water usage has become more efficient, and improved modelling techniques and technological advances have enabled the existing assets to be used more effectively. The systems were typically designed for detached dwellings of a lower density than what is proposed in future. Water and sewer distribution networks are able to be incrementally expanded to support demand growth into the future.[73] However, the tipping point where the existing network can no longer support additional growth has not yet been analysed or defined at a systems level, and existing water and sewer infrastructure has not been assessed for its ability to support precinct scale growth.

Precinct development should therefore be planned for in conjunction with upgrades to aged infrastructure. The majority of infrastructure in established areas of Melbourne was constructed prior to 1970,[74] and will progressively require upgrading. This could be efficiently coordinated with adaptation to support precinct developments in the future. The response could be to increase the capacity of existing infrastructure when replacing aged infrastructure, or alternatively adopting an integrated water management response within precincts to avoid placing additional load on the existing network.

Integrated water management

Victoria's history of drought has highlighted the importance of managing water resources sustainably, while significant demands from a growing population and climate change are putting water resources under further pressure. Victoria's

[73] Infrastructure Victoria (2019) *Infrastructure Provision in Different Development Settings – Volume 1 Technical Paper*

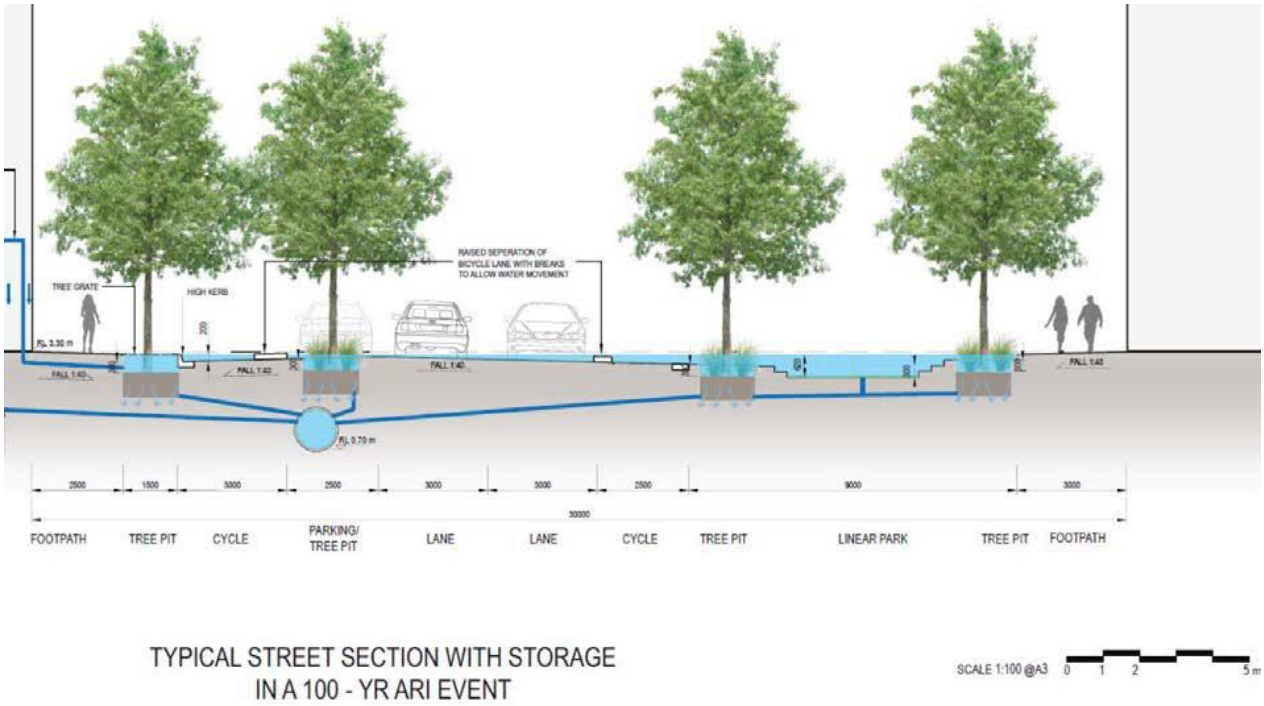
[74] Melbourne Water (2018) *Melbourne Sewerage Strategy Discussion Paper,* Fig 18

population is expected to grow from just over 6 million in 2018 to more than 10 million by 2051, which will drive increasing demand for water and sewerage services. A warmer, drier climate in the future will mean less water flowing into our dams, putting more pressure on water supplies. Climate change may also result in more extreme storm events and sea level rise that will disrupt essential water and wastewater services more often. There may be flooding and greater risks of fire in water supply catchments, while more significant rainfall events could create overland flows of stormwater. Urban intensification can lead to increased water run-off due to higher levels of impervious surfaces. Increased development can also lead to increasing expectations and demands for improved waterway health.

The industry is working to develop cost-effective solutions for established areas. However, the best opportunities to realise the benefits of Integrated Water Management (IWM) are in greenfield developments or large-scale brownfield precincts where entirely new or upgraded infrastructure is needed. Adopting an integrated water management approach in precinct developments brings together infrastructure planning for the streetscape, roadways, open space, green infrastructure, stormwater, sewer and water services. An integrated water management approach will require cross sector involvement as it involves the local government and water authorities undertaking joint planning and delivery. This creates complexity in planning and funding, and Infrastructure Victoria has made recommendations about improvements to governance which will help with these complexities.

If an integrated water management approach is adopted in a precinct, space will be required in the existing roadways to support flood mitigation, urban cooling and green infrastructure. Figure 5 provides an example of a scheme developed for the Fishermans Bend precinct that supports water storage, passive vegetation watering and provision of green canopy and vegetation. However, there is complexity associated with tree planting on streetscapes, due to the potential to interfere with utilities.

Figure 5: Fishermans Bend typical street section



Source: City of Port Phillip 2019

Adopting recycled water can reduce water supply demand by 25% to 35% in precincts, as displayed by the Doncaster Hill and Fishermans Bend proposals. The Doncaster Hill Recycled Water project proposes to pump sewage out of the sewer, treat it to an appropriate standard and store the treated water in tanks, before pumping via a pipeline to dwellings and buildings with a third pipe for recycled water supply. The recycled water can be used to water public green open space and for flushing toilets, washing clothes, watering gardens and car washing in new residential and commercial developments. The Doncaster Hill approach suggests 25% less demand for water supply and reduced sewerage transferred to existing central treatment facilities.[75] A challenge for both proposals is locating the treatment facility. The

[75] Yarra Valley Water (2018) *Yarra Valley Water Doncaster Hill Project Stage 1, https://www.yvw.com.au/faults-works/planned-works/completed-works/doncaster-hill-recycled-water-project-stage-1*

treatment facility would not have to be located within the precinct; however, the further from the precinct the greater the energy demand and cost to pump water to the precinct.

Stormwater

Options also exist for reducing flood risk in precincts by capturing and storing stormwater that can be incorporated into a recycled water scheme or released after a storm event has passed. Stormwater can be released into the drainage system or into a passive irrigation system to water green spaces. Storage can be in the form of swales, rain gardens and pits located in roadways and public spaces or contained in tanks managed by intelligent systems within public and private properties.

Stormwater drainage infrastructure is inadequate in parts of Melbourne that developed prior to the late 1970s. Melbourne's current flood management strategy identifies that flooding cannot be physically 'fixed' or removed entirely; in many locations, the cost of works would be far greater than the value of the properties they would protect. [76] As a result, the preferred approach is to manage the risk and to reduce the consequences of floods when they do happen. The planning system has been utilised as a significant tool to identify land subject to flooding and apply constraints to further development at these locations.

Precinct-scale developments offer the opportunity to more effectively address stormwater risk. New developments are required to prevent an increase in storm water runoff from the development site. Where a development generates additional run off, it is required to capture that run off onsite, usually achieved through the provision of stormwater tanks in a high-density environment. In areas with high flood risk, a more efficient infrastructure response can be to develop a local area storm water capture system. However, this would require contribution of common land to accommodate the infrastructure and a funding mechanism to be developed to equitably fund the development.

5.5.2 Gas Infrastructure

Victoria's natural gas infrastructure network is Australia's largest.[77] Comprising more than 2,000 kilometres of gas transmission and 31,000 kilometres of distribution, the network's asset value is approximately $2.3 billion.[78] Unique among Australian states, demand for network-supplied gas is largely from residential and small commercial customers.[79] With 80% of Victorian households connected to the gas network,[80] this is largely used for heating and cooking. Since 2003, a program has been in place to progressively replace the gas low pressure distribution network with a high-pressure network across Melbourne. Following the high-pressure mains upgrade and the closure of several industrial facilities, the distribution mains system in established areas has significant residual capacity to support additional users and is unlikely to limit incremental residential infill growth. Where local issues are identified, such as a rapid increase in demand or pre-existing infrastructure constraints, they are typically able to be resolved within the five-year capital planning cycle and do not require longer term planning, according to stakeholders.[81]

Burning natural gas emits greenhouse gases, meaning Victoria will need to transition away from natural gas to meet the Victorian Government's target of net zero emissions by 2050. This has implications for the extensive natural gas network, with consideration of transition options needed. To this end, our 2020 draft strategy recommends that future housing estate developments should be allowed to proceed without mandatory gas connection (draft recommendation 8).

A possible future option could be using the gas network to distribute clean hydrogen. Hydrogen technologies could represent a potential competitive economic advantage for Australia.[82] But the cost and application of hydrogen technology is still uncertain, particularly regarding whether retaining the reticulated household gas distribution network is necessary for the deployment of hydrogen technologies.

5.5.3 Electrical Infrastructure

The electrical distribution network consists of overhead and underground lines connecting end users to substations, which in turn are connected to energy generation sources by a separate transmission network. Most of the distribution

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[76] Melbourne Water (2015) *Flood Management Strategy Port Phillip and Westernport*

[77] AEMO (2018) *Victorian Gas Planning Report Update March 2018,* p. 3

[78] AER (2018) *State of the Energy Market,* p. 231, available at https://www.aer.gov.au/system/files/State%20of%20the%20Energy%20Market%202018%20-%20Full%20report%20A4_2.pdf

[79] AEMO (2018) *Victorian Gas Planning Report Update March 2018,* p. 3

[80] AER (2018) *State of the Energy Market,* p. 183

[81] Infrastructure Victoria (2019) *Infrastructure Provision in Different Development Settings – Volume 2 technical appendix*

[82] *COAG Energy Council, Australia's National Hydrogen Strategy, 2019, p.9. www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf*

network lines are above ground, with overhead wires and transformers mounted on power poles feeding supply to individual developments.

The existing electrical distribution network does not have significant spare capacity. However, it is designed to be incrementally expanded to support growth by adding additional transformers, redirecting the capacity of existing substations and upgrading substations. When a substation has reached its full capacity, it is more efficient to build a new substation at a different location located closer to the load source than expand the substation beyond its initial design capacity. As demand increases, additional transformers and new substation sites will therefore be required. For high density areas, pole mounted transformers may not be appropriate, and developers must therefore allow for electrical transformers to be placed within their development site.[83]

Above ground power lines can be unsightly and can conflict with other elements of the streetscape, particularly green infrastructure. Power to new greenfield estates is now provided underground. However, due to the significant expense of relocating existing overhead lines underground, the majority of powerlines in established areas remain overhead. If undergrounding powerlines is assessed to be needed in some locations, a specific response for implementation and cost sharing will be needed.

Economic growth, population growth and increased penetration of temperature sensitive load such as air-conditioning and evaporative cooling over the last 15 years have been the major drivers for electrical demand growth. Increased use of local energy generation such as solar and battery storage has and will continue to assist offsetting the demand growth, however introduction of electric vehicles and demand management applications are likely to significantly alter demand in the future,[84] in addition to the potential transition away from residential use of natural gas (see discussion of gas at 5.5.2). Existing electrical infrastructure planning and provision processes are adequate to support incremental growth in established areas in advance of disruption to the sector, however a new approach will be required to address these likely disruptions to the electrical sector.

5.5.4 Communications Infrastructure

Communications infrastructure in urban areas, based on current technology, consist of fixed line (fibre, cable and copper) networks, mobile networks and fixed wireless networks. Communications infrastructure supporting businesses and households is regulated by the Australian Government and provided and managed predominantly by the private sector, except the NBN.[85] Therefore, there is no requirement for the Victorian Government to provide or fund communications infrastructure in urban areas. There is however a role available to government to facilitate the provision of infrastructure that enables competition by the private sector, without resulting in oversupply or duplicate communications infrastructure in precincts or major urban renewal sites.

Communication technology will continue to evolve. However, fibre connectivity will likely remain a priority requirement in urban areas for some time. As such, we recommend that, in areas that where the streetscape significantly redeveloped, communications conduits are provided that can be used by multiple providers at a future date to enable efficient provision of fibre. Government could facilitate the rollout of the conduit by developing a governance mechanism for access, operation and cost sharing of the infrastructure.

There is also an opportunity for government to support the growing role for communications infrastructure supporting smart technology and collecting data in areas undergoing redevelopment. Applications for smart technology are continuing to evolve, however current applications include dynamic street markings and signage, real time monitoring of traffic and public transport vehicles, and communication with smart devices.

In addition to facilitating provision of conduit for fibre, government could facilitate the rollout of infrastructure, such as smart light poles, by developing a governance mechanism for them to be provided and managed to enable competitive utilisation by multiple organisations. We found in our *Advice on Automated and Zero Emissions Vehicles Infrastructure* that a network of connected roadside infrastructure is likely to be important in supporting the transition to automated vehicles in Victoria. In the short term, this Vehicle to Infrastructure capability can provide essential information on things such as road conditions and traffic flows.[86] This infrastructure could also enable the introduction of automated public transport within urban areas, such as buses or other ‘last-mile’ services, which could improve overall transport access.

5.6 Integrated utility and streetscape planning in precincts

Central utility facilities required under traditional utility provision, such as electrical substations and pumping stations generate heat and noise, and the impact on surrounding residents and workers needs to be considered when deciding

[83] Infrastructure Victoria (2019) *Infrastructure Provision in Different Development Settings – Volume 1 Technical Paper*

[84] United Energy (2014) *Demand Strategy & Plan 2015/16-2034/35*

[85] Deloitte and Aurecon for Infrastructure Victoria (2016), *Infrastructure Capability Assessment ICT*, table 4

[86] Infrastructure Victoria (2018) *Advice on Automated and Zero Emissions Vehicles*

where to locate these facilities. For additional or expanded utility infrastructure in established urban areas, locating it in or near existing open space is likely to be important to provide a buffer to adjacent residential areas. However, given the multiple competing demands that are likely to be placed on open space in urban areas, the opportunities for utilities are likely to be limited. This reinforces the importance of integrating land use and infrastructure planning to ensure space is allocated for utility central services hubs within the precincts and in locations outside of the precincts that can accommodate various utilities, and that evolve as technology evolves.

Looking to the future, studies of specific precincts in Melbourne have been undertaken to investigate opportunities to introduce new integrated water and energy systems. Locations considered include Fishermans Bend, Doncaster Hill redevelopment area, and Southbank.[87] The precinct studies consider several options that may be applicable to other precincts, including:

- Local energy generation plants that substitute remote coal driven electricity generation with local natural gas fired generation (these initiatives may or not be suitable in the future dependant on the evolving role of natural gas and replacements such as hydrogen use).
- Recycled water plants to treat mined sewer and stormwater.
- Photovoltaic and wind generation.

In urban renewal areas where significant change is proposed to open space areas and roadways, there would be benefit in jointly planning all pavement, landscaping and utility upgrades to reduce disruption to existing users of the space and to deliver the works in a sequence that prevents rework of any elements. This will require coordination, governance and costs sharing mechanisms to be developed to support the process.

5.7 Responding to behavioural changes from COVID-19

Many of the opportunities identified in this report and their associated benefits are just as relevant in a post-COVID world as they were in responding to Victoria's historical population growth trajectory. The Greater Sydney Commission has noted that:

> 'Global cities are unanimous in their ambition not to rebuild or restart their pre-COVID-19 economies, but to use the crisis as a catalyst for a more diversified, more equitable, cleaner and greener reinvention.'[88]

The opportunities presented in this report also align with this objective, by promoting an approach to planning and delivering infrastructure that focuses on making best use of existing assets and open spaces, and promoting greater amenity and liveability by providing spaces for Victorians to live and work that have better access to services, open space and a range of transport options.

Infrastructure Victoria will be doing further work to more fully understand the population, land use and infrastructure impacts of COVID-19 in Victoria in preparation for the final *30-year Infrastructure Strategy 2021*. This analysis will be used to inform and update future recommendations on integrated land use and infrastructure planning.

[87] Total Energy Solutions (2012) *District Energy Services Feasibility Study for Manningham City Council & United Energy;* AECOM (2010) *Southbank sustainable utilities study;* City of Port Phillip & GHD (2019) *Fishermans Bend Water sensitive drainage and flood management strategy 2019*, https://www.stormwatervictoria.com.au/images/2019_Events/2019_Conference_Proceedings/Phillip_Joyce_and_Sam_Innes_-_Water_Sensitive_Drainage_and_Flood_Management_Strategy_for_Fishermans_Bend.pdf

[88] Greater Sydney Commission, (2020) *Global City-Region Economies Post-COVID-19 - Supply Chains, Scenarios, Strategies Desktop Review – Phase 1, The Business of Cities*

About us

Infrastructure Victoria is an independent advisory body, which began operating on 1 October 2015 under the *Infrastructure Victoria Act 2015*.

Infrastructure Victoria has three main functions:

- preparing a 30-year infrastructure strategy for Victoria, which is refreshed every three to five years
- providing written advice to government on specific infrastructure matters
- publishing original research on infrastructure-related issues

Infrastructure Victoria also supports the development of sectoral infrastructure plans by government departments and agencies.

The aim of Infrastructure Victoria is to take a long-term, evidence-based view of infrastructure planning and raise the level of community debate about infrastructure provision.

Infrastructure Victoria does not directly oversee or fund infrastructure projects.

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