GOVERNMENT OF WESTERN AUSTRALIA

Infrastructure Western Australia

Foundations for a Stronger Tomorrow

State Infrastructure Strategy



July 2022





Acknowledgement of Country

Infrastructure WA acknowledges the Traditional Custodians throughout Western Australia and their continuing connection to the land, waters and community. We pay our respects to all members of the Aboriginal communities and their cultures, and to Elders both past and present.

This publication can be made available in alternative formats and languages on request. Please call Infrastructure WA on: 08 6552 5229 or email: enquiries@infrastructure.wa.gov.au.

Aboriginal and Torres Strait Islander people are advised that this publication may contain images or names of people who are deceased.



From the Chairperson

On behalf of the Board, I am delighted to present WA's inaugural State Infrastructure Strategy, which lays the foundations for infrastructure planning, delivery and management for the next 2 decades.

Rarely in our busy lives do we get the opportunity to pause, analyse, consider and consult widely on our state's future. That is exactly what Infrastructure WA (IWA) has done to deliver this State Infrastructure Strategy (Strategy).

As WA's very first infrastructure strategy, *Foundations for a stronger tomorrow* represents a significant step forward in the way government plans, delivers and manages infrastructure.

It considers the entire state's infrastructure needs and priorities in the context of our global environment, unique strengths and strategic opportunities. It looks beyond the annual State Budget cycle to ensure public funds spent on infrastructure are targeted and invested as part of a holistic government approach.

The release of this Strategy comes as Western Australians are transitioning a safe path out of the COVID-19 pandemic. We find ourselves in a solid economic position, with the domestic economy growing at its fastest rate in a decade. While in this fortunate position, we need to act quickly to capture opportunity and prosper. Our state brims with the natural resources to underpin our economy. Many of these resources are finite and we need to plan now for a more diverse and sustainable economic future.

Foundations for a stronger tomorrow provides an infrastructure pathway to support that future. It reaches out to our regions, leveraging their unique potential, while delivering opportunity for Aboriginal people.

It considers not only investment in new infrastructure, but how we can get more out of our current infrastructure. The Strategy outlines how the digital technology adoption can ensure infrastructure lasts longer and operates more efficiently. It details how refreshing planning processes, policies and systems will streamline and improve effectiveness now and for future generations.

This Strategy identifies urgent climate action and leadership that is needed to preserve our environment, wellbeing and economy. This was a high priority for our stakeholders. Our state's economy is emissions intensive and ongoing decarbonisation is needed to align our activities and commodities to the fast-growing international demand for low-carbon resources and net zero emissions.

Throughout the Strategy, priority is placed on infrastructure opportunities that will improve the empowerment and self-determination of Aboriginal people. The Strategy builds on progress already made to develop cultural understanding and respect, boost economic opportunities and improve participation.

As well as infrastructure opportunities, the Strategy tackles areas of critical need in metropolitan, regional and remote areas, including improvements to health and housing infrastructure. In particular, the Strategy considers these critical needs in relation to Aboriginal communities and our state's mental health needs. It shows us how early intervention and preventative initiatives can ultimately divert, delay or avoid the need to build and maintain costly infrastructure.

Collectively, the recommendations will build a stronger, more diverse and resilient community, economy and environment for Western Australians, as well as providing long-term clarity for business and industry who want to invest in our state.

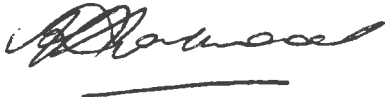
I would like to acknowledge inaugural chairperson, John Langoulant AO, for his personal investment over many years and recent leadership in establishing IWA and developing this Strategy. I also thank the rest of the Board and the entire IWA team for their hard work and dedication in creating this landmark Strategy.

In addition, I extend my appreciation to the many government entities, industry groups, community organisations and individuals who contributed to its development. *Foundations for a stronger tomorrow* is a collective effort. It captures the thoughts, ideas and perspectives of hundreds of people from all corners of the state. I had the privilege of personally meeting with many individuals and groups and I acknowledge how invaluable their input has been.

The release of this Strategy is just the beginning for IWA. The Strategy represents infrastructure needs and opportunities at a specific point in time. In this regard, IWA has prepared a supplementary document that provides an update on contextual factors and significant initiatives announced since the Strategy was submitted to the WA Government in early 2022. This ensures that the Strategy is supported by current information at the point that it is tabled in Parliament. Once the WA Government formally responds to the Strategy, we will continue to monitor and support the implementation of its recommendations.

This next phase of working collaboratively with state government agencies will ensure WA is well placed to retain and gain a fair share of federal infrastructure funding.

This Strategy will help realise our state's enormous potential and deliver the very best results for all Western Australians.



Nicole Lockwood
Chairperson







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Executive summary

Each year government invests billions of dollars in infrastructure to meet the social, economic and environmental needs of WA. It makes sense to consider these investments as part of a long-term plan – one that takes into account long-term challenges and identifies emerging opportunities. Addressing those challenges and opportunities requires a shift in the way the state plans, delivers, operates and maintains infrastructure. The State Infrastructure Strategy (Strategy) sets the state on that path.

The Strategy represents Infrastructure WA's (IWA) assessment of the state's significant infrastructure needs and priorities and makes recommendations to address them. This document provides the framework for improving the state's public infrastructure system. It addresses key areas and requirements that frame and guide infrastructure processes, such as strategic planning, legislation and regulation, policy and decision-making tools. These improvements will help futureproof the state and provide greater investment certainty for industry and the thousands of people who work in WA's infrastructure sector.

This first Strategy provides the **framework for improving the state's public infrastructure system**.

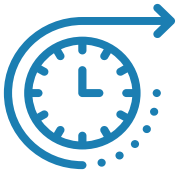
There are good examples of effective work being done across the public sector. However, further steps must be taken to improve infrastructure coordination and development processes. This will provide the WA Government with a whole of government perspective and improved information from which to identify priority infrastructure investments. These investments can offer WA more value over the long term and support the state in meeting agreed government objectives, such as economic diversification.

IWA's work in this first Strategy has been impacted by the limited availability of WA Government agency, statutory authority (collectively referred to as state agencies) and government trading enterprise (GTE) infrastructure plans that extend beyond the annual State Budget's 4-year forward estimates. Where longer-term plans exist, they were typically developed with a narrower focus on the business of the state agency or GTE, rather than taking a more coordinated view across government. Coordinated and collaborated plans that recognise impacts and opportunities across state agencies and GTEs were generally not available.

While this may be understandable, given that such coordination in the infrastructure development process was not always the focus, it does mean that the first Strategy focuses largely on getting the basics right. This will help to ensure future infrastructure investment decisions are based on quality data and, in the meantime, that the right decisions are made to increase the value received from existing infrastructure assets over the long term. It is important to focus on improving the investment decision-making system so that long-term planning is consistent, aligned and evidence-based.

Simply building our way out of an increasing demand for infrastructure is unaffordable and cannot be the only solution. Infrastructure that is built should be built to last. In addition, what is built today will typically still be operating in several decades, serving a society, economy and environment that may be vastly different from those we see and experience now. Maintaining long-term currency of infrastructure assets is a major challenge, particularly given the pace of technological change and rate of digitisation. Globally, the move is towards a much more modular and agile approach to the build and use of infrastructure. For WA, that means recognising that while the physical infrastructure might still be operating in several decades, its use may well be significantly different. We will need to make swift transitions, enabled increasingly by digital technologies. Our built infrastructure will need to be smarter, more integrated, connected and resilient so that value to the community and industry is maximised.

This Strategy also recommends more than 70 capital projects and programs for investment, business case development, planning or investigation, but it is not just a long list of projects. Rather, a significant number of the recommendations relate to non-build initiatives, concentrated over the next 10 years. This will provide the framework and foundation for IWA to build upon with future state infrastructure strategies.



Infrastructure that is built today will typically still be operating in several decades, **serving a society, economy and environment that may be vastly different.**

The final Strategy recommendations form the basis of IWA's advice to the WA Government and inform other functions, such as IWA's role in assessing major infrastructure proposals and the preparation of an annual 10-year state infrastructure program by the WA Government.

Current state

A unique combination of global and local circumstances, dominated by the ongoing impacts and risks of the COVID-19 pandemic, mean the Strategy is being finalised at a time when the public sector is subject to an unusual level of uncertainty and pressure. Attention over the past 2 years was necessarily focused on immediate management and planning priorities rather than longer-term planning.

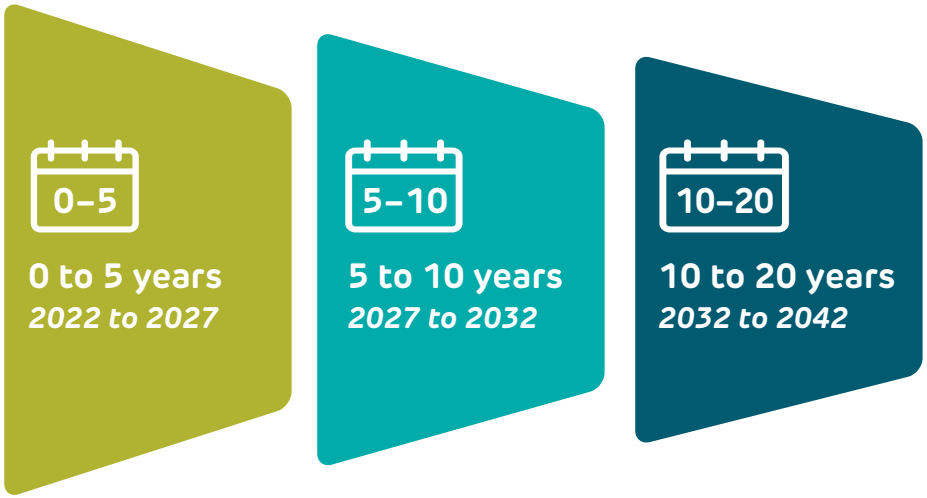
While IWA has recognised and carefully considered those factors in framing its recommendations, the Strategy also underlines the importance of evidence-based, long-term planning to maximise value, improve resilience and best serve the WA community.

Economically, the state has performed well during the pandemic. A combination of factors has provided a significant contribution to supporting this economic performance. These include relative certainty in business conditions, government management of the pandemic, federal and state government stimulus measures and the strength of the state's resources sector. Further detail on the infrastructure-related impacts of the COVID-19 pandemic is provided in the Introduction.

Infrastructure investment has been a primary economic-stimulus policy tool at the state and federal levels. Considerable effort has been directed by many state agencies and GTEs to develop stimulus measures. State agencies and GTEs are currently tasked with delivering an expanded Asset Investment Program. The original target time frames for completing many projects were fast-tracked during 2020 in anticipation of a prolonged and severe economic downturn. The infrastructure-related capability and capacity of the public sector is now heavily focused on delivering the large volume of current projects and programs.

Implementation of the Strategy's recommendations, therefore, extends over 3 time frames: 0–5 years, 5–10 years and 10–20 years (Figure 1). The Strategy provides a framework to enable the public sector to develop its infrastructure plans and programs in a more coordinated and comprehensive manner. IWA's analysis found that the quality, breadth and depth of the current asset plans of state agencies and GTEs varied considerably. The Strategy's 0–5 year recommendations are essential to establishing these long-term plans to an appropriate standard across all state agencies and GTEs. Strategy recommendations that have a 0–5 year focus include non-build actions, work that government has already initiated, ongoing planning activities and recommendations that require rapid progression due to state needs.

Figure 1: State Infrastructure Strategy time frames



Through the consultation process on the *Foundations for a stronger tomorrow, State Infrastructure Strategy draft for public comment* (draft strategy), IWA received feedback from stakeholders requesting greater guidance on specific completion dates for recommendations within the 0–5 year time frame. As a result, IWA undertook a detailed review of all recommendations, in consultation with suggested lead state agencies and GTEs, to identify specific years for completion. Particular attention was given to ensuring the overall timing of recommendations as a package is affordable and achievable, with consideration given to state agency and GTE workloads.

IWA will assist the WA Government throughout implementation of those recommendations supported by the WA Government.

Public infrastructure represents approximately 20% of total public and private infrastructure investment across the state.[1] It provides the facilities for essential social, economic and environmental services provided to the community and industry. The delivery of public infrastructure is heavily influenced by conditions in the broader economy. Governments participate as clients in the construction market. To secure private sector contractor capacity, government projects must compete against the much larger number and higher value of private sector projects. Greater certainty of the WA Government's long-term infrastructure direction and pipeline of work is required to instil confidence in the infrastructure industry and the thousands of people who work in it. This will be assisted by:

- the WA Government's articulation of how it will implement and prioritise the Strategy's supported recommendations, including releasing an annual state infrastructure program with a 10-year outlook from 2023
- monitoring and annual public reporting, prepared by IWA, on the WA Government's progress in implementing the Strategy's supported recommendations.

Challenges and opportunities

The infrastructure challenges and opportunities facing WA are many and varied and are referenced throughout this Strategy. A number of key challenges and opportunities, however, have underpinned the development of many of IWA's recommendations.

WA's economy is strong, yet heavily reliant on selling raw materials to the world. While WA's natural resources are expected to drive the state's growth for many years to come, it is well recognised that a shift to a more diversified and complex economy is needed to ensure a strong and resilient state into the future – one that can withstand risks such as changing trade relationships. Infrastructure is crucial to supporting and growing existing industries and serves as a catalyst to unlock emerging industries.

A shift to a more **diversified and complex economy** is needed to ensure a **strong and resilient state into the future**.





The WA population is forecast to grow from around 2.7 million in 2021 to 4.3 million by 2042, an increase of 60%.[2] This is based on a return to open borders and net migration in the near term. In this environment, Perth and many other centres around the state will continue to grow, placing increased pressure on existing infrastructure and generating demand for new infrastructure. Factors such as reduced rainfall and the introduction of new technologies will mean that the population, and population growth, in some centres is likely to stabilise or even decline. This will present different challenges and a need to adopt new models to provide infrastructure and services in alternative and more efficient ways.

Demographic trends to 2042 indicate relatively low birth rates and a higher percentage of the population aged 65 years or over.[3] This will impact many infrastructure sectors, particularly health and education, and will have flow-on economic impacts.

The demand for infrastructure and services is ever increasing, placing pressure on the sustainability of government finances. This Strategy highlights the need for a stronger focus to be placed on demand management and prevention initiatives that ultimately divert, delay or avoid the need for costly infrastructure. Infrastructure and services should also be delivered more efficiently where possible.

On current predictions, climate change will impact areas of the state in different ways, with significant impacts such as reduced rainfall, more intense weather events, a rise in sea level, coastal erosion and shifts in temperature.[4] The need for our current and future assets, the people who use them, and the economy to have the capacity and resilience to deal with the infrastructure-related challenges of climate change must not be underestimated. Climate change is also driving the need to reduce emissions. Given the nature of industry in WA, reducing carbon emissions to reach net zero by 2050, in keeping with the WA Government's stated target, while remaining globally competitive, is both a challenge and an opportunity. Infrastructure has a large role to play in reducing emissions across sectors such as energy, transport, water, waste and the built environment.

Embracing digital technologies will result in increasing agility in the provision of government services. This can be achieved by enabling data-informed and quick-response decision-making, and flexible service delivery models. As evidenced in other jurisdictions, digital transformation can be harnessed in WA to create competitive advantage, efficiencies and jobs. A digital-first approach should be embedded throughout the infrastructure lifecycle to maximise the value of infrastructure. As technologies do also give rise to greater risks of digital disruption, such as increased cybercrime, a strong risk-based management approach is warranted.

Approach to developing the Strategy

Given the dynamic rate of change and the inability to precisely predict the future over a 20-year horizon, IWA's approach to developing the Strategy has been to place a strong focus on exploring what the future might present and applying scenario planning to identify a range of plausible futures. IWA examined global megatrends and drivers in the context of WA's strengths and advantages and identified 6 strategic opportunities where these intersect. These opportunities formed the foundation of the Strategy's 2042 vision – driving the state towards a more diversified economy and prosperous society over the long term.

The 6 strategic opportunities identified for WA are:



a global location of choice



value-adding for strategic commodities



approaching the technology frontier



transitioning to net zero emissions technologies



promoting and leveraging Aboriginal cultural heritage and enterprise



serving the emerging consumer class

IWA identified strategic opportunities which formed **the foundation of the Strategy's 2042 vision** – driving the state towards a more diversified economy and prosperous society over the long term.

Working with these 6 strategic opportunities provided IWA with a top-down approach to developing the Strategy. IWA also used a bottom-up approach – reviewing the range of existing infrastructure strategies and plans held by state agencies and GTEs. As a result of this hybrid approach, a number of IWA's recommendations focus on accelerating and building upon work that government has already initiated.

As part of the development process, IWA consulted widely to gather different perspectives on a wide range of infrastructure issues and potential solutions. To ensure the Strategy was evidence-based, IWA also commissioned work where gaps existed, and to better understand technical and strategic matters.

In line with the *Infrastructure Western Australia Act 2019* (IWA Act), IWA has taken a triple bottom line approach – considering social, economic and environmental matters – in developing the recommendations.

Feedback received during consultation on the draft strategy has further refined the Strategy's content and recommendations. Hundreds of stakeholders provided feedback on the draft strategy, providing a wide range of perspectives. The consultation outcomes chapter, A collaborative journey, provides an overview of what IWA heard and outlines the refinements made throughout the Strategy to address this feedback. In addition, each cross-cutting theme and sector chapter contains a summary of stakeholder feedback and subsequent refinements specific to that chapter.

Core themes

The Strategy is divided into chapters that address 7 cross-cutting themes and 9 infrastructure sectors. As wide as those areas may be, there are core themes that underpin most of IWA's recommendations. These core themes were recognised and reconfirmed by IWA's consultation on the draft strategy.

Managing demand for infrastructure through prevention, early intervention and pricing

Infrastructure is costly to develop, operate and maintain and it is becoming increasingly challenging for government to meet the growing demand for infrastructure and services. IWA has found that a greater focus on demand management and prevention initiatives – whether it be from a transport, health or cross-sectoral perspective – can ultimately divert, delay or avoid the need to build and maintain costly infrastructure. Early intervention to address complex issues, such as social disadvantage, can also help to improve an individual's life outcomes and reduce demand on health and other social services infrastructure. These gains take time to realise, and government may need to spend more initially to realise the benefits. For example, access to social and affordable housing is a key factor in reducing disadvantage and enabling a safe and secure base from which to access wraparound services.

A greater focus on **demand management and prevention initiatives** can ultimately divert, delay or avoid the need to build and maintain costly infrastructure.

While there are examples of the successful rollout of demand management and prevention initiatives in WA, there is scope to apply these practices across a wider range of sectors and at an increased scale and pace. These initiatives are often complex, particularly in relation to social infrastructure and services, and therefore require coordinated action across multiple entities within and outside of government.

IWA has made a range of recommendations that recognise the importance of demand management and prevention measures, such as transitioning to a person-centric, preventative and community-based public health system to reduce demand on hospitals. The Water, Waste, Transport, and Justice and public safety chapters also include demand management recommendations.

The Strategy also recognises that demand management initiatives will increasingly rely on digital technologies, which can improve understanding of consumer behaviour, better monitor infrastructure performance and provide valuable data to inform planning and decision-making. Demand management is discussed in greater detail on page 172.

Improving the quality and consistency of strategic infrastructure planning and processes

One of IWA's primary findings is that individual state agency and GTE infrastructure strategies, plans and business cases are, in many cases, of inadequate quality and consistency. In the main, these documents are outdated, generally focused on a 5-year period and do not adequately or consistently consider strategic matters such as climate change mitigation or adaptation, or the opportunities that digital technologies can provide.

Other common themes that emerged, and that underpin many of IWA's recommendations, were the need for infrastructure planning to be place-based and community-led to ensure infrastructure is fit for purpose and meets the needs of the community it serves. Achieving greater integration of land-use and infrastructure planning is also addressed in the recommendations. Integrating state agency and GTE long-term plans for infrastructure and services with desired patterns of growth and development enables the right infrastructure to be delivered in the right place and at the right time. For example, the integration of transport and land-use planning is paramount to achieving urban consolidation objectives and can reduce overall travel demand and distances, shift mode choices and deliver system efficiencies. Aligning housing, health, education, arts and recreation investments with transport and land-use plans will enable us to live more sustainably and affordably.

The Strategy also places a strong focus on improving system basics, identifying gaps in the strategic planning framework and recommending improved processes to guide state agency and GTE planning. Improving these plans and processes will provide a strong foundation on which future state infrastructure strategies can build. Good-quality, consistent and integrated planning, and well-informed decision-making by government will also support greater investment certainty for industry.

The review and improvement of the Department of Treasury's Strategic Asset Management Framework is strongly recommended to guide state agency and GTE planning. IWA appreciates, however, the resource implications for state agencies and GTEs of the measures proposed in this recommendation and therefore proposes they mostly apply to projects and programs of $100 million or more, in the first instance.

At a cross-cutting theme and sector level, the Strategy recommends development of a number of strategies and plans to establish the long-term needs for the different sectors, which can then inform future government activities. This includes plans relating to digital connectivity, water, housing, waste, transport, land use, arts and culture, sport and tourism. This Strategy recommends that a range of plans be finalised or refreshed in the health sector and recommends the development of a strategic framework to maximise regional development outcomes.

Addressing climate change

Climate change was a high-priority issue raised by stakeholders throughout the consultation undertaken as part of developing the Strategy. It is a critical long-term issue impacting many sectors, particularly water, transport and energy, and one that is not currently adequately addressed by most state agency and GTE infrastructure planning systems and processes.

Reducing carbon emissions and improving the resilience of infrastructure to address the impacts of climate change is also a focus of this first Strategy. In developing the Strategy's climate change recommendations, IWA has considered the Western Australian Climate Policy (WA Climate Policy, inclusive of the *Western Australian Climate Policy: a plan to position Western Australia for a prosperous and resilient low-carbon future*). Building on this policy, several recommendations seek to embed and accelerate the implementation of key elements as they relate to infrastructure. This includes a more coordinated and accountable WA Government, state agency and GTE leadership, and transparent reporting on progress.

Climate change recommendations seek to embed an interim target and net zero emissions by 2050 target for WA, focusing on the assets and activities of state agencies and GTEs as a priority. The Strategy's recommendations leverage the net zero emissions transition plans and sectoral emissions reduction strategies detailed in the WA Climate Policy, emphasising the need to accelerate development, with actions funded and resourced.

The Strategy places a strong focus on **improving system basics, identifying gaps in the strategic planning framework** and **recommending improved processes** to guide state agency and GTE planning.





Implementing data sharing and other tools to support infrastructure planning and investment decision-making

Sound infrastructure planning, policy and investment decision-making is underpinned by access to current, high-quality and fit for purpose data. The application of consistent planning assumptions, availability of data and forecasts at suitable geographies, and access to data analytics, visualisation capabilities and modelling tools are important in developing evidence-based, aligned and integrated infrastructure plans and major infrastructure proposals.

In developing the Strategy, IWA found that while some state agencies and GTEs have access to complex data and models to support planning processes, others were lacking, and many did not apply scenario planning as a tool. While many state agencies and GTEs hold large amounts of data, little of the most valuable data is shared.

To improve on these issues, this Strategy recommends further a government data management and asset information policy that includes processes and standards to enable data sharing and analysis. Specifically, this should be done to address 2 pressing challenges: management of the existing asset portfolio, and planning and prioritising new infrastructure. The Strategy also recommends establishing a whole of government digital platform that enables sharing of location-based asset information. Other recommendations include developing and implementing a single set of common planning assumptions to improve the alignment and consistency of strategic planning processes and developing climate change data projections across all regions of the state to inform strategic planning.

Optimising the existing infrastructure asset base

As the network and scale of the state's infrastructure assets grow, so does the cost to operate and maintain the asset base. Around two-thirds of the total cost of an asset generally occurs after it is built or acquired.[5] The state's vast distances and low population densities in most areas present further challenges in optimising investment decisions.

Establishing and providing funding to support sound asset management practices is a challenge for all governments, at both state and local levels. IWA's baseline review confirmed that while asset management practices vary considerably across government, these practices require substantial improvement across most state agencies and GTEs. Common features include significant maintenance backlogs, a lack of asset management data and a short-term focus on funding new projects. Challenges in meeting the growing demand for infrastructure and services within fiscal constraints is driving the need to consider how existing infrastructure can be used more efficiently and effectively.

The Strategy recommends infrastructure planning processes consider how existing assets can be optimised or capacity increased before new builds are considered. The application of digital technologies or non-capital demand management solutions provide many opportunities to extend asset life or increase capacity, deferring or avoiding the need to build new infrastructure. A digital-first approach should be embedded in asset planning and management processes to identify where digital solutions can achieve asset optimisation. Improving the integration of land-use and infrastructure planning can also help to improve the use of existing assets, for example, by considering where system capacity is available to support increased urban densities.

The Strategy includes a number of recommendations to improve maturity in asset management practice by state agencies and GTEs, incentives to implement improvements, and improvements in asset information policies, processes and standards.

Identifying major infrastructure projects and programs

While the Strategy places a strong focus on non-build system improvements, it also recommends more than 70 capital projects and programs for investment, business case development, planning or investigation. Further, the Strategy recommends measures to improve project assurance, governance and skill development, while modernising procurement and cost management.



Challenges in meeting the growing demand for infrastructure and services within fiscal constraints is driving the need to consider **how existing infrastructure can be used more efficiently and effectively.**

The Strategy recommends investing in major projects and programs across the Water, Transport, Housing, Arts, culture, sport and recreation, and Justice and public safety chapters. IWA also recommends that essential infrastructure in remote Aboriginal communities and town-based reserves be upgraded.

Strategy recommendations

IWA has made 93 recommendations addressing key infrastructure sectors and a range of cross-cutting themes. Many of the recommendations are related and interconnected. IWA has carefully considered how the recommendations work together to achieve the Strategy's vision and objectives.

Many of the recommendations are non-build initiatives, focusing on improving fundamental elements of the infrastructure system, such as policy, planning and legislative frameworks. Significant thought has gone into ensuring they are affordable and deliverable and that they are evidence-based wherever possible and will have lasting impacts over the long term. Many of the recommendations address major investment across both economic and social infrastructure sectors, having also considered environmental matters.

Strategy vision and infrastructure outlook

Fast forward to the year 2042

To navigate our way to a stronger tomorrow, we need to imagine what our future looks like and establish a vision for the state in 2042. This will create a framework for understanding what needs to be done, now and over the medium to long term, to get there. This section outlines this vision by referring to the main global megatrends and drivers of change that IWA expects will impact the state. Clearly, many things will occur over the next 20 years that no-one can accurately predict. The vision, therefore, also provides a framework within which these unanticipated developments might be managed.





Vision statement

WA is a sought-after place to **live, visit, study and invest**, with infrastructure improving productivity and equity, and unlocking industry growth that **leverages WA's advantages** and diversifies its economic base.

Western Australia in 2042

In 2042, WA has come a long way. Even though the population has grown to 4.3 million, carbon emissions have reduced markedly as a result of the transition to green energy, increased energy efficiency and a strong uptake in the low and zero emission vehicles market. Accessible social and affordable housing has made great strides in reducing homelessness, unemployment is low with a skilled labour force filling jobs in the green and digital economies and, while the state's economy is still supported by a strong resource and energy sector, growth in other sectors has resulted in a more diversified economy bolstered by efficient supply chains.

Aboriginal culture is thriving

Enduring connections between land and wellbeing are recognised and Aboriginal culture has been elevated as a source of higher knowledge. As a result, WA's society, economy and environment have grown as Aboriginal people's deep knowledge of the land is shared and integrated with research and development. WA's Aboriginal population has prospered, with considerable advancements in Aboriginal business development, economic participation and social outcomes. Aboriginal culture has flourished as part of a vibrant WA cultural identity, recognised locally and internationally for its arts and cultural tourism offerings. The state's infrastructure investment in housing, water, energy and digital connectivity in Aboriginal communities has helped close the gap on Aboriginal disadvantage.

The green energy economy is booming

Driven by a strong commitment by governments, industry and the community to reduce carbon emissions, WA has successfully navigated its way through a reduction in fossil fuel consumption by investing in a renewables market. WA has been particularly successful in solar and wind energy generation, taking great advantage of the state's vast available land and its significant solar radiance and wind speeds. Coupled with the development of a successful green hydrogen energy industry, WA's industries and households benefit from reduced energy costs, with a significantly decarbonised local industry and a new major export.

The ongoing decarbonisation of the global economy has created a fast-growing demand for WA's rich minerals, which are needed to enable the world's energy transition. With its strong industrial history in the resources sector and its substantial reserves of cobalt, nickel and lithium, it has been a natural transition for WA to develop a strong export market in these strategic commodities. The state's early recognition of downstream processing opportunities, enabled by an affordable supply of green energy, has optimised the value of our mineral resources and we are now enjoying a richer and more diverse export market than ever before. WA's well-developed lithium battery manufacturing industry is directly servicing the massive global green construction and electric vehicle market.



A diverse and thriving economy

Downstream processing opportunities have not been limited to minerals. New technology enabling increased water efficiency has been coupled with investment in agrifood and has raised productivity to facilitate the transition from low-input/low-value production to low-input/high-value production business models. Foresight in the 2020s that recognised the opportunity from the growing middle-class consumer market (particularly in Asia) has led to the expansion of markets in the tourism, education, agriculture and food, and cultural sectors.

A proactive commitment to expand and diversify WA's economic base has resulted in the growth of advanced manufacturing hubs where industries such as shipbuilding, digital technologies and advanced materials are thriving. WA has combined its strengths in shipbuilding and subsea expertise to become a world-class centre for maritime and naval shipbuilding and maintenance.

WA's reputation as an important incubator of knowledge capital and innovation has led to continued investment in research and development. This investment has grown from a strong focus on oil and gas, minerals, exploration and mining services to a much broader scope. WA is now also leading in equipment manufacturing, information technology system design, remote operations and automation across several sectors. Strong collaboration between universities, research institutions and industry has underpinned extensive innovation across a range of WA's key industries.

Western Australia is the place to be

WA is renowned as a global location of choice for international migrants to live, visit, study and invest. WA recovered well from the impacts of the COVID-19 pandemic in the early 2020s, and our progressive and person-centric health system is recognised as world-class. Our ongoing strong performance in global liveability rankings has encouraged skilled migrant workers to our shores and the international education sector is flourishing.

Regional communities have benefited from our strong growth in the knowledge economy, diversifying beyond traditional agricultural and resource industries. WA's access to high-quality digital connectivity and optimisation of fast-speed international connections has resulted in the state being highly competitive in the global marketplace.

Outlook for Western Australia

Table 1 presents information representing significant shifts sought over the next 20 years for each of the cross-cutting themes and sectors addressed in this Strategy.

Table 1: Western Australia – today and tomorrow

	Today – 2022	Tomorrow – 2042
Cross-cutting themes		
 **Digital connectivity and technology**	• Mobile coverage in regional and remote WA is highly variable and patchy, with 1,750 registered mobile blackspots.[1] • A mix of new and legacy technologies is resulting in variable performance, with some areas of WA experiencing slow, unreliable and costly internet services. • Adoption of digital technologies in infrastructure planning and control systems is emerging but is hampered by outdated information and communications technology systems.	• Due to its digital transformation, WA is a leader in the knowledge economy and is reaping the benefits of digitised infrastructure systems and advanced manufacturing hubs. The Square Kilometre Array and space research have become established components of the science and research sector supported by world-leading, high-performance computing capability. • High bandwidth and data demand, driven by increased uptake of digital, is being met by the availability of a range of telecommunications services at affordable prices. • Government infrastructure assets are digitised, and a strong data analytics and visualisation capability informs planning and decision-making and results in significant cost savings.
 **Aboriginal cultural heritage, wellbeing and enterprise**	• Aboriginal cultural heritage is a rich and enduring resource, and its benefits and opportunities are starting to gain wide acknowledgement. • Like other Australian jurisdictions, WA has made limited progress in meeting Closing the Gap targets.[2] • Sub-standard infrastructure and services in many remote Aboriginal communities and town-based reserves is resulting in poor environmental health outcomes.	• Aboriginal cultural heritage is widely celebrated, supported and acknowledged, with Aboriginal business development, economic participation and social outcomes strongly established. • WA is meeting Closing the Gap targets. • Remote Aboriginal communities and town-based reserves receive appropriate essential services.
 **Climate change and sustainability**	• International and domestic pressure on governments to take strong action to mitigate climate change is intensifying. In its WA Climate Policy, the WA Government seeks to achieve enhanced climate resilience and net zero emissions by 2050.[3] • WA is highly vulnerable to climate change. Average temperatures have already risen about 1°C over the past 100 years.[4] The impacts of climate change are particularly evident in coastal erosion, water availability and natural disasters. • Infrastructure sustainability innovation is being implemented in some sectors, including the use of sustainability rating tools in some cases.	• Aligned with growing global recognition of climate change, the state has progressed substantially towards its net zero emissions by 2050 target and has met or exceeded its interim targets by progressive transition to green energy and fuels, greater energy efficiency and offsetting residual emissions through carbon sequestration. • The public infrastructure program has undertaken a comprehensive transition to renewable energy use and the adoption of sustainable infrastructure design. • There is an ongoing focus across state agencies and GTEs to provide resilient infrastructure and services to adapt to and mitigate climate change impacts.

Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
 **Regional development**	• WA has transitioned from the 2007 to 2013 resources investment boom and regions are entering a new phase of economic diversification and growth. • Regional challenges such as digital connectivity, housing and climate change are impacting on regional development. • Unclear regional development priorities are holding back step change in regional outcomes.	• Regional economies are diversifying and growing, capitalising on relative strengths to attract people and investment, drive skills and innovation and create sustainable business and employment. • WA's network of liveable, connected and growing regional centres is offering high-quality services, attractive lifestyles, employment and careers. • Collaboration between communities, government and business is driving diversification and growth and achieving a step change in regional outcomes.
 **Planning and coordination**	• The extent of integrated land-use and infrastructure planning across the state is highly variable in currency, long-term outlook and evidence-based understanding of infrastructure needs to support growth. • Some progress is being made towards the 47% infill target for Perth and Peel but more work is needed to unlock barriers, increase amenity and incentivise development in established urban areas, which will lead to better use of existing infrastructure.[5]	• A shared, long-term view of WA's public infrastructure needs is driving well-considered investment decisions and collaborative delivery. • Integrated regional plans are established, measured and routinely updated, aligning infrastructure needs with population change and economic development. • Improved attractiveness and feasibility of urban intensification has resulted in well-located and well-designed infill development being the preferred outcome, with infill targets being met or exceeded.
 **Infrastructure delivery**	• Industry can struggle to respond to peaks and troughs in infrastructure investment without long-term pipeline visibility or the certainty to increase investment in training. • Skills across the infrastructure lifecycle vary within the public sector, and the lack of skilled personnel is a challenge due to the cyclical infrastructure market. • Project approvals, procurement and assurance practices are impacting on infrastructure delivery objectives and heightening risk profiles.	• The certainty provided by an infrastructure pipeline has resulted in a well-resourced, appropriately skilled and sustainable infrastructure sector. • Modernised project procurement and assurance processes enhance the efficient and cost-effective delivery of the state's infrastructure program. • The public and private sectors have the confidence and appetite to invest in productivity-enhancing economic infrastructure, enabled by policies and practices that protect the public interest.

Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
 Asset management	• The level of maturity in asset management practice varies considerably across the WA public sector, including local government, resulting in a significant maintenance backlog. • There is an absence of incentives to drive better practice in asset management or extend the life of existing assets instead of building new ones. • Asset information is inconsistent and often inaccurate, making it difficult to understand risks or secure funding for asset maintenance and renewal.	• The state's asset base is well understood, managed and maintained, resulting in appropriate levels of funding, better service provision, safer assets and lower lifecycle costs. • All state agencies and GTEs have access to centralised, best-practice guidance and support, have a baseline level of asset maturity, and individual asset management systems are operationalised. • Use of digital technologies and real-time data in asset management is common practice.
Sectors		
 Energy	• Transition to renewables is underway with rooftop solar systems common in WA, adding complexity to baseload supply systems. • Emergence of standalone power systems in regional and remote areas is increasing. Battery technology is improving but is not yet a viable solution to baseload supply. • WA dominates the country's liquefied natural gas (LNG) output and Australia has become one of the largest exporters of LNG.	• Gas remains a component of the state's base energy system but is offset through successful carbon sequestration. WA has primarily transitioned from coal-fired to renewable energy generation and is a leading exporter of renewable hydrogen as international trading partners demand cleaner fuels and energy. WA is on track to meet its net zero emissions by 2050 target. • Households and businesses are increasingly adopting off-grid renewable energy generation and storage options while using energy-efficient appliances in energy-efficient buildings. • The resource extraction industry transitions from diesel to renewable energy generation and storage, including renewable hydrogen, enabling value-adding through downstream processing.
 Water	• Large centralised systems provide water treated to drinking water standards for all-purpose use. • Water supply mix is dominated by desalination and groundwater, with wastewater recycling and replenishment schemes also contributing to a small degree. • Water demand management policies are having some success in reducing water consumption, with further measures and increased targets needed.	• Water security and resilience is achieved through best-practice natural resource management and investment in climate-independent and energy-efficient water sources. • A highly water-literate consumer base and an optimised infrastructure network has combined to achieve water efficiency targets. • Implementation of full water-cycle management, including reuse and waste minimisation, has resulted in optimised use of multiple water sources.

Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
 Waste	• WA's economy is based on a take, make, use and dispose economic model. However, Western Australians are increasingly recycling and avoiding waste. • WA is not achieving waste targets, and bans on the export of waste plastic, paper, glass and tyres are placing pressure on waste management. • Community attitudes towards waste are shifting. However, these remain a major barrier to increased waste avoidance and recovery.	• WA has embraced a sustainable, low-waste circular economy that values waste, produces less waste, and reuses and recycles more for the benefit of the WA economy and environment. WA's waste targets are being met or exceeded. • Strong demand for recycled waste products is contributing to meeting waste targets for waste avoidance and recovery. • Modern, accessible and well-managed waste infrastructure is supporting a viable domestic recycling industry.
 Transport	• Private motor vehicles remain the dominant mode of transport over public transport, cycling and walking. • There is early-stage movement towards an integrated and mode-agnostic approach within the Transport Portfolio. • Multi-modal freight supply chains support primary industry exports.	• Technological advances in transport, through automated and semi-automated vehicles and zero emissions technology, lead to more productive supply chains, improved safety outcomes, cost savings and lower emissions. • Fully integrated planning and delivery results in more efficient and flexible connections between transport modes and stimulates and supports greater infill housing development, with a modal shift towards greater public transport use and active transport. • Ongoing targeted investment in freight networks, including in the Perth metropolitan area, supports efficient supply chains, international trade and export industries. • Improved technology, infrastructure planning and behavioural change lead to better transport system safety outcomes in line with the WA Government's vision for zero serious injuries and deaths on WA roads.
 Housing	• There is increasing demand for social housing linked to rapid changes to personal circumstance and the housing market as a result of the COVID-19 pandemic. • Social and affordable housing planning and investment does not fully respond to region-specific market conditions. • A disproportionate number of Aboriginal people live in overcrowded dwellings and experience issues accessing housing.	• Tailored home and housing support, at the right time and in the right place, is more accessible. • A diverse social and affordable housing sector provides greater choice and targeted wraparound services catering for the needs of vulnerable people. • Targets to reduce overcrowding in Aboriginal communities have been met and Aboriginal organisations lead the delivery of social and affordable housing in their communities.

Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
 Health	• WA's population is growing and ageing, and the incidence of chronic disease is placing increased pressure on the health system. Mental health is an area of significant need. • WA's health system is focused on treatment in acute hospitals and growing expenditure may negatively impact on other areas of the State Budget. • Managing the impacts of the COVID-19 pandemic is a current system-wide focus.	• WA's population is healthier, supported by a health system with a strong focus on prevention, equity, child health, end-of-life care, and more seamless access to services at home and in the community through use of technology and innovation. • Advanced technologies and a digital approach underpin a modern, integrated and personalised health system delivering safer, more efficient and higher-quality health care. • WA is globally recognised for innovative biotechnology and digital health, personalised medicine and advanced manufacturing of medical products, and the medical research sector has grown as a share of the WA economy.
 Education and training	• There is a greater focus on group and collaborative learning with fit for purpose classroom design incorporated into new schools. Online and distance learning is in use in some cases. • TAFEs, private training organisations and WA industries are increasingly collaborating to understand curriculum and training needs. • Changes to funding and reduced migration as a result of COVID-19 are impacting on the financial viability of the state's universities.	• Education and training facilities are delivered using modern methods including modular offsite construction techniques that are designed for modern teaching and learning methods. Regional and remote education and training services are increasingly delivered online. • The international education sector is thriving and growing to meet or exceed targets. Through a range of strategic measures implemented by the WA Government, the education and training sector's share of gross state product has increased materially. • Course offerings and the associated infrastructure are designed for the modern economy, with higher education and student accommodation located both in the Perth central business district (CBD) and across well-connected urban areas.
 Arts, culture, sport and recreation (ACSR)	• WA has a wide variety of ACSR facilities, but some existing assets are no longer fit for purpose due to historical under-investment. • WA's long-term tourism outlook is unclear, and tourism-related activities are not always well coordinated to achieve integrated industry outcomes. • Opportunities for enhanced liveability, creativity and economic activity are lost to WA in some cases, due to a lack of enabling ACSR infrastructure.	• The recognition of WA's natural beauty, vibrant arts, Aboriginal cultural offerings and strong sporting identity has resulted in a booming tourism trade. • WA's world-class and contemporary suite of ACSR venues attract events and performances, audiences, athletes and participants from around the world. • Investment in ACSR infrastructure has resulted in a thriving and diverse creative arts industry, high participation rates in sport and recreation and improved liveability.

Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
Justice and public safety	• Increasing demand, exacerbated by COVID-19 (for example, border control), has resulted in a significant increase in the size of WA's police force. • WA has the second-highest imprisonment rate in Australia per 100,000 adult population, and the highest Aboriginal and Torres Strait Islander imprisonment rate per 100,000 adult Aboriginal and Torres Strait Islander population.[6] • Emergency response training facilities and radio communications are under pressure to keep pace with legislative changes, the impact of climate change, and the demands of urban infill and design.	• A focus on early intervention, prevention and rehabilitation has reduced crime rates in WA and resulted in safer communities. • Technology interventions have enhanced crime prevention, modernised court proceedings and improved offender rehabilitation. • Fire and emergency services responders are resilient and highly skilled, supported by modern communications and trained to deal with a wide range of incidents.



Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
Society, economy and environment		
 **Society**	• WA's population is 2.7 million.[7] Approximately 75% of the state's population live in the Perth metropolitan area, and 25% live in regional WA (inclusive of the Peel region).[8] • WA's population growth is largely driven by immigration in response to economic growth cycles, most recently due largely to the resources sector. • The population of Greater Perth increased by 1.8% in 2019–20, the second-highest growth rate of all Australian capital cities.[9]	• WA's population is around 4.3 million, an increase of 60% since 2021.[10] Continuing strong population growth is the main driver for efficient, effective and timely provision of public infrastructure. • The population of regional WA has increased. Service models have been planned and adapted to meet the changing needs of communities across WA. • WA's population is ageing. There are proportionally fewer children (under 15 years of age) and a larger proportion of people over the age of 65.[11] An ageing population has increased demand for health, aged care, disability services, accessible transport and housing services.
 **Economy**	• WA's gross state product was $361.8 billion in 2020–21 or 17.5% of Australia's gross domestic product.[12] • WA's economy is more dependent on exports than any other state or territory in Australia. WA's top 5 export markets are China (60%), Japan (9%), South Korea (6%), United Kingdom (4%) and Singapore (4%).[13] Commodities dominate WA's exports, and WA is currently the world's largest single supplier of iron ore and lithium, and second-largest exporter of LNG and alumina.[14] • It is acknowledged that economic diversification is required to drive new sources of innovation and growth and improve resilience of the economy to resources demand.	• The resources sector is continuing to contribute strongly to the economy, driven by global demand. However, competition from foreign producers has increased.[15] • The resource sector's share of WA gross value add has grown.[16] However, the sector's share of WA employment has decreased due to new technologies. Service industries such as health care and social assistance contribute more to gross value add and employment, outpacing agriculture and construction.[17] • Infrastructure has strengthened global competitiveness and the productivity of existing industries and supported the growth of new industries that have capitalised on WA's strengths. • Trading partners increasingly value WA's enhanced global position as a safe, clean and green location due to its stable, open economy and strict biosecurity measures.
 **Environment**	• WA is internationally renowned for its biodiversity. WA has 8 of Australia's 15 biodiversity hotspots, and 1 of the world's 36.[18] The south-west hotspot, which extends from Shark Bay to Esperance, hosts more than 8,000 plant species, of which about half are found nowhere else.[19] • Increasing community expectation for strategic, sustainable developments that protect valuable natural assets, delivered through initiatives such as the Native Vegetation Policy for WA.	• The intrinsic value of WA's environmental assets is well recognised. The state balances sustainable development with conservation and enhancement for future generations. • There is ongoing focus across state agencies and GTEs to deliver infrastructure that is resilient to and mitigates climate change, and to choose solutions that avoid and mitigate impacts on natural assets.



Introduction

Infrastructure shapes and influences every aspect of our modern world – from where we live, to how we work, our social interactions and economic structures. It enables us to plan and respond to change, and ensures our daily essentials are provided safely and reliably.

Well-planned and efficient infrastructure is essential to enhancing liveability and maintaining a strong economy and healthy environment. Most infrastructure is built to last for several decades and will still be in use at a time when society, the economy and the environment may look vastly different from what they do today. Having a long-term and comprehensive state infrastructure strategy in place is important because it enables the WA Government to consider long-term global trends as well as local challenges. In times of increasing change, having a robust vision and direction that unifies stakeholders and creates clear pathways for change has arguably never been more important.

Infrastructure WA

IWA is a statutory authority tasked with providing expert advice and assistance to the WA Government on the state's infrastructure. IWA was established in July 2019 and is governed by a Board established under the IWA Act. Aside from developing a 20-year strategy, IWA also undertakes a range of other roles, including:

- assessing major infrastructure proposals
- providing advice to the WA Government on the preparation of an annual 10-year state infrastructure program (from 2023)
- providing advice and assistance to state agencies and government trading enterprises (GTEs) in preparing infrastructure strategies, plans, policies and proposals
- coordinating the state's submissions to Infrastructure Australia
- providing advice to the Premier on infrastructure priorities, and the funding and financing of infrastructure
- reviewing and reporting to the Premier on completed infrastructure projects.

Under the IWA Act, IWA is required to assess all major infrastructure proposals (defined in the IWA Act as projects and programs with a capital cost of $100 million or more, those nominated by the Premier or as defined in regulation) prior to an investment decision being made. Interim guidelines were released in late 2021, setting out the multiple-step assessment process and adopting the Department of Treasury's Strategic Asset Management Framework as the basis for content requirements. IWA liaises with the Department of Treasury and proponent state agencies and GTEs in undertaking this function, including involvement through the earlier stages of concept and business case development. The guidelines will be refined over time in collaboration with state agencies and GTEs, including with regard to alignment with Infrastructure Australia's Assessment Framework, where appropriate, and any relevant recommendations from this Strategy that are supported by the WA Government.

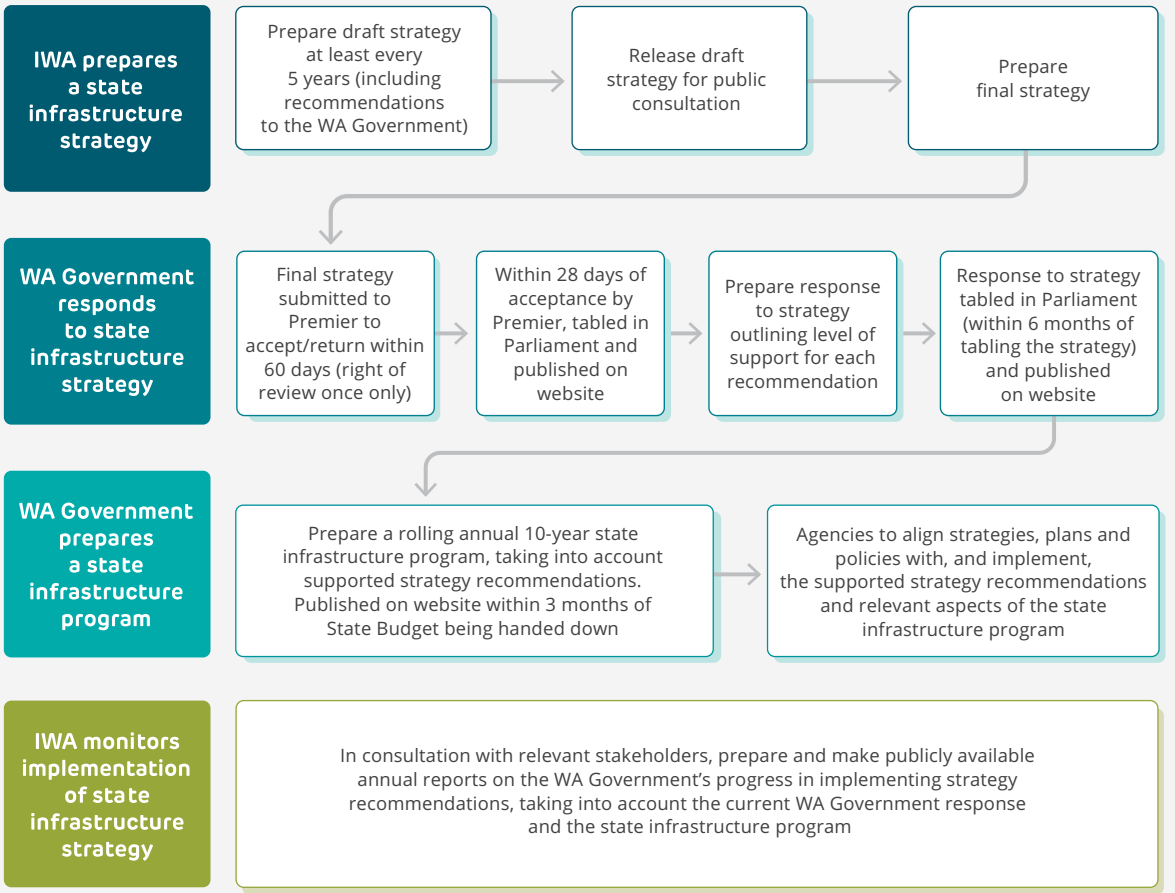
State Infrastructure Strategy

The IWA Act requires IWA to prepare a strategy at least every 5 years. Each strategy must:

- identify WA's significant infrastructure needs and priorities over at least the next 20 years
- identify the social, economic and environmental objectives against which infrastructure needs are assessed
- make recommendations regarding significant projects, programs and/or other options that meet identified needs and priorities, funding and financing options for these projects and programs where appropriate, and indicate the relative priority of recommendations.

Following the WA Government's formal response to the Strategy's recommendations, IWA will work with relevant stakeholders to ensure timely implementation of the recommendations supported by the WA Government. IWA will monitor and report on the WA Government's progress in implementing the Strategy's recommendations on an annual basis. The full process, which includes the interplay with the annual 10-year state infrastructure program, as required by the IWA Act, is set out in Figure 2.

Figure 2: Process overview





This Strategy is comprised of several key elements, headlined by the Strategy's 2042 vision (Figure 3). Further details on the approach to developing the Strategy are outlined in the Methodology chapter.

Figure 3: Key elements of the State Infrastructure Strategy



This Strategy focuses on non-build solutions, such as **policy, regulation, pricing, asset management, technology, procurement** and **governance reforms**, along with **new infrastructure projects and programs.**

Strategy objectives

IWA's objectives for the Strategy indicate the critical areas of focus over the next 20 years. Required under the IWA Act, these objectives have been applied, along with other criteria, to guide the formulation of the recommendations and will continue to guide IWA's monitoring and reporting on implementation of the Strategy. The 10 objectives are expressed below and should be viewed through an infrastructure lens. Consultation on the draft strategy largely supported these objectives.

Support a strong, resilient and diversified economy

WA's infrastructure supports long-term economic growth and facilitates industry diversification to achieve competitive advantage. The economy is more productive, innovative and supported by efficient and reliable supply chains, and a skilled workforce, and better able to withstand and adapt to extreme shock events.

Maximise regional strengths to unlock strategic opportunities for Western Australia

Regional initiatives and industries that build on the strengths of a region (or multiple regions) and support long-term, statewide outcomes are supported by investment in enabling infrastructure. Gaps in social services have been addressed, supporting the wellbeing of regional communities and their ability to attract and retain people.



Support access to social services and improve Aboriginal wellbeing

Social services models plan and adapt to suit the changing needs of communities, with a strong focus on early intervention and prevention. Access to health, education and training, justice and public safety services meets community needs. There are sufficient social and affordable housing options available. Self-determination and capacity-building opportunities have resulted in more empowered Aboriginal communities, with strong growth seen in the capacity and capability of Aboriginal businesses.



Enable environmental sustainability and resilience, and address climate change

Carbon emissions related to WA's infrastructure and their impacts on the environment have been reduced. Infrastructure planning, delivery and operation results in systems that are resilient to the impacts of climate change, improve environmental outcomes, and reduce, reuse and recycle resources.



Maximise wellbeing, liveability and cultural strategic opportunities for our community

Arts, culture and heritage have been supported by investments in well-designed cultural infrastructure that result in inclusion and wellbeing. 'Blue' and 'green' infrastructure supports sports and recreational activities that contribute to a healthy and safe community.



Enhance cross-government coordination and planning

Integrated land-use and infrastructure outcomes have been achieved through strong cross-government collaboration and engagement with industry. Reform initiatives have resulted in strategically aligned, contemporary and fit for purpose planning, policy and regulation.



Support population growth and change

WA's infrastructure meets the changing demands of the population and facilitates population growth in the right places, maximising our existing infrastructure. Alternative service models have been established resulting in efficient and effective infrastructure and services in areas experiencing population decline.



Embrace technology, data and digital connectivity

Western Australians have access to high-quality digital connectivity and enjoy the economic benefits of a strong technology sector. Data and a digital-first approach inform decision-making and optimise infrastructure efficiency. A strong cybersecurity capability protects our information and assets.



Enhance infrastructure delivery and develop skills for the future

Infrastructure planning and delivery is supported by a skilled and agile workforce. Investments are staged to maximise value for money and market capacity to deliver. Delivery of infrastructure benefits from improved procurement and best-practice project management and assurance.



Get the most from our infrastructure and improve maintenance

Best-practice asset management and maintenance has delivered optimal performance and supported investment prioritisation. The value of government assets has been maximised through improved lifecycle planning and delivery of fit for purpose infrastructure. Non-build solutions, such as demand management measures, have been adopted where appropriate.

Infrastructure for resilience

Infrastructure plays a vital role in the resilience of our cities, towns and communities. The community's dependence on infrastructure is thrown into sharp relief in times of crisis or disaster, and infrastructure is increasingly tested by ongoing stresses, ranging from ageing infrastructure through to increasing population and competing investment priorities. Currently in WA, there is no comprehensive statewide approach to resilience that seeks to identify the shocks and stresses relevant to WA's cities, towns, infrastructure and communities. This may impact the ability of planning and infrastructure delivery agencies to adequately assess need and implement actions to increase long-term resilience of assets, systems and communities.

The state's existing and future infrastructure should not only be resilient but also improve and support the resilience of Western Australians. That is, infrastructure should be able to withstand disruption, operate in crisis and deal with and adapt to shocks and stresses, and help the WA community to do the same. Infrastructure has a critical role to play in supporting community resilience. With increasing uncertainty and a changing risk landscape, the way infrastructure is planned, built, maintained and operated will need to change.

Shocks and stresses refer to both the sudden, sharp events that have the potential to disrupt the services supplied by infrastructure, such as natural disasters, cyber threats or a pandemic, and the long-term, chronic conditions that impact our assets, organisations and communities, including the vulnerability of ageing infrastructure and ongoing climate change. Stresses can, and do, exacerbate the impact of shock events.

In infrastructure planning, the understanding that the resilience of an asset is dependent on the environment and community that it services and vice versa is vital. Therefore, the focus should not be on just the resilience of a particular piece of infrastructure, but also on the contribution it makes to the resilience of the overall community. This is known as 'infrastructure for resilience'.

In line with Infrastructure Australia's Assessment Framework, there are 7 characteristics of resilience that should be considered for infrastructure projects and programs:

- **robustness**: the ability to withstand shocks and stresses without significant damage or disruption
- **redundancy**: the ability to maintain operations without significant deterioration in quality or value through additional capacity, flexible systems or substitution
- **resourcefulness**: the ability of operators, users and infrastructure itself to use resources in alternative ways to respond to shocks and manage stresses
- **recovery**: the ability to respond and mitigate the consequences of shocks and stresses
- **adaptability**: the ability to continually assess, build knowledge, learn and improve to inform future decisions
- **integration**: the ability to embed resilience in all decision-making, across systems, sectors, activities and risks
- **inclusivity**: the ability to involve all citizens and stakeholders to reflect the diversity of those using or in proximity to the infrastructure.[1]

The Strategy introduces resilience as a concept within the infrastructure lifecycle. It addresses a range of matters that contribute to more resilient infrastructure, including improved data management for better decision-making, cybersecurity and climate change mitigation and adaptation. Embedding resilience throughout infrastructure planning, delivery and operation supports the 10 objectives of the Strategy. As resilience maturity grows within WA, further development and guidance may be needed to embed resilience across and between state agencies and GTEs.

What infrastructure does this Strategy address?

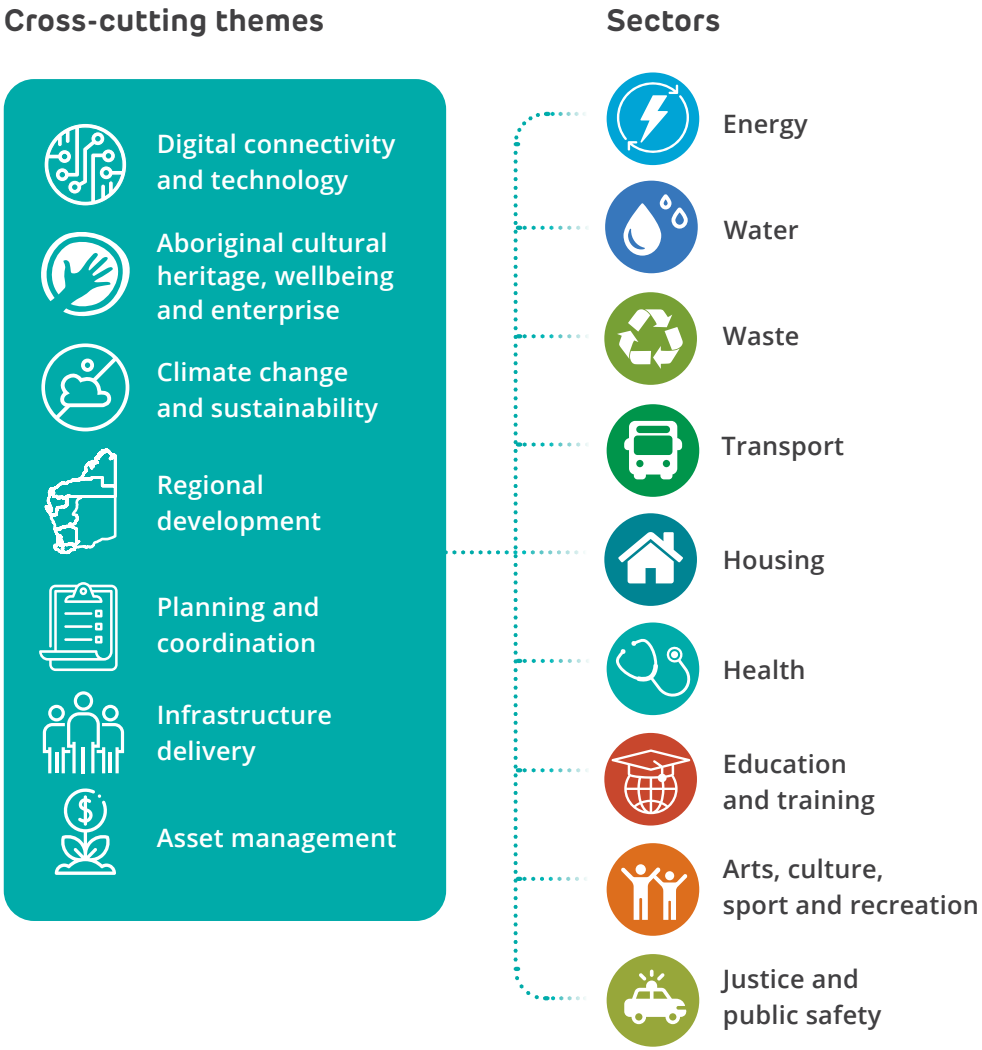
The Strategy addresses key infrastructure pressures and trends facing the state over the next 20 years. To enable a system-wide view, it addresses a broad range of infrastructure types, categorised in this document as 9 sectors (Figure 4). This categorisation allows for the identification of themes and interdependencies common to many sectors. In considering the impact of external drivers on infrastructure sectors, as well as each sector's relationship to others, 7 cross-cutting themes emerge that influence WA's infrastructure agenda and underpin the Strategy (outlined further in their individual chapters) (Figure 4).

Infrastructure has both tangible and intangible elements that can be broadly categorised into build and non-build considerations. The Strategy focuses on non-build solutions, such as policy, regulation, pricing, asset management, technology, procurement and governance reforms, along with new infrastructure projects and programs.

Infrastructure is planned, delivered and managed by all levels of government, private industry and the community. The Strategy encompasses infrastructure owned and delivered by state agencies and GTEs. Infrastructure owned and operated by the private sector has also been considered in some cases, particularly infrastructure that has a direct or indirect financial or government policy implication.

In considering infrastructure for the Strategy, IWA has applied a significance test, rather than setting a dollar threshold. This significance test takes into account the impact and transformational aspect of infrastructure to a region and the state, along with alignment to the Strategy's vision for 2042, the 6 strategic opportunity areas and 10 objectives. The dollar threshold that triggers IWA's assessment of major infrastructure proposals (a capital cost of $100 million or greater) does not apply to the Strategy.

Figure 4: Infrastructure cross-cutting themes and sectors

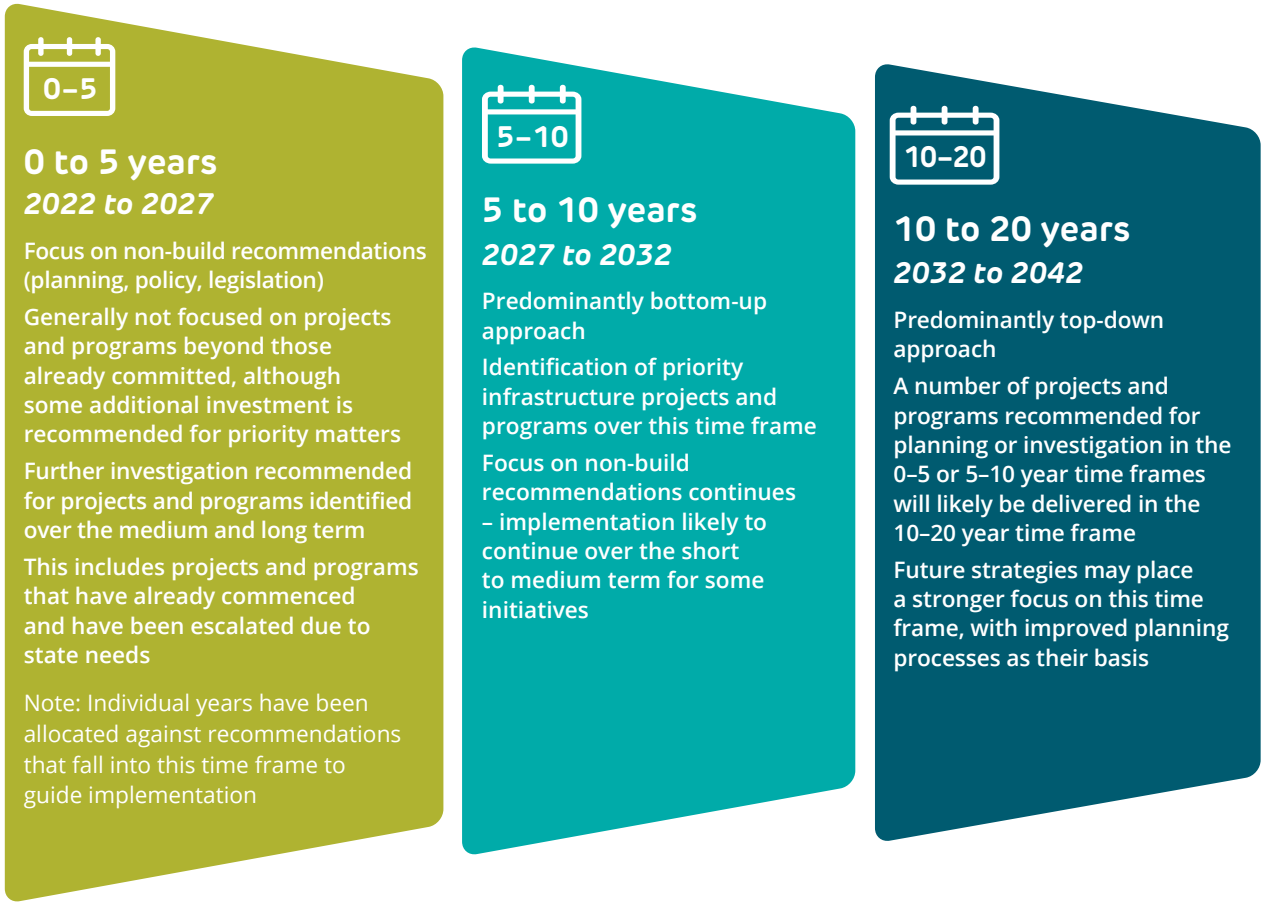




Strategy time frames

The Strategy's 20-year time frame has been divided into 0–5, 5–10 and 10–20 year time frames (Figure 5). As this Strategy is strongly focused on addressing key requirements that frame and guide infrastructure processes (for example, strategic planning, legislation and regulation, policy and decision-making tools), it is largely focused on initiatives over the 0–5 and 5–10 year time frames.

Figure 5: State Infrastructure Strategy time frames



Recommendations within the Strategy's 0 -5 year time frame are essential to establishing longer-term plans across all state agencies and GTEs. Through the consultation process, IWA received feedback from stakeholders requesting greater guidance on specific dates for completing implementation of recommendations within the 0–5 year time frame as planning and delivery for critical infrastructure needs to proceed in a timely manner. IWA has undertaken a review of these recommendations and identified specific years for completion to ensure the overall timing of the recommendations as a package is affordable and achievable.

As highlighted in the Strategy's name, *Foundations for a stronger tomorrow*, the document concentrates mostly on the next 10 years to ensure government is getting the basics right and building the foundations to assist with the development of future state infrastructure strategies. As infrastructure processes mature and there is improvement in the quality of relevant infrastructure plans that inform the bottom-up approach, it is likely that future state infrastructure strategies will place a stronger focus on the 5–20-year time frame.

Implementation completion time frames and the suggested lead state agency or GTE for each recommendation are outlined in the Summary of Strategy recommendations at the end of this document. IWA will assist the WA Government throughout implementation of supported recommendations. Through its annual monitoring and reporting role, IWA will report on the WA Government's progress towards implementing each recommendation according to the relevant completion time frame.

Moving forward, the Strategy provides the framework that will enable the public sector to develop its infrastructure plans and programs in a more coordinated and comprehensive manner.

Relationship with other strategies

Consistent with the requirements of the IWA Act, relevant government strategies, plans, policies, priorities and forecasts have been considered by IWA in developing the Strategy. For example, IWA has considered the economic development framework within Diversify WA and strategic land-use frameworks such as Perth and Peel @ 3.5 million, and regional planning and infrastructure strategies. Sector-specific strategies and plans have also informed the Strategy's content and recommendations. This includes, but is not limited to, the Energy Transformation Strategy and the *Western Australian Renewable Hydrogen Strategy* in the energy sector, the *Sustainable Health Review: final report to the Western Australian Government* in the health sector, *Perth and Peel@3.5million: the transport network* and the *Revitalising Agricultural Region Freight Strategy* in the transport sector, and the Waste Avoidance and Resource Recovery Strategy 2030. Whole of government and cross-sectoral plans were also reviewed, including, but not limited to, the WA Climate Policy and the Strategic Asset Management Framework.

Relationship with federal and local governments

IWA has considered the roles of all 3 levels of government in the preparation and implementation of the Strategy.

Infrastructure Australia and the Australian Government

IWA has specific legislated functions in relation to Infrastructure Australia. IWA coordinates the WA Government's submissions to Infrastructure Australia in close collaboration with relevant state agencies and GTEs. Infrastructure Australia, the Australian Government's independent advisory body, is IWA's primary interface between federal and state government agencies. The state receives funding contributions from the Australian Government, particularly for infrastructure and services relating to the transport, health and education sectors.

Through 5-yearly infrastructure audits, Infrastructure Australia identifies the major challenges and opportunities facing Australia's infrastructure over the following 15 years.[2] The audit is conducted and developed in consultation with states and territories. In future audits, IWA will be responsible for coordinating the WA Government's engagement on the audit. The challenges and opportunities identified in the most recent audit were considered as part of IWA's bottom-up approach in developing the Strategy.[3] Following each audit, Infrastructure Australia prepares a 15-year infrastructure plan, which outlines national roadmaps for reform.

Reforms to meet Australia's future infrastructure needs: 2021 Australian Infrastructure Plan provides recommendations on priority infrastructure reforms across the nation for implementation at both a federal and state level. Infrastructure Australia and IWA engaged throughout the parallel development of the plan and this Strategy.[4] It is expected that future plans and strategies will inform one another.

Infrastructure Australia also prepares an annual Infrastructure Priority List, which outlines the national infrastructure needs for consideration by federal and state governments.[5] IWA coordinates the WA Government's submissions to this annual process and the business cases for initiatives that are listed.

Infrastructure Australia and IWA maintain a close and collaborative working relationship. This will continue to develop as IWA moves into its wider functions, such as Major Infrastructure Proposal Assessment, supporting state agencies and GTEs in the development of submissions and coordinating other activities, such as training and policy advice, with Infrastructure Australia.

Local governments

There are many linkages and interdependencies between infrastructure, the Strategy and local government planning, policy and service delivery. The operations and responsibilities of local governments intersect with all the themes identified in the Strategy.

Local governments have a significant role in:

- the planning and provision of infrastructure as an important decision-maker, regulator and participant
- the provision of services
- the direct and closest government link to the community in many cases.

The community has a strong expectation that local character and needs will be an important factor when determining local infrastructure priorities. Challenges that local governments face include meeting the diverse needs of the community with finite financial resources. This includes the development of new infrastructure and operating and maintenance costs of existing infrastructure. This is especially the case for remote local governments with a small rates base who are often unable to self-fund infrastructure projects and are reliant on federal and state government grants for major infrastructure delivery.

Some local governments seek to take a community development approach to building civic infrastructure around their public institutions and focus on how anchor institutions, such as public libraries, civic offices and shopfronts, are connected to social infrastructure and social services.

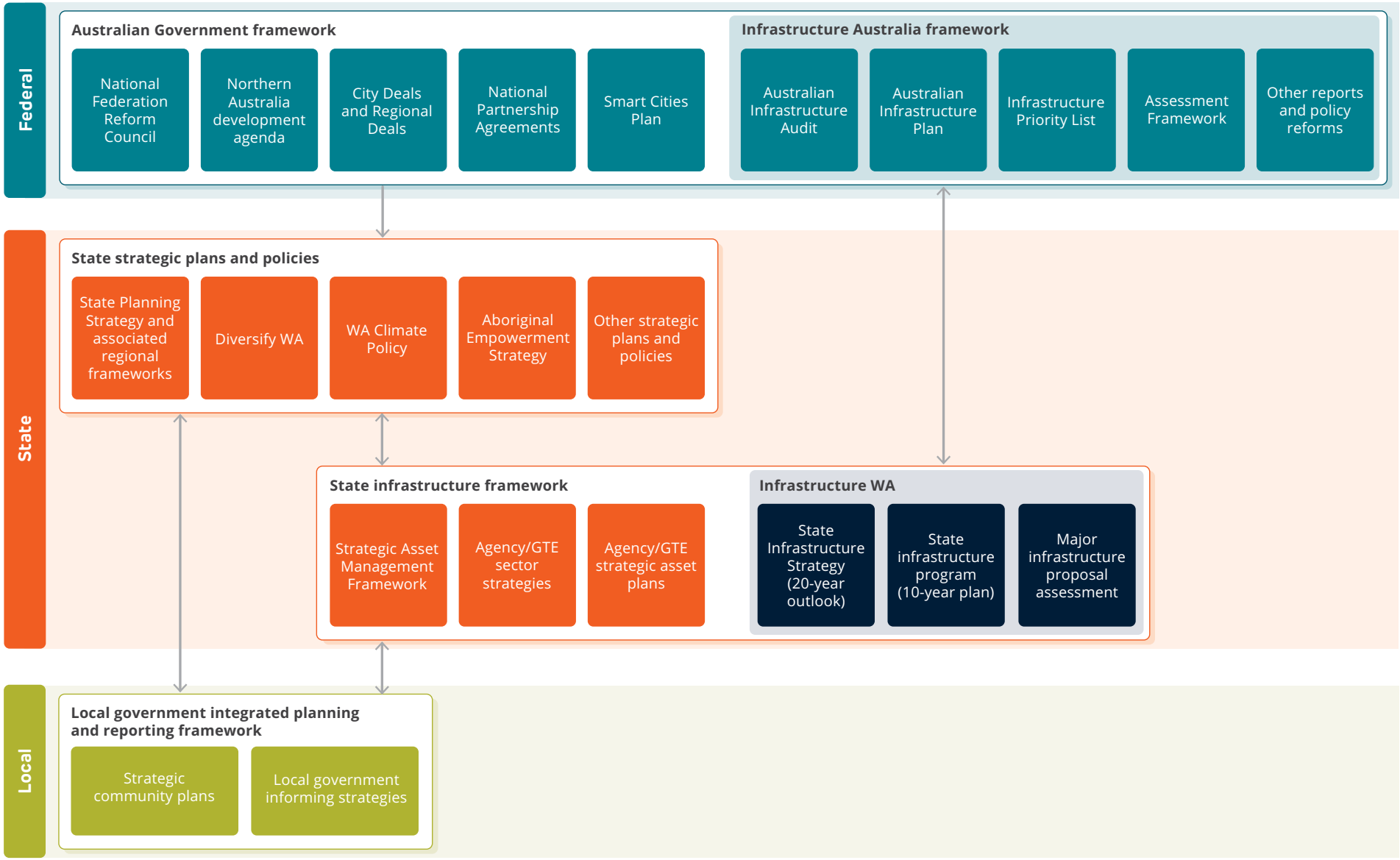
There are 139 local governments in WA, including 2 Indian Ocean territories.[6] Integrated planning and reporting gives local governments a framework for establishing local priorities and linking this information to operational functions. The *Local Government (Administration) Regulations 1996* requires each local government to adopt a strategic community plan and a corporate business plan.

Associated plans and strategies (particularly financial, asset management and workforce) inform a local government about how capable it is of delivering the services and assets required by the community. Issue-specific informing plans and strategies, such as community safety and disability support strategies or major infrastructure or works strategies, also assist the local government to deliver the services, assets and projects required by the community. Other informing plans and strategies include asset management plans, long-term financial plans, local health plans, local waste plans, local planning strategies and economic development strategies.

Local government plans and strategies set out the medium-term and long-term plans for each local government and focus on the upgrade, renewal and development of infrastructure required to deliver services to the community. It is acknowledged that several of the Strategy's recommendations will have an impact on local governments and will intersect with their responsibilities. Local governments and the community will remain key stakeholders that should continue to be engaged where necessary during the implementation of the Strategy.

Figure 6 demonstrates how the 3 levels of government align in the provision of infrastructure, and how the local government integrated planning and reporting framework can inform state and regional strategic plans and policies and vice versa.

Figure 6: Government integration



Note: The plans, policies and frameworks referenced in this diagram are key examples and do not represent a comprehensive list.

Impact of COVID-19

Worldwide, the impacts of the COVID-19 pandemic have been and continue to be profound. In addition to the health impacts, measures to reduce the spread of the virus, such as lockdowns and travel restrictions, are significantly impacting economic activity and changing fundamental norms.

It is inevitable that COVID-19 will be an ongoing part of life for the foreseeable future. Achieving a high vaccination coverage means fewer people will become very sick, need hospital care or die from COVID-19. Depending on the nature of any outbreak, relevant public health and social measures may need to be temporarily scaled up, in a targeted way if necessary, to slow the spread of COVID-19 and reduce the impact.

While it is still too early to understand with any certainty the long-lasting effects and the implications for infrastructure, developing this Strategy in the context of COVID-19 is an opportunity to capitalise on positive impacts and ensure infrastructure investment can contribute to long-term recovery and resilience. The WA Recovery Plan is driving, and will continue to drive, economic and social recovery across the state in sectors such as construction, manufacturing, tourism and hospitality, renewable energy, education and training, agriculture, mining and conservation.

Skills shortages and staff absenteeism have emerged as a pressing issue across a range of industries, exacerbated by the restricted availability of labour from interstate and overseas. There are reports of skills shortages in industries that are central to the state's economic recovery, including mining, construction and transport, as well as in the health and hospitality sectors.[7] The resources industry, however, has been able to continue operations and provided significant economic stability for both WA and the nation. Nevertheless, some industries have experienced decline. Agriculture and fishing industries suffered from the lack of seasonal labour, while education and training are impacted as closed borders exclude international students.[8] The tourism, arts and recreation industries have also experienced negative impacts.[9]

The COVID-19 pandemic has highlighted the strategic importance of reliable, safe and efficient supply chains and the associated supporting infrastructure. There has been an increase in freight driven by online shopping, but a decrease in domestic and international aviation due to border closures and travel restrictions.[10]

COVID-19 has also affected passenger transport use, as more people worked remotely during lockdowns and have continued to do so since. There has been a reduction in public transport use and an increase in transport via private car, personal mobility device and active transport.[11] The Productivity Commission's *Working from home* research paper (September 2021) found the percentage of Australians working remotely had jumped from 8% to about 40% over the past 2 years.[12] Census data from 2016 shows that approximately 35% of workers had jobs that could be done remotely.[13] The ability to work remotely is associated with higher levels of education, higher incomes and full-time employment.[14] Companies will need to take proactive measures to help workers acquire and share new information across groups, so that productivity, collaboration and innovation are not impacted with the increase in remote work. Technology is likely to continue to significantly or completely change the way people work over the time frame of the Strategy.

The health sector responded quickly to COVID-19. Testing and treatment facilities were expanded. There was a rapid escalation in telehealth and telephone appointments, which saw an increase of 66% from May 2021 compared to October 2019.[15] Between July 2020 and April 2021, mental health–related emergency department attendances increased by 4% compared to the same period in 2019–20.[16] The mental health impacts of the pandemic continue to be an important issue, particularly for young people, and are expected to have further implications into the future.

The WA Government committed an additional $1.3 billion in spending on health and mental health in the 2021–22 mid-year review. This comprises additional beds and staff to meet demand and increase capacity for when COVID-19 enters the WA community, additional pandemic response spending such as vaccinations and testing, and other initiatives including health information and communications technology and infrastructure. This increases the total additional investment in health spending (including the 2021–22 State Budget) to $3.2 billion.[18]

Other social services, including education, were also impacted. There was a shift to online learning and a major decline in international education. The use of public parks and urban greenspace also increased. Housing availability remained an ongoing concern, with rental vacancy around 1% for Perth, and increasing waiting lists for public housing.[19]

Restricted mobility and physical distancing rapidly increased our use of digital platforms to do business as well as to connect socially, highlighting the importance of connectivity. The Strategy seeks to leverage this momentum, supporting digital transformation across all sectors, and improved connectivity, particularly to remote and disadvantaged communities, to ensure equitable access to social services and commercial opportunity.[20]

COVID-19 has had significant implications for infrastructure across many sectors, both in terms of current usage and long-term planning. With border closures impacting immigration in the short to medium term, it is important that infrastructure investment supports economic growth and diversification. The Strategy takes a longer-term perspective to complement shorter-term recovery investment, and focuses on initiatives, projects and programs that will deliver social, economic and environmental benefit to support long-term resilience.



Developing this Strategy in the context of COVID-19 is an opportunity to capitalise on positive impacts and **ensure infrastructure investment can contribute to long-term recovery and resilience**.



Methodology

The development of IWA's first Strategy involved engagement with a wide range of stakeholders, and extensive analysis of material to help inform an objective position of the state's infrastructure needs and priorities. To develop a long-term outlook for the Strategy, it was necessary to review the current status of infrastructure planning and delivery in WA, as well as form a view on what the future needs and priorities of the state are likely to be.

Infrastructure WA's guiding principles for the Strategy

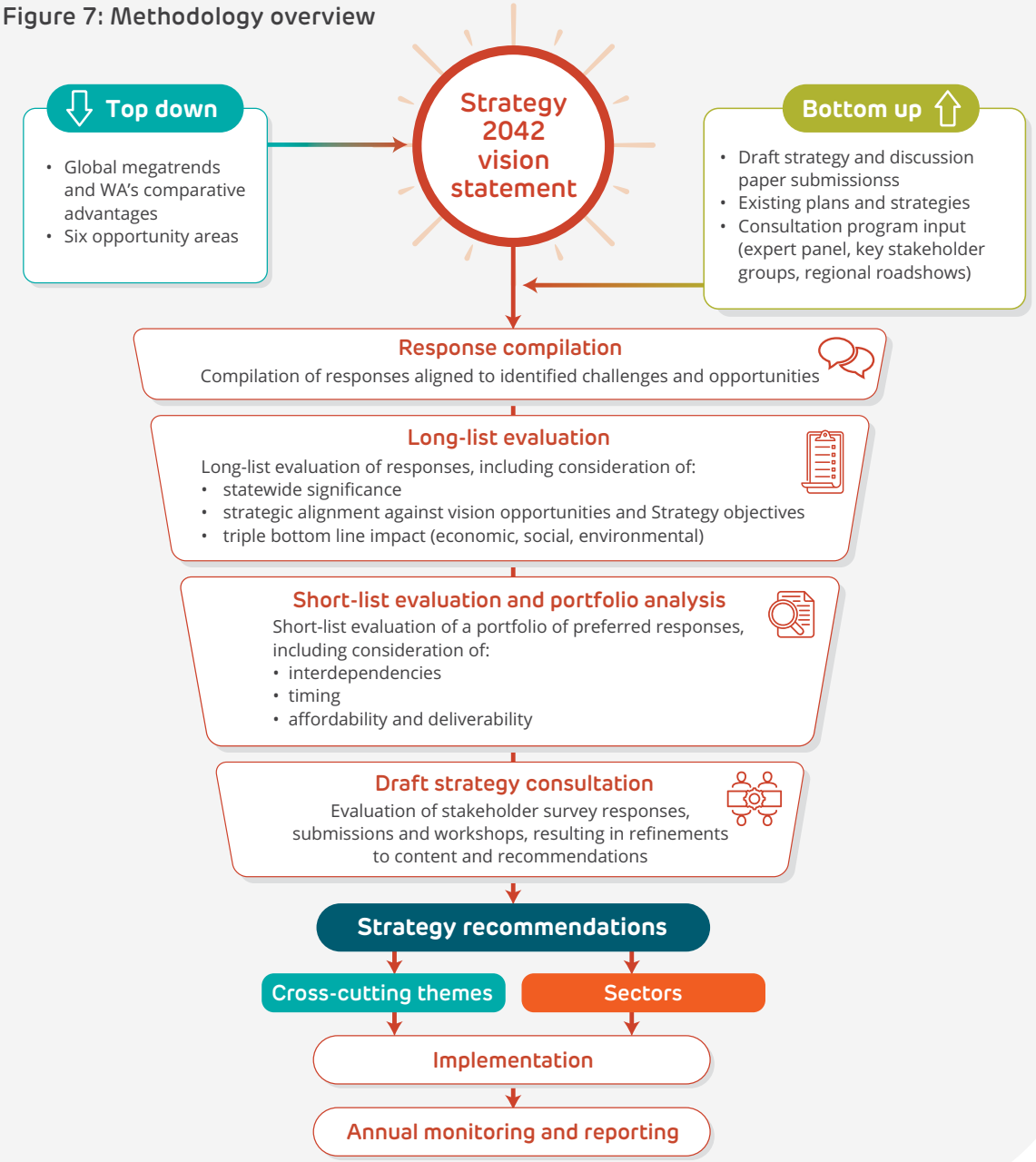
- **Open, consultative and engaging**
- **Objective and rigorous**
- **Improvement over time**
- **Affordable, deliverable and maximise value**
- **Forward looking and open to change**

The IWA Act, Strategy vision, objectives and guiding principles steered development of this first Strategy. IWA has placed a strong focus on:

- using existing infrastructure more effectively, including through prevention and demand management approaches
- addressing the complete infrastructure lifecycle
- developing a strong understanding of the needs of each region, particularly the non-metropolitan regions
- supporting Aboriginal cultural heritage, wellbeing and enterprise
- applying a triple bottom line (social, economic and environmental) approach
- understanding the baseline of existing infrastructure networks and processes
- considering the affordability and deliverability of the recommendations, particularly in the context of the current COVID-19 pandemic.

As outlined in *A stronger tomorrow: State Infrastructure Strategy discussion paper*, IWA applied a hybrid top-down/bottom-up approach in developing the Strategy.[1] This was informed by a bottom-up assessment of the short-term to medium-term outlook over the next 10 years, and a strategic top-down assessment focusing on the long-term outlook out to 20 years. An overview of the methodology is shown in Figure 7.

Figure 7: Methodology overview



IWA applied a hybrid **top-down/bottom-up** approach in developing the Strategy.

Top-down approach

To identify appropriate strategic infrastructure responses, it was critical to understand the long-term strategic vision for WA. This required an assessment of the global context in which WA sits, and potential changes to this environment over the next 20 years. IWA applied a scenario-planning approach to identify global megatrends and developed a range of plausible futures to identify how WA can best respond to a changing world. Six opportunity areas were identified (representing where global megatrends and the state's comparative strengths intersect), which underpin the Strategy's vision (see Appendix A for further detail on IWA's scenario-planning outcomes).

This approach has ensured the Strategy has a broader and longer-term focus than planning horizons usually applied by government. Ongoing monitoring of the environment will be needed to guide strategic infrastructure decision-making into the future.



Bottom-up approach

A key part of developing this Strategy involved the review and analysis of existing infrastructure-related strategies and plans. Applying a standardised methodology, this review focused on establishing the status of WA's existing public infrastructure base and the relevant legislative and policy settings. A further analysis was conducted to establish the levels of planning maturity across the public sector, evidenced by the quality and completeness of the infrastructure strategies and plans of state agencies and government trading enterprises (GTEs).

Other material was considered to gain benefit from wider viewpoints and alternative approaches relevant to each cross-cutting theme and infrastructure sector, including Infrastructure Australia's *An assessment of Australia's future infrastructure needs: the Australian Infrastructure Audit 2019*, other relevant federal strategies and plans, industry research, stakeholder input and other jurisdictional strategies and publications.

Feedback gathered from stakeholders during consultation on *A stronger tomorrow: State Infrastructure Strategy discussion paper* and the supplementary resources *A look at the sectors* and *A look at the regions* also fed into the bottom-up approach.

Evaluation approach

In line with its guiding principles for the Strategy, IWA applied an objective and rigorous approach to analysis, including development of an evaluation framework to assist in examining and prioritising recommendations. Bottom-up and top-down components were combined to identify infrastructure challenges and opportunities, and a long list of potential responses (both build and non-build) for each cross-cutting theme and sector.

A high-level assessment was undertaken to support the consistent, strategic assessment of responses, considering matters such as:

- alignment with the Strategy's 10 objectives and 6 strategic opportunity areas
- triple bottom line impacts (social, economic and environmental)
- affordability and deliverability
- significance of infrastructure responses.

This approach was compared to that used by interstate counterpart infrastructure bodies in the development of equivalent state infrastructure strategies. The criteria applied were consistent with the principles of Infrastructure Australia's Assessment Framework and the Department of Treasury's Strategic Asset Management Framework.

Short-listed responses were assessed in greater detail to determine and refine recommendations. A portfolio analysis considered interdependencies and delivery time frames.

Place-based approach

To tailor infrastructure responses to local needs and opportunities, IWA applied place-based elements to the methodology. The Strategy considered infrastructure issues and opportunities in each of the state's regional areas, as defined by the *Regional Development Commissions Act 1993*, as well as the Perth metropolitan area (Figure 8).

The regions generally encompass 'functional economic areas', each with diverse characteristics and strengths. However, they are also highly interdependent, as parts of seamless cross-regional networks with strong connectivity.

Perth is WA's capital city and the main population, economic and transport hub. All regional areas rely on Perth to some extent to provide the highest level and range of economic and population services, and Perth relies on the regions for much of the state's economic output.

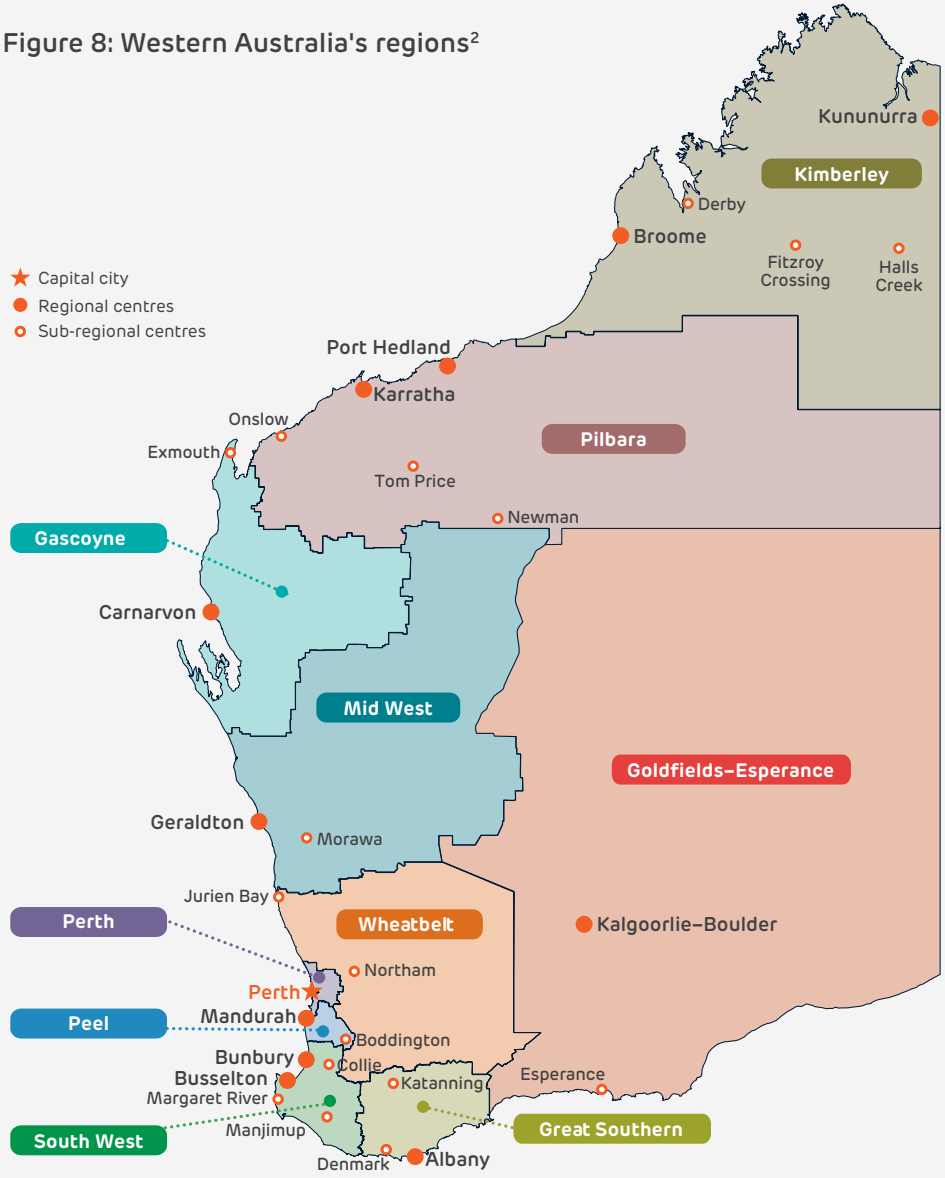
Successful ongoing regional development in WA is a complex challenge, and infrastructure alone certainly cannot deliver the total solution. IWA reviewed a range of regional strategic documents and plans and consulted with regional communities. Cross-regional data analysis was undertaken to better understand how each region was placed to leverage megatrends and maximise strategic opportunities. The Strategy is focused on significant infrastructure proposals (build and non-build) that can capitalise on the relative strengths of each region.

Northern WA is a key regional grouping, comprising the Kimberley, Pilbara and Gascoyne regions. It is aligned to the Australian Government's Northern Australia agenda and is a focus area within Infrastructure Australia's *Reforms to meet Australia's future infrastructure needs: 2021 Australian Infrastructure Plan*.

Regional centres are the main cities or towns of a region that provide higher levels of services and facilities to a network of surrounding smaller sub-regional centres. Remote settlements are small population centres such as remote roadhouses, Aboriginal communities, workers' camps and tourist camps that are geographically distant from larger regional and sub-regional centres. This Strategy includes a focus on remote Aboriginal communities as they support Aboriginal people to live on country and maintain their culture and traditions. The Strategy also addresses the infrastructure needs of town-based reserves to enable appropriate service standards and improved environmental health outcomes.

Precincts are geographic areas that support clusters of related activities, such as urban, train station, education, innovation and industrial precincts. This Strategy includes a focus on precincts, as they capitalise on locational advantages and agglomeration, and can concentrate investment in infrastructure to generate significant benefits.

Figure 8: Western Australia's regions[2]



Note: Settlement hierarchy as identified in the State planning strategy 2050

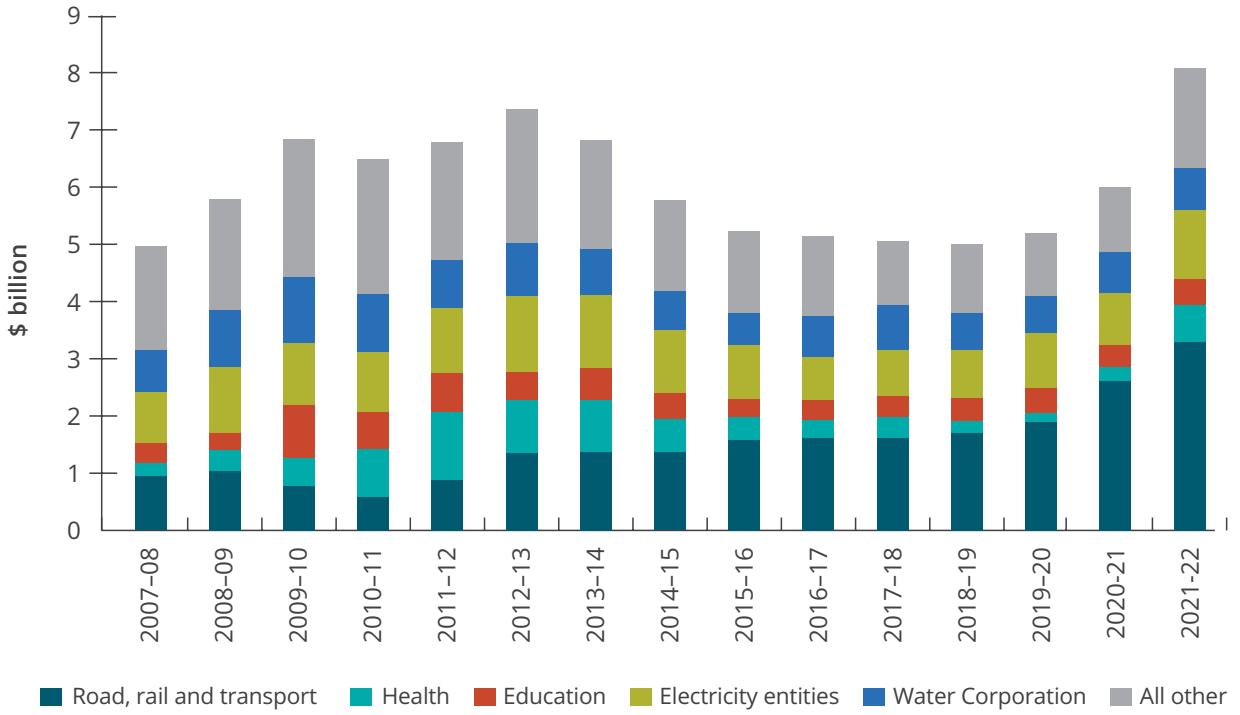
Affordability and deliverability

A key consideration in the amount of public infrastructure that can be delivered is the fiscal capacity of government. IWA is required by the IWA Act to consider the affordability of the Strategy's recommendations, including by reference to the Financial Strategy Statement under the *Government Financial Responsibility Act 2000*. The Financial Strategy Statement in the 2021–22 State Budget lists several targets for the government. The most relevant asset-focused target related to this Strategy is to maintain or increase the net worth (net assets) of the total public sector, which the Strategy is consistent with.

In a broader sense, IWA has carefully considered the affordability and deliverability of the recommendations in the Strategy. Measuring budget capacity for infrastructure delivery over a 20-year time frame is difficult. This is due to uncertainty regarding future economic conditions, the state's volatile revenue base and the limited availability of cost estimates for many proposals.

For over a decade, the state government Asset Investment Program (AIP) has averaged approximately $6 billion per annum (Figure 9). Over the next 20 years, the value of public investment may grow in line with WA's population and revenue base, while also being subject to cyclical macro-economic conditions. With the current focus on the state's continued recovery from the COVID-19 pandemic, a 4-year AIP of $32.7 billion is forecast over the current forward

Figure 9: WA Government Asset Investment Program total actual spend 2007–08 to 2019–20, estimated actual spend 2020–21 and budget estimate 2021–22[3]



estimates period.[4] In combination with other unique current pressures on the public sector, this increase presents some short-term challenges for capacity and deliverability.

Total public sector net debt is expected to fall for a third consecutive year to $32.6 billion in 2021–22 and remain relatively stable at $36.8 billion by 30 June 2025.[5] Growth in WA's public sector net debt levels remains much flatter than the other states. This reflects the impact of sustained operating surplus forecasts in WA. These surpluses represent an important source of non-debt funding for infrastructure.

Public infrastructure investment is allocated across many sectors. This is reflected in the diversity of Strategy recommendations (Figure 10). A significant ongoing portion of the AIP is dedicated to essential, non-discretionary investment to operate and maintain critical existing infrastructure networks. There is a large, stable level of investment in the electricity, water, roads and education sectors.

Health expenditure can vary based on delivery timing of major new hospital projects, while overall transport investment is currently high. Many recommendations in the Strategy are focused on ensuring value-for-money outcomes across the overall AIP in future years.

The AIP represents the WA Government's full investment commitments for the 4-year State Budget forward estimates, leaving minimal funding capacity for additional short-term infrastructure investments. Almost all the recommendations in the Strategy over the 2022 to 2027 time frame (0–5 years) are focused on non-build actions (Figure 11). These include many areas of infrastructure planning to inform subsequent potential investments. Some non-build recommendations may have associated costs. In many instances, state agencies and GTEs may be able to address these as part of their core activities, from within existing budget allocations. State agencies and GTEs will have 5 years to complete recommendations in the 2022 to 2027 time frame from when the government responds to the final Strategy, which is anticipated around mid to late 2022. Beyond this time frame, some greater flexibility and capacity is available to the WA Government to determine new infrastructure priorities.

Where IWA has recommended a build response, further planning and business case development is generally required to justify the investment and delivery case for each project or program. For other longer-term potential projects or programs, IWA has generally only recommended that planning or further feasibility investigations occur, with genuine options analysis being a critical component. This will help improve the quality of the state's investment prioritisation process with better cost estimates and support the development of a more reliable capital investment pipeline. Eventual project and program investment decisions will also need to consider evolving government priorities, the total AIP, and private and public sector delivery capacity.

Given these considerations, IWA is confident that the recommendations of the Strategy over the 20-year time frame are affordable and deliverable.

Figure 10: Recommendations by cross-cutting theme and sector
(including sub-recommendations)

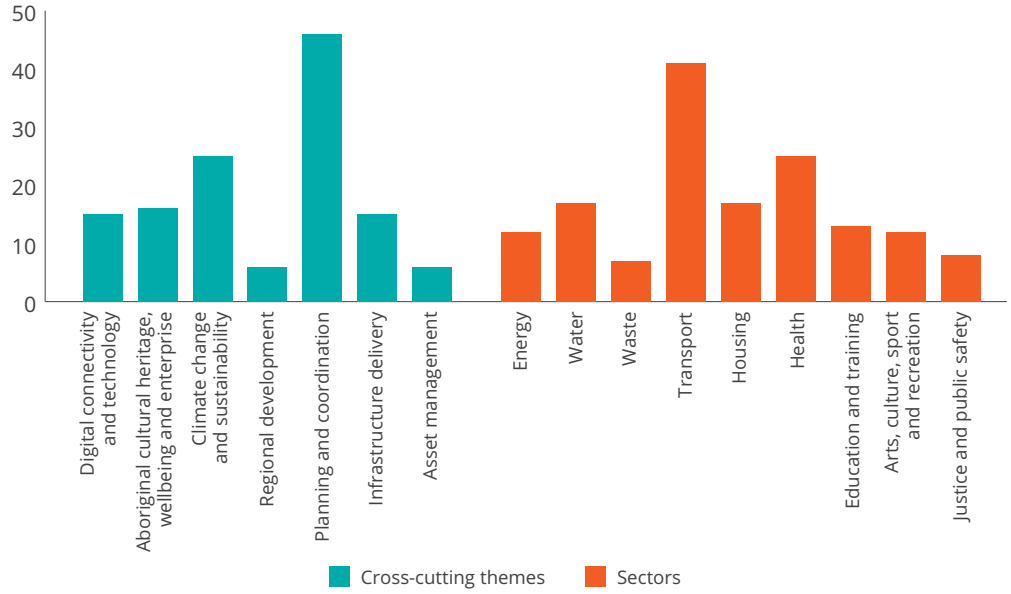
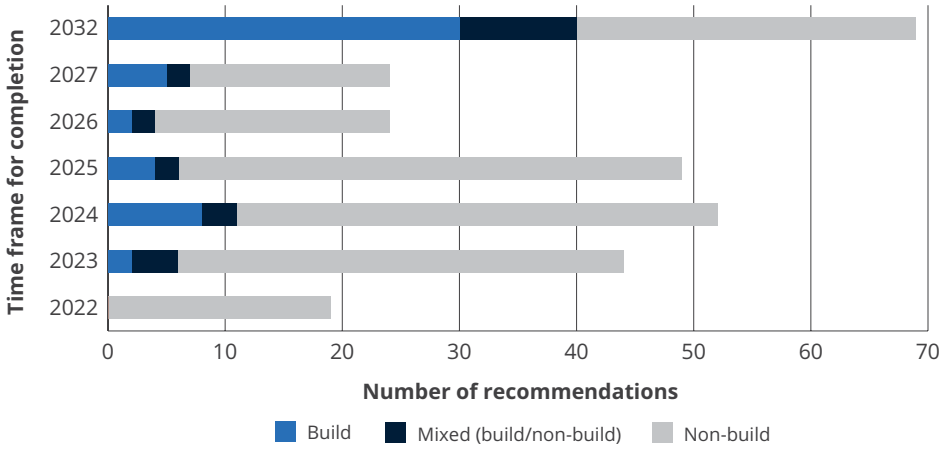


Figure 11: Recommendations by time frame for completion and type
(including sub-recommendations)





A collaborative journey

Extensive consultation over a period of 2 years has shaped the vision for WA's infrastructure future.

A collaborative and multifaceted consultation and engagement program, led by IWA, ensured all Western Australians had the opportunity to contribute to the development of the Strategy, with hundreds of organisations and people having their say.

As a result, the Strategy reflects the views and priorities of stakeholders across the state and benefits from the invaluable expertise, perspectives and knowledge they have contributed through their considered input, technical advice and peer review.

More than 800 individuals and organisations responded to an initial discussion paper, *A stronger tomorrow*, released in June 2020, which outlined the principles, objectives and methodology that would be used to develop the Strategy. The discussion paper sparked wide-ranging conversation on infrastructure priorities that would best support WA's future.

Feedback was published in the *Consultation outcomes report*, released in December 2020, and channelled into the detailed analysis that underpinned the Strategy's development.

A range of reference groups and discussion forums were convened to gain the insight of subject matter experts and special interest groups to ensure recommendations were well-informed, relevant, practical and considered. These groups included a State Agencies Working Group, External Stakeholder Reference Group and Strategic Expert Panel.

The release of the draft strategy marked the start of another intensive consultation and comment period.

IWA again opened its consultation channels to request feedback on the draft strategy's recommendations. More than 700 people accepted that invitation and participated in 30 workshops, roundtables and briefing sessions in all regions across the state.

This generated rich feedback from all regions and sectors of the WA community, which included 193 submissions, with the strongest level of response coming from peak bodies, local government and the general community. Figure 12 shows the breakdown of submissions by stakeholder group.

Submissions were received via an online survey and through written submissions. Quantitative survey results demonstrated 87% overall support for the draft strategy.

New issues and responses arising from this phase of the consultation process resulted in further refinement and testing of refined and new recommendations with stakeholders. An overview of the full consultation process is provided in Figure 13.

What we heard

Hundreds of Western Australians reviewed the draft strategy from a broad geographic, social and economic perspective and their input was far-reaching. Overall, there was strong support with many stakeholders welcoming a strategic infrastructure outlook for the state and the proposed recommendations to support it.

Many of the themes and recommendations that resulted are closely linked and call for improvements to the core elements of the infrastructure system, such as policy, planning and legislation, to better position the state to achieve the Strategy's vision and objectives.

The discussion paper **sparked wide-ranging conversation on infrastructure priorities** that would best support WA's future.

Figure 12: Percentage of submissions by stakeholder group in response to the draft strategy

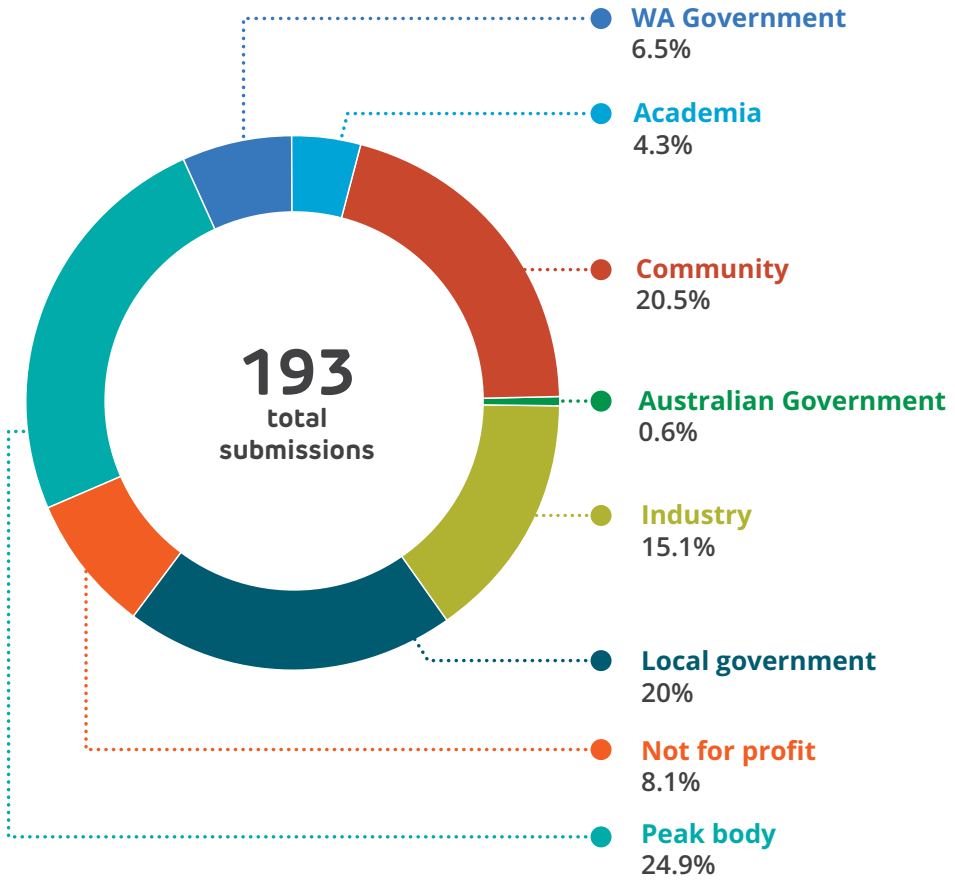
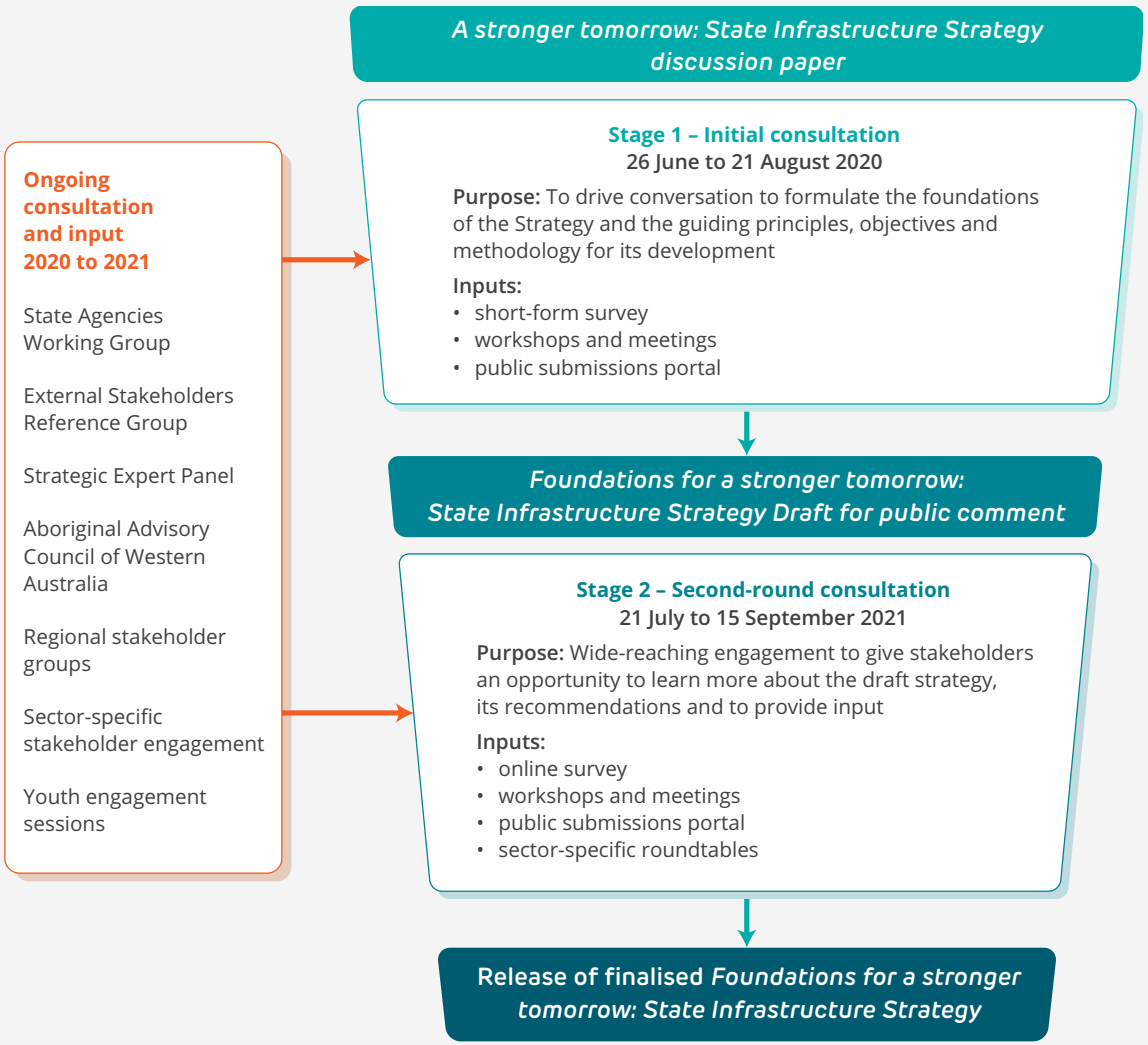


Figure 13: Consultation overview



Common themes emerging from consultation on the draft strategy and IWA's subsequent response included:

- Calls for more ambitious targets and time frames to reduce greenhouse gas emissions, including legislation and interim targets to be included. Local governments also requested additional guidance and funding support for emissions reduction. The Strategy now recommends that the WA Government strengthen the current net zero emissions by 2050 aspiration to become a firm target and establish interim emissions reduction targets.
- Clarification of local government's role in implementing the Strategy. To address this, additional detail on the Strategy and IWA's role in relation to local governments, as well as the interaction between different levels of government and the role of the community, has been included.
- Request for clear guidance on the implementation time frames of several recommendations. To address this, a detailed review has been undertaken, and for recommendations in the 2022 to 2027 time frame category, the Strategy now recommends a specific year for completion.
- Greater consideration of infrastructure resilience matters to be incorporated, including shocks and stresses such as managing cybersecurity risks, natural hazards and impacts of climate change. In response, IWA has included additional content on resilience throughout the Strategy.

There was also support for recommendations within the Aboriginal cultural heritage, wellbeing and enterprise chapter, particularly regarding stronger Aboriginal engagement and co-design throughout the infrastructure lifecycle to support empowerment, self-determination and wellbeing.

Feedback on the development of the Strategy confirmed 6 core themes, which have been addressed throughout and underpin most of IWA's recommendations. Within these core themes, the following feedback was received, recognised and embedded throughout the Strategy.

Managing demand for infrastructure through prevention, early intervention and pricing

There was strong consensus that better demand management and the need for early intervention and prevention initiatives are required to divert, delay or avoid the need for costly infrastructure, particularly to reduce demand on our health, social services and justice system.

The connection between health outcomes and housing was raised by several stakeholders and has been addressed in this Strategy to demonstrate how appropriate, stable accommodation can improve the health of Western Australians and reduce demands on the state's health system.

Other feedback and IWA's subsequent response relating to better demand through early intervention included:

- The need to improve water efficiency through better understanding and management of self-supplied groundwater and surface water. As a result, relevant recommendations have been expanded to address these matters.
- The role of active transport through early intervention and stakeholder feedback. In response to this feedback, active transport recommendations have been extended beyond cycling to address walking and e-mobility devices, such as electric scooters.

Improving the quality and consistency of strategic infrastructure planning and processes

Stakeholders acknowledged the importance of robust and evidence-based planning as a foundation to identifying infrastructure investment needs and priorities. Stakeholders also noted the role of the Strategic Asset Management Framework and supported the recommendations that seek to improve decision-making in relation to infrastructure proposals, particularly business cases.

Regional stakeholders provided significant feedback reinforcing the need for a regional development strategic framework and to reform regional service models, and noted the importance of:

- infrastructure investment to support economic development and diversification of existing and emerging industries and the growth of regional centres and populations
- access to appropriate and affordable housing in the regions to enable economic growth, recognising that in some locations, even when incomes are relatively high, demonstrated market failure requires a greater role for government-driven mechanisms and investment.

An additional recommendation has been included to establish the principles, criteria and models for state government housing intervention in regional locations that are demonstrating market failure, informed by regional housing plans.

Other plans and processes suggested through consultation and addressed in this Strategy included:

- Greater focus on environmental protection and enhancement in infrastructure and land-use planning, including the development of an environmental and heritage information system for priority locations.
- Well-placed developments around activity centres, urban corridors and public transport hubs to promote increased density. Greater clarity has been provided to identify and prioritise infrastructure capacity upgrades and coordination issues to support infill development in line with the locations set out in the accompanying land-use plans and frameworks such as Perth and Peel @ 3.5 million.



- Planning for future education precincts and schools to meet the needs of growing populations. This has been addressed in the recommendation for a business case to support school site acquisition in inner and middle suburbs.
- Stronger integrated planning that gives greater consideration to public open space, and sport and recreation facilities. Recommendations for development of a regional-level sporting facilities plan and investment in capital works proposed in the State Sporting Infrastructure Plan have been added to the Strategy.

Addressing climate change

Recommendations in the Climate change and sustainability chapter received strong support from stakeholders, with many stakeholders seeking clarity or further detail.

In addition to a more ambitious approach to time frames and targets to address climate change, other significant feedback included:

- calls for increased support for renewable energy, particularly green hydrogen, with further detail added to this Strategy to explore the feasibility of prospective large-scale hydrogen industry in locations where energy, water, transport, skilled labour and market proximity can be leveraged.
- support for long-term water planning and protection of natural water resources, including development of a 20-year state water strategy as recommended in the Strategy.

Feedback on natural gas and hydrogen varied. Some highlighted the importance of transitioning away from natural gas and increased greenhouse gas emissions associated with the blue hydrogen industry compared to green hydrogen. Others highlighted the need for the blue hydrogen industry to support effective transition to green hydrogen.

The Climate change and sustainability, and Energy chapters have been refined to better clarify and link how greenhouse gas reduction planning mechanisms will enable emission reduction in the energy sector.

Implementing data sharing and other tools to support infrastructure planning and investment decision-making

Feedback reinforced the importance of digital connectivity and inclusion for increasing social equity. The importance of digital technology was also widely acknowledged as an enabler for improved productivity across sectors and industries. This was especially recognised in the health sector, where stakeholders called for the acceleration of digital technology initiatives, noting the electronic medical records program as a priority for implementation, to underpin system-wide reforms. This has been addressed in the Strategy.

Generally, stakeholders supported increased digitisation of infrastructure, but noted that outdated information and communications technology (ICT) systems operating within government are a barrier to digital transformation and readiness. The announcement of a dedicated government funding program for ICT projects has been highlighted and supported in the Strategy.

The need for greater emphasis on building digital and data science skills within government was also raised by some stakeholders, as well as the need to establish improved data sharing and management tools and processes, such as a whole of government platform to enable the sharing of location-based asset information. Amendments have been made to recommendations to strengthen the focus on a whole of government data platform.

Optimising the existing infrastructure asset base

Stakeholders supported the recommendations for asset management and proposed a whole of government asset management policy to raise asset management maturity. To address this, the Strategy has recommended expanding the Building Asset Management Framework pilot, once established, to apply to all asset classes.

A greater focus on digitisation, digital connectivity and a more coordinated approach to data management were also identified as important for optimising the existing infrastructure asset base and improving the government's capacity in this area.

Feedback called for asset management practices across local government to be strengthened. The Strategy acknowledges a significant amount of community and social infrastructure assets are managed by local government and that having sound and consistent management systems in place and improving maturity is important.

The Strategy also addresses stakeholder feedback calling for proposed reforms in funding and hypothecation arrangements to consider and ensure adequate support for regional and local government roads, along with improved resilience, road maintenance and road safety programs.

Identifying major infrastructure projects and programs

While many recommendations in this Strategy focus on non-build initiatives, examining future major projects or programs through a robust process of planning and business case development was an area of interest to many stakeholders.

Increased investment in rail infrastructure drew strong support. Some stakeholders emphasised the need for light rail to link with land-use and transport planning. The link between the light rail, bus rapid transit and the Perth and Peel transport plan has been emphasised.

The Strategy recommends more than 70 capital projects and programs for investment, business case development, planning or investigation. Once the Strategy is finalised, planning for the annual rollout of the 10-year state infrastructure program from 2023 will also commence, which will inform a future pipeline of projects.

What happens next?

Targeted engagement is now ongoing as the strategic focus shifts from planning to the WA Government's implementation of the Strategy's supported recommendations.

The Implementation and future activities chapter of this Strategy provides further information on the WA Government's implementation of the Strategy's supported recommendations, and IWA's monitoring and reporting function.



Implementation and future activities

Implementing the Strategy

The recommendations and sub-recommendations that are supported in the WA Government's response to the Strategy outline the actions required for implementation of the Strategy. The contextual information provided in each chapter should be read in conjunction with the recommendations and sub-recommendations.

Through the consultation process, a number of government and private sector stakeholders raised concern around perceptions of inaction and the potential inadequate implementation of the Strategy. The IWA Act accounts for this by requiring state agencies and government trading enterprises (GTEs) to:

- align their strategies, plans and policies with the Strategy
- to the extent that the recommendations are supported by the WA Government's response, implement the recommendations that are relevant to them.

This promotes a whole of government approach to infrastructure planning, investment and delivery. In addition, IWA's annual monitoring and reporting role, as required under the IWA Act and explained further in this chapter, will provide transparency in relation to the WA Government's progress of implementation.

IWA will assist the WA Government throughout implementation of supported recommendations. IWA's contribution may range from an observation and monitoring role to a more active participant in delivery. While lead state agencies and GTEs have been suggested for each recommendation, this does not preclude the relevant involvement of other state agencies and GTEs.

While the time frame for completion and full implementation of certain recommendations may not be required for some time, it is intended that IWA, through its annual monitoring report, will provide detail on work being progressed to implement each recommendation. IWA will also consider the contextual information provided in each chapter when reporting on the WA Government's implementation of the Strategy's supported recommendations.

Monitoring progress

Annual reporting on the WA Government's progress in implementing the supported recommendations of the Strategy is required by the IWA Act. To fully realise the value of the Strategy, and how it needs to be adapted over time, analysis of progress against outcomes rather than simply actions is also required. These annual reports will be developed in collaboration with relevant stakeholders and made publicly available.

To support greater accountability, transparency and outcomes, the Strategy will be supported by a monitoring and reporting framework. As the Strategy will be updated at least every 5 years, the framework will support continual, systematic collection of data to measure and assess how the Strategy and infrastructure have performed over the long term.

Monitoring will help:

- track progress against the Strategy's recommendations, vision and objectives
- ensure the Strategy is driving the right outcomes
- account for the efficient and effective use of funding
- assess the impact of major policies, strategies, programs and projects to which the Strategy and infrastructure priorities are aligned
- understand how change is affecting WA and identify emerging infrastructure opportunities and challenges for the state
- identify priorities and focus areas for future state infrastructure strategies.

The framework will align with, and draw upon, data collected through the monitoring frameworks of the strategies, plans, programs and projects of relevant state agencies and GTEs. This will assist in tracking the WA Government's progress.

Relationship to the annual 10-year state infrastructure program

In line with the IWA Act, the WA Government is required to prepare an annual 10-year state infrastructure program that gives a medium-term view of infrastructure priorities and investments to support greater visibility beyond the 4-year State Budget cycle. The goal is to create confidence in, awareness of and preparedness for the state's infrastructure pipeline. IWA will work with relevant state agencies and GTEs to complete this.

It is expected the program will detail projects and programs drawn from the Strategy, strategic asset plans and other relevant material and will be in line with the State Budget. Recognising that preferred infrastructure responses may change over time, the program may point to needs and options to address these rather than propose specific infrastructure solutions, particularly in the 5–10 year time frame. As with recommendations within this Strategy, initiatives featured in the program will still need to follow due process in line with the Strategic Asset Management Framework and the IWA Act to ensure the proposal is the right option to address the issue or opportunity. The annual program will be prepared by state government and publicly released within 3 months of the annual State Budget. The first program is expected to be prepared and publicly released following the release of the 2023–24 State Budget. IWA's advice is required to be sought in preparing each program.

Applying the Strategy to Infrastructure WA's other functions

The Strategy will be used to guide IWA in its other functions, including:

- assessing major infrastructure proposals in terms of alignment with the Strategy and potential interfaces with other infrastructure initiatives
- providing strategic guidance on the WA Government's submissions to Infrastructure Australia for consideration in the annual Infrastructure Priority List
- identifying initiatives that require further investigation or advice to state government.


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Cross-cutting themes

Digital connectivity and technology	56
Aboriginal cultural heritage, wellbeing and enterprise	72
Climate change and sustainability	86
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Planning and coordination	124
Infrastructure delivery	150
Asset management	162

Digital connectivity and technology



The Commonwealth Scientific and Industrial Research Organisation has estimated that digital innovation has the potential to deliver **$315 billion in gross economic value** to Australia over the next decade, with the possibility of generating a quarter of a million new jobs by 2025.[1]

What IWA heard

During consultation on the draft strategy, feedback reiterated the importance of digital connectivity to support equitable access to services, social inclusion and economic development. Stakeholders recognised the importance of data sharing and management, resulting in a strengthened focus on the need for a whole of government digital platform.

The opportunity to embed data standards into contracting processes was highlighted as a mechanism to achieve integration and interoperability, resulting in refinements to recommendations. Stakeholder concerns relating to cyber risk has led to a stronger recognition of the government's policy developments in cybersecurity and protection of critical infrastructure.

Other concerns relating to funding and procurement of digital technology projects has resulted in attention being drawn to the importance of the government's new Digital Capability Fund. Stakeholder feedback also highlighted the importance of research infrastructure to science and technology, prompting the inclusion of a new recommendation.

Digital connectivity and technology are rapidly changing almost every aspect of our lives. Technology is transforming how government and commercial services are accessed and delivered by redefining business models, supply chains and labour markets, and breaking down physical and social barriers. Embracing digital will enable data-informed and faster decision-making, support more flexible service delivery and create a more agile government. Digital has a role across all infrastructure sectors and warrants a strong and sustained government focus.

It is important that WA recognises digital connectivity infrastructure as a strategic asset and a major enabler for economic development and social equity. Data indicates that the international competitiveness of Australia's information and communications technology (ICT) sector is slipping. In 2019, Australia ranked seventh out of 16 countries across 24 indicators and, over 2 years, fell in rank in more than half of the indicators, including internet access, ecommerce and capabilities in the ICT sector.[2]

The importance of digital connectivity was highlighted by the unexpected isolation caused by the COVID-19 pandemic, when data demands on telecommunications networks surged more than 50% during peak periods across WA. The speed at which the sector adjusted to meet the challenge was impressive and it demonstrated how responsive government can be in delivering more essential services through online platforms and programs. It also demonstrated the importance of a resilient digital network. As infrastructure systems become more reliant on digital technology to operate, the risk of cyberattack also increases. Combined with the increasing likelihood of other shock events such as storms, cyclones or bushfires, it is essential for resilience in digital infrastructure to be prioritised.

Supported by improved connectivity, WA has an opportunity to reimagine itself as a digital state. Enhancing infrastructure assets through digitisation, such as optimising supply chains with smart technologies, will improve system efficiency and realise the value of rich, up-to-date data in long-term infrastructure planning. For example, in the water sector, the integration of digital technologies, such as sensors, smart meters and pressure control systems, has reduced water loss and consumption and improved water conservation. Efficiencies such as these can create competitive advantage and jobs. Another example is the Digital Built Britain program, which was designed to transform how the United Kingdom construction industry and operations management professionals plan, build, maintain and use infrastructure through digital technology. The program is forecast to unlock an increase of 0.5% to 0.7% in annual gross domestic product over a 5-year period, rising to 1% to 2.7% over the subsequent 10 years, and growing to 3% to 6% after 15 years.[3]



The rise of the cloud, big data, mobility, artificial intelligence, augmented and virtual reality, and the Internet of Things is fuelling a fourth industrial revolution – **Industry 4.0**. Between 2018 and 2024, it is estimated that **demand for technology workers in Australia will grow by 100,000**.[4] The contribution of digital technology to gross domestic product is expected to **grow by 40%** between 2018 and 2023.[5]

What is digital?

For the purposes of this Strategy, digital refers to the application of technology to physical infrastructure, which facilitates the connection of assets and people to the internet. It encompasses:

- telecommunications infrastructure, such as submarine cables and fibre transmission
- access networks, such as fixed-line, mobile and satellite
- end-point user devices and applications, such as Internet of Things devices and handsets
- policies and frameworks, such as those used to secure and organise digital information.

Digital refers to how data is generated and collected to create value. Data is an asset class that transforms infrastructure systems into information generators and enables more efficient asset management practices.

Digital connectivity and the digital divide

Aside from the Australian Government's national broadband network (NBN), telecommunications infrastructure is largely delivered by the private sector. NBN Co's multi-technology mix model has resulted in satellite service coverage for large areas of WA which, due to frequent service dropouts, bandwidth (speed and contention) and latency issues, poses challenges in meeting current and future connectivity demand.[6]

To meet the demand of 95% of households nationwide, Australia's bandwidth requirements are estimated to more than double over 10 years, from 24 megabits per second in 2018 to 56 megabits per second in 2028.[7] Average household data demand is estimated to nearly quadruple from 199 gigabytes per month to 767 gigabytes over the same period.[8]

WA's size and low population density in many regions limits the commercial viability of service delivery and, as a result, the private sector has not delivered adequate connectivity (particularly mobile) to meet the ever-growing needs of regional communities, businesses and government in many areas of the state. For example, it is estimated that approximately 74% of WA (geographically) has no mobile coverage (Figure 14).[9]

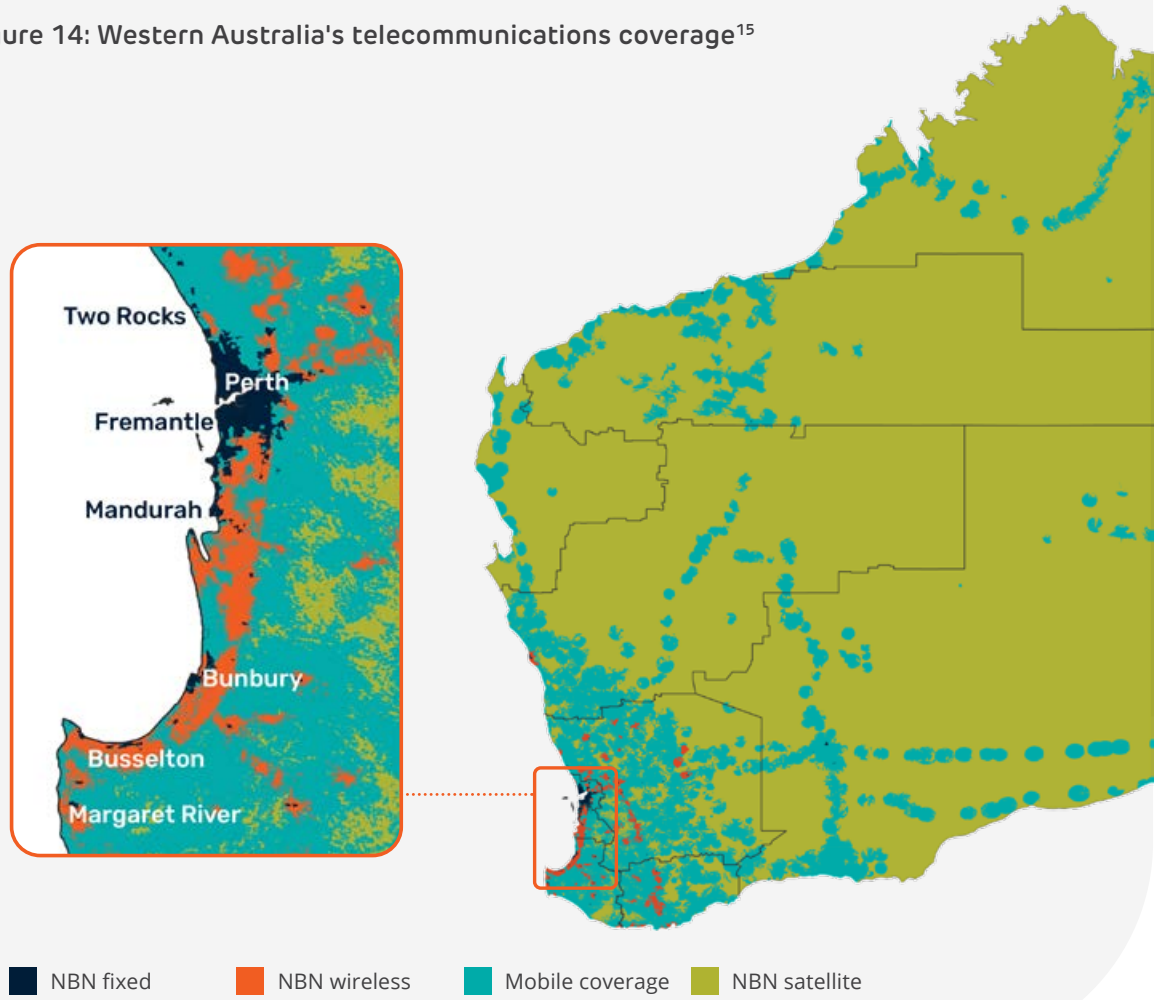
These shortfalls create a digital divide between metropolitan, regional and remote areas, and the gap is widening in vulnerable communities. Aboriginal people are especially impacted, with Indigenous Australians' digital inclusion scoring 7.9 points below the national average.[10] While WA ranks second in the nation on the Australian Digital Inclusion Index 2021 (with a score of 72), many regional areas sit below the national average.[11] On a national level, the divide between metropolitan and regional areas remains marked, with regional areas recording a score of 67.4, 3.6 points less than the national average of 71.1 and 5.5 points less than metropolitan areas, which scored 72.9.[12]

In WA, 94% of regional local government areas scored below the state average, with a gap of 13 points at the lowest end, compared to metropolitan local government areas where only 2 scored below the state average and some scored up to 7 points higher.[13]

As a result, many regional and remote areas experience poor-quality mobile network coverage, limited choice of providers and higher-cost broadband services of variable quality. Consequently, economic growth, service delivery and social participation in these areas are impacted. Emerging technologies, such as low earth orbit satellites, may result in wider access to high-speed broadband services in regional WA, and it will be important for government to consider how to support and leverage these developments where appropriate.

Other factors can also lead to digital exclusion. In 2021, highly excluded Australians were the most likely to have not completed a secondary education (38%), fall in the lowest income quintile (31%), live in a single-person household (26%), have a disability (23%), be unemployed (21%) or not be in the labour force (22%).[14] Some groups may have limited access to internet or online platforms, have fewer skills to connect them digitally or may experience language or accessibility barriers that limit their opportunities to engage with online resources.

Figure 14: Western Australia's telecommunications coverage[15]



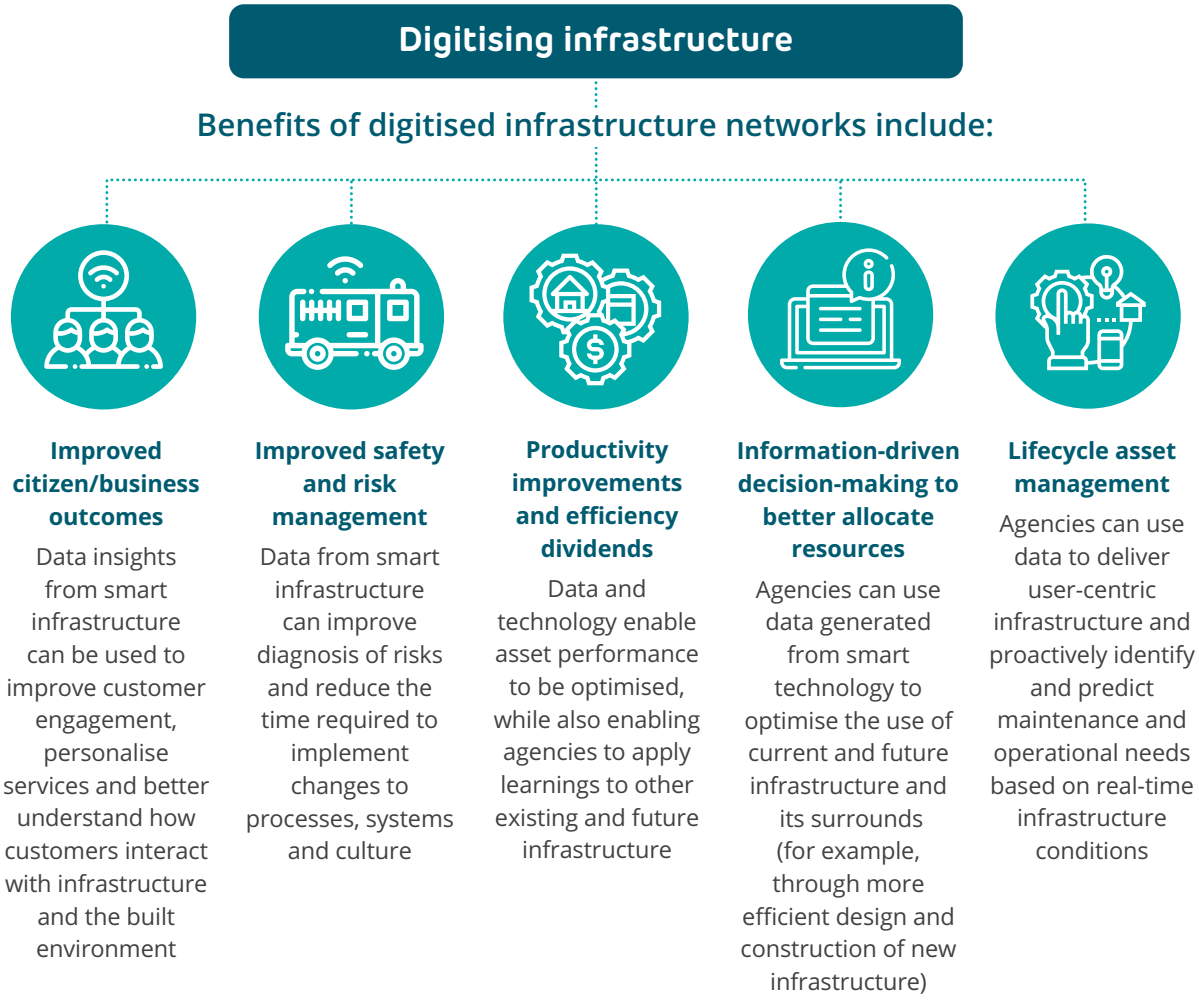
On a global scale, **Australia's fixed broadband speeds lag far behind comparable developed countries** and the quality, reliability and affordability of data services across WA varies greatly.[16]

A digital-first approach – the case for digitising infrastructure

Digitising infrastructure creates a range of benefits including better business outcomes, improved safety, greater customer engagement and experience, operating efficiencies, opportunities for new revenue streams and better lifecycle management. Sophisticated use of building information modelling technology alone was estimated to have saved the United Kingdom the equivalent of $4 billion over a 6-year period by enabling interventions to be modelled and tested before they are fully deployed.[17] Going forward, the Digital Built Britain program will apply a new model of digitisation that will provide the platform for a full cross-integration of the built environment sector.[18] Greater savings are possible from sharing data to inform lifecycle planning for related projects, and demonstrating value and efficiencies created through optimisation and automation.

Adopting a digital-first approach will help manage operational risks and improve safety. Embedding digital tools and thinking will deliver benefits at every stage of the infrastructure lifecycle (Figure 15). This is demonstrated through the Australian Integrated Multimodal EcoSystem project in Melbourne, which uses digital technology to link transport infrastructure with its users to deliver safer, cleaner and more sustainable urban transport. The system also includes a predictive platform that enables a near-future view to optimise the transport system in real time.

Figure 15: The benefits of digitising infrastructure



The volume and value of data being generated is constantly increasing, and many public and private sector entities hold large and powerful data sets comprising static and real-time information. In 2019, the Organisation for Economic Cooperation and Development estimated that public sector data access and sharing generates social and economic benefits worth between 0.1% and 1.5% of gross domestic product.[19] An opportunity exists to better use data to solve complex business and societal challenges, and to improve the quality and consistency of infrastructure planning, policymaking and investment decision-making. This requires a range of supporting capabilities, such as robust privacy frameworks, data sharing and management policies and platforms, and digital literacy and specialist skills. New infrastructure should be designed and built to capture at least baseline data, with the view to broadening and deepening this data capture in line with a digital-first approach and to support business and operational needs. As standard practice, state agencies and government trading enterprises (GTEs) should identify digital alternatives to physical built form investments, using digital tools in the planning and design phases.

Digital infrastructure systems need to be protected with effective cybersecurity and information privacy controls. Achieving the right balance between data security and data sharing is a delicate balance but this is critical to enabling innovation and realising value. For state-owned and regulated infrastructure, there is a need for a continuous focus on setting and implementing clear cybersecurity standards. This will help manage critical risks, support digital transformation and protect industry, individual and government data. WA is well positioned to lead in this space, building on its strong track record and leveraging its skills, such as through the Southern Hemisphere's largest university-based security operations centre at Edith Cowan University.

Digital opportunity for Western Australia

WA Government investment in telecommunications infrastructure has been relatively modest and largely focused on addressing the digital divide, particularly through leveraging Australian Government grant co-investment programs. These programs have delivered benefits to some regional and remote communities but there are still very significant gaps in connectivity across the state. A prioritisation framework to guide future investment decision-making, coupled with effective cross-government coordination, is needed to support improved outcomes.

The Office of Digital Government (within the Department of the Premier and Cabinet) addresses digital inclusion gaps in its *Digital inclusion in Western Australia, A Blueprint for a digitally-inclusive state* consultation draft. This initiative provides the strategic direction to address the impacts of digital exclusion and is an important policy instrument that will enhance the benefits of connectivity by also addressing digital literacy, affordability and accessibility barriers.

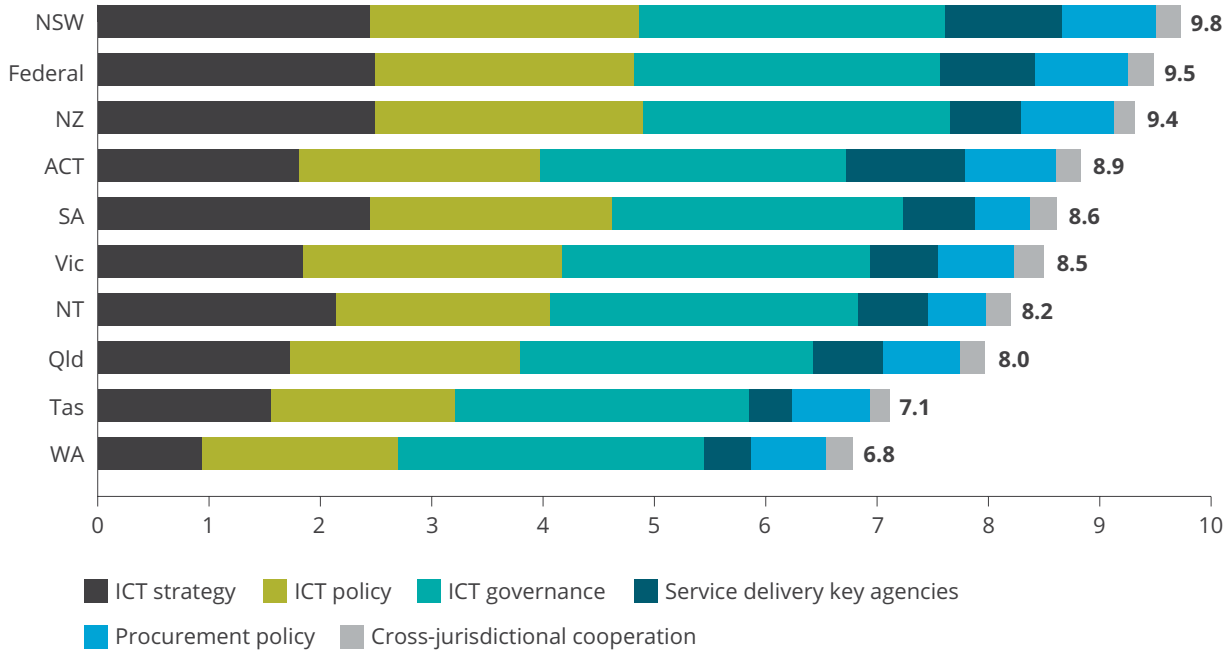


WA's capacity to **digitise, create value from and futureproof its infrastructure assets** depends on the success of a range of critical capabilities.

Its implementation as part of the WA Government's *Digital Strategy for the Western Australian Government 2021–2025* should be supported. Other jurisdictions are increasingly recognising the negative economic and social impacts of poor regional connectivity and addressing this through the establishment of dedicated programs and additional investment. For example, the New South Wales Government is progressing the $400 million Regional Digital Connectivity program, which aims to address the digital divide between metropolitan centres and regional areas through investment in digital infrastructure.

In terms of digital readiness (how well a jurisdiction is positioned to benefit from the internet economy), WA ranks fourth of all Australian jurisdictions on the Cisco Australian Digital Readiness Index. WA performs well in technology adoption and human capital, but poorly in government and business investment and provision of critical technology infrastructure.[20]

Figure 16: Digital Government Readiness Indicator 2021[21]

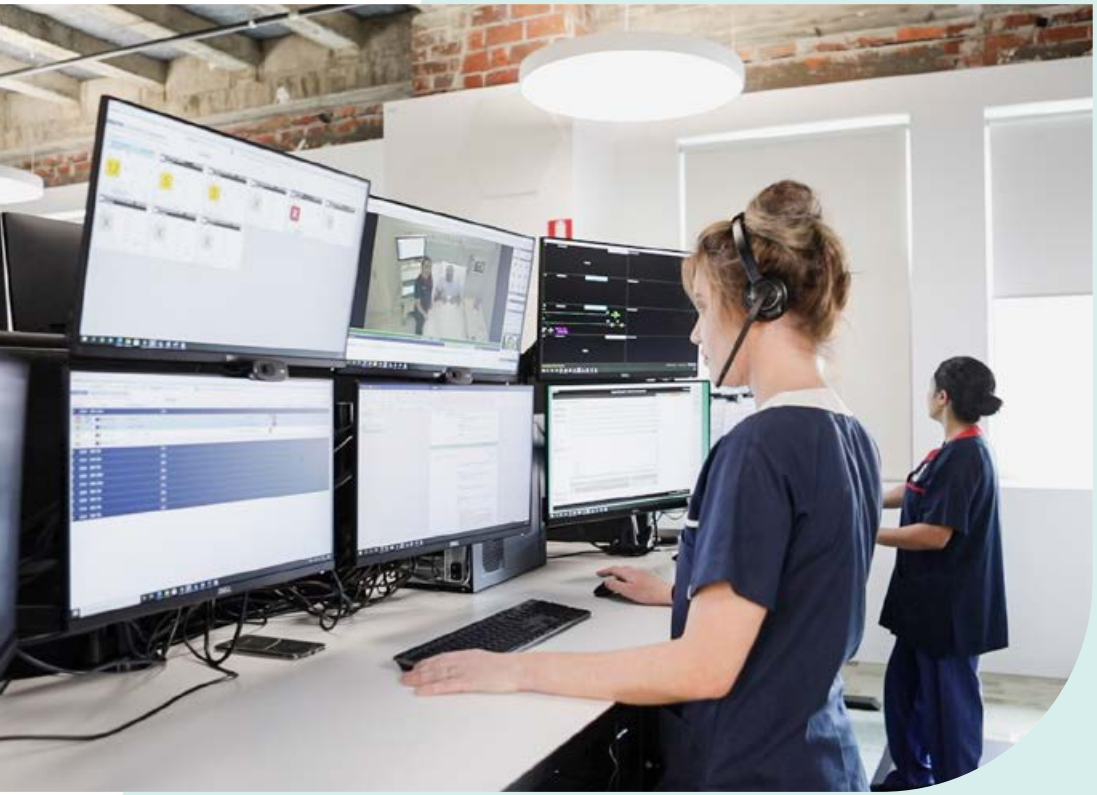


WA ranks lowest on the Digital Government Readiness Indicator.[22] Many factors contributed to this low ranking, including expiration of the Digital WA: State ICT Strategy 2016–2020, the lack of a central service delivery state agency and continuing to operate without adequate privacy legislation (Figure 16). The WA Government has since released its Digital Strategy for the Western Australian Government 2021–2025 and is implementing its Whole of Government Digital Services Policy by establishing a whole of government service delivery portal.

Stakeholder feedback suggests outdated ICT systems operating within government create limitations for service delivery and increase risk, which is impacting its digital readiness. This is exacerbated by a funding model that is not well suited to recognise the unique characteristics of digital project lifecycle and funding requirements. The WA Government's $500 million Digital Capability Fund announced in September 2021 acknowledges the importance of providing a dedicated funding stream to enhance its digital capability. Continued investment in digital infrastructure will help WA to realise the economic and social dividends that digital connectivity and technology provide. The WA Government needs to develop a strong digital readiness agenda and be agile in its governance, planning and decision-making to keep pace with demand and technological change.

Case study

Health in a virtual environment



In December 2020, the East Metropolitan Health Service commenced HIVE (Health in a virtual environment), an inpatient remote monitoring service. HIVE is staffed by clinical experts and provides continuous 24/7 monitoring of vulnerable patients at Royal Perth and Armadale hospitals.

The service uses an artificial intelligence platform that interacts with a range of medical devices and clinical applications to identify subtle changes in patients' conditions and detect early signs of clinical deterioration. When the platform identifies a problem with a patient, HIVE clinicians and staff are notified. HIVE clinicians use a 2-way audiovisual system to intervene and support staff to care for the patient.

The benefits of the service include enhanced safety and quality of patient care, improved hospital operations and patient flow, improved patient satisfaction and improved staff satisfaction and morale.

While currently applied to inpatient care, the service has the potential to be combined with mobile and wearable technologies to support and empower patients with chronic health problems to co-manage their health in the community. Managing health at home may assist in decreasing admissions to hospitals, therefore reducing pressure on existing infrastructure.

For further information, refer to www.emhs.health.wa.gov.au.

Governance

Provision of telecommunications infrastructure is regulated by the Australian Government and most services provided to consumers are delivered by the private sector (with the exception of NBN) (Figure 17). Services provided to end users can be broadly separated into 2 areas: mobile and fixed services.

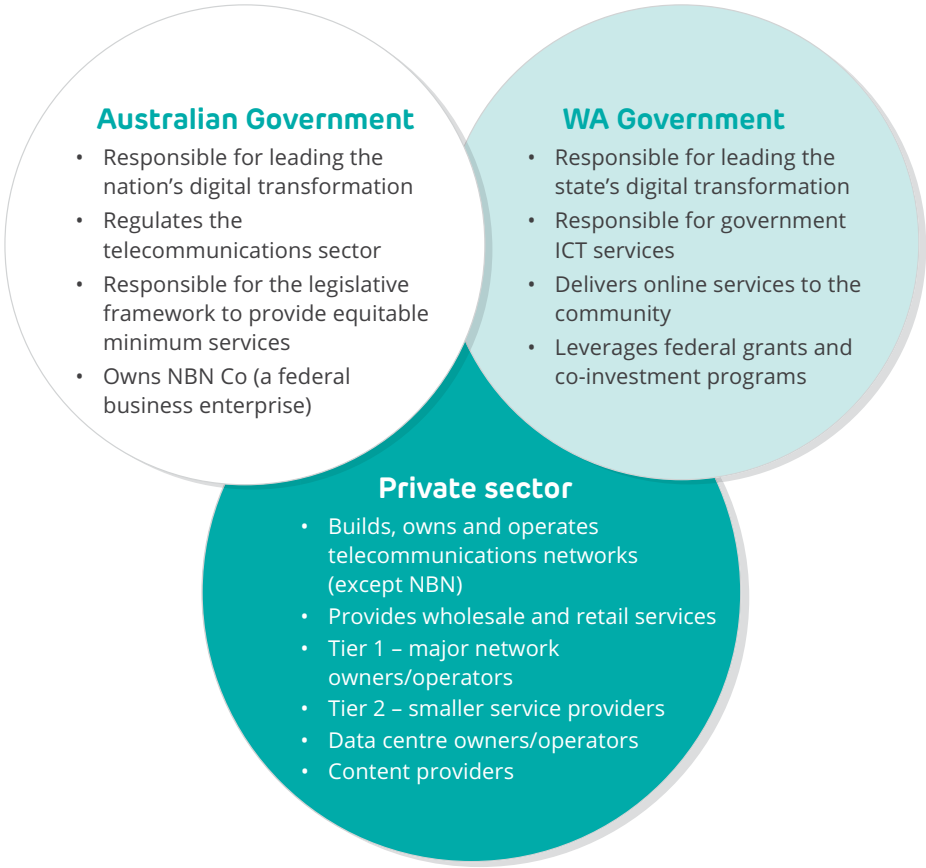
Three mobile network operators provide mobile services to the Australian market: Telstra, Optus and Vodafone. In addition, more than 50 smaller virtual mobile network operators lease network space from these major operators, offering the market a lower-cost alternative but with fewer features. Mobile services have evolved from 3G (low speed/wide range) to 5G (higher speed/shorter range). 5G is being designed to respond to major growth in the demand for data and connectivity. Deployment of 5G requires higher densities of towers and cells. Given the additional investment requirements and lower concentration of customers in regional areas, it is unlikely that 5G will be commercially viable outside highly-populated centres.

Internet services are currently provided via a range of technologies, including fixed-line, mobile and satellite services. NBN Co owns and operates Australia's wholesale broadband access network. NBN Co's primary objective is to ensure all Australians have access to fast broadband at affordable prices, with the least cost to taxpayers. In accordance with the 2016 *NBN Co statement of expectations*, NBN Co is expected to deliver access to peak wholesale download speeds of at least 25 megabits per second to all eligible premises, and at least 50 megabits per second to 90% of fixed-line premises. NBN Co is solely a wholesale provider of broadband services and sells access to its network to over 150 large and small retail service providers nationally.[23]

NBN Co provides 121 points of interconnect across Australia to connect users within a local area to the NBN network. In regional WA, retail service providers are required to establish and manage the connection from these points back to Perth, meaning they must either build or own existing backhaul fibre, or lease space on other operators' fibre transmission. In many cases, the owners of fibre transmission are also large retailers of NBN products and services, which gives them an inherent advantage over other service providers. In the future, the emergence of mobile 5G technology and low earth orbit satellite technologies may offer alternative options for end users of internet services.

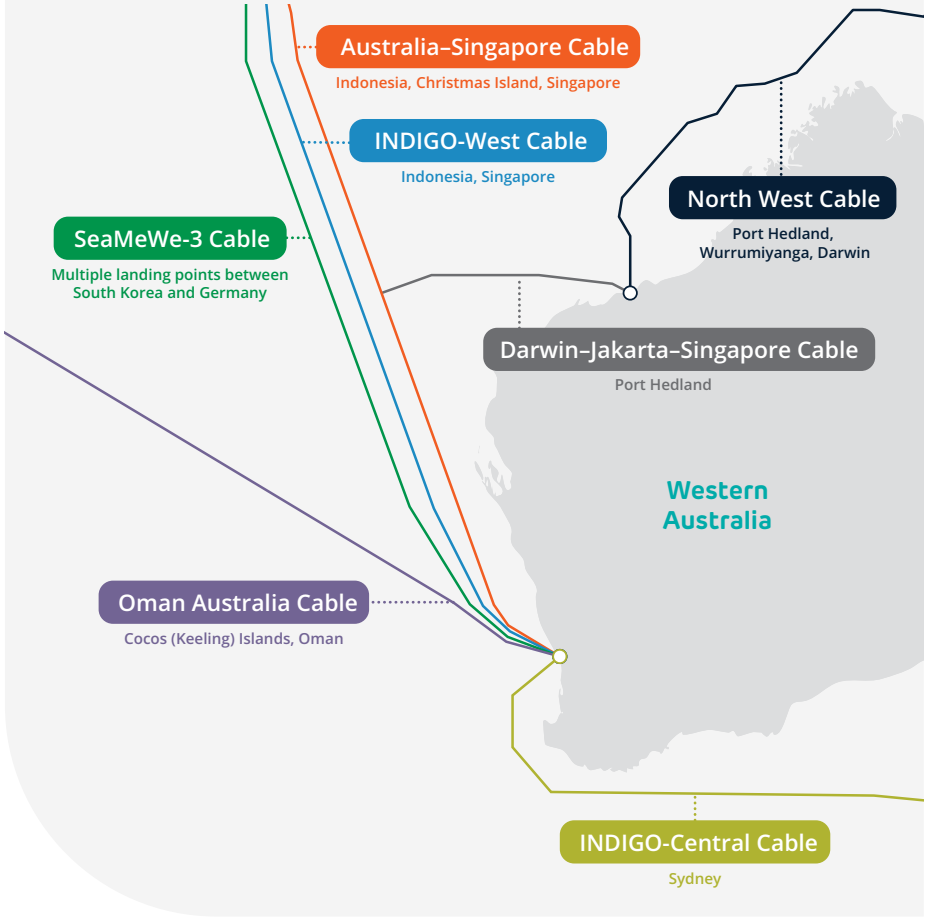
Recently announced major investment in a fibre network that will connect major data hubs in capital cities across Australia promises to boost data transmission capacity, which may unlock new economic opportunities.

Figure 17: Telecommunications sector roles



Two other areas of major influence for digital connectivity are the availability of international optical fibre cable routes and data centres. Served by 4 international submarine cable routes and a national Perth–Sydney submarine cable route, Perth is well positioned as an internet hub location (Figure 18).[24] Outside Perth, there are few data centres and no international submarine cable landings, which can impact the ability to support low-latency, high-bandwidth applications.

Figure 18: Subsea cables[25]



Recommendations

Prioritise digital transformation

Maintaining and increasing WA's global competitiveness through digital transformation requires prioritised investment in digital connectivity infrastructure. Strategic and coordinated WA Government intervention in the digital and telecommunications sector will address the most pressing needs of the state and build the basis for a strong digital future. The WA Government's Digital Capability Fund is an initiative that aims to enable more strategic and targeted investment in digital transformation and achieve coordinated and collaborative investment in digital capabilities.

A centralised and strengthened role for government is needed to coordinate statewide investments where market forces are failing to deliver the infrastructure to bridge the digital divide and build digital prosperity. Government funding should focus on improvements and upgrades in regional and remote areas across a diverse range of proven emerging technology types such as 5G and low earth orbit satellites. Investment should be aimed at enhancing economic and social benefits and/or supporting critical services, such as emergency, health, education and transport. Connectivity that is augmented by digital infrastructure, skills and ecosystems will drive adoption and deliver improved economic and social outcomes.

Digital connectivity is a core strategic asset and enabler of economic development and social equity. The digital future is characterised by a rapidly changing technological landscape, the pace of which has increased due to the increased focus on digital technologies during the COVID-19 pandemic. Due to this pace of change, the level of disruption is high. Outcomes-based, agile planning is needed to support the application of the most appropriate technologies and infrastructure types at any given time.



Several levers available to the WA Government can be applied in a coordinated manner to optimise investment outcomes. These include but are not limited to:

- recognition of economic and social benefits of digital technologies in business cases
- coordinated procurement to leverage government spend on telecommunications services
- a whole of government approach to leveraging NBN investment
- co-investment with the private sector and the Australian Government.

Recommendation 1

Elevate WA's focus on accelerating digital transformation and the priority given to underlying connectivity infrastructure by:

a. allocating a lead state agency with a statewide, whole of government focus to proactively increase digital technology adoption and ensure digital services are more accessible and responsive to community and business needs

b. developing and implementing an integrated statewide plan for digital connectivity, supported by a prioritisation framework, to guide future government investment

c. developing a collaboration model, adopting a coordinated WA Government approach to federal programs and encouraging private sector investment

d. providing multi-year WA Government funding and leveraging Australian Government co-investment opportunities for initiatives that have been prioritised in the statewide plan for digital connectivity.

A digital-first approach

Embedding digital tools and thinking throughout the infrastructure lifecycle will deliver improved safety and risk management, increased productivity and efficiency dividends, and optimise resource allocation (Figure 19). For example, a digital twin that replicates a physical asset or real-world process, such as a building or supply chain, enables sophisticated real-time monitoring and adjustments. This kind of digital solution can support rapid decision-making, with a high degree of confidence in outcomes, and provide valuable information to inform planning and management of assets (Figure 20).

Infrastructure digitisation proposals should be supported by cost-benefit assessments to determine the potential investment net benefit from digitisation scenarios, taking into consideration commercial, environmental and social factors. A decision to not digitise any aspect of a new infrastructure asset should be supported by evidence-based rationale.

Reporting on the uptake of digital in the public sector will be important to embed a digital culture and make informed cost-benefit analyses. Indicators that could be used for reporting include:

- prioritisation phase: demonstration that digital alternatives and enhancements were considered, and data collection and analysis opportunities were identified in business cases
- design phase: extent to which digital tools were used in the design process, including building information modelling
- procurement phase: data sharing included as a condition of contracts
- build phase: extent of digitisation and percentage of total expenditure attributed to digitisation
- operate and maintain phase: optimisation and automation achieved, data collection and management controls and potential value created/ efficiencies generated.

Figure 19: Application of digital across the infrastructure lifecycle

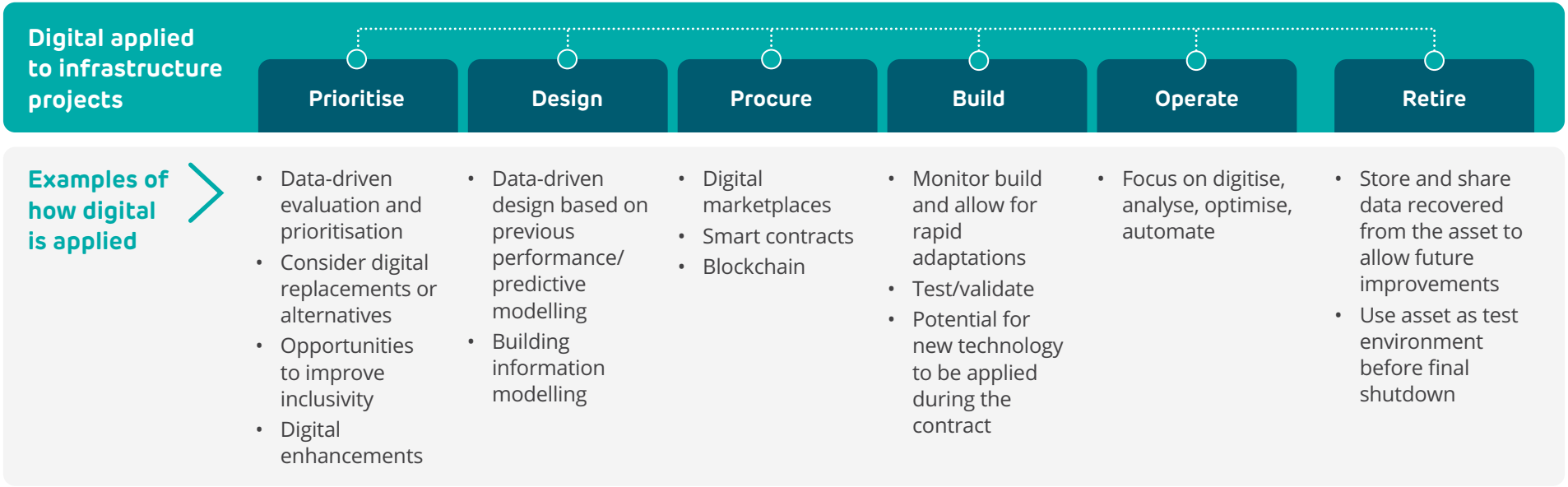
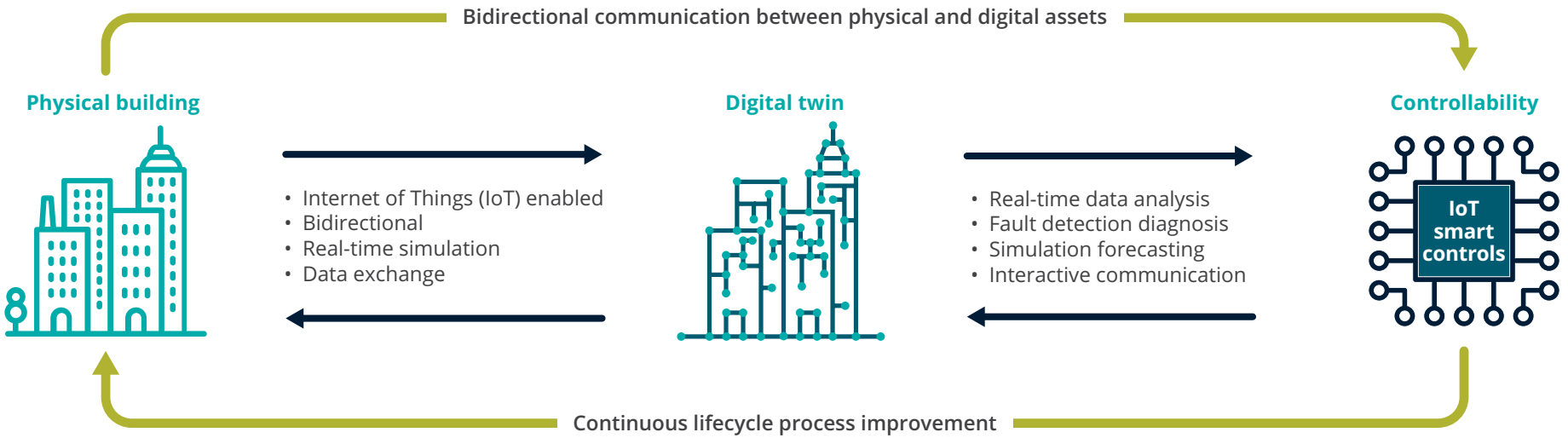


Figure 20: Digital twins in the built environment[26]



Recommendation 2

Improve infrastructure efficiency and performance and enhance service delivery through application of a digital-first approach to all stages of the infrastructure lifecycle, by:

a. developing a digital-first smart infrastructure policy that guides the application of digital technologies, that includes:
   - design principles for digital-enabled infrastructure such as interoperability and flexibility, resilience, open standards and user-centred design
   - minimum requirements to embed smart technology in new and upgraded infrastructure where a positive net benefit can be demonstrated
   - a clear process for state agencies and government trading enterprises that would identify how to assess and implement digital at all points of the lifecycle, including accounting for upfront and recurring costs in the business case phase
   - outcomes and metrics

b. amending the Strategic Asset Management Framework's Strategic Asset Plan and Business Case guidelines to require state agencies and government trading enterprises to apply the digital-first smart infrastructure policy commencing with projects and programs with a capital cost of $100 million or more

c. undertaking annual public reporting on digitisation of infrastructure, including on prioritisation, design, procurement, build and operational phases.

Cybersecurity

Cybersecurity is a major focus for state agencies and GTEs. Until recently, the Australian Government's *Security of Critical Infrastructure Act 2018* (SOCI Act) applied to specific entities in the electricity, gas, water and maritime ports sectors.

The *Security Legislation Amendment (Critical Infrastructure) Act 2021* (Cth) amended the SOCI Act on 2 December 2021, creating a framework for managing risks relating to critical infrastructure, focusing on cybersecurity and expanding the scope of the original SOCI Act to include critical infrastructure entities in a wider range of sectors, including communications, financial services and markets, data storage or processing, defence industry, higher education and research, energy, food and grocery, health care and medical, space technology and transport.

The Australian Government is consulting on a second piece of legislation, the Security Legislation Amendment (Critical Infrastructure Protection) Bill 2022, with the intention of introducing it into the Australian Parliament in early 2022. This legislation would require owners and operators of critical infrastructure assets to establish, maintain and comply with a risk management program appropriate to their business.

The Australian Cyber Security Centre draws attention to the growing cybersecurity risk associated with the increasing convergence of information technology and operational technology (for example, digitised infrastructure networks). Approximately one-quarter of all cyber incidents reported to the Australian Cyber Security Centre during the 2020–21 reporting period were associated with Australia's critical infrastructure or essential services.[27] This means an essential service or critical infrastructure was attacked every 32 minutes. As infrastructure systems become increasingly digitised, the risk of cyberattack also increases, threatening the availability and reliability of critical services and security of personal and commercial data. The Australian Cyber Security Centre provides guidance on essential mitigation strategies for industrial control systems.

The Cyber Security Unit within the WA Government's Office of Digital Government is leading and coordinating whole of government cybersecurity initiatives to protect the integrity of government systems and grow cybersecurity maturity across the public sector. The Western Australian Cyber Security Policy prescribes a minimum baseline of cybersecurity controls for state agencies to implement. The Office of Digital Government is also leading a security operations centre, a resource available to all state agencies and GTEs to assist with threat detection, incident response, recovery activities and other security-related services. State agencies and GTEs need to ensure the resilience of their infrastructure and protect critical assets by adopting these best-practice approaches and adhering to recognised cybersecurity standards for major infrastructure assets.

WA Government attention to this matter should be strengthened to ensure owners and operators of critical infrastructure protect against cyber risks to information, assets and service delivery.

Recommendation 3

Manage critical risks and support digital transformation by improving cybersecurity practices for state-owned and regulated infrastructure owners and operators, including:

a. clearly articulating state and federal government cybersecurity obligations to government infrastructure owners and operators

b. implementing mechanisms to mandate application of the Western Australian Cyber Security Policy by government trading enterprises

c. updating the Strategic Asset Management Framework's Strategic Asset Plan and Business Case guidelines to require all infrastructure strategic asset plans and business cases to demonstrate compliance with the Western Australian Cyber Security Policy and, where applicable, the *Security of Critical Infrastructure Act 2018* (Cth).

Digital capabilities and enablers

WA's capacity to digitise, create value from and futureproof its infrastructure assets depends on the success of a range of critical capabilities. These include robust privacy frameworks, data sharing and management policies, protocols and platforms (including across government and between the private and public sector) and a diverse skills base that infrastructure owners and operators can draw on to embed digital into infrastructure assets.

The development of privacy and responsible information-sharing legislation for WA will be a critical step to foster a data-sharing culture. Alignment of legislation with existing Australian privacy laws where possible will ensure consistency and streamline information data sharing across jurisdictions. Legislation should also support adaptive approaches that respond to technology advancements. While legislation is critical, organisational cultural barriers relating to the sharing of information should also be addressed.

Effective data sharing across the public and private sectors, and academia, is key to supporting improved infrastructure planning, design, construction, operation and maintenance, and ensuring decisions are supported by robust evidence and analysis. For example, location or place-based information is powerful and enables the creation of digital twins (digital models of the real world) and smart cities. Bringing this data together through a collaborative exchange or platform would allow entities to share and visualise location information (such as buildings, infrastructure and services), simulate concepts, test options and solve problems. This practice is increasingly being established in other jurisdictions. To reduce duplication and ensure interoperability, it is important that environments such as these integrate with other platforms being developed by the WA Government, such as that being developed to allow customers to access integrated government services through a single portal.

The prioritisation and management of maintenance programs relies on up-to-date and accurate asset information. The quality of asset information is often inconsistent and lacking in some areas, making it difficult to develop fit for purpose, risk-based management plans that consider asset condition and lifecycle status. More sophisticated asset information (including that provided through building information modelling) will enable good practice asset management, such as risk-based decision-making, preventative maintenance and lifecycle asset optimisation. Information on asset use, lifecycle cost, performance and benefits should be systematically captured and used to inform planning and justification for future assets, as part of strategic asset plan and business case development processes. Embedding data-sharing requirements in procurement processes provides an opportunity to ensure relevant data is shared to required standards.

Recommendation 4

Ensure optimal operation and security of infrastructure by developing digital capabilities within state agencies and government trading enterprises, including:

a. prioritising development of state privacy and information-sharing legislation that addresses the need to protect information and leverage value from the state's information and data and, where practicable, aligns with existing Australian privacy laws to enable streamlined information sharing
b. establishing a whole of government digital platform that enables the sharing of location-based asset information
c. developing a WA Government data management and asset information policy that would include processes and appropriate standards to enable data sharing and analysis that supports improved planning and delivery of new infrastructure and better management of existing assets and embed these in government procurement processes, where applicable
d. assigning a centralised lead state agency that is responsible for developing and retaining data science capabilities within government, including developing a comprehensive workforce strategy.



Advancing science and research in Western Australia

The Strategy's vision acknowledges the science and technology expertise within WA and the opportunities this expertise provides to improve the productivity, efficiency and competitiveness of the economy. This is reflected in the WA Government's Diversify WA framework which identifies science, innovation and technology as a cross-sectoral enabler. Many existing and emerging industries rely heavily on science and technology to thrive, and rely on research and development processes for the development of new products and services. In addition, a wide range of critical services provided by state agencies rely on science and technology for decision-making and delivery, in areas ranging from environmental regulation to forensics, and from the provision of clean drinking water to climate change modelling.

WA has a strong and emerging science and research capability, with significant Australian and WA Government investment in associated research infrastructure, such as the Pawsey Supercomputing Centre and the Murchison Radio-astronomy Observatory that supports the Square Kilometre Array. Government investment in science has given WA a comparative advantage in a number of research niches and has catalysed private sector investment.

Research infrastructure comprises a range of assets, facilities and services that support leading-edge research and innovation, and are often of a scale and technical complexity that warrants them being considered state or nationally significant infrastructure. Investment in this type of infrastructure is often only possible through a common-use approach, either because of the high cost of the asset, the speed at which redundancy occurs and/or the highly specialised nature of the technology.

In WA, the approach to development and investment in this infrastructure has often been ad hoc and has not been assessed in a systematic way. The condition of the infrastructure and the risks to the state from its decline are also not clearly understood. There is a need for the WA Government to consider the technologies and assets that are needed for economic diversification, agency service delivery, environmental protection and community wellbeing. This assessment should include needs for both new infrastructure as well as the optimisation of existing infrastructure. Identification of priority infrastructure projects will also assist WA research organisations to access National Collaborative Research Infrastructure Strategy and other co-investment funding.

Recommendation 5

Advance economic, environmental and social outcomes by undertaking an assessment of WA's science and research infrastructure needs.

Aboriginal cultural heritage, wellbeing and enterprise



The *Closing the Gap report 2020* identified that the target to close the life expectancy gap between Indigenous and non-Indigenous people by 2031 is not on track, with **WA recording the largest gap** of all jurisdictions for males, at 13.4 years.[1] In 2018, the **child mortality rate** for Indigenous children was **141 per 100,000**, which is twice the rate for non-Indigenous children.[2] The **employment rate** for Indigenous Australians was around **49%**, compared to 79% for non-Indigenous Australians.[3]

What IWA heard

During consultation on the draft strategy, there was strong support for the Aboriginal engagement, empowerment, co-design and wellbeing themes. There was significant feedback on procurement and capacity building, including economic opportunities for Aboriginal people and businesses. It was suggested that initiatives to build capacity and capability of Aboriginal businesses be Aboriginal-led where possible. In addition, an update to the Aboriginal Procurement Policy was released, resulting in amendments to relevant recommendations.

Stakeholders highlighted the need to strengthen and support governance arrangements within remote Aboriginal communities and town-based reserves, and clarify the role of local government, which is now discussed further in this chapter.

Native title and cultural heritage were also raised, and the link to infrastructure has been made clearer.

Aboriginal people are strong and resilient, with an enduring culture, deep knowledge, history and connection to country. They know what is best for themselves and their communities, lands and waterways. Despite efforts, a significant gap still exists between the life outcomes of Aboriginal and non-Aboriginal people, and our existing systems are not serving Aboriginal people as well as they could. Issues are many and complex, and it will take significant engagement, effort and time to bring about real change and achieve better outcomes. By promoting and leveraging Aboriginal cultural heritage and enterprise, Aboriginal wellbeing will be supported into the future.

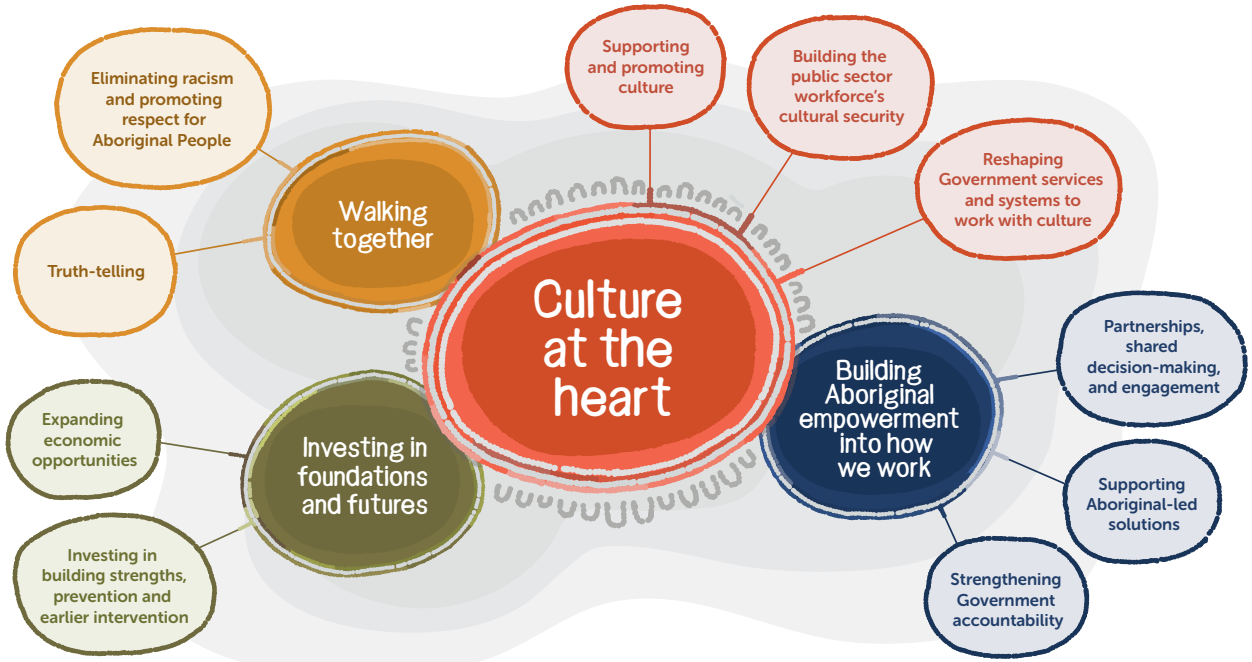
The *National Agreement on Closing the Gap* (Closing the Gap) includes a range of socio-economic targets that measure the outcomes experienced by Aboriginal and Torres Strait Islander people, including outcomes relating to education, child mortality, employment and life expectancy.[4] Progress on reducing disadvantage has been largely unsuccessful despite significant government investment at both a federal and state level.[5] A lack of opportunities for self-determination and capacity building, poor environmental health conditions in remote Aboriginal communities and town-based reserves and inconsistent funding arrangements have contributed to this lack of progress.[6] A new approach is needed to deliver improved life outcomes – one that places culture at the heart, embraces inclusive and genuine partnerships, and structurally changes the way government works with Aboriginal and Torres Strait Islander people.[7]

Infrastructure planning, design, delivery, operation and maintenance offers a range of opportunities for Aboriginal empowerment and self-determination to improve outcomes for Aboriginal people and increase the sustainability and resilience of their communities. While some progress is being made, more needs to be done through infrastructure development to build cultural understanding and respect, boost economic opportunities and improve participation, and enable fit for purpose community-led infrastructure solutions. It will take some time to embed and normalise new processes and realise improved outcomes for Aboriginal people.

Empowering Aboriginal people, families and communities is a focus of the WA Government's Aboriginal Empowerment Strategy. The strategy provides a vision ('Aboriginal people, families and communities empowered to live good lives and choose their own futures from a secure foundation') and framework to enable government to work more coherently together, and to work better with Aboriginal people, communities and organisations, federal and local governments and the private sector.[8]

This will help to improve social, economic, health and cultural outcomes for Aboriginal people. It includes 10 strategic elements, grouped into 4 themes that place Aboriginal culture at the heart (Figure 21).[9] Closely aligned with the strategy is the WA Government's first *Closing the Gap Jurisdictional Implementation Plan*. The plan outlines actions that will be taken to meet Closing the Gap priority reforms and targets, and information on specific activities, programs and services.[10]

Figure 21: Strategic elements of empowerment[11]



Culture is central to Aboriginal people's wellbeing. It is at the heart of a secure foundation for life, and forms the bridge between a person's identity and the futures they might choose.[12]

Achieving the goal of empowerment is not simply about more or better services, but a change in the relationship between Aboriginal people and government. This requires a shift from structures that sometimes position Aboriginal people as passive, individual consumers of services to structures that empower Aboriginal people and communities to actively identify solutions. Issues relating to Aboriginal heritage, wellbeing and enterprise are complex, deeply entrenched and stretch far beyond the remit of this Strategy. However, infrastructure presents a range of opportunities to contribute to Aboriginal empowerment, build self-determination and enable solutions designed for and with Aboriginal people.

There are 3 themes and subsequent recommendations addressed in this chapter that require both central and multi-agency responses:

1. **Aboriginal engagement and co-design for infrastructure**

   Infrastructure is vital to support social and essential services and improve the wellbeing of Aboriginal people. It should be planned and delivered in a co-designed process that embraces self-determination and empowerment of Traditional Owners and Custodians and their communities (including Aboriginal people whose families have been displaced from their traditional lands).

2. **Procurement and business development**

   Economic participation provides a strong foundation to realise better social, economic, health and cultural outcomes. There are opportunities – which should be Aboriginal-led and informed – across many areas of government activity to increase Aboriginal employment and procurement, and support the establishment, growth and sustainability of Aboriginal businesses.

3. **Infrastructure for remote Aboriginal communities and town-based reserves**

   Remote Aboriginal communities provide a deep connection to country and cultural security, uphold customs, cultures and traditions and provide traditional authority structures. Poor living conditions and environmental health in some communities contribute to higher rates of infection, injury and chronic disease and low community amenity and perceptions, impacting on wellbeing and participation. There is an urgent need to improve infrastructure in many of these communities.

The following infrastructure sector-specific challenges and opportunities will benefit from consideration in line with these 3 themes. Relevant chapters of the Strategy provide further detail, as they relate to infrastructure, along with the recommendations being made. Many of these support Closing the Gap targets.

- **Digital connectivity and technology:** Addressing digital connectivity constraints in remote areas, where small and geographically dispersed populations are difficult to service with reliable and affordable mobile and internet services, will assist in providing regional economic development opportunities, providing equitable access to services and closing the digital divide.
- **Housing**: Some Aboriginal people face housing issues such as poor-quality infrastructure, overcrowding and homelessness. Progress in improving housing outcomes for Aboriginal people has been slow, with significant negative environmental health impacts. Access to safe, good-quality and culturally appropriate housing is fundamental to achieving outcomes in health, education, employment and community safety.[13]
- **Health:** Aboriginal people across WA do not always have access to culturally appropriate health care. Aboriginal people experience unequal health outcomes compared to non-Aboriginal people, ultimately resulting in rates of lower life expectancy and higher childhood mortality.[14] There is an urgent need for government to address this inequity in partnership with Aboriginal people and communities to improve health outcomes.[15]
- **Education:** Education outcomes are significantly lower for Aboriginal people than non-Aboriginal people.[16] While solutions are multi-faceted and complex, they should include place-based, co-designed education facilities. A shift towards greater engagement with young Aboriginal people in the design of kindergarten, pre-primary, primary and high school infrastructure and services has the potential to achieve positive outcomes. For example, the planning for redevelopment of Roebourne District High School is underway, with students involved at all stages of the process, together with a focus on providing facilities for programs that engage Aboriginal children.[17]





- **Arts, culture, sport and recreation:** Empowering Aboriginal people has the potential to realise socio-economic benefits, particularly in rural and remote communities. This will require investment in cultural infrastructure and tourism experiences that recognise and celebrate the world's oldest continuous culture and develop pathways for Aboriginal enterprise in domestic and international markets, including development of a flagship Aboriginal cultural centre for WA.
- **Justice and public safety:** High rates of imprisonment have resulted in profound and ongoing intergenerational trauma for Aboriginal people and communities. These challenges and drivers, along with historical disempowerment leading to a level of distrust in law-and-order systems, contribute towards WA's lack of progress in closing the gap for Aboriginal incarceration rates.[18] Early intervention, diversion and rehabilitation initiatives provide the opportunity to improve outcomes.

Governance

Many state agencies and government trading enterprises (GTEs) have responsibilities and obligations in relation to Aboriginal people, communities and enterprises. This can be through (but not limited to) the provision of infrastructure and services, policy development, reconciliation action plans and engagement plans, along with employment and procurement targets.

The Aboriginal Advisory Council of Western Australia is the primary body advising the WA Government on Aboriginal affairs. The council's role includes co-designing a community engagement framework, providing stewardship and direction to the federal and state governments regarding Closing the Gap initiatives, and undertaking dialogue between Aboriginal communities and the WA Government regarding Aboriginal recognition, and Aboriginal and non-Aboriginal reconciliation.[19] Membership comprises 12 Aboriginal leaders representing diverse regions, organisations, areas of expertise and genders.[20]

Several WA Government entities have an active role in leading Aboriginal policy matters in WA:

- The Department of the Premier and Cabinet leads strategies to build positive relationships between Aboriginal people and the state government. The department provides leadership, direction, and management of strategic policy and program development in relation to Aboriginal affairs within WA and nationally. It also shapes the WA Government's approach and engagement with native title groups and Aboriginal communities, and implements agreements and projects in partnership with communities.
- The Department of Communities plays a role in the management of remote Aboriginal communities and town-based reserves, providing housing and essential and municipal services in many locations. They also provide housing services for people across WA.
- Through its oversight of Aboriginal cultural and built heritage matters, land use and management of Crown land and policy development, the Department of Planning, Lands and Heritage also manages Aboriginal land access, issues grants to preserve and promote Aboriginal sites and is a source of information about Aboriginal sites and other heritage places.

- The Aboriginal Lands Trust is a statutory board with management responsibility for 10% (24 million hectares) of WA's land mass and holds the land title for almost all of WA's remote Aboriginal communities.
- The Department of Finance manages and administers the Aboriginal Procurement Policy, which sets targets for the number of registered Aboriginal businesses awarded government contracts and seeks to develop entrepreneurship and business opportunities for the Aboriginal community.

At the federal level, the National Indigenous Australians Agency leads policy development for Aboriginal and Torres Strait Islander people, provides advice on whole of government priorities, and leads and coordinates the development and implementation of Australia's Closing the Gap targets in partnership with Indigenous Australians.

Recommendations

Aboriginal engagement and co-design for infrastructure

Infrastructure is essential to support social and essential services and improve the wellbeing of Aboriginal communities. Historically, WA's planning and delivery approach has been shaped around Western ideals and standards and has not always included early, genuine and culturally appropriate engagement with Aboriginal people. This has resulted in assets that Aboriginal people do not connect with and that are not fit for purpose.

A significant shift is required to embed a genuine process of co-design across the full infrastructure lifecycle that embraces self-determination and empowerment of Traditional Owners, Custodians and their communities (including Aboriginal people whose families have been displaced from their traditional lands). This can only be achieved over



time by working side by side with Aboriginal people, ensuring cultural heritage, training, enterprise and employment is considered and supported through strategies, processes and structures that empower Aboriginal communities to identify their own solutions and create services and products that meet their needs.

It starts with inclusive, genuine and consistent engagement to build long-term trust and rapport. Proponents of WA Government projects and programs with a capital cost of $100 million or more should prepare an Aboriginal engagement strategy. Along with the requirement for this

engagement strategy to be embedded in the Strategic Asset Management Framework, it should also be published and address, at a minimum:

- cultural recognition and interpretation
- design
- governance and decision-making structures
- engagement processes
- stakeholder identification
- training, employment and enterprise opportunities and targets as part of the project or program
- strategy reporting and/or evaluation measures.

This engagement should be embedded across all stages of the infrastructure lifecycle and the preparation of engagement strategies is also strongly encouraged for all projects and programs, including those with a capital cost below $100 million. These strategies can increase participation, support ongoing partnerships with Aboriginal people, and improve awareness of Aboriginal cultural heritage for all Western Australians. Principles of engagement and co-design should also be applied to program development and service delivery to ensure they are culturally appropriate and fit for purpose.

Native title recognises Aboriginal peoples' rights and interests in their traditional lands and waters, and can often co-exist with other interests in land, such as pastoral or mining leases.[21] The WA Government applies a whole of government approach to native title, with all activities across WA needing to comply with the *Native Title Act 1993* (Cth) and other relevant legislation, including infrastructure planning and delivery.[22] Approximately 85% of WA is covered by native title claims determinations and/or Indigenous Land Use Agreements, which often co-exist with other interests in land, and federal, state and local government policies and laws.[23] This adds complexity to planning for land use and infrastructure, with the need to allow additional time in some cases to resolve land tenure for economic opportunities.

The *Aboriginal Cultural Heritage Act 2021* reflects contemporary Aboriginal cultural heritage management principles and practices and resets the relationship between Aboriginal people, industry and other land users.[24] It recognises the fundamental role of Aboriginal cultural heritage in the lives and wellbeing of Aboriginal people.[25] Aligning state legislation with federal native title laws enables Aboriginal people to negotiate outcomes for projects and opportunities on their land and assist with navigating the complexities of federal and state laws and policies. The Act provides clarity around processes for all stakeholders.

Recommendation 6

Embed and support early, inclusive, genuine and culturally appropriate engagement with Traditional Owners and Custodians addressing all stages of the infrastructure lifecycle by:

a. developing and implementing engagement guidelines that:
   - promote community-led processes and place-based infrastructure outcomes for Aboriginal communities
   - include guidance to identify and understand, at an early stage, native title and cultural heritage implications of infrastructure proposals
   - align with principles of the WA Government's Aboriginal Empowerment Strategy

b. updating the Strategic Asset Management Framework's Strategic Asset Plan and Business Case guidelines to require preparation and publication of an Aboriginal engagement strategy, including Aboriginal employment targets, for projects and programs with a capital cost of $100 million or more.

Case study

Gnarla Biddi: METRONET's Aboriginal Engagement Strategy



Gnarla Biddi (Our Pathways) provides a Noongar-led guide and framework for Aboriginal engagement and participation on the METRONET program of works.[26] The focus is on long-term, consistent and genuine engagement with the Aboriginal community, throughout the planning, design and operational phases of each project.[27] The framework of 5 engagement streams puts cultural, business, job and land access outcomes for the Aboriginal community at the centre.[28]

The streams are:

- Noongar cultural recognition
- Noongar cultural input into place-making
- Aboriginal procurement
- Aboriginal employment
- land access and sites management.

In accordance with Gnarla Biddi, the METRONET Noongar Reference Group provides cultural input, advice and support to the program of projects. This includes, but is not limited to, guiding cultural recognition activities, such as ceremonies and welcomes, input into cultural awareness training programs, and cultural input on design elements, including landscaping, art and urban design.

Prior to contract award, project delivery contractors are required to prepare Aboriginal engagement and participation plans that outline how the 5 engagement streams will be embedded into the project delivery processes.

These streams align with the targets of the Aboriginal Procurement Policy and provide Noongar and other Aboriginal people with direct employment and career development opportunities. METRONET's Construction Business Register connects registered Aboriginal businesses with successful contractors, supporting the development of Aboriginal enterprise opportunities.

Gnarla Biddi demonstrates what can be accomplished when government, the private sector and the Aboriginal community work together towards positive outcomes. While Noongar-led, its principles for the delivery of major transport infrastructure on Noongar land are universal. The application of place-based, Aboriginal-led engagement to other infrastructure projects has the potential for far-reaching and positive long-term outcomes.

For further information, refer to www.metronet.wa.gov.au.



Aboriginal people know what is best for themselves and their communities, lands and waterways. The WA Government needs to lead the way in co-designed infrastructure planning and delivery – **leveraging Traditional Owners' and Custodians' knowledge, history and connection to country.**

Aboriginal procurement, participation and business development

As a major employer, capital investor, asset manager and purchaser of goods and services, the WA Government can play a critical role in increasing economic participation of Aboriginal businesses in WA, creating a strong foundation to realise greater social, economic, health and cultural outcomes for Aboriginal people. Nationally, Closing the Gap targets aim to increase the economic participation of Aboriginal and Torres Strait Islander people by 2031 – targeting 67% of people aged 15 to 24 and 62% of people aged 25 to 64 in employment and/or training within the next decade.[29]

The WA Government's Aboriginal Procurement Policy was introduced in 2018 and updated in July 2021.[30] The policy mandates progressive targets for the awarding of government contracts (valued at $50,000 or more) to registered Aboriginal businesses.[31] The policy commenced with a target of 3% of government contracts by the end of June 2021, increasing to 4% by 2024.[32] In 2019–20, state agencies awarded 5.6% of all contracts to Aboriginal businesses, significantly exceeding the policy's target when viewed at a whole of government scale.[33] Although there have been significant achievements by individual state agencies to date, many have not met current targets and will have to work harder to engage with the Aboriginal business sector.[34]

The 2021 update of the policy saw the inclusion of Aboriginal participation requirements (that is, subcontracting or region-specific employment targets) for specific contract types with a value of $5 million or greater.[35] Higher-value and longer-term contracts are important for growing Aboriginal business capability, and for those businesses to become more sustainable and provide greater employment opportunities. This could be supported through inclusion of contract value targets in the policy. Lifting awareness among state agencies and GTEs about the capacity, capabilities and breadth of services available from Aboriginal businesses is an important challenge. Building the cultural competency of the public sector through updated guidance and education (including encouraging a greater uptake of unconscious bias training) should also be addressed.

Initiatives implemented by the private sector should be considered and adapted. This could be through, but not limited to, partnering or joint ventures with Aboriginal businesses to share, develop and expand skills and capability. Other supporting measures, such as establishing a community of practice, improving awareness of the policy across state agencies, ongoing transparent evaluation of policy effectiveness and improving registers of Aboriginal businesses, could also assist.

While government provides some capability-building services to support the development of the Aboriginal business sector, more is needed to improve business capacity and capability across broader business types, including advisory, community and social services. The development of these measures and initiatives should be done with the Aboriginal business community and be Aboriginal-led where possible. Consideration needs to be given to initiatives that extend from business establishment and emerging industries through to mentoring across tendering and contract delivery phases.

Recommendation 7

Ensure infrastructure investment delivers tangible benefits to Aboriginal businesses and people by strengthening application of the WA Government's Aboriginal Procurement Policy, including:

a. establishing targets that also consider contract value
b. providing updated guidance and education, including unconscious bias training, for procurement and other relevant public sector officers involved in procurement decision-making to support Aboriginal business contracting
c. implementing mechanisms to mandate application of the policy by government trading enterprises
d. setting new incremental procurement stretch targets (over and above current overall performance levels) in the policy over time.

Recommendation 8

Progressively build capacity and capability of Aboriginal businesses by developing and implementing complementary and proactive measures that are Aboriginal-led where possible.

For every dollar spent with an Aboriginal business, **$4.40 worth of economic and social value is created for Indigenous communities**.[36] Higher-value contracts are important to grow Aboriginal business capability, and sustainability, and to provide greater employment opportunities.[37]



Infrastructure for remote Aboriginal communities and town-based reserves

Approximately 15,000 Aboriginal people reside in WA's 274 remote Aboriginal communities and 37 town-based reserves.[38] These communities play a vital role in wellbeing, providing cultural security and a deep connection to country, while upholding customs, cultures and traditional authority structures.

Shocks and stresses can disproportionally affect remote Aboriginal communities. Events like floods, fires and pandemics can impact access to critical infrastructure or require additional response capacity and resources. As the climate continues to change, these communities may become increasingly vulnerable, and their resilience may be increasingly dependent on infrastructure beyond their direct control.



Funding, governance and land tenure

Through the Remote Essential and Municipal Services Program, the Department of Communities provides many Aboriginal communities with basic essential services, including maintaining housing, power, water and wastewater infrastructure, as well as municipal services such as maintaining community roads and providing waste management services.[39] Improving outcomes will require funding above that currently provided to deliver baseline services. A sustainable funding model is crucial for successful and ongoing planning and delivery of infrastructure and services and to provide certainty about funding and support. The private sector has the potential to be an additional funding source for provision of critical services in remote Aboriginal communities and town-based reserves, and to support Aboriginal traineeships and enterprise, when undertaking large projects on Aboriginal lands and waters.

Limitations in governance are disempowering many remote Aboriginal communities and restricting the potential of government investment in infrastructure and planning. A lack of legislative powers, funding and formalised decision-making authority means many of these communities' leadership councils function without appropriate support. Effective governance is a key factor in the successful delivery and operation of sustainable infrastructure and services within and for Aboriginal communities. While beyond the remit of this Strategy, the implications of remote Aboriginal community governance for infrastructure delivery and asset management are acknowledged.

Complex land tenure arrangements also create uncertainty over asset ownership and service delivery responsibility. The Bidyadanga Land Activation Pilot provides an example of the complex land tenure issues and the barriers to economic activation that result.

Land tenure change is a fundamental first step in improving the economic sustainability of remote Aboriginal communities and town-based reserves by attracting new forms of investment, improving services and creating opportunities for home ownership.

Case study

Bidyadanga Land Activation Pilot



The Bidyadanga Land Activation Pilot in the Kimberley region is a $7.3 million innovative place-based partnership between the WA Government, community residents and native title holders to remove land tenure barriers and deliver a sustainable future for Bidyadanga, WA's largest remote Aboriginal community, through an Indigenous Land Use Agreement.[40]

Land tenure reform is considered the first step of full economic transformation and its resolution will enable future economic activation, business development and the regularisation of community services.

As is common across remote Aboriginal communities, the Bidyadanga community has historically faced an inflexible and confusing mix of land tenure arrangements. As a new way of doing business, the objectives of the pilot stretch beyond the resolution of land tenure and native title issues, to adhering to land-use planning, building code and heritage laws, regulations and other statutory requirements that have often hindered community and native title aspirations. Community by-laws and divestment of the Aboriginal Land Trust Reserves are also considerations of the pilot. Divestment should result in a change of tenure that provides Aboriginal people with direct control or management of the land.

The pilot recognises that place-based partnerships keep culture at the heart of reform. Transformation must be built around the Bidyadanga community's own future vision and cannot be realised without local leadership and the active participation of native title holders and community members. To support this co-design process, cultural mapping is being used as a valuable engagement tool to assist the Bidyadanga community to identify and reclaim resources. Data about the Bidyadanga community and native title holders' use of country, and of important ceremonial sites, is vital information for the future negotiation of any land-use management, resource extraction and development proposals.

For further information, refer to www.dplh.wa.gov.au.

Access to **safe, effective and reliable water, power and wastewater services is essential to liveability** in any community.[41] Providing those services in remote Aboriginal communities is a particularly significant challenge that successive governments have grappled with, often with mixed results.[42]



Power, water and wastewater services

Many remote Aboriginal communities and town-based reserves are provided with unlicensed and unregulated essential services. In 2021 the Auditor-General reported that while water quality had improved (since 2015) in 38 communities, 37 communities remained at risk from unsafe water.[43] There was no water quality testing conducted in 51 of the smallest communities.[44] The Department of Communities, Horizon Power and Water Corporation are working collaboratively to better understand the condition of infrastructure within these communities,[45] and are progressing a proposal to transfer responsibility for power and water from the Department of Communities to Horizon Power and Water Corporation respectively, to ensure services are safe, reliable, efficient, equitable and fit for purpose. This will continue over the medium to long term, given the large number of existing remote Aboriginal communities and town-based reserves in WA. An enforceable mechanism that outlines minimum service levels for power, water and wastewater services to all remote settlements – including Aboriginal communities – is required. A regulated service standard would also provide clear direction to GTEs and the WA Government on investment required.

Municipal services

Municipal-type services such as maintenance of local roads, parks and sporting facilities or provision of waste management services are provided to 133 remote Aboriginal communities through the Remote Essential and Municipal Services Program.[46] Infrastructure and services such as these are critical to environmental health and community health and wellbeing. These services are normally provided by local government in settlements across the state, but this is generally not the case for these communities, with the lack of local government presence often attributed to complex land tenure arrangements and lack of revenue from rates. Roads are mostly ungazetted and in poor condition and amenities such as parks and playgrounds are often poorly maintained, with funding not often available for ongoing operation and maintenance. Waste management facilities and services are ineffective or non-existent, contributing to poor environmental health outcomes for people living in these communities, which has numerous flow-on impacts.

The roles and responsibilities of relevant entities require clarification as a priority, along with resolution of funding needs, to ensure remote Aboriginal communities and town-based reserves are provided with necessary municipal services. The planning, delivery, operation and maintenance of infrastructure and services should be community-led and place-based where possible, and managed by the entity best placed to do so. This has the potential to provide opportunities for Aboriginal Community Controlled Organisations and to build local workforce capacity.

The maintenance of infrastructure in many remote Aboriginal communities and town-based reserves is generally managed by separate entities, undertaken by a workforce who live in distant towns and centres.

Multiple visits may be required to conduct inspections and subsequent repairs. For different types of infrastructure, assets maintenance tends to occur in isolation from each other. Consideration should be given to opportunities for infrastructure and service providers to train and upskill a local workforce to conduct general maintenance within and across communities. Opportunities such as these may assist to build capacity, accountability and self-determination. In addition, while in some cases visits to remote Aboriginal communities are coordinated across government, there are opportunities to better organise and coordinate visits, to improve efficiencies and reduce consultation fatigue.

Planning, delivering and maintaining infrastructure and services should be done in a manner that is **community-led, place-based and builds the capacity of the local community**, including employment and business development opportunities.

Recommendation 9

Support improved environmental health, social and economic outcomes in remote Aboriginal communities and town-based reserves by improving the quality and resilience of infrastructure and services, ensuring they are safe, reliable, equitable and fit for purpose, including:

a. developing a sustainable funding model and investment framework for state government infrastructure that considers whole of lifecycle asset costs, including recurrent funding for the operation and proactive maintenance of assets

b. ensuring state agencies and government trading enterprises share information relating to the delivery of state government infrastructure and services to improve efficiency and coordination

c. investigating opportunities for the private sector to fund and/or participate in the delivery, operation and maintenance of infrastructure and services

d. evaluating the outcomes of the Bidyadanga Land Activation Pilot Project, and once completed, assessing the suitability of the model for application in other remote Aboriginal communities and town-based reserves

e. ensuring licensed and regulated water, wastewater and power services are provided by accelerating the regularisation of water and wastewater services to the Water Corporation and power services to Horizon Power, and prioritising these works based on agreed criteria

f. establishing and implementing a tiered regulated water, wastewater and power service standard for remote settlements (including remote Aboriginal communities and town-based reserves) to achieve equitable levels of service with other population centres of a similar size across the state

g. clarifying the roles and responsibilities of entities providing municipal infrastructure and services, including roads, waste management and sport and recreation facilities

h. determining appropriate funding arrangements for the provision of municipal infrastructure and services, including the need for subsidies

i. investigating and pursuing opportunities for local Aboriginal residents to be trained to deliver operations and maintenance services for infrastructure.

Climate change and sustainability



Today's investment decisions must identify and balance environmental, social and economic outcomes to ensure infrastructure is sustainable and equitable for future generations. Infrastructure decisions should seek to avoid and mitigate any negative impacts and align to a **net zero emissions future**.

What IWA heard

During consultation on the draft strategy, a significant number of stakeholders highlighted the importance of addressing climate change and infrastructure sustainability issues. Stakeholders supported the reduction of greenhouse gas emissions to net zero by at least 2050, with many calling for a more ambitious time frame, interim targets, legislation, guidance and sufficient funding. The Strategy now calls for the strengthening of the current net zero by 2050 aspiration to become a firm target and for the establishment of interim targets.

The pressure climate change is having on WA's coastal areas was also raised, and there were calls for the WA Government to provide a greater infrastructure response to coastal erosion and inundation. The Strategy now acknowledges the vulnerability of coastal infrastructure and recognises the existing coastal adaptation programs.

Feedback also called for wider consideration of environmental protection and enhancement, particularly limiting native vegetation loss, and some stakeholders sought greater incorporation of blue and green infrastructure. Several stakeholders highlighted the need for better environmental and heritage information to understand and monitor the cumulative impact of infrastructure and to inform the infrastructure decision-making process. A new recommendation on environmental information has been included to inform infrastructure decision-making in priority locations.

Infrastructure has the potential to decrease impacts on the environment as well as introduce new pressures on it. This has been considered in the development of the Strategy. This is reflected in the priority and prominence given to infrastructure that accelerates progress towards net zero greenhouse gas emissions, renewable energy and the sustainable management of water resources, recognising the crucial threat that climate change poses not just to the natural environment but also to wellbeing and the economy. The Strategy is also mindful of the need to minimise the impacts of infrastructure on the environment, such as the generation of waste, habitat loss, pollution and the loss of amenity and cultural heritage. Further, planning for new infrastructure should recognise opportunities to enhance the delivery of environmental outcomes, such as clean water and air, amenity and cultural connection. The Strategy also anticipates that infrastructure must be resilient to the changes in the environment resulting from a changing climate.

Climate change and global warming are 2 of the most pressing matters of our time. This was reinforced in the Intergovernmental Panel on Climate Change *Sixth assessment report*, which found that unless there are rapid and large-scale reductions in greenhouse gas emissions, limiting warming in line with the Paris Agreement will be beyond reach.[1] Under the Paris Agreement, much of the international community, including Australia, committed to take actions to limit global warming to well below 2°C, preferably 1.5°C, compared to pre-industrial levels.[2]

Across Australia, this has been followed by jurisdictions setting net zero greenhouse gas emissions reduction targets.[3] Each jurisdiction has taken a different approach on the timing of the net zero targets, with some supporting their position through interim targets or dedicated legislation.[4] The WA Government has established a long-term policy of economy-wide net zero emissions by 2050, but has not yet set interim targets or formalised emission reduction targets through legislation.[5] This mirrors the Australian Government's position, established in advance of the 2021 COP26 in Glasgow. Many private sector companies are now setting their own interim and net zero targets to leverage the significant opportunities of a low emissions economy.



The time is now

WA's industries and trading partners are moving fast to reduce emissions, driven by corporate responsibility and, increasingly, the financial risks of inaction.

Infrastructure that is not prepared for a net zero emissions future risks loss of value and restricted finance. Unless rapid progress is made, WA risks losing global investment opportunities, as financiers and industry look elsewhere for greater certainty, action and risk mitigation. State agencies and government trading enterprises (GTEs) should embed targets set by the WA Climate Policy in the infrastructure decisions and operations of today to meet long-term goals.

Outcomes from the 26th United Nations Climate Change Conference of Parties

The 2021 United Nations Climate Change Conference of Parties (COP26) conference was the biggest climate change summit in the last 5 years. The summit produced a 10-page agreement known as the Glasgow Pact.[6] The Glasgow Pact is a follow-up to, and does not change, the structure of the 2015 Paris Agreement. The Glasgow Pact requires each signatory country to determine how it will reduce greenhouse gas emissions through legislation, policies and targets. While the Glasgow Pact is voluntary and not legally binding, each country's commitment is on the record. Any party not implementing directions detailed in the Glasgow Pact will come under domestic and international scrutiny.

There are several items in the Glasgow Pact that relate to this Strategy and infrastructure sectors. This includes requesting each country, head of states and government to:

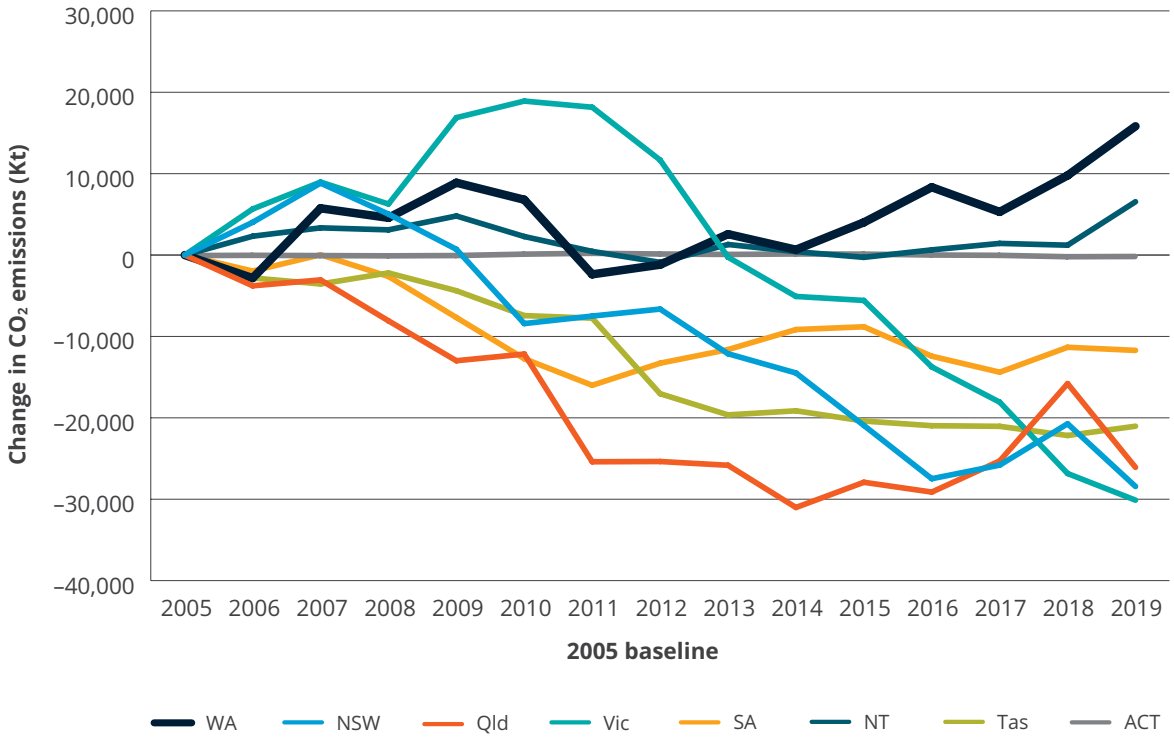
- revisit and strengthen the 2030 emission reduction targets by the end of 2022 to align with the Paris Agreement temperature goal
- work with the private sector to accelerate sectoral action by 2030
- accelerate technological and policy development to transition towards low emission energy systems, including rapidly scaling-up clean power generation and energy efficiency measures, phasing-down coal power and inefficient fossil fuel subsidies, and recognising the need for support towards a just transition
- increase pledges to the Climate Finance Delivery Plan to reach the US$100 billion goal to assist developing countries to decarbonise and adapt to climate change impacts
- provide additional financial support to developing countries to cover the 'loss and damage' caused by climate impacts that cannot be adapted to.

This Strategy calls for the WA Government to strengthen the current net zero emissions by 2050 aspiration to become a firm target and establish interim emissions reduction targets, and for these to be embedded in the activities of government and industry. The Strategy also highlights the need to accelerate decommissioning of coal-fired power (subject to the outcomes of new modelling) and the importance of a just transition for impacted communities.

For WA, reducing its emissions to achieve net zero emissions by 2050 is both a challenge and an opportunity. As shown in Figure 22, several jurisdictions have begun decarbonising their economies, despite population and economic growth.[7] Since 2005, WA's emissions have increased by 20.8% (Figure 22), primarily attributed to production expansion in the resources industry.[8] WA's transport emissions have also increased, driven by a growth in population and vehicle numbers.[9]

There is considerable opportunity for WA to meet the net zero emissions by 2050 target while ensuring the state's economy continues to remain strong and competitive. WA has access to some of the best renewable energy resources in the world, and has the land mass to support the footprints required by the sector.[11] By harnessing these resources, industries can transition to clean energy and produce low-carbon exports. As trading partners seek to meet their own emission reduction targets, low-carbon exports are expected to increase in demand. While reducing emissions should be a priority, the state is also in a strong position to capitalise on its vast geography to lead carbon farming and support a market for carbon sequestration.

Figure 22: Change in Australian jurisdictional emissions[10]



With around 70% of Australia's emissions associated with infrastructure-based projects, infrastructure has a very large role to play in meeting the net zero emissions by 2050 target.[12] Using the 4 pillars of decarbonisation (Figure 23), a range of emissions reduction actions should be taken across sectors.[13] This includes:

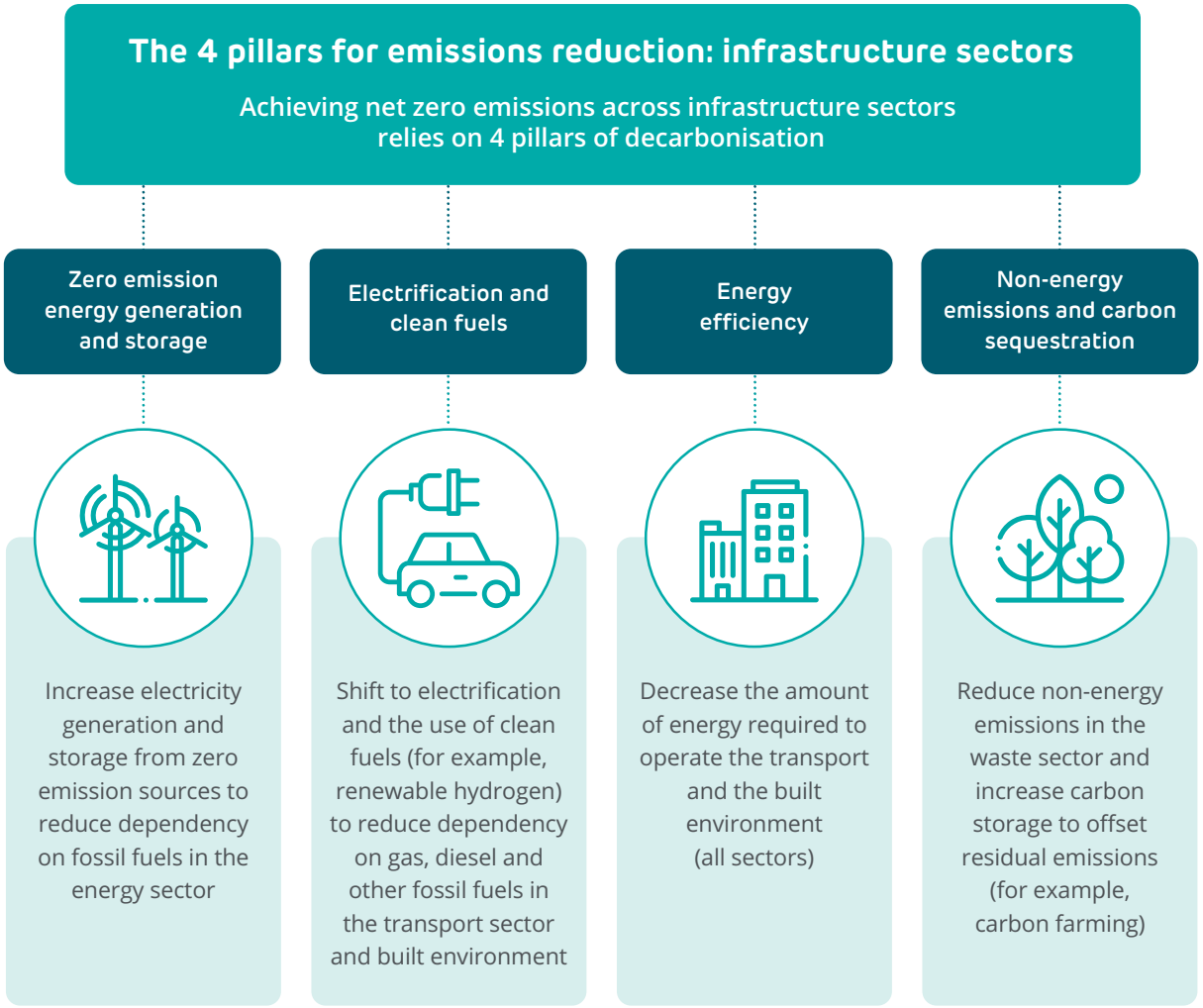
- transitioning energy generation to renewables, adopting renewable energy storage and influencing energy demand (see the Energy chapter)
- supporting the uptake of electric vehicles, transitioning private vehicles, public transport and freight to clean fuels, and shifting to more sustainable transport modes (see the Transport chapter)
- improving sustainability and efficiency performance in the built environment
- reducing non-energy emissions in the waste sector (see the Waste chapter) and increasing carbon storage to offset residual emissions.

Infrastructure policy and decision-making processes should focus on these areas to ensure state agencies and GTEs are leading the transition to net zero emissions by 2050. While there are upfront capital costs associated with infrastructure emissions reduction, low-carbon technologies are, in many cases, becoming more cost-effective than fossil fuel-related alternatives.[14] Reducing emissions through energy efficiency also reduces infrastructure operation costs for state agencies, industry, businesses and the wider community. A recent example is the Greener Government Buildings program by the Victorian Department of Treasury and Finance. Since its establishment in 2009, the program has facilitated 35 energy efficiency and renewable energy initiatives, achieving annual savings of $27 million and abating 132,000 tonnes of emissions per year.[15]

Adapting to the impact of climate change on infrastructure is equally as important as reducing infrastructure emissions. Adaptive strategies for infrastructure assets can include:

- reducing the vulnerability to, and likelihood, of impacts (for example, including infrastructure protection measures and relocation)
- increasing the resilience (reducing the consequence) of impacts on infrastructure (for example, increased maintenance and urban greening).

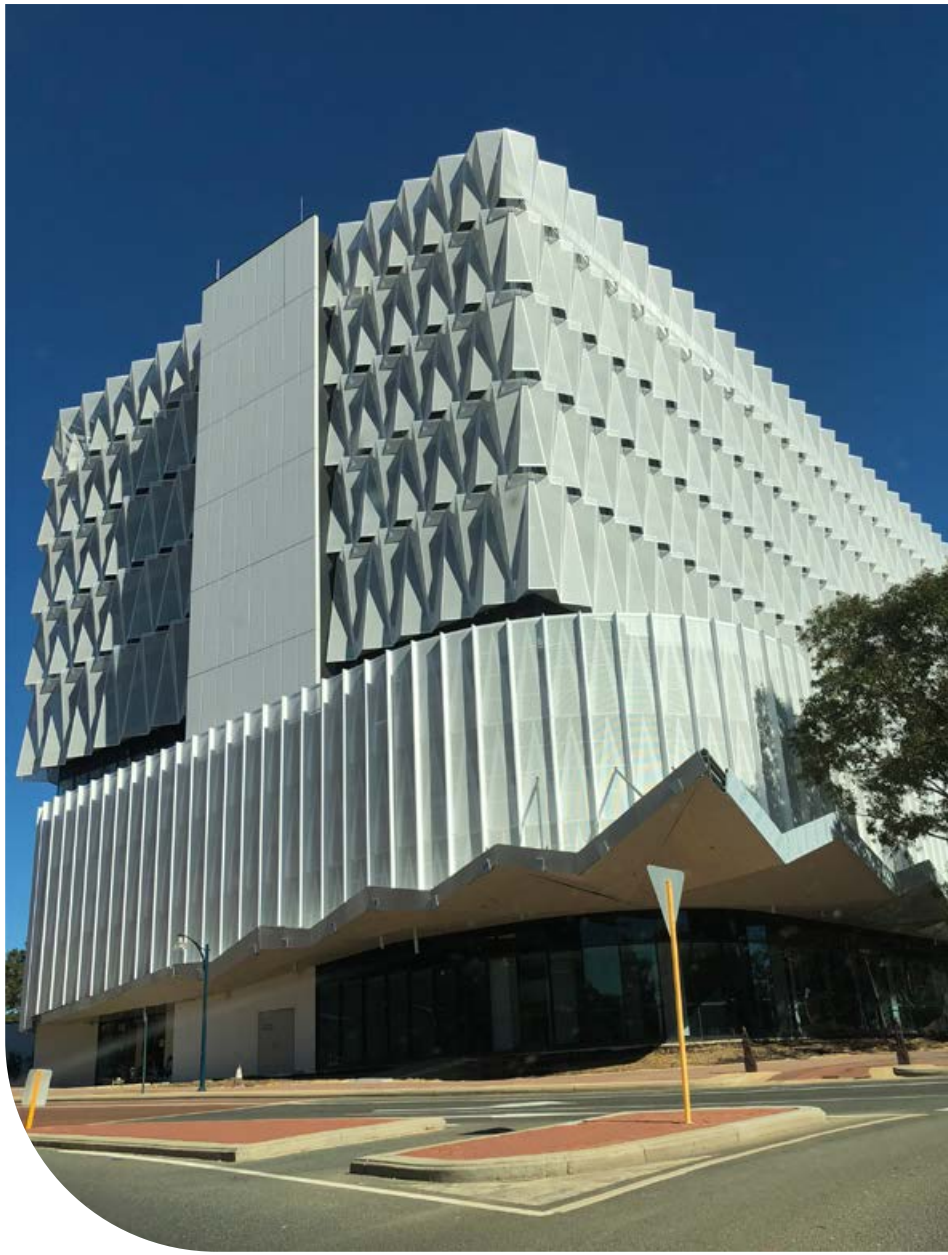
Figure 23: Four pillars of decarbonisation[16]



Essential infrastructure in sectors such as housing, transport, energy and water is potentially at risk from sea-level rise, coastal inundation, intensifying weather events and bushfires. **State agencies and GTEs have an important role to perform** in understanding and planning for the potential impacts on its assets, as well as working with stakeholders to build adaptive capacity more broadly.

Built environment energy efficiency and the National Construction Code 2022

Today's planning, design and investment decisions for long-life infrastructure must be made in the context of a net zero emissions future. One of the simplest and most cost-effective ways to reduce emissions in government operations is improving energy performance in the built environment. The WA Government can show leadership and drive change through the buildings and assets it owns, leases and constructs by progressively increasing and exceeding minimum energy efficiency and other sustainability standards (for example, the Nationwide House Energy Rating Scheme or the National Australian Built Environment Rating System star ratings for built assets) and establishing energy efficiency retrofitting targets for existing assets. For the wider building and property industries, change can be achieved by adopting the National Construction Code 2022 without delay, which will set higher energy efficiency standards for residential buildings. This will align WA's standards with other leading jurisdictions. Government projects should be early adopters of the code, with information on costs and benefits shared with industry to build confidence in the transition.





Governance

Climate policy and assessment

In 2020, the WA Government released the WA Climate Policy, which includes a commitment to working with all sectors of the WA economy to achieve net zero emissions by 2050.[17] The policy outlines actions to support emissions reduction and enhanced climate resilience. The Department of Water and Environmental Regulation is responsible for coordinating the suite of actions, with implementation actions distributed across a range of state agencies and GTEs. In the absence of climate change legislation, government-led climate action relies on the initiatives set out in the policy. Implementation of these actions will be guided by the recently established Ministerial Taskforce on Climate Action and is supported by the $750 million Climate Action Fund announced in the 2021–22 State Budget. The fund includes renewable energy and renewable hydrogen initiatives, an expansion of the state's softwood plantation estate, activities to create climate resilient communities and carbon innovation grants.

When considering the emissions of infrastructure proposals, the Environmental Protection Authority is guided by the WA Government's *Greenhouse Gas Emissions Policy for major projects*, which includes an aspiration for the state to reach net zero emissions by 2050.[18] The Environmental Protection Authority's *Environmental Factor Guideline: greenhouse gas emissions* outlines how and when the greenhouse gas emissions factor is considered in the environmental impact assessment process.[19] Major project proposals (both government and private industry-led) assessed under the *Environmental Protection Act 1986*,

likely to result in over 100,000 tonnes of Scope 1 emissions, require a greenhouse gas management plan, including interim and long-term targets consistent with the WA Government's target.

Climate change adaptation planning has also begun to be reflected in a number of policies and initiatives across state agencies and GTEs, such as responding to a drying climate in the water sector and adapting to increased risks of sea-level rise and bushfires through state planning policies. In 2020, the Department of Health completed the Climate Health WA Inquiry to investigate the implications of climate change on health, which took into account infrastructure considerations.[20] The departments of Treasury, and Water and Environmental Regulation are developing a climate risk framework to enhance management of climate risks across the public sector. This framework will guide the monitoring, assessment and reporting of climate risks associated with the state's finances, infrastructure, physical assets and service delivery.

Climate change mitigation and adaptation in infrastructure planning

In developing this Strategy, IWA undertook a review of the strategies and strategic asset plans of state agencies and GTEs. Most plans did not communicate that climate change mitigation and/or adaptation considerations had factored into infrastructure planning, project selection, design or operation. The review concluded that some GTEs are considering climate change risks and adaptation measures, as well as being required to measure and report emissions under the National Greenhouse and Energy Reporting Scheme. However, most other state agencies did not appear to consider the impact of policies on emissions, measure emissions under their control or fully consider climate change impact risks and appropriate adaptation measures. Considering the urgency of climate change action and the level of risk posed to state assets, it is necessary for all state agencies and GTEs to address actions in the WA Climate Policy and build capability and skills in this area as a matter of priority.

Sustainability

Sustainability is commonly defined as meeting present-day needs without compromising the needs of future generations by balancing social, environmental and economic outcomes. There is currently no whole of government sustainability framework that seeks to balance social, environment and economic objectives, policies and activities across government. However, sustainability is sometimes considered at individual state agency or project levels. Sustainability certification is being applied to some major projects to improve social, environmental and economic outcomes. For example, Main Roads Western Australia (Main Roads WA) and METRONET are using the Infrastructure Sustainability Council of Australia's sustainability rating tools to guide road and rail infrastructure design.

Reporting against sustainability objectives is also undertaken sporadically and without an agreed, consistent framework. In the absence of an agreed position, DevelopmentWA has been applying the Global Reporting Initiative standards in its Annual Sustainability Report for several years to assess performance against sustainability measures.

Environmental protection and assessment

Environmental impacts from major infrastructure projects are assessed under federal and state legislation, including the *Environmental Protection Act 1986*, the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), the *Rights in Water and Irrigation Act 1914* and the *Biodiversity Conservation Act 2016*. Proponents of significant infrastructure projects or planning scheme amendments must demonstrate efforts to mitigate impact to the environment and heritage, and show that those impacts are acceptable and, if necessary, can be offset.

There has been increasing public expectation around environmental protection, transparency and statutory reform following recent reviews of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The *Environmental Protection Act 1986* has also been amended to emphasise cumulative environmental impacts and may result in environmental approvals being more difficult to obtain.

A focus on government, state agency and government trading enterprise leadership

IWA's climate change and sustainability recommendations seek to build on the actions in the WA Climate Policy. IWA has focused on embedding and accelerating initiatives across infrastructure sectors, through setting interim targets, coordination across government, state agency and GTE leadership, changes to the infrastructure decision-making process and transparent reporting on progress.

To achieve net zero emissions by 2050 – ideally earlier – it is vital that targets are formalised (including the 'aspirational' 2050 target within the WA Climate Policy), and clear strategies and plans are established. These should outline the actions, responsibilities and timing required across government and industry sectors to progressively reduce emissions, along with modelling of the effect of these changes and emissions profiles over time. Net zero transition plans for state agencies and GTEs, coupled with sectoral emissions reduction strategies, are essential components in establishing the path forward. These tools will be critical in understanding organisations and sectors that can decarbonise quickly and those which will need greater support or regulatory oversight. With the WA Government's own energy and water utilities cumulatively contributing 7 million tonnes of Scope 1 and 2 emissions in 2019–20, there is much that can be gained by an early focus on the state's assets.[21]

Given the rapidly changing policy, regulatory and technological environment, IWA will continue to review the greenhouse gas reduction progress of both the WA Government and private industry.

Recommendations

Interim and net zero emissions by 2050 target

IWA supports the WA Government's aspiration for whole of economy net zero emissions by 2050 – ideally earlier, where it is feasible to do so. To clarify the intent for all parties, it is essential that interim targets are set that map a pathway to net zero emissions and that the 2050 aspiration is strengthened to become a firm target. There are a number of potential options for how interim targets could be set, including an economy-wide target and targets specific to each sector. A critical review should be undertaken to understand the contribution that each state agency and GTE makes to emissions reduction within its existing and planned asset base. This review should include the role of their suppliers as well as the influence that the state agencies and GTEs have on the emissions profile of other parties.

Actions from the WA Climate Policy that embed greenhouse gas reductions in state agency and GTE infrastructure assets and broader activities include:

- **net zero transition plans:** require state agencies and GTEs to develop and implement plans to transition toward net zero emissions by 2050
- **sectoral emissions reduction strategies:** evaluate opportunities for cost-effective abatement across WA's key economic sectors and develop strategies to guide emissions reduction.[22]

Limited detail is provided in the WA Climate Policy about the methodology, timing or requirements for these plans and strategies. However, the process and principles for developing sectoral emissions reductions strategies has recently been announced by the WA Government.[23] There is significant potential to establish a common, transparent pathway for reducing the emissions of government and industry more broadly. Future infrastructure investment decisions could then be measured against the extent to which they align with the strategic intent.

Development of net zero transition plans and sectoral emission reduction strategies should be accelerated, with cost-effective greenhouse gas reduction actions appropriately funded and resourced. Importantly, strategies and plans to achieve net zero emissions must be reviewed and refined over time to ensure actions are achieving intended outcomes. In this regard, state agencies and GTEs should understand their emissions through data, as well as digitise and automate the collection and analysis of this data to better inform real-time decisions.

Recommendation 10

Better inform future infrastructure requirements and align infrastructure investment with the WA Climate Policy by implementing the WA Government's policy for net zero emissions by 2050, including:

a. strengthening the current net zero emissions by 2050 aspiration to become a firm target and establishing interim emissions reduction targets

b. preparing and implementing net zero transition plans as required by the WA Climate Policy by an agreed deadline, that:
   - align with interim targets (once defined) for Scope 1 and 2 emissions associated with facilities under the operational control of state agencies or government trading enterprises
   - identify actions, with associated timing, for Scope 1 and 2 emissions reductions
   - include mechanisms for state agencies and government trading enterprises to report annually on progress against targets and implementation actions
   - are supported by funding, resources and public sector capability training

c. preparing and implementing sectoral emissions reduction strategies, as required by the WA Climate Policy by an agreed deadline, that:
   - are prepared under the direction of the Department of Water and Environmental Regulation with authority of a Cabinet decision
   - clearly identify government policies and processes that impact emissions for the sector and the changes required to those policies and processes needed to give effect to the sectoral emissions reduction strategy
   - include analysis of opportunities for state agencies and government trading enterprises to influence embodied, operational and enabled emissions
   - account for enabled emissions through infrastructure design and assessment processes, and prepare infrastructure to accommodate emerging low and zero carbon technology and transitions
   - identify cost-effective emission reduction actions, along with associated requirements for funding and financing, resources and public sector capability training.

Carbon farming and sequestration

The WA Climate Policy has highlighted opportunities to capitalise on the state's significant land mass and extensive coastline to capture and store carbon in vegetation and soils (known as carbon farming).[24] Industries may seek to offset residual carbon emissions by purchasing carbon credits to achieve net zero targets, creating a demand for projects that can sequester carbon. WA carbon sequestration projects that remove carbon dioxide from the atmosphere can create economic value by providing locally produced carbon credits. These projects can also generate wider benefits, including landscape regeneration, empowering Traditional Owners and Custodians, biodiversity conservation and expanding existing industries.



There is also a broader opportunity for Traditional Owners and Custodians to play a role in co-managing, conserving and restoring native vegetation, and in planning for its management. This opportunity has been highlighted in the recent consultation draft of the native vegetation policy for WA.[25] Recently, the WA Government has announced proposed changes to the WA *Land Administration Act 1997* to introduce new and more flexible forms of land tenure, allowing for Crown and pastoral land to be used for carbon farming.[26]

The WA Climate Policy includes various actions that contribute to carbon farming and sequestration. Existing and emerging programs include:

- Carbon for conservation initiative: led by the Department of Biodiversity, Conservation and Attractions, this program provides opportunities for carbon farming service providers to work with the state agencies and GTEs to restore degraded areas of the conservation estate.
- Carbon farming and land restoration program: led by the Department of Primary Industries and Regional Development, this program targets the uptake of carbon farming in the South West agricultural zone.
- Problem and opportunity statements: led by the Forest Products Commission, this initiative explores a 50,000 hectare expansion of softwood plantation estate in the next decade.
- Enabling access to the Australian Government's Emissions Reduction Fund: the Department of Planning, Lands and Heritage provides support for carbon farming through human-induced regeneration on pastoral leases and savannah burning (emissions avoidance) methods on Crown land in the Kimberley.[27]

While recognising the potential impact of these measures, the WA Climate Policy has no overarching strategic approach or agreed lead state agency charged with responsibility for carbon farming and sequestration. A coordinated effort is required to ensure this opportunity is fully realised.

Recommendation 11

Assist in offsetting carbon impacts associated with infrastructure by strengthening and expanding programs outlined in the WA Climate Policy to develop carbon farming and sequestration markets, including:

a. assigning a lead state agency to coordinate the program of works, including development of a Western Australian carbon farming strategy and carbon farming industry development plan across state agencies, government trading enterprises, and tenure types to identify and enhance the carbon farming market in WA
b. exploring opportunities to expand carbon farming to government-managed land outside of the conservation estate
c. supporting Aboriginal empowerment through land management and custodianship in carbon farming initiatives.

Statewide climate change adaptation

Climate change impacts on infrastructure assets will continue even if global commitments to meet emissions reduction targets are achieved. Understanding projected impacts is essential so that government and industry can respond by adapting existing infrastructure and increasing the resilience of new assets to disruptive climate-related events and chronic climate trends. This will require accurate climate science and hazard data, effective planning and appropriate infrastructure choices and design.

Key climate change adaptation actions identified in the WA Climate Policy are led by the Department of Water and Environmental Regulation and seek to embed climate science and climate change adaptation into state agencies' and GTEs' policies and operations. These actions include:

- Climate Science Initiative: funding regional climate change projections for priority regions including the north-west
- Climate Resilience Action Plan 2022–25: developing a coordinated, collaborative plan to support WA industries, cities and regions to identify and manage climate impacts and enhance climate resilience
- Pilot Sectoral Adaptation Plan: collaborating with government, industry and the community to pilot development of an adaptation plan for a priority sector.[28]

The Department of Water and Environmental Regulation has an important role to play in working with climate science organisations to interpret impacts and provide clear, up-to-date climate change information suited to the WA context. This should inform policy direction and adaptation guidance to ensure impacts are well understood and planned for by infrastructure sectors, and in a regional context. At present, the Climate Science Initiative has only been funded to identify climate change impacts in priority regions in WA. However, climate change is impacting every region, their infrastructure and communities. Due to the complexity of climate change adaptation and cross-sector implications, there is a need for statewide coverage for the Climate Science Initiative.

Sectoral adaptation plans will be a valuable tool for government, industry and the community to develop a common understanding of future impacts and opportunities to manage or reduce climate impact risks on infrastructure. Plans should be developed for systems such as health, transport, energy, water and the built environment, and be led by the state agencies and GTEs responsible for the sector. In developing these plans, place-based stakeholders, including local government, industry and the community, need to be engaged to ensure that local knowledge is integrated into statewide adaptation planning. In particular, Aboriginal stakeholders have an understanding of the local environment and how it can adapt to climate variability and trends. In addition to looking at the macro level impacts for sectors, it is also vital that state agencies are managing their own assets, services and operations to minimise climate change risks and increase resilience. This requirement is not included in the WA Climate Policy.

A particular area of risk is greater coastal erosion and inundation associated with rising sea levels. While state planning policies governs new development, there is much existing infrastructure that could potentially be impacted.



A 2019 state government study, *Coastal erosion hotspots in Western Australia*, identified 55 locations across the state where coastal erosion is expected to impact public and private infrastructure.[29] The study highlights that most physical assets, in these locations, require management and adaptation actions within the next 25 years, the majority within the next 5 to 10 years.[30] A set of actions were recommended, including:

- state agencies providing integrated coastal planning and engineering support to local coastal managers, in addition to community education
- a statewide comprehensive review of lease arrangements to support coastal management and adaptation
- the development of more accurate methods for predicting coastal changes to inform adaptation.[31]

Recommendation 12

Better inform future infrastructure climate change risks and adaptation requirements by implementing a statewide approach for climate change adaptation to infrastructure, including:

a. expanding the Climate Science Initiative to require statewide coverage and update it regularly to incorporate new information
b. requiring all state agencies and government trading enterprises to develop climate change adaptation plans to enhance the climate resilience of assets, operations and services under their control, including analysis of place-based climate change impacts, risk assessment of vulnerable assets and infrastructure requirements to increase resilience to potential climate change impacts for assets at risk, which are embedded in their strategic asset plans and business cases
c. developing guidance that enables state agencies and government trading enterprises, in partnership with peak industry bodies, to progress the further development of sectoral adaptation actions
d. requiring relevant state agencies and government trading enterprises, in partnership with the private sector, to develop sectoral adaptation plans for all relevant sectors that enable sectoral stakeholders and infrastructure asset owners to identify climate change risks and measures to adapt to current and future climate change impacts.

Government coordination for climate change mitigation and adaptation

The state government can greatly assist climate action by leading and coordinating sector-wide and statewide initiatives. State agencies and GTEs can also facilitate communities and organisations working together to understand and address challenges. The Department of Water and Environmental Regulation has been charged with coordinating various actions under the WA Climate Policy. However, coordination can be difficult across the public sector when there are few levers to ensure action and accountability. Appropriate measures including Ministerial-authorised reporting and accountability measures being included in directors-general and GTEs chief executive officers annual performance reports would assist.

Recommendation 13

Ensure effective climate change mitigation and adaptation planning and decision-making for infrastructure by implementing methods of accountability and coordination across state agencies and government trading enterprises, including:

a. annual public reporting of progress on mitigation and adaptation actions via responsible Ministers
b. introducing performance measures related to progress of infrastructure-related mitigation and adaptation actions in directors-general and government trading enterprises chief executive officers' accountability mechanisms
c. regular public reporting of the state's emissions, the extent to which they have changed compared with 2005 levels, and estimated emission reductions achieved through implementing the sectoral emissions reduction strategies.

Achieving the greenhouse gas reduction actions required across all economic sectors is a complex task. **Innovative methods will be required** to ensure whole of government accountability, coordination and reporting.

Sustainability in decision-making

Embedding sustainability considerations into the infrastructure decision-making process is important. IWA's legislative provisions reflect this significance and require the consideration of triple bottom line outcomes when considering WA's infrastructure needs and priorities. Informing and defining sustainability benefits and impacts at the strategic and planning phases of infrastructure decision-making will have the greatest influence on outcomes across the planning, business case development, approvals, delivery and operational phases. The WA Government can greatly facilitate this process by establishing a clear framework for sustainability assessment, and clarity on sustainability policy objectives.

The Strategic Asset Management Framework, which guides the investment decision process, should be strengthened to give greater consideration to triple bottom line outcomes and policy settings, including governance and intergenerational equity. Sustainability rating tools, such as those provided by the Infrastructure Sustainability Council of Australia and the Green Building Council of Australia, can be used to guide infrastructure projects to consider lifecycle sustainability impacts and enable smarter solutions to reduce risks and costs. While these are currently used sporadically by a limited number of state agencies, a consistent approach is required to influence greater sustainability outcomes for infrastructure.

Recommendation 14

Incorporate sustainability into all stages of the infrastructure decision-making process by amending the Strategic Asset Management Framework, including:

a. updating the Strategic Asset Plan Guidelines, requiring state agencies and government trading enterprises to include projects and actions identified in climate change strategies and plans in their strategic asset plans, including the net zero transition plans, sectoral emissions reduction strategies, climate resilience action plan and relevant adaptation plans

b. updating the Business Case Guidelines for projects and programs with a capital cost of $100 million or more to require business cases to:
   - quantify Scope 1, 2 and 3 emissions associated with projects and programs and use this as a key input in determining infrastructure options and design outcomes
   - align to emission reduction goals and pathways identified in net zero emissions transition plans and sectoral emissions reduction strategies (once developed)
   - demonstrate potential climate change impacts on the assets, and adaptation actions to reduce infrastructure vulnerability and increase resilience

c. updating the Business Case Guidelines for projects and programs with a capital cost of $100 million or more to require completion and publication of sustainability tool certification, using the most appropriate tool for the type of asset.

Sustainable investment

The WA Government aims to run an operating surplus to fund the pipeline of infrastructure priorities. However, a portion is also borrowed from financial markets to fund a range of infrastructure projects.

Sustainable investment (also known as green, environmental, social and governance (ESG) or socially responsible investment) is increasingly becoming a focus of financial markets and infrastructure funding. Sustainable investment refers to financing projects and programs that prioritise positive environmental, social or governance outcomes. Banks and superannuation funds are increasingly providing sustainable finance to government infrastructure projects because of their low investment risk, good returns and positive ESG impacts. These projects can include, for example, public transport, renewable energy, energy-efficient buildings and water infrastructure, some of which are planned for and recommended in this Strategy. Investor diversity will also ensure that government funding sources are sustainable into the future.

To progress the sustainable finance opportunity, the Western Australian Treasury Corporation, on behalf of the WA Government, should finalise the development of a sustainability bond framework to articulate the governance framework under which the Western Australian Treasury Corporation intends to issue and manage sustainable investment. This framework should include asset identification, reporting regimes and plans to raise funds to support the delivery of sustainable infrastructure priorities.

The WA Government also recently released an ESG information pack to inform current and future investors in state government projects and programs.[32] The pack highlights initiatives that enable positive ESG outcomes and are mapped to the United Nations Sustainable Development Goals.[33] While the pack is a good step forward in articulating sustainability in state government activities, this should evolve to a whole of government sustainability framework that embeds more transparency and accountability across government operations and decision-making. Other effective reporting frameworks include the Global Reporting Initiative and International Integrated Reporting Framework, Sustainability Accounting Standard Board and the Task Force on Climate-related Financial Disclosures. Many of these are already used by private industry, particularly publicly listed companies, to communicate balanced sustainability performance to investors and shareholders.

Recommendation 15

Facilitate access to green, social or sustainable finance by developing a sustainability bond framework.

Environment and heritage information

The Strategy makes a number of recommendations that will enable more robust consideration of blue and green infrastructure in strategic planning across WA's regions, and augment existing processes already in place. These include:

- the development of integrated regional plans that will identify priority areas for environmental protection
- a regional development strategic framework that will identify opportunities where environmental values contribute to the region's competitive advantage and overall economic development
- supporting the protection and more efficient use of natural water resources, including groundwater
- tourism destination management plans that will consider the impacts of tourism on sensitive environmental areas.

For each of these initiatives, and government planning and approvals more broadly, up-to-date environmental information is essential to making informed decisions about existing environmental values and the cumulative impact of proposals. Improved environmental data can enhance the state government's social licence to operate by meeting public expectations and improving transparency.

Similarly, this information is important to proponents in their investigations and analysis of the potential impacts of proposed developments to meet environmental approval requirements. Such investigations can be expensive and time consuming, resulting in delays that can be largely avoided through anticipating, collecting, sharing and updating the information that may



be required for planning and approvals. Under current practice and systems, environmental and heritage information used to interpret and predict impacts is held in diverse places across governments and industry. The effort to access and assess this information is repeated for each proposal, adding unnecessary expense and inefficiencies. This challenge extends beyond project assessment and impacts on compliance, environmental offsets and sustainability performance reporting.

Over recent years, WA has made substantial technical and cultural advances in the sharing, curation and public availability of environmental information collected across industry and government, and there is broad support for establishing a shared analytics and data framework for environmental data.[34] Such a framework is already being established for Cockburn Sound as part of the Westport project.[35] Development of a framework should consider integration with other platforms being developed by the WA Government, such as that proposed in Recommendation 4b.

Recommendation 16

Inform more robust and integrated infrastructure planning, decision-making, design and reporting by developing and implementing a sustained, shared environmental and heritage information system for priority locations.

Environmental offsets

Infrastructure planning should always seek first to avoid environmental impacts. However, there are instances where unavoidable mitigation, management or offsets are required for the clearing of vegetation of high environmental value. Where sites of state or federal environmental significance are disturbed or removed, environmental offsets, among other requirements, are usually necessary to obtain project approvals. These offsets are generally secured on an isolated, case-by-case basis, sometimes resulting in poorer environmental outcomes. There are also risks in approval delays and cost overruns as appropriate offsets become more expensive to fund and harder to source.

The 2019 Review of the WA environmental offsets framework noted the opportunity to develop whole of government consideration and agreement on land acquisition for the conservation estate, including land that connects, or builds scale, to existing vegetation.[36] This review recommended bioregional planning to support the development and implementation of offsets that align with regionally significant and/or landscape-scale environmental objectives.[37] It also made recommendations on the governance and operation of the Part V Offsets Fund, including improved intra-agency coordination of offset identification, acquisition and addition to the conservation estate or other measures that offset impacts on extensive land areas.[38]

In line with this review and its associated implementation plan, the WA Government can apply a more coordinated approach to protect larger, better-networked areas of high environmental value for a cumulative package of major state infrastructure projects. Regional environmental offset plans can support the delivery of infrastructure projects in a timely and cost-effective manner, as the availability of suitable environmental offsets become more scarce and costly. To be most effective, this should be accompanied by engagement with the Australian Government to simultaneously address matters of national environmental significance under the *Environment Protection and Biodiversity Act 1999* (Cth).

Recommendation 17

Support the delivery of major WA Government infrastructure projects by replacing the current system of acquiring environmental offsets separately with a coordinated bioregional approach, including:

a. identifying priority conservation areas for protection, acquisition and on-ground management, regenerative projects and/or research projects where state agencies and government trading enterprises can direct funds to meet environmental offset requirements
b. implementing and administering centrally coordinated funds consistent with the principles and operation of other pooled environmental offset funds.

Urban tree coverage

Over time, development patterns and the provision of infrastructure has resulted in a decline in urban tree canopy cover in both greenfield and infill settings. Urban tree canopy is increasingly being recognised as valuable to infrastructure resilience as it can take pressure off an increasingly strained built environment. Greater tree coverage reduces air pollution, provides oxygen and reduces the urban heat island effect by an average of 6°C.[39] The health benefits of trees in urban environments are also significant. The presence of trees promotes mental wellness and reduces stress, heart rate, blood pressure and the incidence of obesity, asthma and diabetes.[40] More urban tree coverage brings an increase in the use of public spaces and improved social cohesion, physical activity and active transport usage. Urban forests also connect urban bushland and support biodiversity.

Although recent planning policies specifically require and encourage the retention of trees on private property and verges, it is difficult to address historical development patterns. To counter this, the Water Corporation and the Western Australian Local Government Association are jointly administering a one-off Urban Tree Canopy Grant Program to support local governments in urban forest projects. Funding and scope for this program should be extended to ensure more strategic and equitable outcomes, in continued partnership with local government.

Recommendation 18

Contribute to infrastructure and community resilience in the urban environment and support the equitable provision of an interconnected network of cover by developing an overarching urban forest program, including:

a. assigning a lead state agency to provide overarching coordination, resourcing and funding mechanisms
b. embedding program evaluation to ensure it remains fit for purpose
c. extending the existing Urban Canopy Grant Program to increase the urban tree canopy across the Perth and Peel regions, and other major regional urban centres
d. partnering with local governments, community groups and other land managers in the rollout
e. further reviewing existing planning policy settings with regards to the treatment of trees in new greenfield and infill developments.



Regional development





WA is Australia's largest state and comprises 10 regions: **Kimberley, Pilbara, Gascoyne, Mid West, Wheatbelt, Peel, South West, Great Southern, Goldfields–Esperance and Perth**. The 9 regions outside Perth are home to 25% of WA's population, generate approximately 40% of the state's gross state product and are an integral part of WA's rich cultural identity.[1]

What IWA heard

During consultation on the draft strategy, stakeholders identified strong support for the recommendations, reiterating the need for infrastructure investment to support regional economic diversification and population growth. Stakeholders called for infrastructure gaps to be addressed in more coordinated and timely ways to avoid them becoming barriers to growth. This has been addressed in the chapter and, where relevant, the wider Strategy.

Some stakeholders expressed a view that regional proposals were being disadvantaged over metropolitan proposals, and this has been addressed by identifying the need for the regional development strategic framework to incorporate prioritisation criteria that support more-balanced decision-making.

Amendments have also been made to reflect calls for greater recognition of the infrastructure planning and delivery role of regional local governments, and to consider their resourcing needs if reforms to regional service and infrastructure models require them to play a greater role.

The long-term success of WA relies on generating strong and inclusive growth across the state's regions. The regions are highly reliant on each other and must leverage their collective strengths to realise this Strategy's vision. Considerable flow-on opportunity will come from a stronger, more collaborative approach to regional development that is needed to achieve a step change in outcomes over the next 20 years.

During the last resources investment boom (2007 to 2013), the WA Government focused on activating major mining, oil and gas projects and invested significantly in the liveability of regional communities. The focus for the next 20 years should be on diversifying and growing regional economies and communities. As many of WA's comparative advantages are in the regions, they have a vital role to play in driving the state's next phase of growth.

The Strategy supports an integrated, place-based approach to regional development, as infrastructure is insufficient on its own to realise the desired outcomes.[2] In addition to infrastructure, there are several measures required to drive sustainable regional development and growth, such as science and innovation, human capital, industry, housing and health policies. Multiple stakeholders are responsible for the different policy areas and these policies must be well coordinated and targeted to be effective. In line with global best practice, regions need to build on their core strengths to diversify their economies, with a focus on export industries that bring in wealth and generate higher-value jobs.

IWA recognises various initiatives that have been taken in recent years to foster greater collaboration between the regions and better align regional development aspirations with the state's wider development objectives. The recommendations in this chapter seek to build on this work to enhance the way infrastructure investment is coordinated and targeted to ensure it complements broader regional development efforts and achieves positive long-term outcomes for the regions and the state.

WA's 10 regions are highly diverse, with a range of social, environmental and economic strengths, and inequalities such as life expectancy, unemployment and digital accessibility (Figure 24).[3] The regions are highly interdependent, with social and economic linkages spanning regional boundaries and global markets. These interdependencies can expose regions to greater risks and vulnerability, such as regional reliance on a small number of highly cyclical industries for employment and trade. However, they also provide an opportunity for greater resilience to economic change by leveraging the different strengths of the regions and providing additional redundancy and support in the case of shock events and ongoing stresses.

Perth is WA's most developed region and is the state's primary population, economic and transport hub. It relies on other regions to sustain the city and generate wealth for the state. Other regions rely on Perth to provide a high level of economic and population services to sustain regional communities and industries. Global megatrends will continue to shape WA's diverse pattern of development, impacting on regions differently and creating new opportunities to grow strategic industries and employment and close gaps in regional outcomes.

WA's regional development focuses on the 9 regions outside Perth to drive regional social and economic outcomes, reduce disparity between regions and enhance overall state performance. To position regions for growth, infrastructure investment should build on key regional strengths and support long-term, resilient outcomes for the regions and the state. It should enhance regional productivity by strengthening and developing industries to generate sustainable economic, business and employment growth, and supporting workforce development and reskilling. It should also help address gaps in social services, which are critical to the wellbeing and liveability of regional communities and their ability to attract and retain talented people.

Regional communities, businesses and all tiers of government have important roles to play. Communities and businesses are mindful of global change and are actively seeking new opportunities to do business and improve their livelihoods. A collaborative approach to managing and adapting to change, diversifying economies and building strong communities is required. More coordinated and timely approaches to addressing infrastructure needs before they become a barrier to realising growth opportunities are also required. The recommendations in this chapter seek to improve strategic decision-making and help ensure infrastructure is enabling regions to leverage their key strengths.

Government regional development roles in Western Australia

The Regional Development Portfolio is responsible for leading regional development. It comprises:

- Department of Primary Industries and Regional Development: The department has a lead regional development policy role and provides support to the Regional Development Commissions.
- Regional Development Commissions: Established under the *Regional Development Commissions Act 1993*, the 9 commissions are the lead state agencies responsible for promoting and coordinating the social and economic development of WA's 9 regional areas outside Perth.
- Regional Development Council: Established under the *Regional Development Commissions Act 1993*, the council consists of the chairs of the 9 commissions and is the main advisory body to the WA Government on regional development issues.
- WA Regional Development Trust: An independent statutory advisory body, established under the *Royalties for Regions Act 2009*, that provides advice to the Minister for Regional Development on the operations of the Royalties for Regions (RfR) Fund and any other matters referred to it by the Minister.

This is in addition to state agencies and government trading enterprises with overarching responsibilities (for matters including economic development and planning) and others with statewide responsibilities (such as health, education, water and power). The 9 regional areas include 109 local governments, which provide community leadership and strategic direction and deliver a range of services and infrastructure to enhance local prosperity and wellbeing. Regional local governments often rely on federal and state government grants for major infrastructure delivery.

WA has 9 Regional Development Australia committees (including Perth), which are federally funded entities responsible for providing advice on regional development priorities to the Australian Government.

Building on Western Australia's regional strengths

The same global megatrends driving the need to build a more diverse and resilient economy are also creating new strategic opportunities that WA and many of its regions are well placed to take advantage of.

The 6 strategic opportunities identified in this Strategy align with Diversify WA, the WA Government's economic development framework.[4] While Diversify WA identifies 8 external-facing sectors the WA Government should prioritise, it does not identify which of these sectors each region should support. This Strategy has gone a step further by identifying the relative strengths of each region to determine which are best placed to realise the strategic economic opportunities and the significant infrastructure required to support this (Table 2).[5]

It should be noted that Table 2 is not intended to be a comprehensive list. It only identifies the top 2 to 3 strengths and infrastructure directions for each region. Regions not showing a particular strength or infrastructure direction in Table 2 should not necessarily be construed as not having any of those strengths or attributes. In addition, the strengths shown in Table 2 are predominantly based on historical data and do not necessarily capture potential future strengths that a region may aspire to build.

Figure 24: Western Australian regional boundaries and key statistics[6]

Estimated resident population at 30 June 2020

Gross regional product 2019–20

Note: This map has been updated to reflect the boundary change resulting from the relocation of the Shire of Wiluna from the Mid West to the Goldfields-Esperance region as of 27 May 2021, but it reflects population and gross regional product data prior to the boundary change.

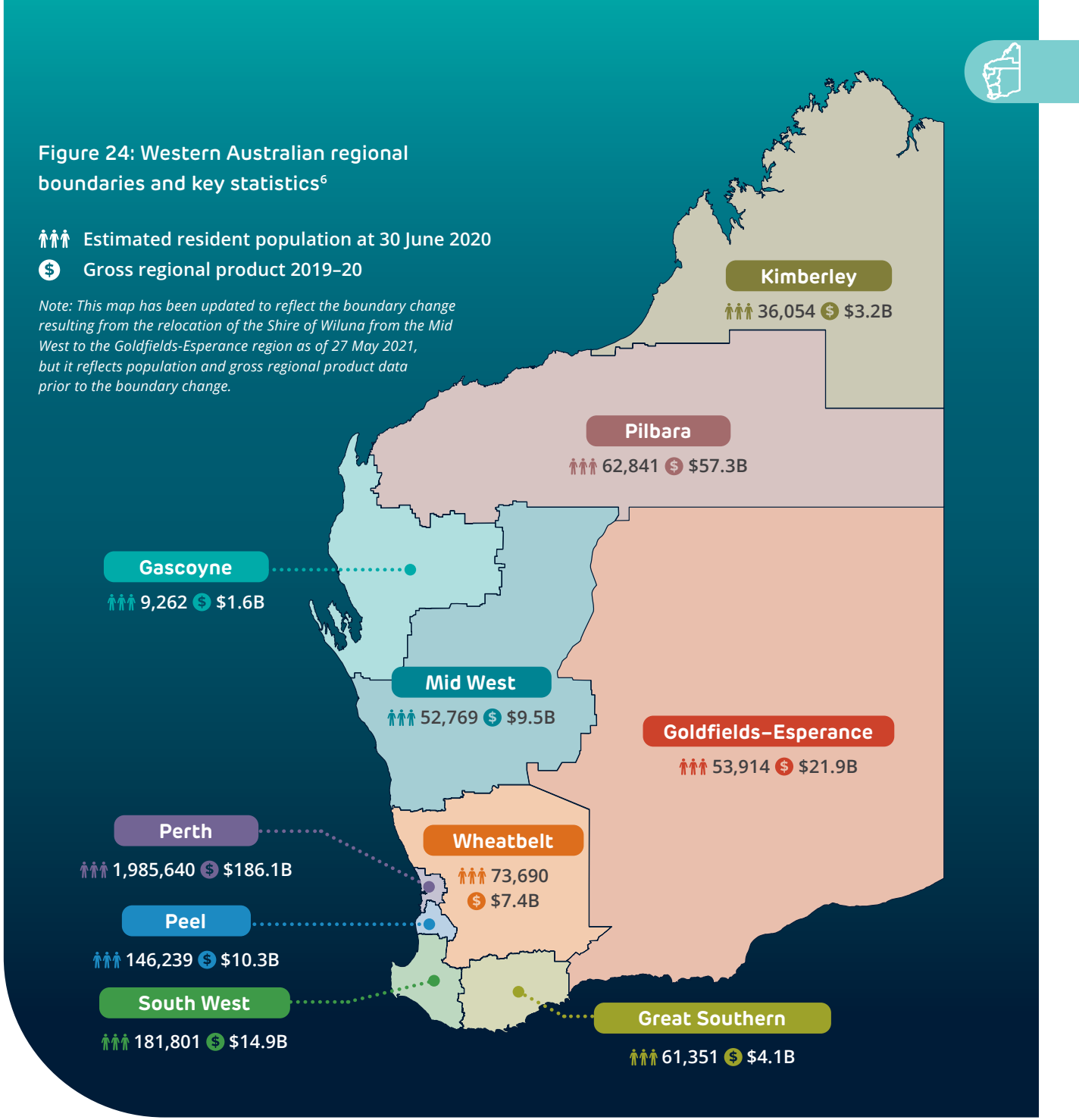


Table 2: Top 2 to 3 strengths and infrastructure directions for each region

Region	Key strengths	Infrastructure directions
Kimberley	• Tourism, agriculture and food, and resources • Significant Aboriginal population, culture and heritage • Natural environment (including a World Heritage area)	• Support interstate and international tourism, and the Kimberley (including Broome) as a world-class tourism precinct • Support agriculture and food, including realising the potential of the Ord River Irrigation Area • Support and advance Aboriginal enterprise, and improve the liveability of remote Aboriginal communities and town-based reserves
Pilbara	• Globally significant resources sector and largest regional economy • Solar resource • Significant Aboriginal population, culture and heritage	• Support resources value-adding, productivity and innovation • Support renewable energy and hydrogen industry • Support and advance Aboriginal enterprise and improve the liveability of remote Aboriginal communities and town-based reserves
Gascoyne	• Agriculture and food, and tourism (including World Heritage areas) • Solar and wind resources • Significant Aboriginal population, culture and heritage	• Support agriculture and food • Support renewable energy and hydrogen industry • Support and capitalise on space science infrastructure
Mid West	• Agriculture and food, and resources • Solar and wind resources • Globally significant space science infrastructure – Murchison Radio-astronomy Observatory and radio quiet zone to support Square Kilometre Array	• Support agriculture and food • Support renewable energy and hydrogen industry • Support and capitalise on space science infrastructure
Wheatbelt	• Agriculture and food • Integrated road and rail freight network • Proximity to Perth	• Support agriculture and food, value-adding and supply chain efficiency • Plan and adapt service delivery and infrastructure to accommodate population change and structural readjustment
Peel	• Resources and value-adding, and agriculture and food • Liveability and proximity to Perth – fastest growing regional population and largest regional centre (Mandurah) • Road, rail and port access, and available commercial and industrial land	• Support resources value-adding, and agriculture and food • Support innovation and advanced manufacturing • Support population growth and address gaps in social services and infrastructure, including health, education, training and housing
South West	• Agriculture and food • Integrated road and rail freight network • Proximity to Perth	• Support interstate and international tourism, and the South West as a world-class tourism precinct • Support agriculture and food, value-adding, and innovation and advanced manufacturing • Support population growth, Greater Bunbury as a major population centre, and Bunbury Faster Rail investigations and planning
Great Southern	• Agriculture and food • Liveability • Road, rail and port access	• Support agriculture and food, value-adding and supply chain efficiency • Address gaps in social services and infrastructure, including health, education, training and housing • Support increased water and wastewater network capacity to improve water security
Goldfields–Esperance	• Resources, and agriculture and food • Road, rail and port access • Significant Aboriginal population, culture and heritage	• Support resources value-adding and supply-chain efficiency • Plan and adapt service delivery and infrastructure to accommodate population change and structural readjustment • Support and advance Aboriginal enterprise and improve the liveability of remote Aboriginal communities and town-based reserves

A range of sources have informed the identification of the strategic direction for infrastructure in each region, including outcomes of stakeholder engagement activities, review of existing government plans, strategies and reports, and economic analysis commissioned by IWA.[7] This has provided a consistent and evidence-based method of identifying comparative strengths to inform IWA's portfolio management approach to infrastructure prioritisation. The analysis has guided the assessment of where government investment in infrastructure should be targeted to achieve the strongest state and regional outcomes.

Infrastructure responses to cross-regional challenges and opportunities

While distinct in many respects, regions face a range of shared challenges and opportunities in achieving this Strategy's vision. The following section summarises how infrastructure recommendations in other parts of this Strategy address these matters. Further information is available in each cross-cutting theme and sector chapter.

Closing the digital divide

What IWA heard in the regions

Improving regional digital connectivity to underpin social and economic development was a recurring theme and recommendations to close the digital divide in regional areas were strongly supported. Many regions highlighted digital accessibility as a significant issue as they currently receive poor-quality service. This is addressed by the recommendations in the Digital connectivity and technology chapter.

Digital connectivity infrastructure is a critical asset, but many regional, rural and remote areas experience poor-quality mobile and internet coverage, which impacts on social participation, service delivery and economic growth. Federal regulation of telecommunications is aimed at equitable provision of minimum service standards and promoting fair market competition, but the market is not adequately meeting all regional needs.



Infrastructure will be required to improve digital connectivity and support mainstream adoption of digital technology. Recommendations include:

- develop a statewide plan to accelerate digital transformation and improve connectivity in the regions to enhance social and economic benefits and reduce disadvantage
- provide WA Government funding and leverage Australian Government co-investment opportunities to improve connectivity.

Improving Aboriginal outcomes

What IWA heard in the regions

Regional stakeholders strongly supported the recommendations to improve outcomes for Aboriginal people. Stakeholders reinforced the potential for procurement policies and processes to support Aboriginal business development and employment opportunities. Stakeholders also noted that governance arrangements in some remote Aboriginal communities may act as a barrier to improving infrastructure and services. This has been acknowledged and incorporated.

In 2016, approximately 61% of WA's Aboriginal and Torres Strait Islander population lived outside the Perth metropolitan region.[8] Despite increasing action and investment, many socio-economic inequalities between Aboriginal and non-Aboriginal people persist. Infrastructure will be required to improve the liveability of remote Aboriginal communities and town-based reserves and to support Aboriginal business development and employment. Co-design of services and infrastructure will be essential in supporting the empowerment and self-determination of Aboriginal people. Recommendations include:

- prepare Aboriginal engagement strategies for projects and programs with a capital cost of $100 million or more, to support place-based and community-led approaches
- strengthen Aboriginal procurement targets
- develop initiatives to build the capacity and capability of Aboriginal businesses
- deliver sustained investments in Aboriginal housing and build the capacity of Aboriginal Community Controlled Organisations in relation to the delivery of housing services
- in relation to remote Aboriginal communities and town-based reserves:
  - establish a sustainable funding model and investment framework to guide infrastructure investment
  - transition the provision of water, wastewater and power services to Water Corporation and Horizon Power, supported by tiered regulated service standards
  - clarify the roles and responsibilities for provision of municipal infrastructure and services, such as roads, waste management and recreation facilities.

Mitigating and adapting to climate change

What IWA heard in the regions

Stakeholders strongly supported action on climate change due to the range of impacts it may have on their communities and businesses. Stakeholders in the South West region noted they will be at the forefront of the transition from coal-fired power as WA reduces greenhouse gas emissions. *Collie's Just Transition Plan* to support transition has been recognised in the Energy chapter.

The impacts of climate change will be felt strongly in regional areas – this is already happening to some extent.[9] Government and industry need to respond to global action to reduce carbon emissions. Industry and investors are increasingly avoiding jurisdictions that are not taking strong action on climate change. Infrastructure will be required to enable regions to mitigate and adapt to climate change and realise economic opportunities in renewable energy. Recommendations include:

- strengthening the net zero emissions by 2050 aspiration to become a firm target and establish interim emissions reduction targets
- develop up-to-date climate change information and modelling that covers all regions of WA
- accelerate preparation of sectoral emissions reduction strategies
- develop climate change adaptation plans to effectively manage risks to existing infrastructure
- develop carbon farming and sequestration markets, which would also create new regional business and employment opportunities
- implement whole of government coordination methods for climate change action, including mechanisms that encourage a consistent, integrated approach across all sectors and regions.

Securing reliable and affordable energy

What IWA heard in the regions

The importance of a reliable and affordable energy supply and the need to enhance adoption of renewable technologies was raised in many regions. Several regions recognised a major role for hydrogen in diversification of the region's economy and identified a number of projects in development to emphasise the need for supporting infrastructure. Stakeholders in the Mid West highlighted the need to augment the Mid West Transmission Line to facilitate more reliable energy supply, renewable energy and hydrogen production, which has been reflected in the Energy chapter. The Wheatbelt requires edge-of-network solutions to meet the needs of many towns throughout the region, which is also reflected in the recommendations.

The energy sector is going through a period of rapid transformation that is affecting regional WA in many ways.[10] The energy system is becoming more decentralised and renewable energy technology will play a greater role as WA transitions to net zero emissions by 2050. Energy infrastructure is required to implement new technologies that provide more sustainable, cost-effective and reliable power sources, and realise opportunities to develop new energy industries. Recommendations include:

- update the Whole of System Plan to address a range of additional factors, including greenhouse gas emissions reduction targets and new industry opportunities
- prepare a North West Interconnected System energy futures report to provide a long-term view on energy generation, demand and network infrastructure requirements, and inform evaluation of key project proposals, including the Burrup Common User Transmission Line and East Pilbara Link.



- undertake a dedicated program to accelerate rollout of energy storage, microgrids, virtual power plants and standalone power systems across WA, particularly for communities currently on the edge of the grid, or reliant on expensive standalone diesel systems
- plan for enabling infrastructure to grow and support the hydrogen industry, including modelling to determine the need for supporting energy infrastructure such as the Mid West Transmission Line.



Improving water security

What IWA heard in the regions

Stakeholders in many regions raised the issue of water security and the need to improve water outcomes for community and industry use. The need for climate-independent solutions (such as desalination) was also raised by stakeholders in various regions, in response to the availability and declining quality of groundwater supplies. Stakeholders highlighted the need to address drought impact and improve the supply of non-potable water resources and improve distribution networks. The recommendation to develop regional water plans provides an opportunity to address these issues.

WA's future economic and population growth is highly reliant on the availability, security and affordability of water supply. Climate change is impacting different regions of WA in different ways, ranging from reduced rainfall in the south-western part of the state to more intense weather events in the north. Water resources are becoming scarce in some parts and more saline in others.[11] The state will need to reform water regulation and planning to develop regionally appropriate responses to these challenges and invest in infrastructure and programs that ensure security of drinking water and maximise availability of non-potable water for other uses. Recommendations include:

- modernise legislative, regulatory and planning frameworks for water resources and water services, including prioritising the development of consolidated water resources management legislation
- develop a 20-year state water strategy, as well as 10+ year regional water plans aligned to the state water strategy
- review self-supply arrangements for strategic water resources
- develop a prioritisation framework to guide investment in water infrastructure projects for the agricultural industry.

Improving waste management and resource recovery

What IWA heard in the regions

There was strong feedback and support for the recommendations to improve waste infrastructure across WA. Stakeholders noted further action and investment is required to develop regional facilities and grow regional markets for products with recycled content, which has been addressed in the Waste chapter. However, comments suggested that the Waste Levy should not simply be extended to regional areas without consideration of factors such as the availability of recycling infrastructure to provide an alternative to landfill, which has been noted. A new recommendation has been added to address the potential highlighted by stakeholders for the mining and resources sector to increase waste recovery, noting this sector is often not held to the same standard as communities.

Regions have the potential to improve waste management and recycling to support a circular economy. Further action and infrastructure are needed to achieve targets outlined in the Waste Avoidance and Resource Recovery Strategy 2030.[12] The mining and resources sector in particular has significant opportunity to recycle waste and reuse industrial by-products. Recommendations include:

- undertake statewide waste infrastructure planning to identify the type and location of waste facilities required across regional WA
- expedite waste legislative and regulatory reform, including review of the Waste Levy and application statewide where practical and feasible
- investigate opportunities for the mining and resources sector to increase waste recovery
- investigate opportunities for more local governments in regional WA to participate in collective arrangements to enhance waste management.

Strengthening regional transport and supply chain connectivity

What IWA heard in the regions

There was strong support for the recommendations to enhance WA's transport linkages. Expanding regional port capacity and direct shipping to the state's north-west were strongly supported. The recommendation to investigate the long-term feasibility of Bunbury Faster Rail also received strong support in the South West region, to improve connectivity and support regional growth.

Regional areas require efficient logistics networks to support supply chains that serve domestic and international markets. People from regional communities often travel long distances between where they live and work, so they require good and safe connectivity. Transport infrastructure is needed to enhance the safety and connectivity of regional industries and communities. Recommendations include:

- update strategic transport planning to address long-term state and regional needs, including development of:
  - a 20-year regional transport plan, which includes a focus on freight supply chains across all modes and consideration of cross-regional issues
  - a 20-year Perth and Peel transport plan
- implement programs to improve road safety treatments and maintain regional roads
- investigate long-term projects such as upgrading the Brand and North West Coastal highways, and the long-term feasibility of Bunbury Faster Rail
- support expansion of direct shipping into northern WA to improve market access and reduce costs
- implement a structured approach to plan and consider public contributions to investment in the freight network across the Wheatbelt, Great Southern, Goldfields–Esperance and Mid West regions to maintain global competitiveness of agriculture exports.



Improving regional planning and coordination

What IWA heard in the regions

Across the regions, stakeholders raised the need for strengthened strategic planning and supported the recommendation to develop integrated regional plans. Stakeholders noted the plans should involve engagement with local governments and communities and consider environmental, landscape and geological (including basic raw materials) values of each region. This has been reflected in the recommendations.

Planning and coordinating development across WA's vast and diverse regional areas is a complex challenge. Continuous improvement in government processes, capacity and culture, and the broader regulatory environment are required to improve outcomes for communities, business and the environment. A range of reforms that ease the process of doing business and build maturity in the way government operations and infrastructure investment are planned, coordinated and targeted are recommended to support the standing of WA and its regions as a global location of choice. Recommendations include:

- developing 20-year integrated regional plans to establish the land use, infrastructure and environmental needs of each region (aligned to the regional development strategic framework as also recommended in this Strategy)
- establish state priority areas to identify and endorse on a whole of government basis those areas where significant economic or urban growth is intended and to facilitate and coordinate private sector investment
- ensure the protection of strategic industrial land uses, infrastructure and resource inputs
- facilitate and coordinate investment in industrial and technological precincts
- identify and secure strategic sites for infrastructure by establishing a dedicated and recurrent fund for regional land acquisition
- identify the cumulative impacts of large-scale investments on demand for services and infrastructure through place-based assessments, with an initial pilot recommended for the Pilbara region.

Addressing gaps in social infrastructure

What IWA heard in the regions

There was strong support for better social infrastructure to improve regional liveability and quality of life. The need to address housing and land constraints was a very strong theme and there was broad support for regional housing plans to address this recurring issue. Pilbara stakeholders volunteered to pilot a regional housing plan due to the housing issues faced across the region. Supporting the growth of WA's tourism sector was a strong theme and several regions identified tourism growth opportunities, which can be supported through the 10+ year tourism strategy and investment in the 4 tourism 'jewels in the crown' recommended in the Arts, culture, sport and recreation chapter.

Social services and infrastructure, including housing; health; education and training; justice and public safety; and arts, culture, sport and recreation, are critical to the liveability of regional communities and their capacity to attract and retain people, build a future-ready workforce and support economic growth and diversification. Infrastructure is required to enable gaps in services to be addressed and the provision of integrated, accessible and efficient services tailored to local needs. Access to housing is a particular challenge for communities across regional WA, especially in locations subject to highly cyclical economies and housing market failures.

Recommendations include:

Housing

- Prepare place-based regional housing plans to enable strategic, targeted housing outcomes for each region and a consistent evidence base for future investment priorities
- Develop a sustained social and affordable housing investment program to respond to diverse housing circumstance, informed by regional housing plans
- Establish the principles, criteria and models for government housing intervention in regional locations that are demonstrating market failure, informed by regional housing plans
- Review regional officer housing assets and programs across the public sector, including the Government Regional Officer Housing program, to ensure that the housing needs of state agencies, staff and regions are met

Health

- Expedite implementation of the Sustainable Health Review to increase provision of regional community-based and primary care health services
- Expand mental health services and facilities
- Expand application of digital technologies, such as telehealth and remote monitoring, to deliver virtual services to regional areas
- Provide health facilities in Aboriginal communities that are fit for purpose with high-quality digital connectivity, and support primary care and allied health facilities that are designed and operated in partnership with Aboriginal communities

Education and training

- Ensure individual school planning and delivery methods plan for and use transportable buildings as a temporary solution only, and not where enrolment growth is expected to continue
- Implement collocation and shared use of schools with childcare, health and community support services to provide better access to services, particularly in disadvantaged areas
- Plan for future skills and training, fund relevant TAFE training equipment and software (facilitating industry co-contributions where appropriate) and encourage apprenticeships and traineeships on public infrastructure projects

Arts, culture, sport and recreation

- Develop and publish a 10+ year state arts and culture strategy to guide priorities, including infrastructure and investment needs
- In collaboration with Aboriginal communities across WA, invest in a flagship Aboriginal cultural centre to provide Western Australians and visitors with a gateway to Aboriginal cultural journeys across the state, connecting approximately 50 existing Aboriginal cultural centres
- Develop and publish a 10+ year regional-level sporting facilities plan to identify infrastructure needs in major centres
- Develop a 10+ year tourism strategy to guide tourism precinct development and investment across WA
- Until such time as the 10+ year tourism strategy is available to guide further investment, focus tourism infrastructure destination planning and activation on the 4 'jewels in the crown' of WA's tourism offering to drive international and domestic visitation for the Perth region (including Rottnest Island), the South West region, Ningaloo Coast (including Exmouth) and the Kimberley region (including Broome)

Justice and public safety

- Set targets to reduce demand for police, courts and corrective services, and associated infrastructure by focusing on measures related to prevention, early intervention, rehabilitation and recidivism, and address over-representation of Aboriginal people in the justice system
- Improve justice and public safety infrastructure planning, focused on the interdependencies of police, courts and correctional facilities, and management of shared assets, including ageing regional facilities
- Pursue collocation opportunities with government and non-government providers to establish precincts to support provision of complementary services to local communities
- Progress a business case for the replacement of Broome Regional Prison and further investigate the phased rollout of the Government Radio Network

Regional cities and towns

WA's regions are supported by a highly dispersed network of settlements. These cities and towns are an important infrastructure focus as they accommodate most of regional WA's population and are major concentrations of services and infrastructure. To improve infrastructure coordination, the WA Government should review the strategic roles of cities and towns across the settlement network and prioritise those with potential to support the strongest economic and population growth opportunities to ensure their development needs are properly managed.

The *State Planning Strategy 2050* designates the main hubs in the settlement network as regional centres, and sets out a settlement hierarchy (based on role and size) which has 4 tiers:

- Capital city (Perth)
- Regional centre (11 centres)
- Sub-regional centre (16 centres)
- Other centre (13 centres).[13]

Regional centres are the main population, business and transport hubs, often acting as gateways to their regions. These cities and towns have important roles in servicing regional communities and economies, underpinning their region's productivity and liveability. Larger regional centres can become engines of innovation and growth, as the economic forces that drive growth also drive the generation of new ideas and products for domestic and international markets.

The WA Government will need to consider the long-term prospects of regional cities and towns and identify the impacts of economic, technological and environmental factors that will drive change over the next 20 years. Regions will rely on their designated regional centres to support increasing commercial activity and nurture, attract and retain skilled people. However, locations impacted by changing climate, or new technologies that improve productivity but involve fewer local jobs, may experience population decline. Some towns in regional areas have already experienced population decline due to structural changes in the economy, as has been the case throughout WA's history.

The settlement hierarchy was last updated in 2012, at the height of the last resources boom. However, given the changing economic outlook, it potentially does not reflect the strategic roles that key regional cities and towns will need to play to support WA's next phase of growth. It should be reviewed in light of updated economic and population drivers, identifying the strategic value of each centre and elevating those likely to experience the fastest economic and population growth. IWA will align its advice on infrastructure investment with the strategic importance of a regional centre to support strong industry and population growth to avoid infrastructure constraints becoming a barrier to growth.

Drivers of regional growth and change should be closely monitored to enable a proactive approach to managing growth and change pressures, such as those experienced in the Pilbara during the last resources boom. Government agencies should find better ways to manage and respond to these pressures, as they continue to occur. For example, housing shortfalls continue to emerge in many regional locations, such as the Pilbara. The Housing chapter recommends the preparation of regional housing plans to support well-functioning regional housing markets, but markets will need to be monitored on a regular basis so that early action can be taken to ensure adequate housing supply.

To support regional centre growth and maximise value from infrastructure investment, WA should also consider adopting approaches to promote migration to regional centres that offer the greatest business and career growth opportunities. This Strategy supports growing regional populations to build the critical mass of regional communities. For example, the Transport chapter recommends an investigation into the viability, benefits and costs of a Bunbury Faster Rail link. However improving liveability and connectivity is not in itself enough to promote sustainable population growth. The availability of meaningful employment is a critical factor as people are unlikely to want to move to a regional centre and could find themselves in a more vulnerable economic situation without adequate employment options.

Remote Aboriginal communities and town-based reserves

Aboriginal people across WA have a strong connection to the land. Remote Aboriginal communities provide a deep connection to country and cultural security, uphold customs, cultures and traditions, and provide traditional authority structures.

There are 274 remote Aboriginal communities and 37 town-based reserves located across the state. Governance of these communities and reserves is complex, and infrastructure and service provision are often ad hoc or of a poor standard. This often contributes to poor living conditions, which impact on health and wellbeing. Improvements to infrastructure and the way it is managed will be critical to improve the liveability of remote Aboriginal communities and town-based reserves and to close the gap on Aboriginal disadvantage. Co-design of infrastructure and services will support self-determination and empowerment of Traditional Owners, Custodians and their communities.

The Aboriginal cultural heritage, wellbeing and enterprise chapter provides a range of recommendations that support remote Aboriginal communities and town-based reserves.



Northern Western Australia

The Kimberley, Pilbara and Gascoyne regions present opportunities to realise the Australian Government's Northern Australia agenda.[14]

Northern WA has a strategic opportunity to become a major global exporter of renewable energy, notably renewable hydrogen, to complement the Pilbara's globally significant resources sector. Maximising the Pilbara's global competitiveness should be a priority, as Brazil and Africa potentially open new supplies of iron ore over the next 10 years. The Gascoyne and Kimberley regions have opportunities to serve growing international tourism and food markets. Creating world-class tourism experiences in the Kimberley (including Broome) and the Ningaloo Coast (including Exmouth) should be a priority to unlock opportunities.

Enhancing the liveability of the regional centres and remote Aboriginal communities in this area is a priority for attracting and retaining a workforce to support growing industries. Karratha is the largest regional centre, with the potential to become the main innovation hub in the north-west.



There is a range of different funding sources for regional infrastructure. One of these is **RfR**, overseen by the WA Regional Development Trust, which was established in 2008 to allocate an amount of government funding specifically for regional WA.[15] It is funded by allocating the equivalent of 25% of the state's forecast revenue from mining and onshore petroleum royalties into a fund that is separate from the Consolidated Account.[16] The balance of the fund cannot exceed $1 billion.[17]

Recommendations

Regional development strategic framework

As the state's economy diversifies and adapts to change, clear regional development strategic priorities will be required to guide government action and investment in a structured way and in collaboration with industry and regional stakeholders. IWA is pleased to note that the Regional Development Portfolio has commenced identification of regional development priorities as a basis for further consultation with regional stakeholders. IWA calls for further progress of this work in line with this Strategy's recommendations.

To align infrastructure with regional development priorities, a range of national, state, regional and local policies, strategies and plans, such as the Regional Development Commissions' regional investment blueprints and corporate strategies, growth plans and regional planning and infrastructure frameworks, were reviewed by IWA. However, it was found that they did not provide an adequately coherent strategic framework within which to align infrastructure priorities. There were a range of gaps, as well as issues such as documents being out of date or inconsistent, overly aspirational, not aligning adequately with key regional relative strengths or being region-centric and not addressing cross-regional or statewide implications.

The Productivity Commission's *Transitioning regional economies study report* and the WA Government's *Special inquiry into government programs and projects* both noted that the effectiveness of RfR was hampered by a lack of a strategic framework setting out regional priorities and outcomes to guide investment decisions.[18] The *Special inquiry into government programs and projects* noted that RfR had a very broad, but clear, objective to enhance regional areas; however, its greatest weakness was that 'it has struggled in establishing how to go about the task. Since its inception, it has had no comprehensive or coherent strategy.' [19]

The *Special inquiry into government programs and projects* found that 'there was a significant deficit in the rigour applied to project selection and poor targeting of funding towards projects that would deliver lasting economic and social outcomes to regional Western Australia'.[20] It was also noted that without effective outcomes measurement, it was difficult to determine the level of economic or social progress since the introduction of RfR.[21]

The impetus for RfR largely arose from a perceived lack of investment in regional areas. It is currently not possible to identify a detailed account of government capital or recurrent investment in regional areas because the State Budget often does not identify how much of each line item in the budget is allocated to the regions. To provide greater transparency, and to be able to measure the impact of government regional investment, better data on service delivery activity and capital investment program spend through the regions is required so that future decisions are better informed. Regional infrastructure is funded from a range of different sources and RfR is just one. For example, one of regional WA's largest public infrastructure projects – the $852 million Bunbury Outer Ring Road – is funded almost exclusively from non-RfR sources.

While the various approaches taken in recent years to achieve greater collaboration between the regions and better align regional development aspirations with the state's wider development objectives are welcomed, this Strategy recommends this now be taken a step further through the development and implementation of a regional development strategic framework. The framework would signal the WA Government's objectives and priorities for regional development, while retaining a level of flexibility necessary to enable industry to present new and innovative proposals to government.

Importantly, the framework should not present a centralised control or top-down approach. It would need to be developed in close collaboration with industry, regional stakeholders and relevant state agencies to build trust and provide confidence in its robustness to inform government investment decisions. It should be periodically updated to ensure it remains contemporary. Similar initiatives in other jurisdictions could provide potential models, such as South Australia's Regional Development Strategy and *A 20-year economic vision for regional NSW* (2018).[22]



A regional development strategic framework will provide a basis for integrated whole of government action and investment in the regions, not just that of the Regional Development Portfolio. IWA has undertaken some initial work through its own regional analysis but a more comprehensive framework that builds on this work will be required to better align infrastructure and regional development priorities in the future.[23]
The framework should target complex and strategic regional challenges and opportunities, provide a consolidated set of regional and cross-regional priorities, and identify how regional communities, government and business can collaborate to drive a step change in regional outcomes.

The framework should incorporate the following elements:

- a short, strategic document that includes an integrated set of regional development objectives, outcomes and priorities at both state and region scales, that aligns with integrated regional land-use plans (see the Planning and coordination chapter) and is robust, consistent and evidence-based
- a regularly updated implementation plan to guide activities that stakeholders need to work on together to achieve objectives, priorities and outcomes
- a performance framework, which embeds specific, measurable, outcomes-based key performance indicators for regional WA, and a process for regular monitoring, evaluation and publicly reporting on whether action and investment is achieving outcomes
- a portfolio management approach linking the strategic document, proposals, prioritisation and funding sources, including the annual State Budget process. It should incorporate a methodology for appraising and prioritising regional proposals, which includes criteria that consider factors that might otherwise disadvantage regional proposals over metropolitan proposals, such as:
  - remoteness
  - relative impact on a region's development trajectory and outcomes
  - population fluctuations due to economic cycles
  - managing assets through fluctuations in demand
  - social, environmental and economic benefits
- modelling and simulation software tools that enable proposals from within or across multiple regions to be appraised and compared on a like-for-like basis to determine which proposals would make the greatest regional impact, and assess cumulative impacts of proposals
- a governance structure to drive development and implementation of the regional development strategic framework, with oversight including government representatives from outside the Regional Development Portfolio, such as the departments of Treasury, and Jobs, Tourism, Science and Innovation
- an ongoing capability-building program to improve the knowledge and skills of the Regional Development Portfolio and other regional development stakeholders in economic and social development, and strategic planning and business development.

To facilitate collective action, the framework should address the following regional development matters and align, where relevant, to sectoral strategies and plans, to provide whole of government strategic direction and priorities on:

- regional role and development approaches supporting economic diversification and workforce development
- managing the long-term development and growth of regional centres
- promoting regional migration and population attraction and retention.

Given anticipated long-term change, it is recommended that regional economic scenario modelling be completed and that updated population projections be prepared to inform the regional development strategic framework and long-term planning of services and infrastructure, and, where new service models are required, to respond to long-term structural change.

Recommendation 19

Drive better alignment of infrastructure provision and regional development needs by implementing a regional development strategic framework that identifies state and regional priorities and guides whole of government action and investment.
The framework should:

- align to other government strategic documents, such as this Strategy and Diversify WA, and be developed in collaboration with government, business and regional stakeholders
- prioritise regional centres based on their strategic importance to the state's economic and population growth
- consistent with Recommendation 28 in the Planning and coordination chapter, inform integrated regional plans, which include a baseline assessment of the region's infrastructure, and identify infrastructure and staging required to support the region's development and growth underpinned by a credible evidence base
- incorporate clear linkages to funding sources and processes, including the annual State Budget process
- be reflected in state agency and government trading enterprise strategic asset plans and business cases.

Recommendation 20

Improve the transparency of government regional investment by reporting all regional expenditures (recurrent and capital) and geographic distribution in the State Budget.

Regional social service and infrastructure models

It is important that effective and sustainable social services and infrastructure are available to regional communities across WA to maximise regional outcomes. WA faces significant challenges in keeping pace with the needs of the many diverse regional communities that will experience demographic change, including population growth and decline, over the next 20 years. Government agencies must find new ways to coordinate, plan and deliver social services and infrastructure to ensure they are delivered in the most efficient and collaborative way to communities across WA's vast geographic area. More integrated, place-based models are required to enable state agencies to work together to tailor the mix of services and infrastructure to the varying needs of each community. These models should also be responsive to population growth and decline to ensure they do not over or under cater to local demand, as regional communities are highly exposed to the global economic cycles and structural changes that drive migration and WA's diverse pattern of development.



The need to reform regional social service and infrastructure models has been building for some time. The WA Government's 2017 Service Priority Review final report, *Working together, one public sector delivering for WA* (*Service priority review*), found that a lack of effective coordination and integration between the WA and Australian governments, local government and non-government organisations contributed to poor outcomes and recommended improving coordination of services in the regions.[24]
The *Service priority review* also observed that 'the need for services designed to break cycles of disadvantage is higher in many regional and remote areas. Such services can often be uncoordinated, expensive and difficult to deliver and do little to support individual or family success.'[25] Integrated social services focused on prevention and early intervention can improve outcomes while reducing demand for downstream services and infrastructure.

The *Service priority review* also noted that, historically, services have been developed in response to the needs of individual state agencies rather than from the perspectives of communities and clients.[26] Public sector fragmentation has resulted in misalignment of services and planning regions between state agencies.[27] Agencies must now work together to apply co-design and community-centric approaches to better respond to local needs and facilitate service integration and collocation.

New South Wales hub-and-spoke model

New South Wales is moving to a hub-and-spoke model that focuses major investment in regional centres that can support the communities that surround them.[28] The model is defined as a 'service delivery model that provides connections (spokes) to and from key centres (hubs).[29] The spokes link to different hubs across an area, rather than focusing on one key hub.'

The hub-and-spoke model recognises the importance of strategic regional centres in the provision of essential services and jobs and aims to ensure equitable access of services for regional communities. To align regional communities, services and infrastructure, such as health, education, transport and aviation, the model builds on New South Wales's network of regional centres, providing a geographic basis for 'optimal and productive land use, economic and infrastructure planning'.[30] Strategic regional centres and cities form the hubs and surrounding towns and communities form the spokes.[31]

Population decline and demographic change in some areas of regions such as the Wheatbelt and Goldfields–Esperance has resulted in overprovision of social services and infrastructure in some cases, which diverts funding from other areas. There are also many ageing facilities across regional WA, such as police stations and courthouses that are no longer required or fit for purpose. These facilities are still being used, but decisions are required about their future.

By definition, place-based approaches require a common geographic frame of reference to target areas and align state agency social service planning regions. WA's settlement network could provide a basis for this and applying a hub-and-spoke approach could provide a way of coordinating social services across all regional centres in the network. The WA Country Health Service already applies a hub-and-spoke approach, which could potentially be applied to other services.[32] Digital technology should play an enabling role, facilitating communication, integration and access to services across the settlement network.

It will be important to pilot regional social service and infrastructure models in different regional settings to determine their efficacy, including in a remote Aboriginal community, a small town and a regional centre. Local governments may be well positioned to facilitate integrated, place-based approaches, but resourcing may need to be considered.

A social services and infrastructure needs assessment will be required to inform the design and implementation of new regional service and infrastructure models. The needs assessment will have to consider how social, economic and environmental factors will potentially drive population growth, decline and change across the settlement network to adapt social services and infrastructure to changing community needs over the next 20 years.

Recommendation 21

Improve the effectiveness and efficiency of regional social services and infrastructure by developing regional social services and infrastructure models that are more responsive to the changing needs of communities across regional WA, including those caused by population growth and decline, by:

a. applying integrated, place-based approaches that allow social service state agencies such as health, education, justice, policing, housing and emergency services to better coordinate and co-locate services and infrastructure and ensure the service mix is tailored to changing community needs
b. investigating the application of a hub-and-spoke approach aligned to WA's settlement network to coordinate social services and infrastructure
c. piloting potential regional social service and infrastructure models in a remote Aboriginal community, a small town and a regional centre
d. undertaking a social services and infrastructure needs assessment to understand how needs will change in response to long-term population growth and decline and demographic change.



Service Priority Review

The WA Government's 2017 Service Priority Review considered ways to improve regional service delivery, noting that many of the challenges arising from providing services over large distances are 'inadvertently magnified by a fragmented, insular public sector culture and an inability to coordinate services'.[33] The report, prepared by the Local Service Delivery Working Group to inform the review, made 13 recommendations to improve service delivery and identify possible efficiencies and cost reductions.[34] This Strategy supports and aligns with these recommendations.

Planning and coordination



Aligned strategies and plans, supported by **appropriate legislation, policy and decision-making frameworks** are essential to guide coordination of infrastructure across the state and across sectors to address future demographic, social, environmental and economic scenarios.

What IWA heard

During consultation on the draft strategy, stakeholders provided a large volume of feedback on planning and coordination recommendations. Overall, the recommendations were supported, although additional considerations and alternate responses were suggested, resulting in amended content and new sub-recommendations. Recommendations that received significant support included development of an overarching urban forest strategy, measures to improve implementation of urban consolidation targets, unlocking industrial and technological precincts, preparation of integrated regional plans and broader considerations being accounted for in infrastructure decision-making processes.

There was also strong support for greater levels of collaboration and alignment across government, although some stakeholders questioned how this might be realised in practice. This concern is acknowledged and has been addressed through amendments. Of note, stakeholders queried the role of local government in relation to the recommendations, particularly implications for the involvement of local government and the community in planning and decision-making. In response, greater consideration has been given to the roles and responsibilities of local government.

Stakeholders also raised other matters that were not prominent or addressed in the draft strategy relating to infrastructure facilitation and coordination models, and the protection of strategic land uses, infrastructure and resource inputs. These are now reflected in new content and recommendations.

Planning and coordinating infrastructure for populations and economies that will grow and change is a universal challenge. For WA, the task is to build on the existing program of incremental reform. This can be partly achieved through maturing infrastructure decision-making processes, including strengthening strategic asset plans and improving business case development. Enhancing transparency in the infrastructure decision-making process, encouraging collaboration across state agencies and government trading enterprises (GTEs) and fostering a culture of continuous improvement will also contribute to better outcomes.

The pursuit of continuous improvement should be a priority for all state agencies and GTEs. A combination of direction, culture and practice is required to ensure state agencies and GTEs are working towards the same goal. Without this, the issues of siloed decision-making will be perpetuated – infrastructure will not always align with its strategic intent and demand, its purpose may be unclear, there will be duplicated or inconsistent governance and approvals and a lack of early and effective stakeholder collaboration.

Many and varied reform initiatives have been advanced by state government in recent years and significant progress has been made in areas such as the land-use planning system, mining approvals and procurement. Measures taken to respond to the COVID-19 recovery have amplified this reform program and pace of change for government, demonstrating how state agencies and GTEs can work collaboratively to respond to significant change. Yet there is still much more that can be done.

Many of the issues and considerations covered in this chapter are perennial and familiar issues for government, often without clear ownership within government or a defined path forward to drive change. The Strategy makes recommendations to support better overall planning and coordination. These recommendations represent incremental improvements rather than any kind of 'silver bullet' and, while comprehensive, are not exhaustive.

Both smaller-scale interventions and major reform initiatives can collectively enhance coordination of government operations and improve positive interactions with business and the wider community. These initiatives work towards making WA a global location of choice – both for business investment and as a great place to live, visit and study.

Recommendations in this chapter identify further reform needed to effect meaningful

change in the areas of:

- **facilitation and stewardship**: striving to achieve better infrastructure outcomes through collaboration and stewardship, with industry and community, across the public sector
- **a contemporary and outcomes-focused legislative and policy environment**: facilitating streamlined approvals and delivery processes for infrastructure, while ensuring adequate benefits and protection for the community and the environment
- **integrated planning to support growth**: ensuring land-use and infrastructure planning are integrated and undertaken early and collaboratively to support timely and coordinated delivery of infrastructure needed for population and economic growth
- **collocation, shared services and common user infrastructure**: optimising investment through the collocation of complementary infrastructure and services
- **identification and security of key infrastructure sites and corridors**: providing certainty for service providers and the community that land will be available for critical infrastructure needs
- **consistent access and application of data in infrastructure planning**: ensuring state agencies and GTEs are planning for the same future through accessible, current and fit for purpose data, while embedding data capture and analytics as an essential foundation to planning and decision-making
- **transparency and coordination of the infrastructure pipeline**: supporting and facilitating infrastructure investment across the public and private sectors through shared and transparent information
- **investment decision-making frameworks**: supporting sound, timely and informed infrastructure investment decisions (right project, right place, right time) made on a level playing field.

Simplifying government processes

Across government there are a number of initiatives making it easier to do business in WA by improving regulation, processes and practice. Major initiatives include:

- **Streamline WA** is a whole of government initiative to modernise and streamline regulation, regulatory practices and time frames. The initiative is supported by a Council of Regulators, which plays a stewardship role, and was allocated $120 million in the 2021–22 State Budget for additional approvals, frontline and reform officers.[1]
- **Lead Agency Framework** offers guidance that clarifies the lead state agency responsible for coordinating certain types of proposals and major projects.[2]
- **Approvals WA** is a single website that channels approvals to various state agencies. This includes approval lodgement processes for tourism, aquaculture and liquor licensing (part of Streamline WA).[3]
- **Market-led Proposals Policy** is a process for the WA Government to consider or seek private sector proposals to harness opportunities.[4]
- **Environment Online** is a new portal developed by the Department of Water and Environmental Regulation that provides a digital one-stop shop for environmental assessments, approvals and compliance, with the aim of reducing approval time frames by 6 to 12 months. It establishes a platform to share environmental data across state agencies and consolidate information (part of Streamline WA).[5]
- **Planning reform** is an ongoing process to ensure the land-use planning system is easier to understand and navigate, which enables the community to be more engaged in strategic planning. The reform aims to improve the efficiency, transparency and consistency of the WA planning system.[6]

Governance

Integrated planning and cross-government coordination are the responsibility of all state agencies and GTEs. However, the recommendations in this chapter are mainly confined to state agencies that have a central role in decision-making (approvals or budgets) and in establishing policy settings that have implications beyond a particular infrastructure sector.

Several state agencies play a lead role:

- **Department of Treasury** is the principal economic and financial adviser to the WA Government, including coordination and oversight of the annual State Budget, economic policy and responsibility for the Strategic Asset Management Framework (SAMF).[7]
- **Western Australian Planning Commission** (WA Planning Commission) is an independent statutory body, established under the *Planning and Development Act 2005*. It is responsible for land-use planning policy; determination of structure plans, subdivision and state-significant development applications; administration of region schemes; and making recommendations to the Minister for Planning.
- **Department of Planning, Lands and Heritage** supports the WA Planning Commission on the planning matters mentioned above, has legislative and policy responsibility for the protection and recognition of Aboriginal cultural heritage and built heritage matters, and is responsible for the administration and management of Crown land.
- **Department of Jobs, Science, Tourism and Innovation** is responsible for international trade and investment, tourism and economic development, with a particular focus on the clean energy, resources, tourism, defence, space, international education, science and innovation sectors.
- **DevelopmentWA** is the WA Government's central development agency, responsible for delivering a portfolio of industrial, commercial and residential projects.



Recommendations

Facilitation and stewardship

Infrastructure facilitation and coordination

Improved information sharing, collaboration and coordination of infrastructure planning and delivery are vital in maximising outcomes for the community and value for money of public expenditure.

For WA to remain competitive for major private sector investment in infrastructure, pathways to the determination of approvals must be clear and streamlined, where possible. The WA Government currently has several mechanisms to support this outcome, including the Lead Agency Framework (which helps to coordinate referral and approval requirements), Part 17 provisions under the *Planning and Development Act 2005* for assessment of significant proposals (to be replaced in part by the proposed Significant Matters Development Assessment Panel) and Streamline WA.



There remains some conjecture as to whether these initiatives offer the level of certainty and support to facilitate transformative projects that provide a range of amenity, economic and employment benefits to the community. For example, some jurisdictions have gone further with initiatives such as Queensland's Coordinator-General model.

Effective coordination of infrastructure is fundamental in an environment where there are competing demands for finite government resources. With multiple areas of government responsible for the planning and delivery of infrastructure, it is a significant challenge to ensure investment aligns with the strategic objectives across state agencies and that infrastructure is planned in a coordinated, efficient and appropriate manner. Greater coordination will help to maintain efficiencies, reduce wastage and reduce costs, and avoid making repeated mistakes for future infrastructure projects. IWA plays an important role in this context at a strategic level, through advising on future infrastructure priorities in this Strategy and the WA Government's proposed annual 10-year state infrastructure program. Infrastructure coordination at a more granular, operational level remains an ongoing challenge.

In addition to the existing mechanisms above, the Strategy proposes a number of recommendations to improve infrastructure facilitation and coordination in the day-to-day activities of state agencies and GTEs, including:

- establishing whole of government digital platform that enables the sharing of asset information (see the Digital connectivity and technology chapter)
- establishment of state priority areas
- infrastructure appraisal in decision-making
- development of a shared-use policy framework for infrastructure corridors and facilities
- improved strategic alignment of strategic asset plans and business cases through the SAMF
- improving cross-agency infrastructure procurement mechanisms (see the Infrastructure delivery chapter).

The cumulative impact of existing measures and proposed Strategy initiatives will need to be reviewed over time to determine if they collectively contribute to a more transparent, seamless and coordinated approach to infrastructure planning and delivery. Depending on how well these measures are working, it may be necessary to consider additional reforms, such as those implemented in other jurisdictions.

Recommendation 22

To ensure the timely and optimised delivery of infrastructure, review the effectiveness of existing and proposed infrastructure facilitation and coordination models within 5 years of operation and consider if alternate models should be established.

Infrastructure approval processes

Approval processes for infrastructure and investment proposals can be complex, difficult to navigate and costly. Digital technology enables these processes to be more readily unpacked for users. The Approvals WA and Environment Online digital platforms, recently consolidated under the Streamline WA initiative, represent progressive improvement in coordinating project approval information. However, these initiatives fall short of delivering a seamless user experience. They do not span the full spectrum of approvals, default to individual state agency websites and are less interactive and integrated than users expect. It can be difficult for users to find information about what approvals are required for different activities, the information they need to support applications or the expected time frames for decisions.

The creation of a one-stop, intuitive, online state government approvals system, which places customers front and centre of the process, could transform the way the community and industry interact with WA's approvals system. Through clear and centralised information, transparent mapping of decision-making processes and a simple user interface, an integrated platform (which is interoperable with other platforms being developed by the WA Government) would improve user understanding and navigation of approvals requirements and reduce unnecessary costs and delays. This process is intended to be complementary to stewardship, through a case management approach for major project approvals under the Lead Agency Framework and early engagement with relevant state agencies to identify matters such as outcomes, interdependencies and risks.

Recommendation 23

Improve the navigation of project approval processes by establishing a single digital government approvals system, including:

a. providing a single access platform that offers standardised, consistent and transparent information covering all WA Government infrastructure approvals processes, time frames, roles and responsibilities and supporting information required from the proponent
b. staging updates to the platform to create a single lodgement portal for all WA Government infrastructure approval applications that allows users to track progress, enables transparent reporting and facilitates sharing of consistent information across state agencies.

Targeted legislative amendments can streamline approvals, improve consistency, increase accountability and transparency, and support innovative proposals.



Contemporary and outcomes-focused legislation

Several outdated legislative provisions are impeding outcomes or leading to unnecessarily protracted approvals for infrastructure proposals. Targeted amendments should be implemented to enable a contemporary and efficient planning and regulatory environment.

In line with best practice, comprehensive mapping of intersecting legislation, regulations and policies across state agencies and GTEs should be undertaken as part of this process. This should include concurrent updating of related policies, making amendments to policies or rescinding policies that are no longer required. Streamlining Bills (omnibus amendments within or across Acts of Parliament) should focus on removing unnecessary procedural steps, providing proponents with timely pathways for the determination of applications across related Acts and clarifying problematic provisions. This could include planning and development, water, environment, financial and public works legislation. For example, the *Public Works Act 1902* is well over 100 years old and needs modernising. It contains outdated provisions that should be removed, such as requiring an Act of Parliament for the construction of a public railway.

Recommendation 24

Streamline project approvals processes and reduce regulatory burdens by implementing a program to review and modernise relevant infrastructure approvals legislation and progress targeted amendments at least every 5 years.

Integrated planning for urban consolidation

Aligning infrastructure planning and delivery to accommodate growth is a prevailing theme across this Strategy. This requires cross-sector coordination and a shared understanding of the current context, vulnerability to shocks and stresses, and long-term objectives for places and regions to optimise infrastructure and community outcomes. Step-change improvement in infrastructure coordination is required, with more explicit direction from government about where and how growth should be accommodated. Engagement with local governments and the community will be crucial to achieve holistic, integrated planning.

Achieving greater levels of urban consolidation is intrinsically linked to better use of existing infrastructure, which reduces the capital and operational costs of service provision. This outcome, along with other benefits of infill such as increased housing choice, greater employment self-sufficiency and limiting environmental impact, was reflected in Perth and Peel @ 3.5 million. Guiding growth notionally to 2050, Perth and Peel @ 3.5 million affirmed the 47% target for new dwellings to be accommodated through infill in existing urban areas, particularly activity centres, urban corridors with high-frequency public transport and station precincts.[8] This infill target is low compared to those set for some other Australian cities – 85% in Adelaide by 2045 and an aspiration of 70% in Melbourne by 2050.[9]

However, even the current target for Perth and Peel is not yet being met.

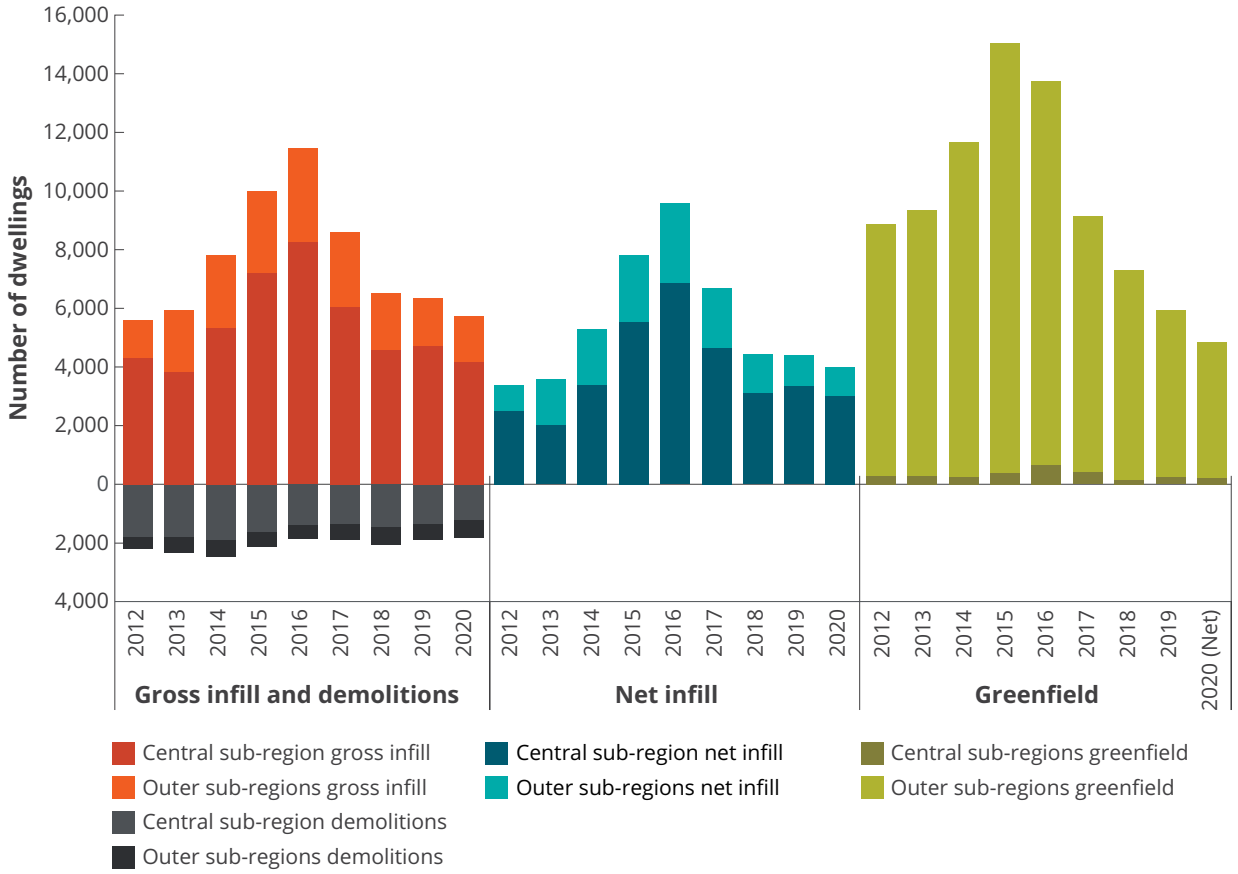
Nonetheless, the target does seek to respond to the importance of containing urban sprawl, making best use of infrastructure assets and ensuring the community has access and connectivity to services, social infrastructure and employment. While figures vary across sources and jurisdictions, the cost of providing infrastructure to greenfield lots is 2 to 4 times more than infill development, depending on the capacity of existing infrastructure to support additional people.[10]

Some current policy settings are out of step or, in some cases, in direct conflict with the WA Government's urban consolidation agenda. Most recently, incentives to stimulate housing construction activity as part of the WA Recovery Plan (providing grants for the construction of 'a detached dwelling on vacant land' or 'entering into an off-the-plan contract as part of a single tier development on a strata plan') fuelled a spike in single-house construction in greenfield residential development. Cash boosts for grouped dwelling developments may encourage infill but it will be important for the draft State Planning Policy 7.3 – Medium Density Code to be applied to ensure well-designed and appropriately located infill development.[11]

Significantly increased support, effort and accountability is required to ensure the infill target is met and exceeded. Improving the feasibility of infill development and positioning it as an attractive proposition to the community requires government to:

- **Unlock barriers:** Infill development is often complex, requiring a range of factors to work harmoniously to ensure the viability of development, such as zoning and local policy settings, infrastructure capacity and cost, build costs, land assembly, availability and cost of finance, and local community support. A much stronger focus is required to identify and systematically unpack barriers to urban consolidation, including consideration of where application of existing instruments, such as the Metropolitan Region Improvement Fund, would be beneficial.
- **Increase amenity and associated social infrastructure:** Through the Design WA state planning policies, design quality for precincts, apartments and medium-density development has received significant focus and will result in improved housing, urban design and community outcomes. However, several of the WA Planning Commission's policy settings are still skewed towards guidance for subdivision of new greenfield areas. Development needs and infrastructure impacts are substantially different between infill and greenfield development. For example, contributions are more likely to be levied against development than subdivision and towards improvements to existing infrastructure rather than new.

Figure 25: Dynamics of dwelling development, 2012 to 2020[12]



Progress against the 47% infill targets for Perth and Peel varies each year, but net infill development is far from comparable to greenfield development on a sustained basis. In 2020, **net infill was approximately 44%, up from 43% in 2019**.[13] Figure 25 presents key measures of dwelling dynamics relating to monitoring infill from 2012 to 2020.[14]

Design specifications may also be very difficult to achieve when considering the contextual factors of an existing urban area, requiring greater discretion and outcomes-based decision-making. Policy settings will require adjustments to ensure equitable access and contributions to education (through further revision of the draft Operational Policy 2.4 – Planning for school sites), high-quality public open space, utilities and public transport.

- **Incentivise infill development:** The WA Government has a range of existing tools at its disposal that influence development outcomes and personal property choices, such as stamp duty concessions and other housing-related grants or financial support, funding and partnerships for place planning, statutory and policy provisions, and government's own social and affordable housing programs. Adjusting these funding or geographic settings to reflect urban consolidation objectives would markedly influence housing choice and availability.
- **Coordinate enabling infrastructure:** While urban consolidation will lead to more effective use of existing infrastructure, replacement or augmentation of existing assets and new infrastructure will still be necessary. Understanding where significant hurdles for infill development exist due to infrastructure constraints (such as energy, water, transport and education) and prioritising and coordinating expenditure in these locations will be key to unlocking future development outcomes.

The Strategy highlights the importance of this enabling infrastructure, including Recommendations 59, 62 and 63 in the Transport chapter and Recommendation 83 in the Education and training chapter.

An ongoing program is required to support the increased delivery of infill development in the locations identified in Perth and Peel @ 3.5 million, effectively acting as an implementation roadmap to achieve established targets.

Recommendation 25

Make best use of existing and planned urban infrastructure by preparing and implementing an urban consolidation action program, including:

a. identifying significant barriers to increasing urban consolidation and developing a clear roadmap that outlines intended outcomes, responsibilities and time frames

b. reviewing and adjusting policy settings to support infill locations, including liveability and amenity improvements, with particular focus on refining policy settings for public open space, public realm improvements, schools, utilities and public transport, and the associated development contribution requirements

c. planning incentives that support infill development, encourage land assembly and create a stronger pipeline of development sites

d. implementing purchaser support where appropriate to facilitate increased infill development, such as further extension of the Off the Plan Duty Rebate Scheme for apartments and place-based approaches to building bonus grants and Keystart lending requirements

e. providing funding and support for development of precinct plans for key infill locations

f. identifying and prioritising infrastructure capacity upgrades and coordination needed to support infill development

g. transparently reporting progress (at least every 2 years) towards achieving infill targets set in Perth and Peel @ 3.5 million by local government area, taking into account relevant contextual factors.





Infrastructure appraisal principles

Land-use planning in WA has traditionally focused on the development of greenfield sites on the urban fringe to meet housing and employment needs. Rezoning significant tracts of land, with poor prioritisation over many years, has resulted in a growing infrastructure need across many dispersed development fronts. This creates challenges for providers in programming, funding and optimising outcomes (such as collocation and shared use) for infrastructure.

Planning decisions are often made on the basis of being able to service land, without true visibility of the full capital and ongoing operational costs. This information is not currently provided to the WA Planning Commission by state agencies and GTEs and may not be captured at all by some authorities. By understanding the full capital and ongoing operational costs of infrastructure (including new infrastructure costs and the costs of maintaining, upgrading or replacing existing assets), the WA Planning Commission and the Minister for Planning will be better positioned to determine the suitability and staging of proposals at strategic planning and rezoning stages. Once developed and operational, the incorporation of local government costs could also be considered.

The Greater Sydney Commission's Place-based Infrastructure Compacts provide a useful frame of reference for more holistic assessment of development infrastructure requirements.[15] The compacts are supported by a detailed assessment of capital costs by sector over a 20-year period, net benefits by growth location, distribution of funding sources for capital costs and the costs of accommodating a new resident or job by location and land-use type.[16]

Recommendation 26

Ensure adequate information on infrastructure servicing and operational costs informs decisions by embedding rigorous infrastructure appraisal in the planning decision-making framework, including:

a. underpinning future reviews of Perth and Peel @ 3.5 million and development of integrated regional plans with a thorough analysis of the capital and operational costs of infrastructure provision and the extent to which this is likely to be carried by the state government, including understanding the cumulative impact of demand that may stimulate major new investment, to inform the staging of greenfield development fronts and consideration of new development areas

b. staging and prioritising development fronts and identifying a clear implementation strategy in land-use plans, which is adhered to in decision-making, to ensure infrastructure is programmed, funded and delivered in the most efficient and effective manner

c. preparing costed and scheduled infrastructure servicing plans, where proponents seek to depart from staging plans, or are outside land identified for future development in the frameworks, to provide decision-makers with an understanding of the real costs (capital and operational) to state government to allow implications to be considered in land-use planning decision-making

d. ensuring rezoning proposals for greenfield land are considered in the context of land supply and demand.

City opportunity plan

A range of recommendations within the Strategy, once adopted, will significantly influence the dynamics of Perth's CBD and immediate surrounds. These recommendations include:

- investing in a flagship WA Aboriginal Cultural Centre
- expanding CBD convention facilities
- establishing an agreed framework for redevelopment of the Perth Convention Precinct
- transforming the Perth Cultural Precinct
- developing a roadmap for the planning and development of Royal Perth Hospital and Sir Charles Gairdner Hospital
- progressing light rail and/or bus rapid transit for CBD and inner and middle suburbs
- unlocking barriers through an urban consolidation action program.

Coupled with other long-standing redevelopment and regeneration opportunities, there is significant potential to activate central Perth, attract additional residential population and provide for social infrastructure needs and long-term commercial growth. A shared vision for how central Perth should be positioned in the future, and the way in which these opportunities integrate to enable that vision, is needed to provide direction to individual projects during detailed planning stages.

A cohesive vision and plan, prepared collaboratively and shared by state and local governments, is required to identify priority initiatives, their intended outcomes, preferred sequencing, associated infrastructure requirements and funding options to support the attractiveness and revitalisation of central Perth. This plan should consider local planning strategies and policies, but stitch together land-use and transport outcomes across affected local governments. Local government involvement, and that of key state agencies, will be essential to this process. Pending timing, it may be possible for this process to be complementary to the Vision Statement required to support the Perth City Deal.

Recommendation 27

Transform the Perth CBD and immediate surrounds (including locations adjacent to the Swan River such as Burswood and South Perth) by preparing a city opportunity plan that sets an agreed strategic framework, including:

a. developing a clear and compelling long-term vision for the city
b. identifying major precincts, other significant redevelopments and infrastructure that will contribute to city growth and activation, and consider:
    - desired outcomes for initiatives and the synergies between them
    - interface opportunities and issues
    - staging
    - implementation requirements and responsibilities.



Central Perth

Central Perth (CBD and immediate surrounds) is WA's main cultural and business hub and international gateway. It is core to Perth's identity as a leading minerals and energy city and its standing as one of the most liveable cities in the world. Central Perth must remain a focus for infrastructure investment that strengthens WA's position as a global location of choice to live, work, visit and invest.

A range of public infrastructure underpins the vibrancy and interconnectivity of central Perth and its precincts. There is significant potential to activate central Perth, attract people into the city, increase the residential population and provide for longer-term commercial growth. This is even more important in light of the negative impacts that COVID-19 has had on central Perth. While unlocking much of this potential will require non-infrastructure solutions, a pipeline of major regeneration and infrastructure opportunities should be realised to sustain Perth as a modern and productive city.

Central Perth is also a major focal point for one of WA's 'jewels in the crown' tourism destination precincts. Positioning WA as a desirable destination will require investment that builds on the city's distinctive cultural and environmental attributes to deliver world-class experiences.

A shared vision is needed to determine how central Perth should be positioned in the future and to map out opportunities for realising that vision. Opportunities must be sequenced to avoid undermining their economic viability. Importantly, WA's creative arts and cultural community must play a key role in conceiving and activating unique and innovative city experiences for locals and visitors.



Integrated regional plans

In WA, state government regional land-use and infrastructure planning occurs through regional planning and infrastructure frameworks, sub-regional strategies and regional land supply assessments. Within and across these instruments, there is great variability in currency, geography, time frames for planning, infrastructure needs and the evidence base to support intended outcomes. Integrated regional plans, based on the Perth and Peel @ 3.5 million model, would provide a consistent, long-term approach to addressing population change, land-use planning, servicing requirements and environmental considerations. Integrated regional plans will help achieve a greater predictability of infrastructure needs, timing and funding.

Elements that will need consideration in the development of integrated regional plans include:

- a comprehensive understanding of the Aboriginal culture and heritage, environmental, landscape and geological (including basic raw materials) values of the region requiring protection (building and maintaining environmental and heritage information as part of this process will be important, in line with Recommendation 16 in the Climate change and sustainability chapter)
- regionwide economic strategies (see Recommendation 19 in the Regional development chapter)
- regional infrastructure plans, where available, such as regional water plans (see Recommendation 48 in the Water chapter)
- existing planning frameworks that will help inform and, in turn, be shaped by plans
- collaboration with local government and their communities.

Integrated regional plans should be rolled out on a prioritised basis and routinely reviewed.



Recommendation 28

Establish the land use, infrastructure and environmental needs of each region by progressively preparing, in order of priority, 20-year integrated regional plans. The plans that should be:

- modelled on Perth and Peel @ 3.5 million
- supported by a robust regional development framework (see Recommendation 19 in the Regional development chapter), along with evidence-based identification of strategic infrastructure needs to serve and support population change and economic growth
- refreshed at least every 10 years.



Clearly identifying **priority places for investment** and the timing of infrastructure provision will facilitate complementary investments from the private sector, local government and the community.

State priority areas

There are several mechanisms within WA's planning framework that denote a hierarchy of places, such as strategic industrial areas, activity centres and redevelopment areas. However, clarity is required on where the WA Government intends to focus its efforts and investments in these places and how it will work with local government partners, industry and the community to collaboratively plan for growth and facilitate enabling infrastructure.

Introducing state priority areas into the statewide planning framework, or another policy setting, would identify locations of state importance where significant economic or urban growth is intended, but which may need additional government support to realise full potential and stimulate private sector participation. State priority areas are intended to:

- ensure a coordinated approach to strategic planning, integrated business cases, infrastructure design and delivery
- guide where greater land-use planning intervention may apply by state government (for example, redevelopment schemes and improvement schemes)
- mobilise state agencies and GTEs to prioritise and coordinate development-readiness activities, including investment in enabling infrastructure
- be supported by cross-agency governance structures, including local government, with clearly established roles and accountabilities.

State priority areas should apply to a limited number of places at any one time and to precincts that present the greatest level of opportunity for the state.

Within state priority areas, governance, planning and infrastructure coordination need to be proactive to attract and harness investment opportunities. Their implementation will send a clear signal to industry that the state is seeking to catalyse development and support partners to achieve the wider objectives for the precinct, be it major urban renewal or the evolution of industrial and technological precincts.

Agile, responsible decision-making will be necessary, as will early progression of land assembly, coordinated approvals and enabling works. Without these, it will be difficult for WA to compete for investment on a national and global stage to stimulate new industries, economic growth or liveability outcomes for the community.

A transparent process should support the identification of state priority areas and their associated objectives. Engagement with stakeholders, including local government, will be crucial in this process. Factors for consideration in developing a prioritisation framework could include evidence of market failure or precincts with significant complexity that goes beyond the ability of individual proponents to unlock, proximity to markets and workforce, and levels of connectivity and accessibility to existing or proposed services.

Recommendation 29

Ensure a focus on state-significant precincts through greater government infrastructure coordination and investment, tailored governance models and land-use planning intervention by establishing and implementing state priority areas, including:

a. developing and publishing a prioritisation framework, in conjunction with key stakeholders, to ensure consistency of approach and application to areas of greatest strategic need or opportunity
b. endorsing the framework and state priority area locations at a whole of government level to ensure sufficient carriage by state agencies and government trading enterprises
c. extending the redevelopment functions and powers of the *Metropolitan Redevelopment Authority Act 2011* to non-metropolitan areas during the Machinery of Government legislative review process to enable an additional method for urban, industrial and economic land project planning and delivery in regional state priority areas.

Strategic industrial uses, infrastructure and resource inputs

Strategic industrial uses, infrastructure and resource inputs are vital to the economic growth and continued prosperity of the state. It is important that a long-term approach is taken to ensure that WA can continue to have well-located, productive industrial land and access to major construction inputs. In some instances, these assets may have potential impacts for sensitive uses that need to be avoided, mitigated or managed. Protection from encroachment of incompatible land uses is therefore necessary to enable continued operation and access, and to ensure that potential risks to human health and the environment are managed.

There are many strategic policy and planning measures in place to avoid or balance risk. Within the land-use planning system, these include state planning policies, operational policies, land-use plans, rezoning and development approval mechanisms. Similarly, environmental consideration of schemes and amendments, along with individual proposals, are undertaken within the context of a range of policies. The difficulty is ensuring these instruments remain contemporary and aligned across the planning and environmental portfolios.

State Planning Policy 4.1 – Industrial Buffer Policy (SPP 4.1) has been in place since 1997.[17] In recent years, SPP 4.1 has been subject to prolonged review processes. The draft State Planning Policy 4.1 – Industrial interface (draft SPP 4.1) was advertised in 2018 and seeks to provide contemporary policy and guidance to prevent conflict and encroachment between industrial and sensitive land uses. Finalisation of the draft SPP 4.1 is important to set clearer guidance on the required actions for new industrial uses (including infrastructure that may have external impacts such as odour, noise or dust), to manage or contain impacts, and to provide a framework for risk-based assessment for transitional uses within the industrial interface and other factors that should be taken into account in the land-use planning process. This will create greater certainty for all interests, spanning industry and the community.

Commensurate updates to the Environmental Protection Authority's Guidance Statement 3 – Separation distances between industrial and sensitive land uses, should also be undertaken to ensure alignment.[18]

Long-term land-use planning should also ensure the ongoing productive capability of inner-metropolitan industrial land. Some near-city industrial areas are experiencing ongoing pressures related to urbanisation and concerns around the potential impacts of truck movements, noise and other environmental factors. With limited remaining industrial zoned land in the inner-metropolitan area, it is important that industrial land-use provisions remain flexible enough to accommodate assets that are critical for the construction of infrastructure and need to be near the markets they serve. For example, concrete is a significant cost component of infrastructure projects, with proximity to market being critical to both the affordability and quality of the product. Two near-city concrete batching plants are scheduled to close in 2024 due to the expiry of existing planning approvals. The closure of 2 important supply points is a risk to the construction sector in the Perth CBD and inner metropolitan area due to increased transport costs and reductions in useable time of concrete from batching to placement. The WA Government has been working with the affected operators to identify appropriate alternate sites given the complexities of batching plant infrastructure specifications and the broader public interest in maintaining access to affordable supply. It is important that this process is resolved in a timely manner to ensure impacts and disruption are minimised.

The cost and timeliness of infrastructure delivery is directly impacted by the availability of other construction inputs, including basic raw materials such as sand, limestone, clay and hard rock. As with Perth and Peel @ 3.5 million, future planning frameworks should have regard for basic raw materials as an essential land-use consideration. It is important to ensure currency and availability of the environmental data sets and mapping regarding vegetation and basic raw materials to ensure balanced decision-making in the planning process. This information should be made available on the shared environmental and heritage information system, as per Recommendation 16, once operational. Sequential land use, staging of development and land-use interfaces must be considered in the future development of areas that contain basic raw materials. The State Planning Policy 2.4 – Basic raw materials (SPP 2.4) sets out the planning considerations for extractive uses and the responsible use of basic raw materials, including reducing the need for virgin materials through alternative construction methods and use of recycled products.[19] With SPP 2.4 only recently gazetted in 2021, its effectiveness in protecting important geological resources will need to be assessed to determine if additional measures should be considered.

Recommendation 30

Ensure the protection of strategic industrial land uses, infrastructure and resource inputs by:

a. finalising and gazetting the draft State Planning Policy 4.1 – Industrial interface
b. reviewing the Environmental Protection Authority's Guidance Statement 3 – Separation distances between industrial and sensitive land uses, to ensure alignment with the finalised State Planning Policy 4.1 – Industrial interface
c. protecting, preserving and maintaining flexible uses in key industrial sites, particularly inner-metropolitan areas
d. reviewing the effectiveness of State Planning Policy 2.4 – Basic raw materials and the updated State Planning Policy 4.1 – Industrial interface, after they have been operational for 5 years
e. updating and maintaining basic raw materials resource mapping to understand the impacts of extraction, changing land-use patterns and environmental restrictions.

Industrial and technological precincts

A rise in international demand for resources, coupled with high levels of business confidence, are expected to have positive flow-on effects for WA's economy and result in increased demand for industrial land across the state.[20] A more coordinated approach to infrastructure provision and approvals for the state's main strategic industrial areas, general industrial estates and technological precincts is required to unlock private investment and ensure adequate land supply. These precincts are the economic powerhouses for the state and are critically important to facilitate economic growth, attract business and build capability through research, technology development and clustering.

The WA Government has an important role to play in identifying, assembling and servicing land for industrial and technological precincts to maintain adequate supply. The cross-agency Industrial Lands Steering Committee has developed a 10-year Industrial Lands Strategy to provide a forward view of the state's industrial land supply, the activities required to bring new land to market and the relative prioritisation of infrastructure investment.[21] In response, the WA Government allocated $50 million in the 2021–22 State Budget to ensure land held by the Industrial Lands Authority across WA is ready for development.[22] This investment is important in maintaining industrial land supply, but it will not cover the full breadth of enabling infrastructure across ports, road or rail access, water, wastewater, power and telecommunications.

Where appropriate and equitable, state government investment in enabling infrastructure that encourages industry development and economic activity can reduce upfront costs for investors and unlock substantial private investment. Government support for enabling infrastructure can be critical in supporting large investments in new and emerging industries, including hydrogen, future batteries, minerals processing and value-adding to strategic commodities.



Of the **7,510 hectares of land** zoned as industrial in the Perth and Peel regions, **approximately 6,650 hectares (88%) is categorised as developed**.[23]

It can allow scalable, common-use infrastructure with wider benefits than those developed entirely by the private sector. There remains a need to develop a funding model for strategic and general industrial areas that can attract foundation proponents and fund common-use infrastructure, as proposed in the Industrial Lands Strategy.

Unlocking private investment for industry growth is supported through the coordination roles of the Industrial Lands Authority (within DevelopmentWA) and the Department of Jobs, Tourism, Science and Innovation. The announcement to establish a $100 million Investment Attraction and New Industries Fund will signal to industry a more proactive approach to investment attraction that will create local jobs and contribute to a more diversified WA economy.[24]

This support also includes streamlining and coordinating approvals for industry proponents. As discussed earlier, navigating and obtaining these approvals can be a major hurdle. At a strategic level, the Lead Agency Framework supports proponents whose initiatives meet thresholds for significance.[25] For precincts and individual projects, there remains a myriad of infrastructure access issues to negotiate. These include:

- Apportioning infrastructure costs across industrial landowners in fragmented landholdings can be difficult. The Industrial Lands Strategy refers to this issue in recommending further exploration of pre-funding development contributions for complex general industrial areas and developing an approach to upgrading infrastructure to optimise land use and employment density in existing industrial precincts in Perth's central sub-region.[26]
- Prompt connection to the regional road (and, in some cases, rail) network can be an acute issue for industrial areas.
- Digital infrastructure, information management and connectivity in industrial precinct design are important considerations to optimise efficiency and productive capability.

Recommendation 31

Facilitate and coordinate investment in industrial and technological precincts by:

a. prioritising the finalisation of land assembly, approvals, development contribution arrangements in precincts with fragmented land ownership and other preparatory works, as recommended in the Industrial Lands Strategy

b. applying existing state land-use planning system tools, such as improvement schemes and redevelopment schemes, in a more consistent and proactive manner to industrial and technological precincts of highest priority to the state

c. consistent with Recommendation 40 in the Infrastructure delivery chapter, establishing an assessment process for the funding of strategic enabling infrastructure that facilitates private investment

d. planning for the long-term land needs throughout the state, with a priority focus on additional heavy industrial land in the Perth metropolitan area, and completing investigations into the South West Advanced Manufacturing and Technology Hub.

Multi-user facilities and corridors

Collocation and shared use of infrastructure are often identified as objectives in strategy and policy, but rarely materialise. The statutory framework for essential public infrastructure does not encourage or require collocation (and, in some instances, deliberately restricts it), meaning the creation of multi-use corridors and facilities is often the result of individual foresight or opportunism rather than embedded best practice.

This issue is distinct from common-use infrastructure, which is typically managed by a single entity with clear terms and conditions for access to that infrastructure by third parties.

Creation of a consistent policy framework for multi-user facilities and corridors is required to address the barriers to shared use, identify suitable complementary use and provide practical guidance to state agencies and GTEs to achieve better cross-sector outcomes.

Greater alignment will optimise efficiencies, such as land requirements, streamlined approvals and best use of assets, while reducing environmental impacts and land fragmentation. The framework can also provide increased certainty for private sector investment.
The shared-use policy framework is intended to apply to a wide range of infrastructure assets and, at a minimum, should consider:

- compatibility of assets for collocation or shared use, based on mutually beneficial outcomes, risk-based assessment and resilience factors
- corridor reservations, where a single state agency or GTE is responsible for easements or reservations and is required to make these available to other users
- a network-led approach to business case and asset investment planning, ensuring they account for broader and multi-user infrastructure needs
- embedding infrastructure coordination and collocation within the strategic alignment requirements of the SAMF
- general public purpose reservation on parts of land
- shared use of public infrastructure, such as school facilities and education campuses that are underused at certain times of the day or year.

Recommendation 32

Improve cross-sector outcomes and alignment and provide certainty for private sector investment by developing and implementing a shared-use policy framework and practical guidelines for multi-user infrastructure corridors and facilities. The framework and guidelines should encompass:

- planning
- land assembly
- access arrangements
- safety and operational requirements
- governance
- conflict resolution
- staging and funding alignment
- risk and liability management.





The WA Government is responsible for vast proportions of land across WA, with **approximately 92% held as Crown land,** with tenure under reserves, management orders and leases, or freehold land owned directly by state agencies and GTEs.[27]

Strategic sites

Strategic regional site acquisition

Region schemes in Perth, Peel and Greater Bunbury provide statutory protection for future regional roads, rail corridors, parks and recreation and public reserves.[28] In Perth, the Metropolitan Region Scheme is linked to a land acquisition fund called the Metropolitan Region Improvement Fund. The combination of the Metropolitan Region Scheme and the Metropolitan Region Improvement Fund enables planning for the Perth area to be done in a coordinated way, and for strategic sites to be acquired to support the implementation of infrastructure requirements. No other region has the benefit of such a fund, and this leads to suboptimal outcomes for land, infrastructure planning and design, project costs, adjacent users and affected landowners.

Enabling access to a recurrent regional strategic site acquisition fund will enable a more agile and timely approach to land acquisition for future public infrastructure needs, such as police stations, fire stations, TAFEs and schools. Principles of fund administration should include sufficient justification of need, opportunity and public value, along with reimbursement of funds into the account at the point of funding approval for capital works.

Better use of government land

The WA Government has significant landholdings that may be surplus to core service delivery outcomes, or not used effectively in line with their highest and best use. State-owned land should be considered a shared public sector resource and a valuable asset that may have a more beneficial use beyond the immediate needs of the holding state agency or GTE. By centrally coordinating the identification of land for strategic infrastructure, the state government can optimise the use of government land, with appropriate consideration of compensation, including land swaps.

Recommendation 33

Provide for future infrastructure needs by identifying and securing strategic sites, including:

a. establishing a centrally coordinated, dedicated and recurrent fund for regional land acquisition

b. centrally coordinating strategic infrastructure site identification, matching state agency and government trading enterprise needs with government landholdings and enabling better use of the existing land asset base.

Common planning assumptions

Common planning assumptions are a critical input to strategic planning decisions, particularly where data is required to inform scenario development, business cases and strategies, and performance metrics, and as a consistent basis for analysis. Many state agencies and GTEs rely on core sets of data and forecasts to inform strategic planning and policy development, including population, housing, economics, employment, land use, transport forecasts and models. Key issues across state agencies and GTEs centre on inconsistent assumptions being applied, currency and access to data, misaligned geographies and lack of end-user input. While a process of improvement has commenced using agreed population projections and Metropolitan Land Use Forecasts, a broader single set of agreed common planning assumptions would help align forecasting, planning and outputs across state agencies and GTEs.

A single, agreed set of common planning assumptions is needed to improve the alignment and consistency of state agency planning and service delivery. To strengthen the adoption of these assumptions and embed them into practice, their development should be informed by a cross-agency working group and adopted under SAMF. As a minimum, a cross-agency working group should consider data relating to population and housing, economy and employment, transport, land use and climate. It should be established to:

- agree on, and make available for sharing, a set of core planning assumptions for application by state agencies and GTEs
- develop and widely socialise guidance around application of planning assumptions (where guidance is not readily available)
- provide collaboration opportunities among state agencies and GTEs and reduce duplication of work
- investigate and resolve matters (where possible) relating to geographies, planning horizons, refresh rate and availability in spatial format.

Recommendation 34

Improve infrastructure planning by establishing a single, agreed set of common planning assumptions for state agencies and government trading enterprises, including:

a. providing, at a minimum, assumptions on population, demographics, housing, economy, employment, human services use, utilities use, transport, land use and climate

b. setting out agreed data sets and guidance material for their application

c. embedding them in the Strategic Asset Management Framework's Strategic Asset Plan and Business Case guidelines as required for use, or provide a clear rationale or an exemption where they have not been applied

d. updating them regularly and making them publicly available.



Statements of opportunity

Statements of opportunity for the electricity and gas industries are currently prepared by the Australian Energy Market Operator. These provide technical and market data to inform the decision-making processes of market participants, new investors and jurisdictional bodies as they assess opportunities in the relevant sector.[29] They are an effective tool to foster common understanding across the industry and influence market readiness and participation.

There is potential to apply a similar approach across state government infrastructure activities, where statements of opportunity would act as an industry prospectus. This would more effectively demonstrate to the market where:

- surplus capacity is available that may drive the locational choices of industry investment
- there are capacity constraints for which industry may have innovative solutions or a role to play in unlocking
- co-investment and collaboration opportunities exist.

Infrastructure and related attributes that may be captured by the statements of opportunity could include access to water, energy, land, skill base, logistics and other supply chain factors, and location-specific funding (such as the Northern Australia Infrastructure Facility). It would be complementary to, and expand on, the Market-led Proposals Policy process which intermittently issues Problem or Opportunity Statements to elicit industry response.

Further place-based analysis should be pursued to better coordinate infrastructure investment across the public and private sectors, including major utility providers. Improved processes for 2-way information sharing on future infrastructure investment decisions can assist both sectors in related strategic planning. Many measures advocated in the Strategy, and future annual release of the 10-year state infrastructure program, will better inform the private sector on the pipeline of public investment.

Government should also seek to better understand and respond to the cumulative impacts of multiple, large-scale private investments on demand for public services and infrastructure. The cumulative impact of large investments was a challenging aspect of the previous resources boom centred on the Pilbara, and this is the most likely region for similar issues to re-emerge.

Recommendation 35

Improve 2-way public and private sector information sharing about infrastructure capacity by:

a. developing statements of opportunity to identify surplus capacity or constraints in public infrastructure networks, in collaboration with industry to harness opportunities or address barriers

b. undertaking place-based assessments of future public and private sector infrastructure intentions, including public and private utility providers, to identify the cumulative impacts of large-scale investments on demand for services and infrastructure, as well as opportunities for greater coordination. An initial pilot should be conducted in the Pilbara region.

Asset planning and decision-making

Investment decision-making frameworks

SAMF is the primary tool for guiding state agency and GTE infrastructure planning and decision-making.[30] Its application varies widely across the public sector, impacting the robustness and quality of 10-year strategic asset plans, applications for concept approval, business cases and project definition plans, which guide public investment decision-making.[31] This is due to a range of factors, including state agencies or GTEs:

- relying on participation in the annual State Budget process to identify infrastructure needs in place of comprehensive long-term plans
- viewing SAMF as a compliance exercise rather than a framework for better outcomes, practices and decisions
- managing capability and resource limitations
- receiving limited feedback to enable continuous improvement
- having a narrow focus on traditional, new build infrastructure solutions that cater only to their requirements rather than taking into account broader strategic objectives.

Strengthening the application of SAMF requirements by state agencies and GTEs will help ensure that infrastructure decision-making, planning and delivery is appropriately informed and more strategic, and that associated benefits are maximised. This requires state agencies and GTEs to demonstrate analysis of the full range of required strategic asset plan and business case content and, importantly, that the information be considered by decision-making bodies and aggregated to provide a public sector-wide perspective. For business cases, investment decision-making should also be subject to the relevant processes of the Expenditure Review Committee of State Cabinet.

State agencies can be supported to respond to these requirements through funding for business case development. A $15 million fund was made available to assist state agencies in preparing business cases for COVID-19 recovery projects, and was highly subscribed. State agencies would benefit from ongoing access, particularly with an increased emphasis on developing public sector capability, both within individual state agencies and through centralised areas that can provide expert support.

A review of 2 key aspects of the SAMF – the Strategic Asset Plan and Business Case guidelines – has been advanced by the Department of Treasury, with updated exposure drafts circulated to state agencies for application and feedback. The refresh of these 2 guidelines is expected to be finalised in early 2022. IWA supports this review and acknowledges that a primary objective has been to streamline the guidance material, which applies to all state agencies and GTEs and to business cases valued at $5 million or more.

However, as recommended at various points in this Strategy, there are additional SAMF enhancements that would further address the breadth of issues considered in infrastructure planning and decision-making. The recommended SAMF changes can be phased to reduce initial impost on state agencies. Additionally, many changes are focused on project and program business cases with a capital cost of $100 million or more, which generally have greater complexity, risk and potential impacts and are to be assessed under IWA's Major Infrastructure Proposal Assessment function. This function commenced on 1 January 2022 and is supported by interim guidelines. IWA's approach to undertaking assessments will be refined to reflect the finalisation of the SAMF refresh and the WA Government's response to relevant Strategy recommendations.

Realising benefits of investment decisions

As part of the SAMF, state government's investment decision-making process centres on maximising public value. However, there can be a disconnect between a project's initial decision-making process and the ongoing monitoring and evaluation of project benefits across its lifecycle. Furthermore, wider implications of associated investment decisions can be overlooked, or there can be insufficient planning, meaning that the full costs, benefits and opportunities are not adequately considered.



Embedding benefits management plans and post-completion reviews will achieve better alignment between a project's investment decision and outcomes in practice.

Capturing the interdependencies and externalities of investment decisions will reduce unforeseen cost or time impacts and provide a more complete understanding of the full costs and potential opportunities of asset investment.

As a project moves from funding into delivery, project benefits identified as part of its business case are sometimes not realised or monitored, leading to investment that may not always deliver the public value that funding decisions were based on. Benefits management plans are an essential tool in forecasting benefits and establishing methods to achieve desired outcomes. They also help to identify learnings that can be applied to future projects and programs. Although it is a requirement of the SAMF's Business Case Guidelines that a benefits management plan is prepared, they are sporadically used and should be applied in a more uniform manner. This includes routinely testing design and delivery decisions against the benefits management plan as a project proceeds. Business cases should also include funding provision for ongoing project evaluation.

In addition to IWA's function to assess major infrastructure proposals, it has a further legislative function to review and report to the Premier on completed infrastructure projects. All proposals that undergo assessment by IWA and proceed to delivery and operation should be subject to a post-completion review by IWA, with the benefits management plan being a critical input. It is expected that the way IWA will undertake its post-completion review legislative function will be commensurate with the complexity, risk, delivery and operational performance of the individual infrastructure project or program. This could potentially include Gateway post-completion reviews (Gate 6), post-completion reviews directly by IWA or post-completion reviews by the delivery agency or GTE with IWA's involvement.

Business cases typically focus on high-level concepts to address a specific problem or opportunity related to the core business of a state agency or GTE. Generally led by a single state agency or GTE, business cases sometimes do not involve the level of cross-agency consultation needed to ensure that impacts on enabling infrastructure are considered across government. Recent revisions to the SAMF's Business Case Guidelines seek stakeholder mapping, identification of potential opportunities for collaboration and consideration of interdependencies that are critical for benefit delivery. In practice, it is important that this translates into integrated business cases that drive mutually beneficial outcomes across state agencies and sectors.

Related Strategy recommendations

There are a number of recommendations across the Strategy, additional to those outlined below, that propose amendments to SAMF requirements for strategic asset plans and business cases. More detail on the individual recommendations is available in the relevant cross-cutting theme or sector chapter. Several recommendations relate to business cases for projects and programs that have a capital cost of $100 million or more. For projects and programs of a lesser value, state agencies and GTEs should still be encouraged to explore these additional considerations, but IWA is not recommending that it be mandated at this stage.

Recommendation 36

Support improved infrastructure planning and decision-making by:

a. establishing an appropriate mechanism to embed and communicate the required use of the Strategic Asset Management Framework, including the requirement for all state agencies and government trading enterprises to comply

b. ensuring that all business case decision-making is considered by the Expenditure Review Committee of State Cabinet, and that all business cases contain the full range of content, relevant to their project value, as required by the Strategic Asset Management Framework

c. providing a centralised fund to support development of prioritised business cases, with an increased emphasis on building public sector capacity in state agencies and centralised expert units

d. updating the Strategic Asset Management Framework's Business Case Guidelines to require consideration of interrelated infrastructure needs beyond the primary investment with other state agencies and government trading enterprises, along with the full costs and benefits, through early engagement and integrated business cases

e. requiring a benefits management plan to be completed and ensuring Infrastructure WA undertakes a post-completion review for all projects and programs that are required to undergo Major Infrastructure Proposal Assessment

f. updating the Strategic Asset Management Framework's Strategic Asset Plan and Business Case guidelines to strengthen requirements for state agencies and government trading enterprises to demonstrate consideration of this Strategy and other relevant strategic planning documents and how they have informed the development of all related strategic asset plan and business case content

g. ensuring strategic asset plans are at the centre of a robust and transparent annual process, through:

   i. systematic analysis of all strategic asset plans on an individual and amalgamated basis by the Department of Treasury and Infrastructure WA

   ii. undertaking analysis and preparing content to inform the annual 10-year state infrastructure program

   iii. engagement by the Department of Treasury with all strategic asset plan–producing state agencies and government trading enterprises to provide feedback to assist in ongoing improvement.

Infrastructure delivery



Effective infrastructure delivery needs the **combined strengths of public and private sector workforces**. The private sector performs at its best when the state government acts as an informed client.

What IWA heard

During consultation on the draft strategy, there was broad support for the range of recommendations, recognising that these can deliver longer-term benefits beyond the current period of very high construction activity.

Stakeholders highlighted that some of the assurance, governance, procurement and funding recommendations are more relevant to projects of larger scale and risk. The success of infrastructure delivery being substantially reliant on earlier planning and business case preparation phases was reinforced by stakeholder feedback and this has been expanded upon in the Strategy.

Content has been amended to reflect where there is already some level of reform and activity occurring, and the underlying intent of some recommendations has also been clarified.

The planning, delivery and operation of government infrastructure is a complex, high-stakes activity impacted by a number of external factors and involving both government and the private sector. Ensuring government is well positioned to deliver projects and programs of all sizes – in terms of its capacity, capabilities, systems and governance – is essential to provide certainty and confidence to the market and the community, and to achieve the best return on investment. There are a range of existing policies and frameworks in place to guide constructive outcomes, in terms of review, market capacity, procurement and funding. These support good practice in business planning, enabling project teams to drive positive results.

The Strategy explores key opportunities to build on existing systems to drive further improvements. These targeted measures are complemented by Infrastructure Australia's 2021 Australian Infrastructure Plan, which further addresses these topics, along with recommendations that may benefit from coordinated consideration across the WA Government.[1]

Infrastructure delivery is impacted by multiple factors. Large projects and programs are necessarily conceived and approved before the full extent of detailed design and construction requirements are known. Unexpected events can occur, needs can evolve during delivery and market conditions can change. Projects can also be delayed and experience cost overruns. Even with sophisticated risk management processes, projects are exposed to unknown risks. Independent project assurance is important to provide a broader perspective to government and assist project delivery teams to identify and address material risks.

WA is currently experiencing a significant increase in infrastructure development activity. This is being driven by the WA Recovery Plan and supported by successful bids for federal infrastructure funding. The level of private sector investment is also high, driven by the resources sector and construction of new housing. This level of activity has benefits but is also putting pressure on private and public infrastructure delivery capacity.[2]

The capability and capacity of the private sector plays a key role in the successful delivery of infrastructure projects and programs. This is particularly noticeable when there is heightened activity, such as the current levels of infrastructure investment across Australia, combined with restricted movement due to the COVID-19 pandemic.

The WA Government's large Asset Investment Program is contributing to current pressures in certain trades and professions. At a national level, Infrastructure Australia recently reported that there is a potential shortage in 34 of 50

Government must **coordinate and manage its infrastructure pipeline** to create market certainty and enable industry to build capability and capacity.

infrastructure occupations, and that industry has low confidence in delivering programs based on current and immediate future growth forecasts.[3] Skills shortages are being experienced in key areas such as traditional trades, experienced technicians, supervisors and maintenance crews, particularly in regional areas.[4] Two responses to this challenge are already underway and should continue:

- support for apprenticeships and traineeships to encourage and provide pathways for people to enter the industry
- procurement policies that support the inclusion of a wider cross-section of the community that may not otherwise be attracted to the sector.

Recommendation 85c in the Education and training chapter complements these initiatives by calling for the expanded use of group training organisations to further encourage apprenticeships and traineeships on public infrastructure projects.

The supply of many materials used in infrastructure delivery has also come under pressure.[5] Infrastructure Australia's 2021 *Infrastructure market capacity* report highlighted equivalent challenges will continue to be faced at a national level for at least the next 3 years.[6] While WA has previously experienced `boom and bust' cycles in the mining and resources sector, one important difference is the current restriction on migration of skilled international labour due to required COVID-19 border controls, which are in place for health and safety reasons.

Public sector infrastructure skills vary considerably across the many state agencies and government trading enterprises (GTEs) that have direct infrastructure responsibilities. While most state agencies and GTEs rely on private sector capacity for delivery, complementary public sector skills are critical in planning, procurement, project management and contract management. A number of independent and internal reviews have identified challenges in these areas.[7] The Strategy builds on government's existing infrastructure skills development programs and the work that is underway at the Department of Finance, including through the formation of the Infrastructure Delivery Unit and Major Projects Directorate. There is an opportunity to accelerate and raise the profile of the critical role of skills development, especially for state agencies with the greatest need.

During the procurement phase, private sector skills and capacity become key drivers of value for money, particularly for high-value, high-risk projects. The timing of major infrastructure programs is critical to avoid over-heated markets, excessive bid premiums and low response rates. Challenging economic conditions have recently led to a reduction in the depth of the private sector infrastructure market. The number of construction-related businesses in the state which have an annual turnover of more than $5 million fell by 15% between 2016 and 2018.[8]

Public sector procurement also occurs in the wider construction market where it competes for resources against much larger value private sector investment, which can be more susceptible to market fluctuations. A very high level of business investment was a defining feature of the last resources boom that peaked almost a decade ago. This has also meant that the public sector share of total investment in WA has been less than in the other major states (Figure 26 and Figure 27).[9]

Various statewide procurement systems and policies are in place to drive value for money procurement outcomes, while state agencies and GTEs also use customised processes based on unique project requirements. In procuring works, the public sector seeks to balance trade-offs in delivering projects on time and on budget against the need to meet diverse social policy and market sustainability outcomes.

Figure 26: Capital investment in Western Australia, 1999–2000 to 2019–20[10]

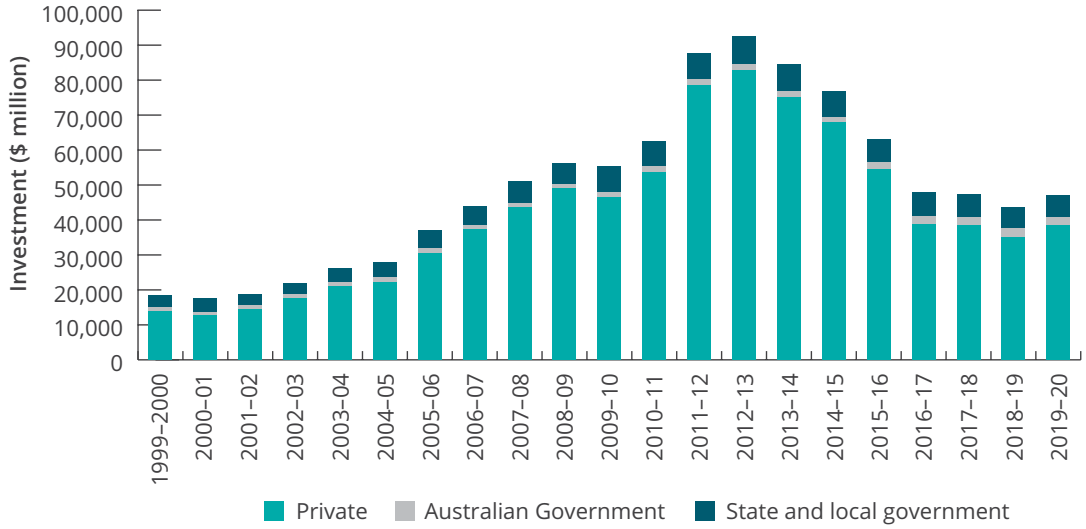
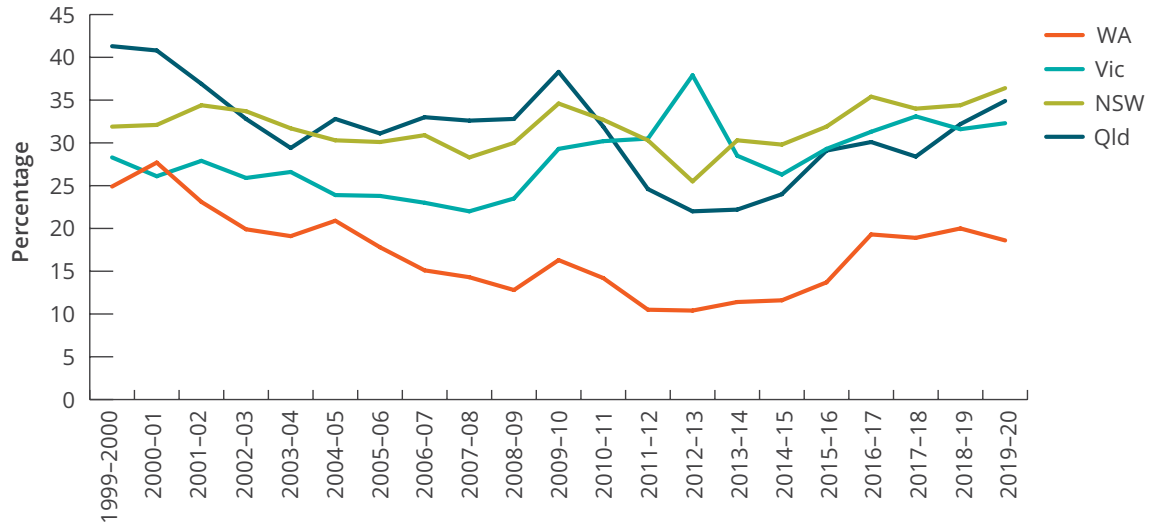


Figure 27: Public investment as a percentage of total (selected jurisdictions), 1999–2000 to 2019–20[11]



Large and more complex procurements can face additional challenges. Outcomes are impacted by governance arrangements and the allocation and subsequent management of risk between public sector client and private sector provider. Many different procurement models have been used in WA (and nationally) with varying levels of success. Project alliance models are currently used to deliver some large projects, particularly in the transport sector. There is value in considering new partnering models to encourage long-term relationships, genuine risk-sharing mechanisms and strategic partnerships that bring greater alignment of objectives and collaboration between clients and contractors. For smaller projects, enhancing cross-agency collaboration and coordination, particularly in regional markets, will help to deliver sustained work pipelines and training opportunities.

While infrastructure investment is currently a major priority through the WA Recovery Plan, this may not always be the case and public funding is likely to remain constrained. Policy refinements therefore need to be regularly reviewed to enable alternative funding sources and process efficiencies.

The **WA Recovery Plan** has renewed the state's focus on **leveraging infrastructure delivery**, cross-agency coordination, participation from marginalised groups and skills development **to maximise return on investment**.[12]

Recommendations

Project assurance and governance

Residual project risks that cannot be avoided or mitigated can be managed through project management and assurance. As part of an overall governance framework, project assurance is an independent process that assesses health and viability throughout the life of a project or program. It is designed to provide government and project owners with a clear sense of whether a project will accomplish its objectives and if there are significant risks. Independence is critical to provide a perspective from outside a state agency or project team. To be of value, assurance feedback needs to be embraced by the project team and any recommended improvement actions undertaken.

WA's current assurance practices are less developed than those of many other jurisdictions. Recent reviews of the Gateway process, administered by the Department of Finance, have identified areas for improvement to address issues such as objective, independence and funding of Gateway reviews. Additionally, it was found that the process is not tiered according to the underlying levels of project risk. Some state agencies view the process as not adding value or recognising internal project management processes. Recent reforms that require the Department of Finance to prepare monthly update reports on the delivery status for the entire Asset Investment Program could become a vehicle for providing Cabinet with additional visibility of project risks, as part of an overarching assurance framework that also incorporates updates to the gateway process.

Other jurisdictions, including New South Wales and South Australia, have introduced independent project assurance practices.[13] These involve independent assessments of a project's health based on a risk assessment made throughout the delivery lifecycle, with aggregated reporting direct to Cabinet. The process is risk-adjusted so that more complex and higher-value projects undergo more rigorous scrutiny. These examples provide a model that should be seriously considered for adoption in WA.

Across some state agencies and GTEs, there is strong existing project delivery capability, supported by forums for information sharing and centralised expertise. The Works Agency Council has been established to enable key infrastructure agencies to discuss common infrastructure delivery opportunities and challenges. The Works Agency Council is complemented by the Infrastructure Delivery Steering Committee, which is focused on strategic oversight of the Asset Investment Program. The Department of Finance has a central role to assist and coordinate in these areas and has established the Infrastructure Delivery Unit and Major Projects Directorate to provide oversight and support to state agencies in delivery. These groups and reforms support improvements in project governance, and they should continue to be implemented, including learnings from project post-completion reviews. Industry also has a role in supporting the improvement of project governance and there are opportunities for WA to consider wider engagement mechanisms, such as those like the Construction Industry Leadership Forum operating in New South Wales and Victoria.[14] Infrastructure Australia's 2021 Australian Infrastructure Plan includes a recommendation to 'expand and promote new and existing industry and jurisdictional reforms and best practices by establishing a government and industry collaborative leadership group'.[15]

Project delivery excellence can also be achieved by strengthening public sector skills and expertise in key areas of planning, business case development, procurement, project management and contract management. These skills are needed to plan and manage project delivery and to embrace project assurance functions. Shortfalls in these skills were identified in the *Service priority review* and *Special inquiry into government programs and projects,* as well as sector-specific reviews, for example in health infrastructure delivery.[16] IWA's new Major Infrastructure Proposal Assessment function, which commenced in January 2022, will strengthen business case development capacity



across the public sector through its constructive approach to reviewing and providing feedback on early-stage proposals and business cases.

Health infrastructure is identified as a particular area of focus for major project improvement due to its complexity and the delivery challenges experienced with most recent major health projects, such as Fiona Stanley Hospital and Perth Children's Hospital, and in light of the upcoming program of major asset investment in the health sector.

Project governance can be strengthened by ensuring that those appointed to chair major project steering committees have sufficient experience and time available to meaningfully devote to the task. While the relevant director-general will have sufficient senior leadership expertise to undertake this role and is often an obvious candidate, this may not always be possible given the extent of that person's other responsibilities.

State agencies have greater incentive to identify internal infrastructure-related skills and areas where capability could be strengthened if there were more and improved pathways available to them. The WA Government should continue to develop support for smaller state agencies, those less-experienced in infrastructure procurement and delivery, and state agencies that have cyclical or periodic investment programs. Expert team members from the Department of Finance should be placed in-house to provide direct support to smaller and less-experienced state agencies, and for high-value or high-risk projects and programs.

Greater consistency in the delivery of major projects should be adopted by agencies, with support from reforms already underway at the Department of Finance, to improve efficiency, harmonisation and to enable centralised capture and analysis of performance data. A feedback process should be implemented to ensure continuous improvement.

Case study

Bunbury Outer Ring Road



The Bunbury Outer Ring Road (BORR) project involves building a 27 km free-flowing highway bypass around Bunbury, linking Forrest Highway to Bussell Highway.[17] The total project budget is $852 million and construction is expected to be completed by early 2024.

Although still in the early stages of delivery, this major infrastructure project demonstrates the application of several principles discussed in the Strategy:

- **Procurement model:** Main Roads WA has adopted a collaborative project contracting strategy for the BORR project, using an alliance form of contract, with principles including:
  - a 'no-blame' culture focused on achieving project outcomes
  - a peer relationship where all participants have an equal say in decisions
  - equitable sharing of risks and rewards
  - a culture that promotes and drives collaboration, innovation and outstanding performance
  - open-book transactions.

The alliance model is not unique to the BORR project – its use has increased in the last 5 years, particularly for the delivery of major road and rail projects, including METRONET.

- **Industry sustainability:** The BORR project procurement favoured applicants that demonstrated a commitment to building local industry capacity and capability, particularly in the construction industry. Targets include $300 million for work contracted to local businesses. These objectives were incentivised in the tender evaluation process through the inclusion of an industry sustainability criteria. All respondents included Tier 2 and Tier 3 contractors in their delivery consortium.
- **Aboriginal participation:** The BORR project is also encouraging Aboriginal employment and business opportunities through a range of measures including an Aboriginal employment forum, a 20% weighting on Aboriginal participation (including evaluation of the cultural knowledge and experience of their Aboriginal Participation Coordinator) and specific targets for Aboriginal employment and business expenditure.
- **Recycled materials:** The BORR project is maximising reuse of local waste products during construction.

For further information, refer to www.mainroads.wa.gov.au.

Recommendation 37

Strengthen infrastructure project assurance processes, governance and public sector skills for the delivery of major projects by:

a. developing an enhanced and rigorous risk-based project assurance process to provide independent verification and review at key stages of project planning, delivery and operation, reporting to Cabinet and the respective project teams with clear action plans

b. ensuring that the appointed chairs of major project steering committees have sufficient time to devote to preparing for, attending and leading steering committee meetings and deliberations

c. further enhancing the capacity of the Department of Finance to provide expert teams within less-experienced state agencies to advise and upskill staff and build capacity

d. developing and rolling out project management standards for adoption by state agencies and government trading enterprises.

Procurement

The WA Government should continue to develop procurement models that encourage proactive risk management and a culture of collaboration across state agencies and GTEs.

Longer-term partnerships between project delivery state agencies, GTEs and industry provide incentives for contractors to build assets that perform well and are cost-effective to operate and maintain, for example, design-build-maintain delivery models. These models support the principle that risk should be allocated to the party best able to manage it. WA can also learn from models being implemented in New South Wales, Victoria and on Australian Government-led projects. International models, such as Project 13, may also have merit and should be considered for adaptation to recognise the characteristics of the WA market.[18] Procurement strategies should, however, always be commensurate with project scale, complexity and risk. The packaging of large projects in procurement, including offering smaller packages, can ensure a stable flow of market opportunities. This approach can harness the capacity of contractors of various sizes, while also recognising comparative capability and risk.

Infrastructure projects deliver a broad range of impacts in addition to direct project benefits and jobs. Delivery also provides an opportunity to send strong signals to the market about local industry sustainability, capability building and local business participation.





Project 13 is an industry-led initiative to develop a new project delivery model.[19] It started in the UK to improve the way high-performing infrastructure is delivered and managed. Project 13 seeks to establish an approach based on 'enterprises' rather than traditional transactional arrangements.[20] An enterprise brings together infrastructure owners, contractors and technical support, working in more collaborative and integrated long-term teams. Enterprise participants are incentivised to deliver better long-term value.

A lack of capacity and competition exists in the local contracting market for major projects, which could lead to an increase and concentration of risk. Broader objectives can be difficult to achieve once contracts are awarded, so there is significantly greater leverage during tender evaluation and negotiation.

The Western Australian Industry Participation Strategy supports these wider objectives, and WA jobs, by ensuring that local WA businesses and workers get a larger share of what the WA Government spends on goods, services and works each year.[21] The Aboriginal Procurement Policy complements the Western Australian Industry Participation Strategy in working towards a more sustainable and inclusive sector by encouraging greater participation of Aboriginal-owned businesses in state government contracts.[22] The Aboriginal cultural heritage, wellbeing and enterprise chapter of this Strategy recommends further improvements to the policy that are aligned with, and support, the broader procurement recommendations.

For procurement on major projects, there is merit in considering a policy that encourages earlier engagement and innovation to support the tender process. This would be particularly relevant for projects involving detailed design, with high tender development costs, where industry participation is less competitive and opportunity costs are high. The principal advantage of this approach is to bring more innovation in design initiatives and to seek out best-value proposals.

This policy would involve the WA Government meeting all, or a major part of, the costs of unsuccessful tenderers. Such an arrangement would be under specific circumstances, where it presents value for money, including the handover of associated intellectual property. Although this practice does occur in some instances, it is only on an ad hoc basis. Equivalent formal policies exist in other jurisdictions. Similar reform of the Market-led Proposals Policy would also be beneficial to deliver a more efficient process with improved public and private sector participation.

Small and standardised projects can be procured using program models to reduce time and cost, instead of procurement on an individual basis. A program approach would allow eligible project types and values to be awarded to panel contractors. This could bring state agencies and GTEs together to determine project synergies, align supply and demand, avoid competing for limited resources, reduce premiums associated with heated market conditions and improve the visibility of project pipelines.

Where appropriate, offsite and modular construction techniques should be further adopted, particularly where there is repetition, such as in schools, prefabricated housing, police and fire stations. Many project components can be built in factory conditions rather than on site. This can reduce the area of land required for construction, which in turn lessens the impact of construction on the community and environment. These techniques can increase quality, reduce capital costs and increase time and cost efficiencies.

Technology has an important role to play in enabling offsite and modular construction techniques, as well as broader uses in the digital planning, engineering and construction of new assets, and at subsequent stages of the infrastructure lifecycle.

At present, many state agencies and GTEs are delivering projects at the same time and are therefore competing for the same skilled labour rather than providing a stable flow of contract value, employment and training opportunity. Enhancing cross-agency information sharing and collaboration, at an earlier stage of project planning, can further support efficient delivery of a steady, staged pipeline of work.

Recommendation 38

Achieve greater value for money from infrastructure investment by making incremental improvements to procurement policies and practices, including:

a. further developing and implementing procurement models for major projects to encourage a culture of collaboration, achieve better risk allocation and address industry sustainability
b. implementing contract packaging strategies that support market participation, including smaller packages, where appropriate, to provide opportunities for mid-tier and lower-tier contractors
c. encouraging greater market response for major projects by developing a policy under which the WA Government would contribute to all or part of the bid costs of unsuccessful tenderers, under specific conditions including the transfer of intellectual property from bidder to government
d. further reviewing and refining the Market-led Proposals Policy to ensure it is meeting its intended purpose and that proposals are considered promptly while balancing risk
e. considering and implementing program procurement approaches, including panels of contractors, where appropriate, such as for the delivery of similar small-to-medium projects across one or more state agencies or government trading enterprises
f. considering the use of offsite and modular construction techniques where benefits can be achieved
g. establishing a cross-agency infrastructure procurement coordination mechanism for projects in the planning phase, or during business case development, to identify staging opportunities.

Funding

Project cost management

The way that infrastructure is funded can lead to significant benefits in project management, risk management and ultimately in project outcomes. There are a number of opportunities to improve the way project funding arrangements are administered.

Regular updates to the management of the WA Government's infrastructure program can ensure efficient use of funding. Opportunities include setting realistic project schedules and cashflows, and centralised management of project contingencies. These actions can support active portfolio management to smooth investment and help mitigate the risk of resource constraints impacting the delivery of the WA Government's Asset Investment Program.



This opportunity aligns with key productivity reforms identified by Infrastructure Australia in the 2021 Australian Infrastructure Plan.

Accurately forecasting how long it will take to deliver a project can sometimes be challenging. The rollover of underspent project cash-flow allocations from one financial year to the next is a significant issue for overall State Budget management. Basing project delivery time frames and spending profiles on robust cash-flow analysis at a program level, accounting for both public and private sector market capacity, can help to overcome optimism bias in project scheduling.

Stakeholder certainty and stability in the longer-term pipeline will also be assisted by the annual release from 2023 of the state infrastructure program. This will provide a 10-year outlook of the WA Government's committed and potential future major public infrastructure investments.

Reforms to aggregate the current system of project-level based contingency management can improve transparency and provide flexibility in how excess contingency is used. Project contingencies, which can vary considerably in size, should be used in a more transparent and flexible way. An example that merits consideration is the way in which contingency is retained and applied across a portfolio of approved WA Government projects by the Australian Government under the *National Partnership Agreement on Land Transport Infrastructure Projects*.[23]

Recommendation 39

Ensure more efficient use of infrastructure funds by improving project cost management, including:

a. establishing clear standards for setting project delivery time frames and cashflows at a program level that account for public and private sector capability and capacity

b. replacing the current, individual project-based contingency management with a whole of government (or whole of state agency or government trading enterprise) based contingency management approach.

Private sector funding and financing

Given limited public funds, the WA Government should consistently review alternative infrastructure funding options to ensure it can continue to respond to growing community needs. Alternative funding sources, and potentially innovative financing mechanisms, should be identified to help bridge the gap between the number of worthy projects and the amount of funding available. Much of WA's public infrastructure is fully funded, or heavily subsidised by general revenue, rather than direct user-pay revenues. However, some project proposals may have associated revenue opportunities or specific sources of potential funding that could be explored to supplement traditional tax-based sources. The need to explore alternative funding sources is compelling, with many of the projects and programs recommended in the Strategy having the potential for funding from sources other than government. The consideration of funding and financing options is already a requirement of state agencies and GTEs preparing business cases. This will also be considered by IWA as one aspect of its function to assess major infrastructure proposals.

Asset recycling involves redirecting revenue from the sale of an asset into construction of new assets or infrastructure. There are ongoing opportunities for private sector funding of public infrastructure, as superannuation funds and other investment vehicles look for long-term, stable assets that fit their portfolio strategies. For the right type of project and risk profile, private funding can benefit private sector investors, the wider community (in the case of superannuation investment) and expand public service delivery capacity. The Strategy is not recommending wholesale divestment of GTEs or asset classes, but rather the targeted recycling of underused assets, including specific buildings and land that are surplus to core service delivery outcomes. Other jurisdictions have successfully reinvested the proceeds from asset divestments into further projects.

The WA Government is regularly approached with proposals to support private sector economic development. Greater consistency and transparency in how state agencies and GTEs assess the relative value of these proposals can ensure that maximum benefits are derived from limited public funds. Principles to guide such assessments could include consideration of the financial returns to government, broader longer-term macro-economic impact, employment creation and the risk profile of the proposal.

As set out in Recommendation 15 of the Climate change and sustainability chapter, developing a sustainability bond framework can help to ensure the WA Government's future borrowings are better aligned with the increasing focus of global financial markets on improving environmental, social and governance outcomes.

Recommendation 40

Increase the total available pool of public infrastructure finance and funding by reviewing the potential to use private sector finance and funding sources, including:

a. investigating asset recycling through divesting suitable assets, such as underused buildings and land, with proceeds used to fund new infrastructure

b. developing whole of government principles to inform the prioritisation of state funding contributions where these facilitate strategic private sector investment.

Asset management



Asset management is a coordinated and systematic process to realise value from assets. This includes asset planning, acquisition, operation and maintenance, as well as renewal and disposal. Organisations with mature asset management systems take a strategic approach to planning and using assets, and a lifecycle view of asset systems and networks, rather than a narrow focus on discrete maintenance and upgrades.[1]

What IWA heard

During consultation on the draft strategy, feedback revealed universal acknowledgement of both the scale and importance of asset management challenges. Many stakeholders noted that all public assets need to be managed well, including local government assets, and that there were similar maturity and funding challenges across many sectors. A new sub-recommendation draws attention to the need for ongoing focus on asset maintenance.

There was strong support for asset information as an underlying enabler, resulting in acknowledgement of the challenges experienced in obtaining adequate asset information to inform good practice. Stakeholders also provided strong support for alignment with international asset management standards and the positive impact that improved asset management maturity would have on other recommendations, including digital technology, infrastructure planning and infrastructure delivery.

There were several calls to go further than incentives and consider policy mandates with enforced compliance. Several respondents noted the connection between asset management and specific themes, such as asset resilience and the inclusion of green assets.

Around two-thirds of the total cost of an asset generally occurs after it is built or acquired.[2] Effective management of the state's approximate $159 billion infrastructure asset base is essential to maximise the value and longevity of these public assets.[3] Yet, historically, good asset management practice has been a challenge for state and local governments, with funding of new assets often prioritised over maintenance of existing infrastructure and reactive use of available funds, in part due to asset information limitations.

There are fiscal and environmental limits to building new infrastructure in response to increasing demand and the deterioration of existing assets. At the same time, technology is extending asset life and enabling smarter use, which may divert, delay or avoid the need for more costly build options.

The public sector is responsible for managing and maintaining a large and diverse asset base that is growing every year with continued state government investment in transport, utilities, buildings, land and equipment (Figure 28). Asset management has been identified in various public sector reviews as requiring significant improvement, including in the 2017 *Service priority review*. This is not unique to WA. In the 2019 Australian Infrastructure Audit, Infrastructure Australia identified a number of nationwide asset management issues across multiple sectors, including historical underspend on preventative maintenance, short budgetary and funding cycles, a lack of data and incentives, and limited mechanisms to link funding to need and maintenance backlogs.[4]

While the significant backlog in maintenance is widely recognised, it is often difficult to quantify, as asset management practice varies considerably across state agencies and government trading enterprises (GTEs). This is symptomatic of wider issues associated with a lack of overall maturity and capability in asset management across the public sector – in particular, the robustness of data capture and analysis, and prioritisation based on asset performance, risk and need. In the absence of consistent practice and accurate information, it is not easy to determine the current scale or cost of the maintenance backlog problem for the state. In the 2 years to 2019–20, a portion of the reported maintenance task undertaken by state agencies and GTEs was around $1 billion per year; however, this figure is unverified and is not a reliable indicator of the total size of the maintenance task across the public sector.[5] Reported expenditure is also highly variable over time, suggesting reactive or breakdown maintenance is a larger component than routine and preventative maintenance.

Benefits of mature asset management include:

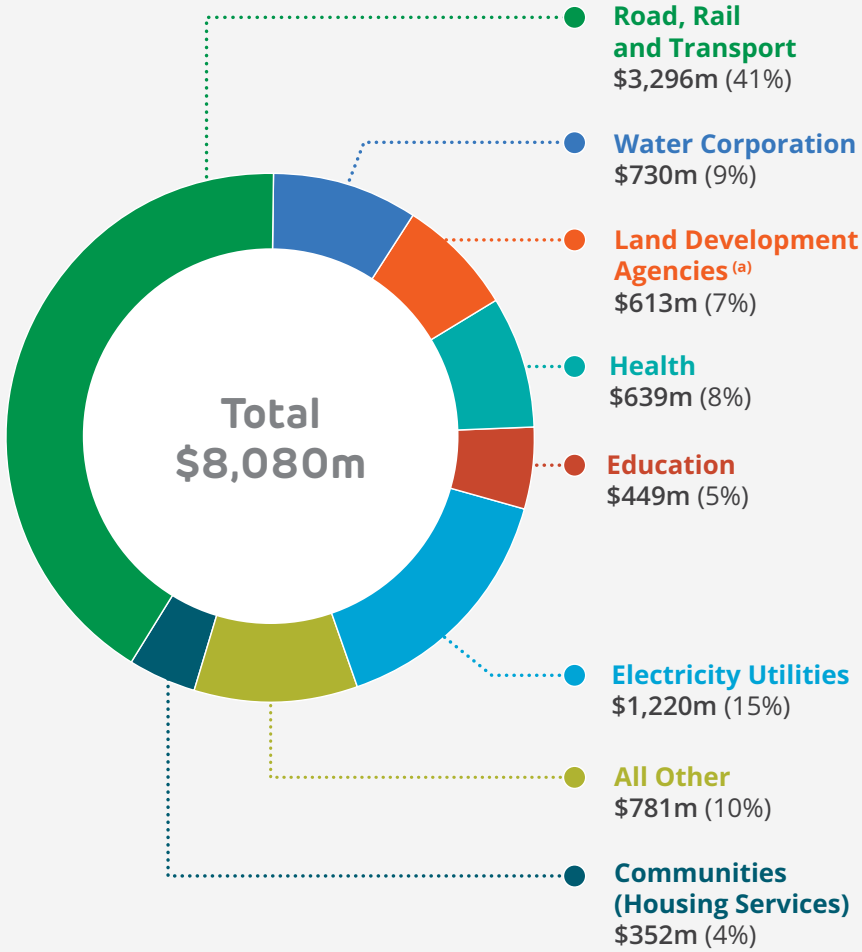
- informed asset investment decisions
- managed risk, improved services and demonstrated compliance
- improved use of existing assets
- delayed or reduced need for capital investment in new assets.

The WA Government's Asset Investment Program is estimated at **$8.1 billion** in 2021–22 and a total of **$32.7 billion** over the 4 years to 2024–25.[6]

Typically, state agencies and GTEs that are responsible for major asset networks have invested more in asset management systems and internal capability than those that have a smaller asset base. Higher standards can generally be found in state agencies that have prioritised investment in asset management practices, such as the Transport Portfolio and GTEs which are subject to more rigorous regulatory requirements. Other state agencies often rely on the Department of Finance and private sector providers to undertake aspects of their asset management functions, in particular, the programming and carrying out of maintenance. Internal management systems used by some state agencies can be limited and many would benefit from initiatives that improve asset management capability, processes and technology.

Failing to address these issues, particularly for those assets in poor condition, exposes government to considerable health and safety risk, impacts on service quality and incurs higher long-term costs. The large number of heritage buildings owned by the WA Government, in both metropolitan and regional areas, brings additional asset management challenges and responsibilities.

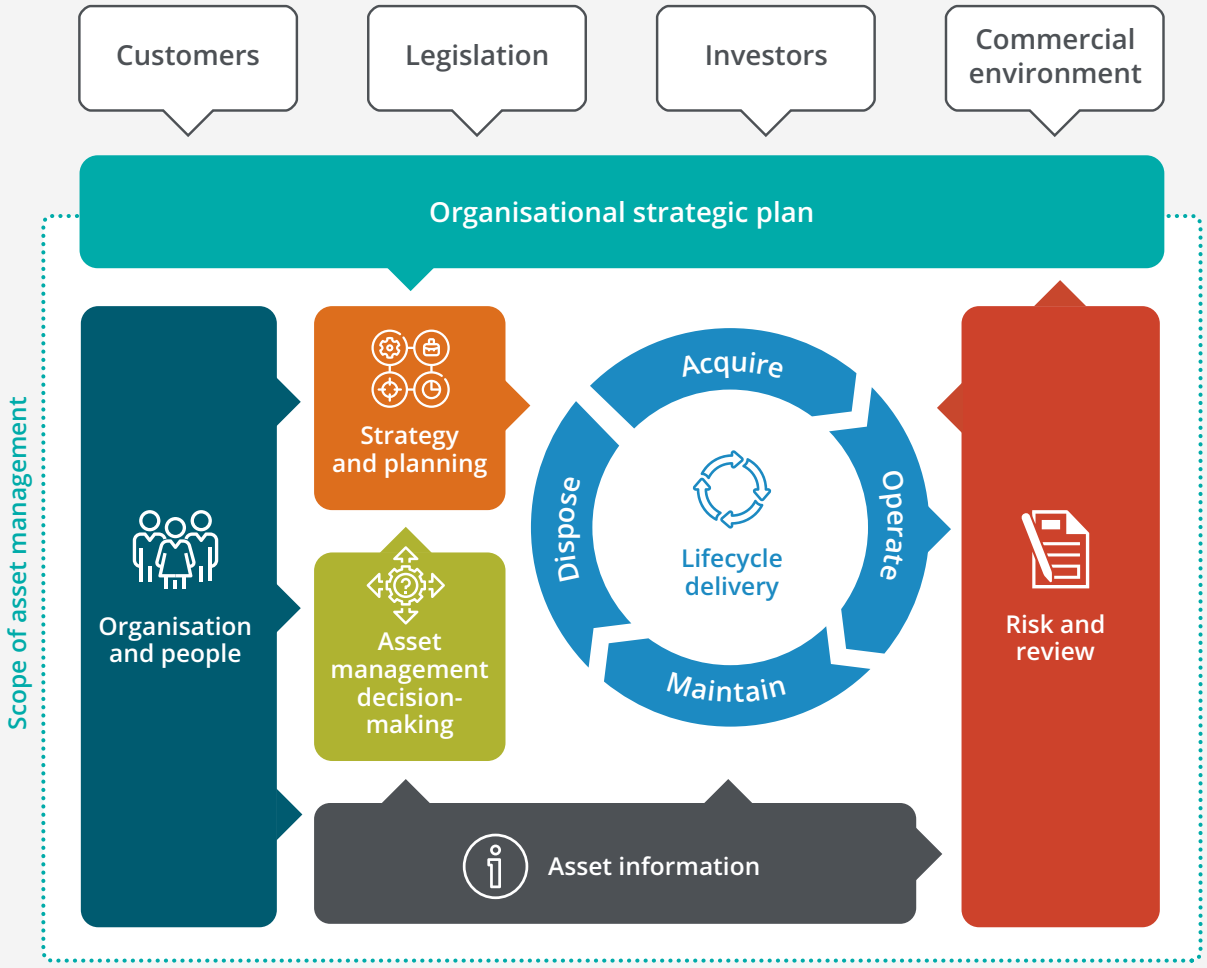
Figure 28: Asset Investment Program 2021–22[7]



(a) Includes DevelopmentWA, the Western Australian Planning Commission and the Department of Planning, Lands and Heritage.

Note: Segments may not add due to rounding.

Figure 29: Conceptual asset management model [8]



Given the value of state and local government-owned infrastructure and its importance in enabling public services, it is essential that all state agencies, GTEs and local governments have sound asset management systems spanning the asset lifecycle, as shown in Figure 29.[9]

Asset management maturity

Central leadership and support are needed to guide consistent asset management practice across state agencies and GTEs. The Department of Treasury's Strategic Asset Management Framework (SAMF) defines asset management principles for state agencies and GTEs and is in line with the international standard for asset management (ISO 55000:2014).

The Department of Finance has recently developed a Building Asset Management Framework, which is a central tool that operationalises the SAMF, with the intention of improving the maturity and consistency of application of these approaches across the public sector for building assets. The framework is still in its infancy and is being jointly piloted by the departments of Finance and Education. This work, and the central role of the Department of Finance, means it is ideally placed to lead and support asset management practice across the public sector into the future.

Well-functioning asset management systems help agencies achieve service delivery objectives through optimal asset capacity and function. This is the basis for identifying and managing risks, lifecycle costs and investment decisions.

Although strong management systems are needed in all agencies, different strategies will apply to individual assets based on risk, and not all assets will require the same level of expenditure.

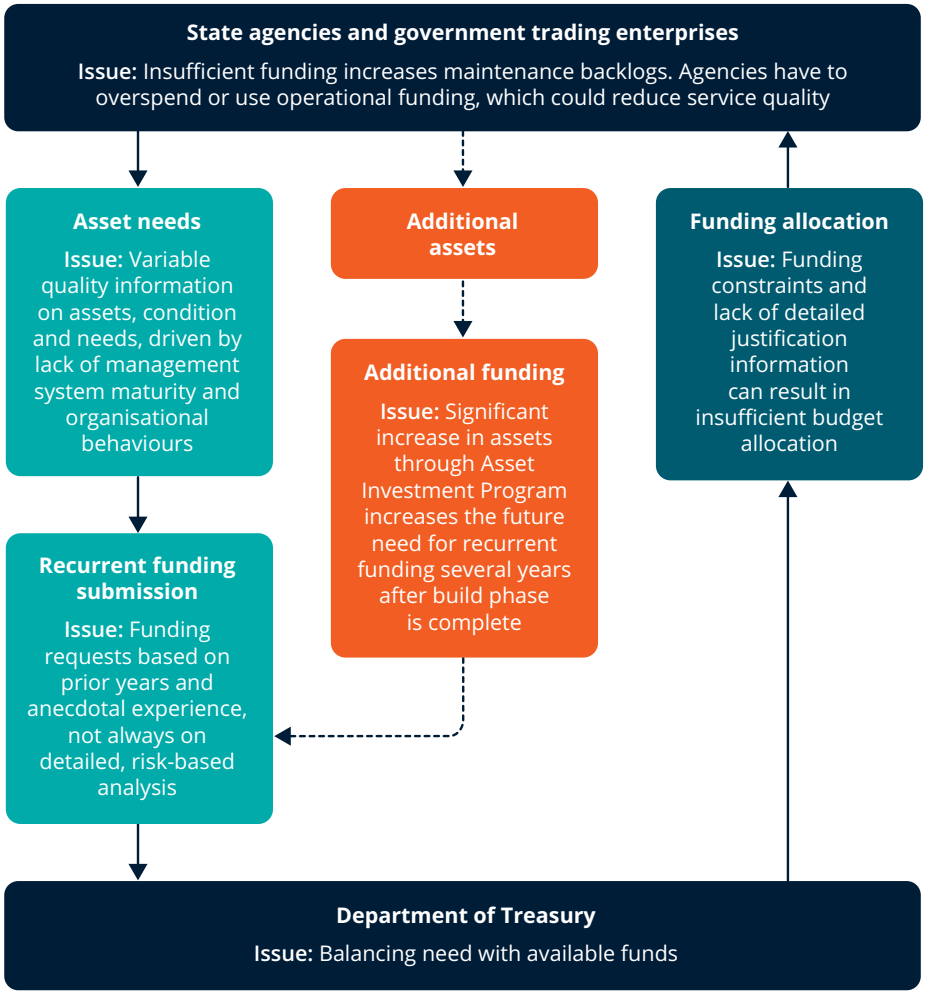
State agency and GTE-level asset management systems should include:

- an asset management policy
- an asset management strategy and objectives
- asset management plans
- essential elements of ISO 55000:2014 applicable to the asset base
- core processes such as demand analysis, strategic planning and asset information management.

In line with best practice, asset management strategies and plans should prioritise interventions such as maintenance, upgrades and replacement, according to asset criticality and level of associated risk. Resilience considerations should also be incorporated into risk assessment and management frameworks.

It is often these areas that state agencies and GTEs have the greatest challenge in articulating and securing funding needs. Although the cost of maintenance and repairs are typically captured in the business case for a new asset, funding is rarely set aside for this purpose. This results in state agencies and GTEs having to continually justify funding requests, despite the need being clearly established at the point of investment. Once a new asset is subsumed into an overall infrastructure system it can be more difficult to make the case for maintenance funding. As WA continues to invest in new assets, this challenge will increase and must be addressed. Figure 30 highlights some of the challenges surrounding the public sector's ability to adequately fund ongoing asset maintenance. Robust asset information is vital at each step of the budgeting process across funding bids, allocation and internal distribution. It will be necessary to measure the extent of improvement in maintenance regimes and associated funding in coming years and determine whether additional initiatives are required, such as ring-fencing of maintenance budgets.

Figure 30: Maintenance funding challenges, highlighting the need for rigorous information and analysis



Case study

Yarra Park Water Recycling Facility

Central Melbourne's Yarra Park Water Recycling Facility is the largest underground water recycling facility in Victoria, capable of producing 180 ML of Class A recycled water annually. The facility treats and reuses sewage from the local sewer network and irrigates the grounds surrounding the Melbourne Cricket Ground, including the heritage-listed Yarra Park and Punt Road Oval.



The publicly owned facility, operated by Downer, achieved Australia's first ISO 55001 certification for its asset management system in 2015.[10] The system involves coordinated and systematic asset management processes, practices and decision rules, to align asset use with functional objectives and stakeholder expectations.

An asset-wide, integrated approach is taken that addresses planning, operation, maintenance, support logistics, renewal and disposal (including the business processes used to support these activities).

Several benefits demonstrate the impact of this systematic approach to asset management, which has the potential to be replicated in other asset systems and organisations. These include:

- an operational cost saving of 47% through improved monitoring and management
- a reliability improvement of 41% over 36 months
- a 40% reduction in reactive maintenance and repairs
- a 22% reduction in power consumption over the last 4 years
- improved risk management and reliability and increased focus on continuous improvement activities, enabling even more benefits to be realised.[11]

The water recycling facility has also been recognised for its contribution to sustainability and circular economy principles with an excellent rating for sustainable operations from the Infrastructure Sustainability Council of Australia.[12] A proposed expansion could provide recycled water for gardening, flushing toilets and car washing for up to 5,000 Melbourne households.[13]

For further information, refer to www.mcg.org.au.



Management of the state's road network gives an indication of the scale of investment required for maintenance and estimated backlogs. For example, Main Roads WA's 2021–22 budget for **maintaining the road network is $385 million**, but there was an **estimated maintenance backlog of $545 million in 2020–21**.[14]

The Department of Biodiversity, Conservation and Attractions receives a **total annual maintenance budget of around $6.1 million**, or just 0.3% of the estimated total replacement value, for its **34,000 km statewide road and bridge network**.[15]

Local governments are responsible for almost 127,000 km of roads or 87.2% of the state's public road network.[16] In 2019–20, local governments spent **$607.1 million on road preservation**, leaving an estimated shortfall of $193.7 million of the **$800.8 million required to maintain roads** in their current condition.[17]

Incentivising better practice

The importance and benefits of good asset management practice are widely recognised. However, in the public sector, a lack of incentives is a major inhibitor of good practice. Currently, there is very little systemic incentive offered to state agencies to improve their asset management maturity, relinquish assets or plan to maintain older assets with recurrent funding needs. In some cases, it is easier to attract capital funding for a new asset than for preventative maintenance funding that could extend the life of an existing asset. Funding available to build capacity, or for innovation in asset management, is also limited. The WA Government's 2017 *Service priority review* recommended incentives to manage assets and finances to maximise their value to the state, but this has not occurred in the 4 years since this recommendation was made.[18]

Asset information

Asset information enables asset management maturity. A wide range of information should be captured to support asset decision-making, including, but not limited to, asset location, type, materials, age, condition and lifecycle cost. A lack of reliable and accurate information currently makes it difficult for many state agencies to understand asset needs and develop fit for purpose, risk-based asset management plans. This makes it challenging for state agencies with lower levels of asset maturity to prioritise and plan maintenance pipelines.

More sophisticated spatial asset information, including data capture, analysis and use, will enable fit for purpose asset management, such as risk-based decision-making, preventative maintenance and lifecycle asset optimisation. Information on asset use, lifecycle cost, performance and benefits should be systematically captured and used to inform planning and justification for future assets, as part of the annual strategic asset plan and business case development processes. This will enable a high-level view of funding requirements across the public sector.

Improvements to the way that asset information is captured, stored, shared and used are recommended in the Digital connectivity and technology chapter.

Recommendations

Asset management maturity

The Department of Finance should provide increased support and assistance to help state agencies determine and improve their current asset management maturity (through assessments led by the Department of Finance and applied to all types of infrastructure assets) and identify any capability gaps.

This would involve the Department of Finance providing:

- central leadership and guidance on what constitutes core and good asset management practice, which agencies should adopt and tailor to their asset portfolio and service needs
- direction on asset management principles and data standards to be adopted consistently across public sector assets.

These principles will align with, and further operationalise, the SAMF and International Standards.

The Building Asset Management Framework should continue to be developed and tested, followed by adaptation to cover the full range of state-owned assets beyond buildings, and progressive rollout across the public sector.

Once the framework has been established as the effective standard, agencies and GTEs should demonstrate alignment. The Department of Finance should be adequately resourced to provide leadership, assistance and advice to state agencies and GTEs where it is needed.



Recommendation 41

Achieve better use of infrastructure assets by improving asset management practices across the public sector, including:

a. formalising and funding the Department of Finance's role as functional lead for asset management to support and assist state agencies and government trading enterprises in developing asset management maturity
b. progressively expanding the Building Asset Management Framework pilot initiative to operationalise the Strategic Asset Management Framework and apply to all government asset types
c. requiring all state agencies and government trading enterprises to develop fit for purpose asset management practices, in line with the Department of Finance guidance
d. undertaking a review within 5 years to assess progress on maintenance outcomes and determine whether additional measures are required to strengthen the ability of state agencies and government trading enterprises to fund ongoing asset maintenance.

Incentive funding

As some state agencies and GTEs require more assistance than others, a budget allocation for seed funding to improve basic asset management capabilities should be introduced as a priority. This funding will allow state agencies and GTEs with the lowest levels of asset management maturity to improve to a level that makes them more competitive in future incentive programs.

As overall public sector asset maturity improves, the creation of a new, central incentive mechanism should be available to reward maturity in asset management practice and fund submissions that demonstrate strong alignment with service delivery outcomes and optimise the use of existing assets. Potential incentive mechanisms could include more flexibility around the retention and reinvestment of cost savings in relation to asset management and/or the creation of an asset lifecycle investment fund. Possible financing sources for such a fund could include a portion of any annual Asset Investment Program underspend, the contribution of unused contingencies and/or savings generated through improved maturity in asset management practice, including management of the WA Government's office accommodation portfolio. Access to funding through this mechanism would be based on state agencies and GTEs reaching a certain level of maturity in asset management practice, and would give them the opportunity to bid on an annual basis to:

- further increase asset management maturity
- supplement available funding to address high-risk asset deficiencies
- fund innovation trials aimed at reducing lifecycle costs
- increase funding for preventative maintenance
- increase use of existing assets.

The intent of the fund is to incentivise asset management maturity, information management, good practice and higher quality assets. One intended outcome is to incentivise behavioural change and foster a culture that considers the lifecycle of infrastructure assets.

Recommendation 42

Incentivise improvements in asset management across the public sector by:

a. introducing a new budget allocation for state agencies and government trading enterprises to implement fit for purpose asset management planning, capability building and systems
b. establishing an asset lifecycle investment fund, or similar incentive mechanism, to reward good asset management practice and support funding submissions that demonstrate strong alignment with service delivery outcomes and optimised asset use.

Asset information

State agencies and GTEs should improve the capture, storage and use of reliable asset information to improve decision-making and reduce risk across the asset lifecycle. This should include, as part of their asset management system:

- developing an asset information strategy to define the strategic approach to collecting, managing, reporting and overall governance of asset information
- developing asset information standards to specify a consistent structure and format for collecting and storing asset information and for reporting, which should be informed by and aligned with the Department of Finance's central guidance
- optimising and developing appropriate technologies and systems to capture, store, access and use asset information.

See Recommendation 4 in the Digital connectivity and technology chapter for recommendations on further developing WA Government data management and asset information policies, processes and standards to enable data and information sharing and analysis, and establishing a whole of government digital platform that enables the sharing of location-based asset information.







Sectors

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Demand management and preventative investment

In developing the Strategy, strong links became apparent between demand management, preventative investment, cross-sector interactions and the need to improve the efficiency of the existing government infrastructure asset base. While not presented as cross-cutting themes, demand management and preventative investment are common elements in many of the chapters.

Growing populations seek increasing access to contemporary, well-functioning infrastructure. Managing demand can help to divert, delay or avoid the need for more costly services and facilities and deliver sustainability and resilience in our infrastructure systems. This includes achieving better outcomes from existing infrastructure and investing in ways that can prevent increased demand elsewhere.

Investing in alternatives to major infrastructure projects can diffuse demand by enabling new ways of doing things. Similarly, behaviour-change programs can influence demand, typically at a fraction of the investment cost required to expand networks and often resulting in better outcomes.[1]

For example, providing easy access to recycling and reuse options will reduce rates of waste generation and the escalating challenges of waste management. Investing in diversionary justice programs can avoid some policing, imprisonment or court service demands, while investing in a program of smaller projects across multiple transport modes that improve connectivity to train stations can boost public transport patronage.

WA's Your Move and Waterwise initiatives are examples of long-running behaviour-change programs. Since 1997, Your Move has encouraged the community to use public transport to help address road congestion and improve public transport efficiencies and health outcomes. The Waterwise program uses education and awareness raising to substantially influence consumers to reduce water usage, along with mandatory measures such as sprinkler rosters.

Across the social service sectors, outreach, support and education programs seek to intervene early to enable better use of existing infrastructure and avoid demand for more costly and intensive services, while delivering long-term benefits to individuals and the broader community. Examples include programs that:

- encourage at-risk community members to access appropriate support services
- assist social housing tenants to meet their property management and financial responsibilities
- educate and support offenders along a clear and culturally appropriate pathway out of the justice system
- encourage the community to adopt healthier living habits and avoid health risks.

The application of policy levers and incentives, including pricing strategies, can also influence behaviours. These types of strategies should be applied thoughtfully to ensure that they do not disproportionately impact those who can least afford it.

Within the energy sector, targeted and tiered energy pricing can reduce consumption and better distribute peak period demand. The long-term uptake of low and zero emissions vehicles means that the current national system of fuel excise revenue is unsustainable. Reforms to implement an alternative funding model should be futureproofed by ensuring that any technology system can also deliver demand management functionality.

Across the state's expansive infrastructure portfolio, the extension of asset life through early, preventative maintenance and strategic planning also offers opportunities for substantial savings that could be redirected towards refurbishment and enhancement rather than replacement.

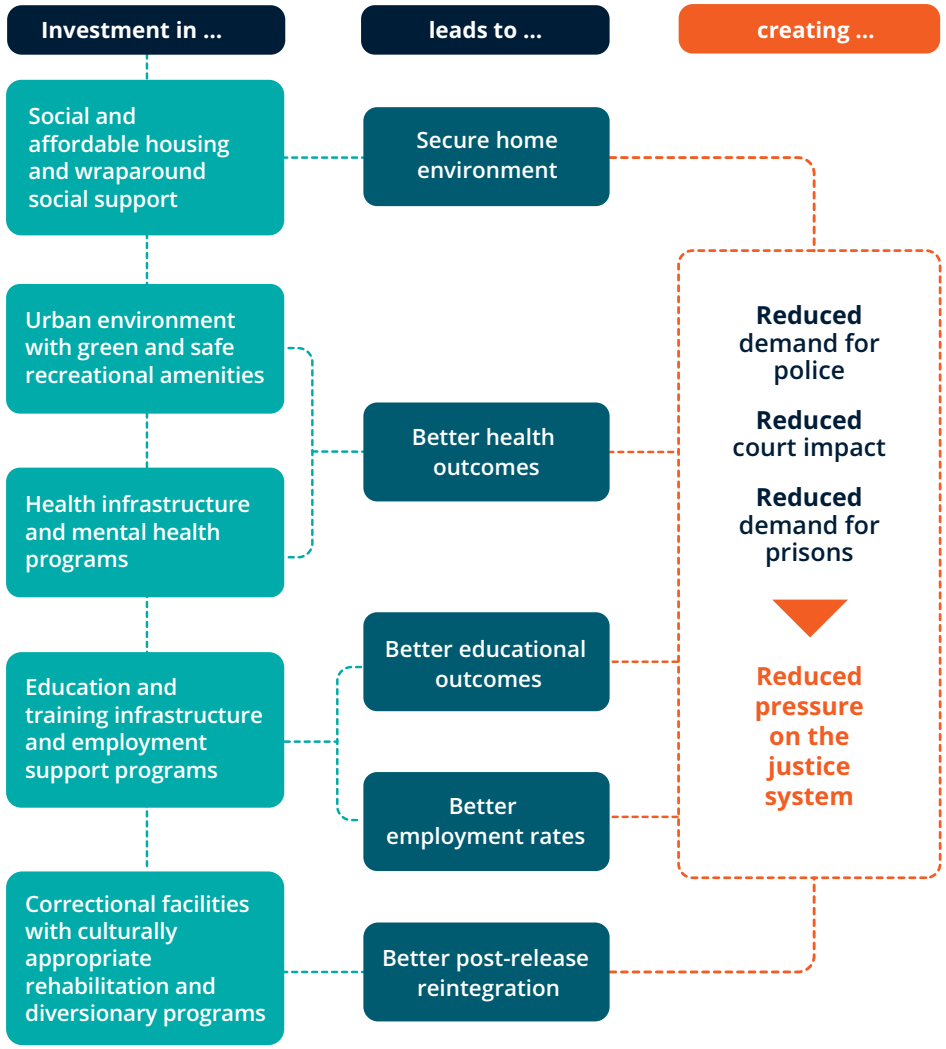
In some cases, demand can be prevented via substantial investments elsewhere. Interdependencies between infrastructure sectors offer both complexity and opportunity in project selection. Projects that offer diverse and far-ranging benefits are likely to make the most significant contributions to the wellbeing of the state's residents. It can be challenging, however, to holistically value investment returns. Consideration of digital alternatives to built infrastructure should be standard practice by adopting a digital-first approach. For example, a modern train signalling system can increase the capacity of the existing passenger rail network by enabling higher frequency services, providing a potentially more cost-effective outcome compared to the cost of building new rail lines throughout the city in future.

Within the social services sector, a strong social housing safety net is expensive to deliver and maintain. However, it also offers immense savings to the state by lowering pressure on mental and physical health, social, policing, judicial and correctional infrastructure systems while establishing strong foundations for individuals to participate in education and employment (Figure 31). For example, a 2016 study found that the provision of social housing to people who were experiencing homelessness resulted in an average saving of $13,000 per person in health, criminal justice and housing services over a 12-month period.[2]

Robust, resilient and secure digital connectivity and technology infrastructure can also have wide-ranging benefits. By overcoming distance and location barriers, digital connectivity enables access to services by reducing reliance on physical infrastructure and creating pathways for economic development and innovation. Similarly, addressing the high level of digital inequality – particularly among older, regionally based people on lower incomes – can stem demand for the suite of needs connected to social disadvantage.[3]

Future business case and funding decisions should include triple bottom line assessments early in decision-making processes and expand established methodologies for assessing benefits and disbenefits. This is of particular importance for the longevity of non-build programs, which rely on the ability to demonstrate continued value and impact.

Figure 31: A systemic approach to reducing demand management for the justice system



Energy



The growth in renewables, batteries and innovative technologies will lead to a **vastly different looking energy system** to the one originally designed for a small number of large fossil fuel sourced generators. Considering the **speed of change in the energy sector**, the WA Government should continue to prioritise proactive transition.

What IWA heard

During consultation on the draft strategy, stakeholders raised the importance of achieving the net zero emissions by 2050 target (in line with feedback on the Climate change and sustainability chapter), highlighting the opportunity for the energy sector to achieve net zero in a more ambitious time frame. Relevant energy sector recommendations reference the achievement of emission reduction targets, including net zero emissions by 2050, and interim targets once they are established. Stakeholders also highlighted the opportunity for additional modelling considerations in the next Whole of System Plan (WOSP). This included gas and hydrogen transmission and use, and large-scale electrification by domestic, commercial and industrial end users as the South West Interconnected System (SWIS) decarbonises. The opportunity to model or apply relevant assumptions to the next WOSP is now discussed.

Feedback on natural gas and hydrogen varied. Some stakeholders highlighted the importance of transitioning away from natural gas and the potentially risky nature of the blue hydrogen industry, due to challenges in capturing and offsetting greenhouse gas emissions. Others raised the need for the blue hydrogen industry to support effective transition to renewable hydrogen and for state government support for carbon capture and storage and sequestration opportunities. Reference is now made in this chapter to hydrogen proposals being considered in the context of emission reduction targets and environmental approvals.

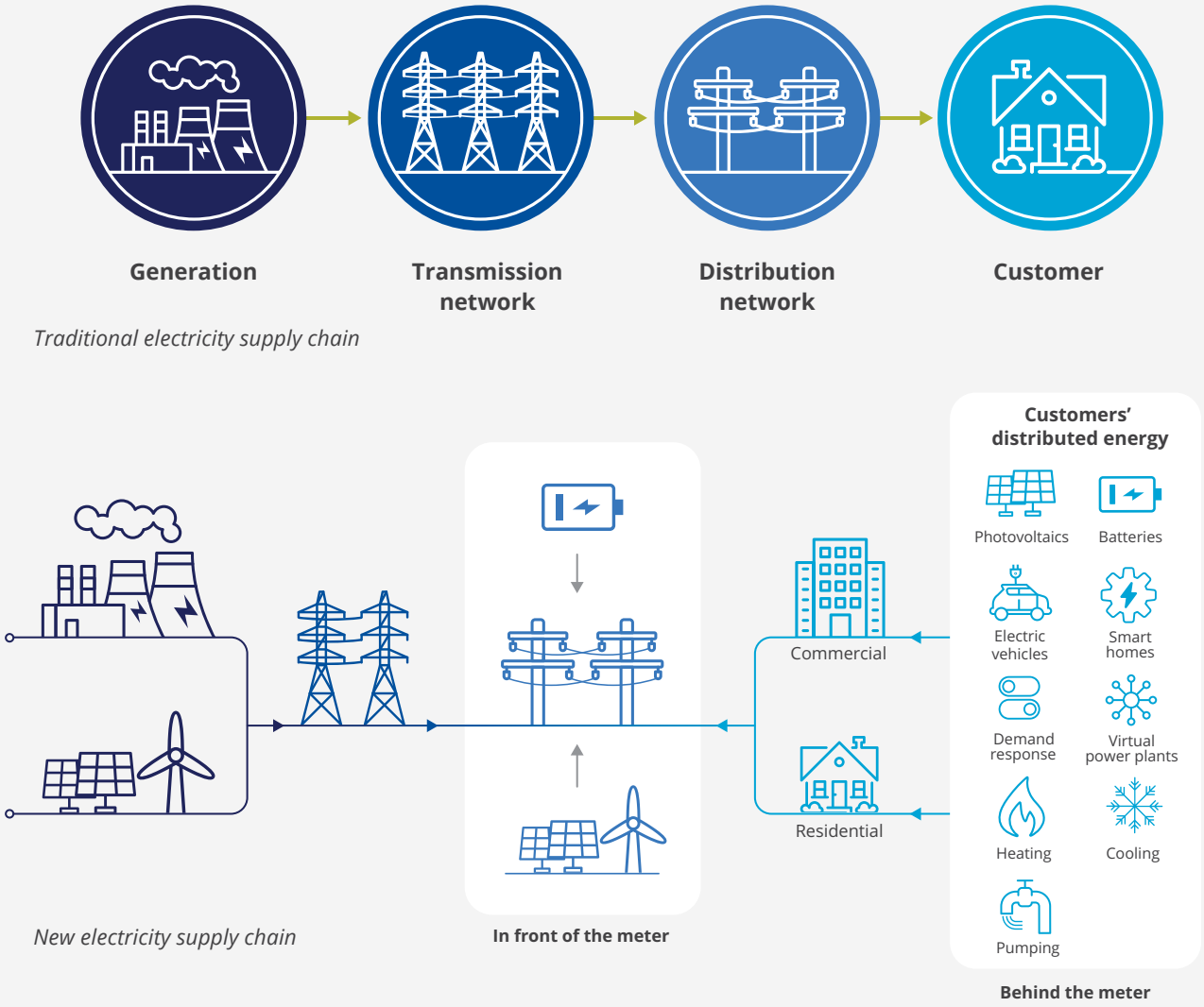
Feedback also highlighted that land use, land tenure, native title, cultural and environmental value and coordination should be better considered in the state's hydrogen program. This is now considered under relevant recommendations.

Around 1 in 3 households in WA have solar power systems on their roofs.[1] In 2020 alone, more than 300 megawatts of residential solar power were added in WA, which is almost equivalent to the annual output of the state's largest coal-fired power station.[2] As more renewable energy resources are added to the network, it will increasingly transform from a traditional linear system to one that is further decentralised (Figure 32).[3]

While advancing renewables is enabling the transition to net zero carbon emissions (as detailed in the Climate change and sustainability chapter), it comes at a cost to existing large-scale infrastructure, which was developed in a different era. Coal-fired power generation is becoming more challenging to operate as it needs to run at a minimum level of service to ensure stable supply, regardless of availability of other power sources. The state has already commenced the transition away from coal-fired power generation to renewable sources. Two of the 4 operating units at Synergy's Muja Power Station are programmed for retirement from October 2022. Further consideration may need to be given to the retirement of remaining coal-fired power sources, particularly in light of the Glasgow Pact, which seeks to phase down coal power.

Generating energy from zero emission sources will reduce dependency on fossil fuels and greatly assist the state's transition to net zero emissions by 2050. It presents a significant opportunity to progress early achievements in emissions reduction, compared to other sectors where progress may take longer. As WA is a major exporter of liquefied natural gas, there will be increasing pressure to transition to cleaner energy for the state to remain competitive, as global customers commit to substantial interim and long-term emission reduction targets. While gas-fired power is used as a transition fuel in the medium term, longer-term reliance on gas would mean the state will find it harder to achieve emission reduction targets.

Figure 32: Transformation of the electricity supply chain[4]



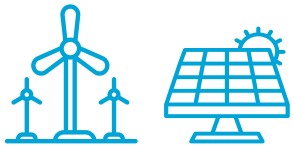
Renewable energy, combined with storage, has the potential to enable energy users to disconnect from the main network, particularly in remote areas. Although renewable energy provides opportunities for lower-cost generation and a less emission-intensive energy network, there are challenges with the intermittent nature of the generation, which can impact system reliability and security.[5] As the state's energy systems are geographically isolated, each network needs to have enough power to meet peak demand, while retaining sufficient backup energy for unplanned outages.

Energy storage will increasingly be a key requirement of reliable supply in a renewable environment. Currently, this storage capacity is limited to small loads of several hours through distributed battery storage. From a system-wide perspective, the current cost of batteries for storage and supply purposes to enable transition to a fully renewable system is a challenge. Until further advances are made to enable lower prices for battery storage, or until alternative storage solutions and supply sources such as pumped hydro and renewable hydrogen develop, energy systems including the SWIS will need to partially rely on gas-based energy sources to maintain sufficient system supply. There are a number of hydrogen projects currently proposed that could connect into the SWIS and consume excess power to convert into hydrogen.

If they proceed, these hydrogen projects could further stabilise the SWIS and accelerate the retirement of coal-fired power generation.

Renewable hydrogen is emerging as an opportunity to decarbonise local industries, create new exports and accelerate the green energy economy.[6] Considerable activity is underway as jurisdictions and industry seek to rapidly advance technologies, establish production capability and harness international market interest. WA is well positioned to become a global leader in the international supply of renewable hydrogen.[7] The state has demonstrated capability in mass production through its liquefied natural gas (LNG) projects. It also has superior co-located solar and wind renewable energy resources, and available land to support large-scale hydrogen precincts and aligned industrial uses.[8] Both the state and Australian governments are ready to invest to attract proponents through initiatives such as the WA Renewable Hydrogen Fund and the Australian Renewable Energy Agency's Renewable Hydrogen Development Fund. Ensuring appropriate infrastructure is in place will help to unlock future strategic industries for the state.

The energy sector plays a fundamental role in supporting the state's resilience. Impacts to energy supply, alongside broader challenges associated with demand and dependence, have the capacity to shape how many industries and assets prepare, respond and recover in the face of shocks to the energy network. Overall, a rapidly changing energy sector requires modified frameworks, infrastructure and regulations as the state continues to plan for a more sustainable, reliable and cost-effective energy system. Considering the speed of change in this area, the WA Government should continue to prioritise proactive transition to renewable energy solutions.



As detailed in the Climate change and sustainability chapter, the outcomes of the recent international negotiations at the 26th United Nations Climate Change Conference of Parties (COP26) in Glasgow calls upon countries to 'accelerate efforts towards the phasing down of unabated coal power, recognising the need for support of a just transition'.[9] The summit called upon governments to 'accelerate the development and deployment of technologies and adopt policies that transition to a low emission energy system, including rapidly scaling up clean power generation and energy efficiency measures'. In 2020, 2 action plans were released: the *Economic Development Action Plan for the Collie and Bunbury Regions* and *Collie's Just Transition Plan* to **strengthen the transformation of the local economy, acknowledging the diminishing role that coal will play**.[10] Depending on the uptake of renewable energy and the level of commitment from all levels of government following COP26, coal-fired power retirement could be faster than anticipated. If this is the case, the support for diversification of Collie's coal-fired, power-related businesses and communities may need to accelerate.

Governance

Compared to most other jurisdictions, WA is in the unique position of having most of its electricity network in public ownership. This presents a number of strategic opportunities, as well as several challenges.

Through state government ownership, specialised energy utilities established as government trading enterprises (GTEs) can more easily implement and direct change but are also required, by legislation, to provide a financial return to government and operate commercially in the market. This includes satisfying an independent economic regulator on the suitability and cost efficiencies of their investments.

WA has 2 main energy systems – the SWIS and the North West Interconnected System (NWIS) (Figure 33) – and many more isolated energy systems throughout the state.

Figure 33: Location of the North West Interconnected System and South West Interconnected System[11]



South West Interconnected System

The SWIS is an interconnected electricity system in the south-western part of the state. Western Power is the GTE responsible for the electricity network that connects electricity generators to customers in the SWIS, while Synergy is the GTE generator and retailer for the SWIS. A significant proportion of power generation in the SWIS is privately owned and operated.

North West Interconnected System

The NWIS is in the Pilbara region and includes a number of variously owned interconnected electricity networks. The 3 largest participants in the NWIS are Horizon Power (a GTE), Alinta Energy and Rio Tinto. Other large mining companies, including BHP and Fortescue Metals Group, also own major energy infrastructure in the NWIS and the broader Pilbara region to service their individual operations.

The WA Government is currently implementing the Pilbara electricity reforms for the NWIS to improve the efficiency and effectiveness of electricity services in the Pilbara. The 2 main components of these reforms are:

- light-handed regulation to facilitate third-party access to designated electricity network assets in the Pilbara, which will apply to the interconnected networks of Horizon Power and Alinta Energy
- an independent system operator, which will apply to the interconnected network in the NWIS.

The Pilbara independent system operator functions are performed by Pilbara ISOCo, an incorporated not-for-profit company limited by guarantee under the *Corporations Act 2001* (Cth). The founding members of Pilbara ISOCo are the 3 main operators of electricity networks in the Pilbara: Horizon Power, Alinta Energy and Rio Tinto.

Other energy sector participants

Horizon Power is responsible for energy generation, transmission, distribution and retail services in many rural and remote areas, and energy infrastructure across WA that sits outside the SWIS. Beyond GTEs, there are a range of private market participants in electricity and gas generation, distribution and retailing.

Domestic gas provides approximately half the state's primary energy needs, supplying gas largely through 2 major pipelines: the Dampier–Bunbury Natural Gas Pipeline and the Goldfields Gas Pipeline. The Carnarvon Basin on the North-West Shelf supports the LNG export industry, as well as the major domestic gas market in the state's south-west. The WA Domestic Gas Policy aims to secure WA's immediate energy needs by ensuring that LNG export project developers also make gas available to the domestic market. The policy makes gas equivalent to 15% of exports available for WA consumers.

Energy strategy and policy

Energy Policy WA is leading WA's energy transformation and includes the Coordinator of Energy function. Energy Policy WA is driving considerable policy reform in partnership with the Australian Energy Market Operator (AEMO), energy sector GTEs and other participants. The major initiative is the Energy Transformation Strategy, which sets out a vision, objectives and high-level action areas to enable energy transformation. These include:

Stage 1 (2019 to 2021)[12]

- Developing the Distributed Energy Resources Roadmap, which outlines key actions to integrate small-scale renewable energy and storage resources in a sustainable and cost-effective manner to support a reliable energy system[13]
- Developing the WOSP, which includes a set of energy system modelling scenarios that detail future energy generation and network needs in the SWIS[14]
- Updating the Wholesale Electricity Market (WEM) Rules to modernise measures relating to supply and trade of wholesale electricity between retailers and generators[15]
- Revising the Electricity Networks Access Code to improve access arrangements to Western Power's distribution and transmission network, including facilitating contemporary technologies, and changes that include amendments to the New Facilities Investment Test[16]
- Trialling energy price signals to encourage households and businesses to consume renewable energy during the day rather than exporting energy during periods of oversupply

Stage 2 (2021 to 2025)[17]

- Implementing the Energy Transformation Taskforce decisions including actions from the Distributed Energy Resources Roadmap and delivering the next WOSP
- Integrating new technology into the power system through trials, including the virtual power plant trial Project Symphony, preparing for electric vehicles through the Electric Vehicle Action Plan and trialling microgrids at the fringe of the Western Power network as part of the long-term transition to a modular grid
- Ensuring system security as the SWIS continues to transition away from coal to decarbonise the energy sector, as well as to growing levels of Distributed Energy Resources Roadmap (one element of this includes reviewing the Reserve Capacity Mechanism to ensure it continues to support a reliable energy supply)
- Regulating for the future including the establishment of a governance framework that can keep pace with ongoing energy transition

Energy coordination and regulation

The WEM supplies electricity to the south-west of WA via the SWIS. The WEM consists of GTEs and private companies that generate and sell electricity, and a network operator.

The AEMO is responsible for operating the WEM in accordance with the WEM Rules and the related WEM Market Procedures. A unique feature of the WEM is the Reserve Capacity Mechanism (RCM), which ensures there is enough energy generated to meet demand at all times. RCMs are set every 2 years and include the certification of reserve capacity and the allocation of capacity credits. The SWIS is a geographically isolated electricity network with strong summer peak demand.[18] Due to its isolation, the SWIS cannot receive electricity from neighbouring states, unlike the National Electricity Market for the east coast of Australia.[19]

Under WA's *Electricity Industry Act 2004*, the current objectives of the WEM are to:

- promote the economically efficient, safe and reliable production and supply of electricity and electricity-related services in the SWIS
- encourage competition among generators and retailers in the SWIS, including by facilitating efficient entry of new competitors
- avoid discrimination in the market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions
- minimise the long-term cost of electricity supplied to customers from the SWIS
- encourage measures to manage the amount of electricity used and when it is used.[20]



Within the WEM, the Economic Regulation Authority monitors market participant behaviour, determines approvals requested by the AEMO, undertakes reviews required by the WEM Rules and provides an annual report to the Minister for Energy on the effectiveness of the market, compliance and enforcement.

The Economic Regulation Authority also regulates and licenses the gas and electricity industries and services throughout WA. It aims to ensure that the delivery of utilities is in the long-term interest of WA consumers by maintaining a competitive, efficient and fair commercial environment. Economic Regulation Authority processes seek to allocate market and technological risk to commercial parties to help ensure consumer electricity prices are as low as can be sustained.

Technological change and emissions reduction policy are having (and will continue to have) a significant impact on WA's energy system and regulation. Energy Policy WA is progressively amending regulatory instruments in line with the changes in the external environment. However, regulation and legislation changes can be resource intensive and lengthy. Ensuring regulation keeps pace with energy transformation and government policy is a continuing challenge.

Recommendations

Whole of System Plan

Using data provided by industry, the WOSP models 4 scenarios of how changes in demand, technology and the economy may shape the way electricity is used and supplied in the SWIS. An underlying principle of the current WOSP is the 'lowest cost supply of energy'. With new energy connections being the highest cost to construct and maintain, the most likely scenario currently directs renewable energy into the Collie/Bunbury area, where existing transmission lines exist. Despite the name, the WOSP does not present as a plan with clearly defined implementation actions.

It is a requirement of the WEM Rules that the WOSP will be updated at least every 5 years. It is understood that the next update of the WOSP is intended to consider many of the matters that IWA is proposing in Recommendation 43a. Due to the absence of data at the time of developing the first WOSP, the modelling did not completely capture the nature of change potentially occurring in the SWIS over the medium to long term. For example, it did not capture opportunities for renewable energy growth in alternate locations outside the Collie/Bunbury area (in particular the Mid West region at the northern end of the SWIS) and industry growth oriented around that renewable energy supply. This region has substantial capability for increased renewable

energy generation, as it can capitalise on high wind speeds and strong solar resources. Along with other considerations, these conditions are contributing to areas such as the Mid West becoming potential locations for large-scale renewable energy and renewable hydrogen supply in WA.

Similarly, the WA Climate Policy had not been released at the time of the original WOSP modelling. While the WOSP model can assess the emissions profile of each scenario, it did not test the lowest-cost pathway to reach the net zero emissions by 2050 target. Interim and net zero emissions targets set by sectoral emission reduction strategies, and developed in consultation with portfolios and industry stakeholders, are expected to set a decarbonising trajectory for the SWIS. As detailed in the sectoral emissions reduction strategies information, electricity will be critical to decarbonising the state's economy through the electrification of key sectors.[21] Energy Policy WA, in consultation with stakeholders, will undertake electricity modelling for the sectoral emissions reduction strategies which should also be considered in all WOSP scenarios in future modelling.[22]

An additional opportunity for the WOSP is to refine the model's approach to the curtailment of renewable energy generation, whereby energy sources connecting into the grid are reduced to enable overall system stability under certain circumstances. A degree of curtailment to ensure the system remains within its technical capabilities is expected in a power system with growing levels of intermittent renewable energy generation. However, as supporting technologies are developed and reduce in cost, future WOSPs should consider new measures that are expected to contribute to maintaining the output from renewable energy generation in the coming years (and therefore reduce the curtailment of renewables in the modelling). This includes an increased role for battery storage in the near term and the aggregation of residential rooftop photovoltaic systems in the medium term. Energy Policy WA have recently released the *Emergency solar management policy* paper that details the last-resort measures to assist the AEMO to maintain power system security during extreme load events.[23] This policy paper has been supported by a range of consumer and industry consultation information.[24] However, the next WOSP should also address practicality and community acceptance of any curtailment measures.

Future WOSP modelling exercises could align inputs, assumptions and scenarios used in AEMO's forecasting and planning for the National Energy Market, where it applies and is easily translatable to the WEM context.[25] In 2021–22 National Energy Market energy scenarios, AEMO modelled the impacts of economy-wide decarbonisation and the extent of transport and industry electrification that has occurred under each scenario.[26] AEMO also has a scenario dedicated to strong renewable hydrogen industry development in response to global action towards emissions reduction and international demand for renewable energy exports. AEMO's scenarios have been aligned to the International Energy Agency's World Energy Outlook 2020.[27]

As industries seek to decarbonise their activities, it is quite possible that large-scale industries located in the SWIS may seek to transition from standalone fossil fuel energy generation to electrification and connections into the SWIS. This could occur as the SWIS decarbonises and where high energy users seek to cost-effectively progress towards emission reduction targets set by their own organisation or government. Similarly, commercial and residential energy users may also seek to electrify to reduce associated emissions. Future WOSPs should consider rates of electrification of all sectors in relevant scenarios. The sectoral emissions reduction strategies will be supported by modelling to assist with determining rates of electrification of key sectors, and will be developed in consultation with the relevant portfolios, industries and stakeholders.[28]

The role of gas in the energy network and assumptions about the degree of electrification across the network were excluded from the WOSP. While the WOSP model is based on the electricity network and consumption of electricity, some assumptions should be made that model the impact gas has on electricity consumption and associated infrastructure needs over time.

Future WOSP exercises should be accompanied by a detailed short-term to medium-term implementation plan for the most likely scenario. This implementation plan should detail the current and planned investment, future locations of constraints in the network and priority projects eligible for streamlined approval processes.

Recommendation 43

Enable transformation of the South West Interconnected System by evolving the Whole of System Plan and ensuring implementation actions are transparent, including:

a. updating modelling inputs, assumptions and scenarios to incorporate the following:
   - achieving interim emissions reduction targets (once defined) and net zero emissions by 2050 targets through the lowest-cost mix of generation, storage, network transmission and distribution
   - potential renewable energy generation locations on the network, such as the Mid West, on energy network infrastructure requirements
   - electricity offtake associated with the development of new industries in line with state government industry development objectives
   - potential entry of existing off-grid large users connecting to the South West Interconnected System and rates of potential electrification across commercial, industrial and residential users
   - using technologies (such as energy storage) to reduce the curtailment of renewable energy generation, and the practicality and community acceptance of any curtailment assumptions
   - accelerated delivery of energy storage and other Distributed Energy Resources technologies, including the impacts these have on the overall energy infrastructure investment program
   - increased uptake of electric vehicles on the energy network, including increased demand for energy and energy storage opportunities from electric vehicle batteries

b. publishing a detailed short-term to medium-term implementation plan for the most likely scenario, which is updated periodically and identifies:
   - current and planned investment
   - network constraints
   - opportunities for investment in programs and projects to deliver energy transformation, including the nomination of priority projects eligible for streamlined approval processes.

North West Interconnected System

There are unique challenges in the NWIS, including large distances and high associated costs of energy network connections. Despite its name, energy infrastructure ownership is often fragmented, and operations lack coordination, with the primary energy users – the minerals, oil and gas industries – largely seeking self-sufficient power supply.

Like the SWIS, the NWIS is also expected to experience transition in the way energy is supplied and used. This may influence the extent to which the NWIS and the wider East Pilbara grids could be better connected. Major disruptors that may impact the NWIS energy landscape include industry proposals for significant new renewable energy generation and advancing net zero emissions targets, particularly by the resources sector.

As part of the Pilbara electricity reforms, the Pilbara ISOCo will have responsibility for long-term planning in the NWIS. The ISOCo will be required to develop a transmission development plan and a Pilbara Generation Statement of Opportunities every 2 years. It is expected that these reports will focus on the core interconnected elements of the NWIS, but there is potential to expand beyond this over time.

However, there is no strategic plan that sets out the long-term interplay between emerging industry and energy opportunities with infrastructure requirements in the NWIS.

It is therefore difficult to determine:

- the role and uptake of potential common user infrastructure, such as the East Pilbara Link and Burrup Common User Transmission Line, which would enable customers to benefit from reliable service through increased access to renewable energy generation
- how evolving options in large batteries, standalone power systems and microgrids may play a role for industries in the future, and potentially reduce the need for a more interconnected network
- what level of investment is required to facilitate industry growth and who should pay, while not over-investing in a network that will likely change in the future.

Recommendation 44

Provide a long-term view on energy generation, demand and network infrastructure requirements by preparing a North West Interconnected System energy futures report. The report should:

- align with interim emission reduction targets (once defined) and net zero emissions by 2050 targets
- test and resolve to what extent interconnection should occur in the system and the infrastructure needs to support this, along with any adjustments to access arrangements
- define the role of state agencies, government trading enterprises and the private sector
- support the identification of suitable sites for large-scale renewable energy generation and storage in proximity to industrial land and high energy users
- inform the evaluation of key project proposals, including the Burrup Common User Transmission Line and East Pilbara Link
- provide recommendations to align regulatory regimes to the outcomes of the report.

WA's mid and north-west regions have some of the **most significant solar radiance resources in the world**.[29] Wind speeds across the coast and inland areas are well above the thresholds required for commercial-scale renewable developments.[30] WA also has an advantage in our vast available land.



Energy storage, microgrids, virtual power plants and standalone power systems

Greater distribution, decentralisation and technological advances of energy infrastructure presents opportunities to reduce costs, emissions and energy loss through transmission, as well as increase the stability of supply. Infrastructure solutions that will help achieve these objectives include energy storage, microgrids, standalone power systems and virtual power plants.

Until emerging options such as renewable hydrogen, pumped hydro or other technologies can be realised, batteries will need to play a foundational role in energy storage to address fluctuating energy supply and demand.



Distributed battery storage is in its relative infancy in WA and elsewhere. The WA Government has recently committed $155 million towards the construction of a significant battery at Synergy's decommissioned Kwinana Power Station.[31] The battery is expected to be operational by the end of 2022.[32] At a domestic level, batteries have had significantly lower levels of uptake compared to rooftop photovoltaic systems.

By April 2021, there were fewer than 3,000 customers with behind-the-meter battery installations, with price being the primary barrier.[33] However, the cost of batteries is declining and greater distribution of large-scale, community and domestic batteries across the network could support system stability.

Energy storage, microgrids, standalone power systems and virtual power plants are being considered in several locations across the state and these should be advanced through a dedicated funding program to accelerate rollout. WA's rural and remote areas are prime recipients for these energy solutions, given their heavy reliance on expensive, emissions-intensive diesel generation. Emerging programs being established by the WA Government include registrations of interest for Western Power's first disconnected microgrid and virtual power plants at a number of schools receiving commercial batteries and solar panels.[34]

Recommendation 45

Increase energy system reliability and resilience, reduce emissions and drive cost-effectiveness by accelerating a dedicated program of energy storage, microgrids, virtual power plants and standalone power systems. The program should include:

- providing appropriate coordination and allocating funding
- identifying feasible locations across the state
- investigating future energy storage options, including hydrogen, pumped hydro, batteries and other energy storage technologies.

Energy legislation, regulation, approvals and funding

Legislative and regulatory reform

Energy legislation and regulation details how the electricity infrastructure is coordinated, approved and funded. Energy legislative and regulatory reform is led by Energy Policy WA. Previous versions of energy legislation and regulation objectives were narrowly focused and had the potential to limit energy transformation and long-term value to the end consumer. Objectives and investment tests that only focus on financial and short-term economic aspects can limit technology choices and innovation, create uncertainty for market participants, and lead to higher prices for consumers in the long term. The energy sector's ability to respond to broader government policy settings can also be constrained. For example, narrow objectives used in investment tests can create approval barriers for energy infrastructure that enables progress towards interim and net zero emissions by 2050, urban infill and industry development opportunities, such as renewable hydrogen.

In recent times, legislation and regulation has been revised by Energy Policy WA to include environmental objectives and respond to changing market conditions, particularly growth in renewable generation and facilitation of battery storage. Among many other improvements, the *Electricity Networks Access Code 2004* objectives have been updated to include non-financial considerations relating to the 'environmental consequences of energy supply and consumption, including reducing greenhouse gas emissions, considering land use and biodiversity impacts, and encouraging energy efficiency and demand management'.[35] Energy Policy WA has also recently proposed that an overarching objective be included in the *Electricity Industry Act 2004* for 'the protection and advancement of the interests of consumers (present and future) through energy services that are fair, secure and reliable, of appropriate quality, and affordable and sustainable, while also accounting for environmental considerations more broadly'.[36] This is a key step in reinforcing the related Electricity Network Access Code objective, and ensuring that these considerations inform decisions across all aspects of the Act.

The broadening of the electricity legislation and regulation objectives is a significant step towards achieving more-balanced outcomes in accessing and augmenting the electricity networks. However, Energy Policy WA will need to continue to review and revise legislative and regulation instruments to enable progress towards emissions reduction targets set for the energy sector (which will have a considerable impact on energy sector transformation and its infrastructure requirements), and other broader community and economic outcomes.

Once the NWIS energy futures report (see Recommendation 44) is implemented, NWIS-related regulation should also be reviewed by Energy Policy WA and, if required, updated and aligned with the outcomes of that report. This will ensure the regulatory framework is consistent with the government's view on energy generation, demand and network infrastructure requirements in the Pilbara. The energy market's highly dynamic nature means that the regulatory environment should be regularly reviewed to reflect a contemporary operating environment.

Legislation and regulation application

Energy legislation and regulation is applied by several energy sector stakeholders. In particular, the Economic Regulation Authority uses WEM objectives and investment tests detailed within legislation and regulation to ensure energy network investments deliver long-term value to WA consumers. As the Code objective of environmental consequences is, so far, unproven in investment tests, there is some debate about the necessary level of detail required of proponents to support proposals and how the Economic Regulation Authority will assess this information. Test cases are required to establish the operational effectiveness of the environmental Code objective, following which a review should determine if the objective is being applied in the intended manner.

Given the long-term nature of environmental consequences, these test cases should also consider medium-term and long-term horizons, beyond those that currently apply for the 5-year Network Access Arrangement, and energy scenarios such as those used in the WOSP.

Legislation, regulation and funding arrangements

Energy transformation and infrastructure, particularly new transmission lines, can be expensive to fund and deliver. New infrastructure may be required to connect renewable energy generation and storage to enable transition to net zero emissions and economic growth.

Currently it is difficult for stakeholders such as energy GTEs to obtain approval for electricity infrastructure via the Economic Regulation Authority or state government budgeting processes where costs are to be borne by the end consumer or the wider community. A symptom of the current arrangements is 'first-mover disadvantage', where one market participant may be left with no option other than to fully fund some or all electricity infrastructure, and participants who follow benefiting but bearing no cost, or a limited amount of the cost. While there are some mechanisms in place to recover costs from subsequent new customers connecting to the energy grid, payback periods may be slow or unpredictable. Where infrastructure investment is significant, such as transmission lines, the costs can be prohibitive even for large participants. Similarly, it is understood that there are some instances of 'last-mover disadvantage'. Last-mover disadvantage results where surplus capacity is absorbed by market participants without upgrading utilities. At the point of energy system constraint, the last mover is then required to fund the full upgrade.

A range of funding and financing sources should be considered to deliver energy infrastructure that enables broader public policy outcomes, such as a low-carbon future and new industry growth.

Funding and financing sources could include federal and state government, the finance sector, private industry, community and energy consumers. To explore this potential, the WA Government should establish a clear policy position on the role of government, GTEs and the private sector in funding, financing and delivering enabling infrastructure, particularly transmission lines.

Recommendation 46

Ensure the legislative and regulatory framework enables energy infrastructure that aligns with broader public policy outcomes by:

a. reviewing and revising energy legislation, regulations, codes, guidelines and associated decision-making documents and processes (particularly relating to the New Facilities Investment Test) to include the interim emissions reduction (once defined) and net zero emissions by 2050 targets, urban infill and industry development objectives in a manner that does not unduly disadvantage first or last movers

b. reviewing the effectiveness of guidance and assessment for investment proposals under the current objectives of the Electricity Network Access Code 2004, as well as the expected levels of information and analysis required from proponents.

c. consistent with Recommendation 40 in the Infrastructure delivery chapter, establishing a clear policy position on the role of government and the private sector in funding, financing and delivery of enabling infrastructure, such as transmission lines, in order to support industry growth and decarbonise the energy sector.

Hydrogen industry

The objective of developing an energy system highly dependent on renewable energy opens opportunities for the hydrogen industry that can be scaled up locally before moving into international exports. The WA Government has set a 2030 target for WA's market share in global hydrogen exports to be similar to its current share in LNG.[37] For context, in 2019, WA accounted for 12% of global LNG exports.[38]

Hydrogen is currently used primarily as feedstock for industrial chemical processes. Emerging uses include transport, heat, electricity generation and energy storage (Figure 34).[39] Renewable hydrogen (otherwise known as 'green hydrogen') is produced by using renewable electricity to electrolyse water, splitting it into hydrogen and oxygen (Figure 35).[40] As a zero-emission energy source, renewable hydrogen is expected to experience high international and domestic demand as countries seek to decarbonise energy-intensive industries and infrastructure sectors. However, blue hydrogen (produced from natural gas, coupled with carbon capture and storage) is likely to play a role as a transitional energy source, using the state's existing LNG capability, production and distribution infrastructure, and customer base to generate initial growth. This is reflective of forecasts that suggest it will take 10 to 15 years for renewable hydrogen to achieve price parity with blue hydrogen.[41]

Figure 34: Uses of hydrogen[42]

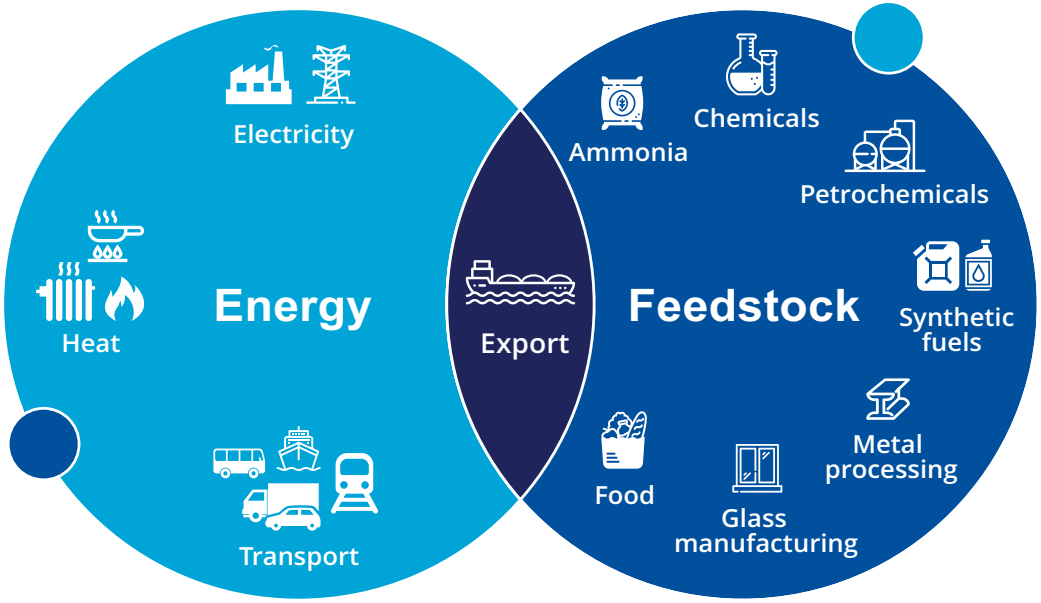
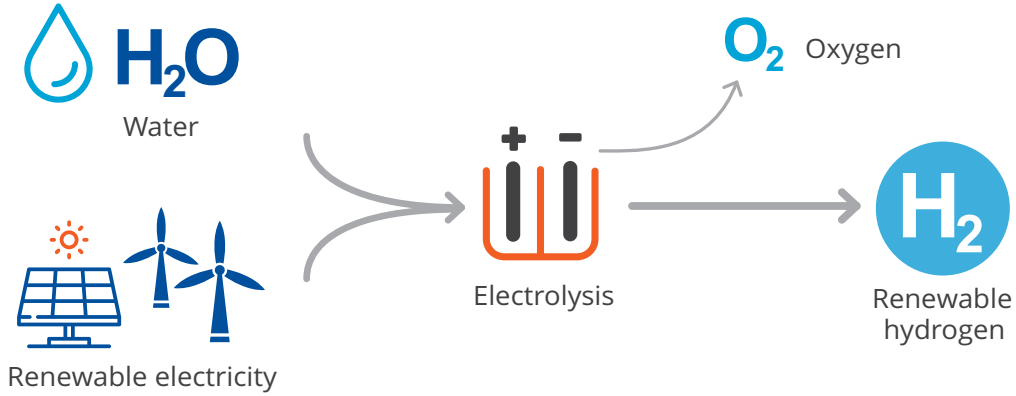


Figure 35: Production of renewable hydrogen (simplified)[43]



All hydrogen proposals should be considered in the context of interim emissions reduction and net zero emissions by 2050 targets and will need to meet expectations set in the Environmental Protection Authority's *Environmental Factor Guideline: greenhouse gas emissions*.[44]

The WA Government's *Western Australian Renewable Hydrogen Strategy* sets out a vision, mission and strategic focus areas for a future hydrogen industry.[45] Strategic focus areas include export opportunities, remote application, hydrogen blending in the natural gas network and transport.[46] Actions outlined in the strategy are now being progressed by the Department of Jobs, Tourism, Science and Innovation together with partnering organisations. These actions include a review of the state's policy and legislative framework, market sounding for hydrogen development at Oakajee and supply chain modelling to identify limitations affecting the renewable hydrogen export industry. This has been coupled with $61 million towards renewable hydrogen initiatives in the 2021–22 WA Government State Budget, which includes a fund to stimulate local demand for hydrogen in transport and industrial settings and an infrastructure plan to activate Oakajee for renewable hydrogen.[47] In addition, the federal Department of Industry, Science, Energy and Resources has produced *Australia's National Hydrogen Strategy*, which explores the country's clean-hydrogen potential and details nationally coordinated actions involving governments, industry and communities.[48]



By capitalising on its comparative advantages, WA has the potential to establish itself as a leading participant in the rapidly developing global hydrogen market. Key to this will be demonstrating lowest cost of production.[49] Initial studies have shown that co-located WA wind and solar farms, which can be used to power renewable hydrogen, are more financially attractive than co-located renewable energy generation in other jurisdictions.[50] This is due, in part, to WA's access to excellent solar and wind resources.

In a hotly contested national and global environment, government action should be prioritised with coordinated plans across state agencies and GTEs. Hand in hand with industry, the state government should continue to prepare for legislation and policy amendments and plan for a pipeline of enabling infrastructure for the hydrogen industry, including ports, roads, water and energy transmission.

The potential to connect the developing hydrogen industry into the SWIS has not yet been modelled in the WOSP. Planning for hydrogen has progressed significantly since WOSP modelling commenced and, now that more industry information is available, hydrogen inputs and assumptions should be modelled more effectively to understand the potential role of hydrogen as energy storage and an energy source for the SWIS. Preliminary investigations into enabling infrastructure for the hydrogen industry have indicated that significant planning and investment is required to expand port capacity to cater for future exports. Studies should consider:

- the most suitable zones/hubs for hydrogen production and export
- opportunities to leverage access to energy, water and transport infrastructure, a skilled workforce and market proximity
- potential volumes of supply
- infrastructure requirements and supply chain needs
- costs and benefits for renewable hydrogen in these respective locations
- land use and tenure requirements, including the consideration of suitable sites for large-scale renewable energy generation and storage in proximity to industrial land and high energy users.

Recommendation 47

Support the development of the state's hydrogen industry by:

a. accelerating the reform of legislation, standards and policies

b. investigating options for stimulating domestic market demand, as a precursor to establishing export industry demand

c. investigating the feasibility of a hydrogen refuelling network on key freight routes across the state through the planned detailed supply chain model for renewable hydrogen

d. publicly reporting the *Western Australian Renewable Hydrogen Roadmap*'s actions on an annual basis, including timing, available funding and transition pathways such as the role of blue hydrogen

e. investigating the feasibility of, and prioritising, large-scale hydrogen industry precincts that leverage energy, water and transport infrastructure, a skilled workforce and market proximity, including:

   i. consistent with Recommendation 43, developing energy consumption and generation projections for use in the Whole of System Plan modelling to determine the need for energy infrastructure to enable hydrogen precincts, such as the Mid West Transmission Line

   ii. coordinating activities for development readiness of precincts across environment, heritage, planning and tenure matters

   iii. consistent with Recommendation 40 in the Infrastructure delivery chapter, establishing a clear policy position on the role of government and the private sector in funding, financing and delivering enabling infrastructure to support the hydrogen industry (including factors such as seed funding, co-investment and cost recovery)

   iv. developing and implementing a staged program of hydrogen-industry-enabling infrastructure including publicly and privately funded upgrades or new infrastructure for energy networks, refuelling stations, water and transport infrastructure.

Water



Where there once an annual average of **420 GL** of rainwater ran into Perth dams, planning is now based on just **25 GL per year**.[1] Now more than ever, it is essential to **thoroughly understand and manage existing natural water systems**. The beneficial use of natural resources should be managed through holistic, adaptive and resilient approaches that recognise and address the competition for resources and changing availability.

What IWA heard

During consultation on the draft strategy, stakeholders expressed significant interest in water trading, which has resulted in a clearer indication that recommended legislative reforms facilitate a balanced approach to water trading. Some stakeholders queried the purpose of a state water strategy. In response, recognition is now given to the value of information in existing plans while retaining the view that government should provide long-term strategic direction for the water sector that extends beyond water-allocation planning.

While the importance of protecting strategic groundwater resources was recognised, feedback suggested that the protection of surface water was also important. In response, the definition of strategic water resources has been broadened. Stakeholders expressed concern about the recommendation relating to the review of the Jandakot groundwater system and associated land development, noting that considerations in the Strategy should be of a more strategic nature and not apply to one specific area only. In response, IWA refocused this recommendation to assess strategic values relating to water and land-use planning and broadened its application.

Stakeholders also identified a need for greater recognition of the cultural and spiritual value of water for Aboriginal people, which has been addressed in additional content and amendments to relevant recommendations.

Water is one of society's most vital commodities and the state's future economic and population growth is highly reliant on the availability and security of suitable water at an economically viable price. Major impacts of climate change on the state's traditional water sources will require increasingly innovative solutions to ensure adequacy of long-term water supply and to enable the state to sustain its economy, environment and way of life for years to come.

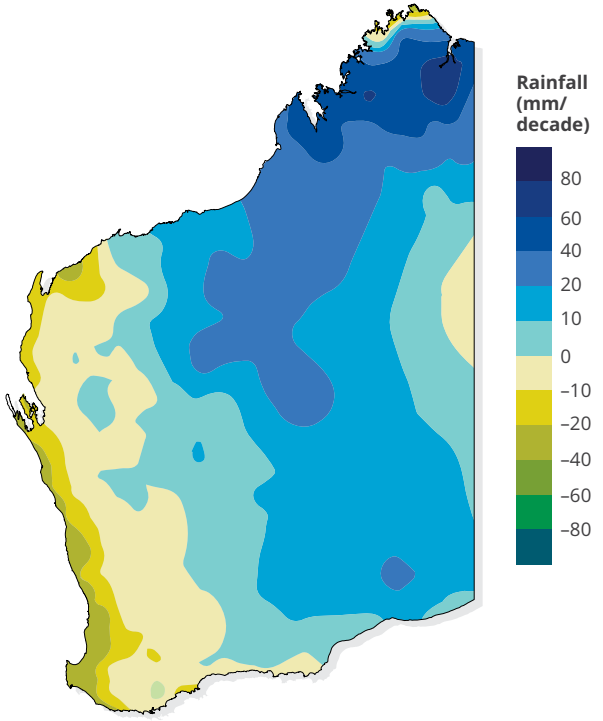
A coordinated, resilient and integrated water sector is essential for:

- ensuring water resources are sourced, allocated, distributed and used responsibly and sustainably
- ensuring a secure supply of quality drinking water to meet the demands of a growing population
- maintaining and enhancing fit for purpose water for commercial, industrial, agricultural, public amenity and liveability purposes
- providing integrated wastewater services (including treatment) to protect public health and the environment
- ensuring the efficient provision of irrigation and drainage services.

Along with population growth, economic growth and land development, climate change is now a critical consideration for water planning. Across the south-western and coastal parts of the state, a substantial reduction in rainfall trends over the past 50 years (Figure 36) has impacted availability of both surface and groundwater.

Where there was once an annual average of 420 GL of water running into Perth dams, planning is now based on just 25 GL per year.[2]

Figure 36: Trend in total annual rainfall, 1970 to 2020[3]





Since 1980, water tables across the Gnangara Mound have fallen by up to 10 metres – a 1,000 GL loss of aquifer storage.[4] The state's increasingly drying climate is driving the need to invest in alternative, climate-independent water sources, principally desalination (from seawater and other brackish sources) and recycling of wastewater. As the resilience of water resources and supply networks continues to be tested by the impacts of climate change and population growth, the need to build innovation and address resilience has never been more pronounced. Adaptive planning for future water needs is required if WA is to remain globally competitive and support population and economic growth. Compared to many other locations around the world that have experienced water supply challenges due to a drying climate, WA has performed well in ensuring an effective and affordable water supply through measures such as water efficiency, desalination plants and groundwater recharge.

An understanding of the cultural and spiritual value of water to Aboriginal people is important when planning for the management of the state's water resources. There are many studies that examine water as a feature of the Indigenous cultural landscape and pay attention to the symbolic attachment to water bodies and the role of water in connecting people. Studies also reveal the material use of water according to Indigenous custom.[5] The *National Water Reform 2020 inquiry report* has a strong focus on recognising Aboriginal and Torres Strait Islander interests in water, upholding the aspirations of Closing the Gap to maintain their distinctive relationship with water.[6] This includes targets to increase Aboriginal and Torre Strait Islander legal rights to land and waters. The first WA *Closing the Gap Jurisdictional Implementation Plan* sets out the strategies and actions to achieve these targets. The 2020 Yamatji Nation Indigenous Land Use Agreement demonstrates progress in this area, providing members of the Yamatji Nation access to and rights to trade the use of 25.8 GL of groundwater under the Yamatji Strategic Aboriginal Water Reserve, 200 km north of Perth. In November 2021, a resource company secured the first lease of 560,000 kL, realising an opportunity for the Yamatji Southern Regional Corporation to generate economic revenue from the reserve.[7]

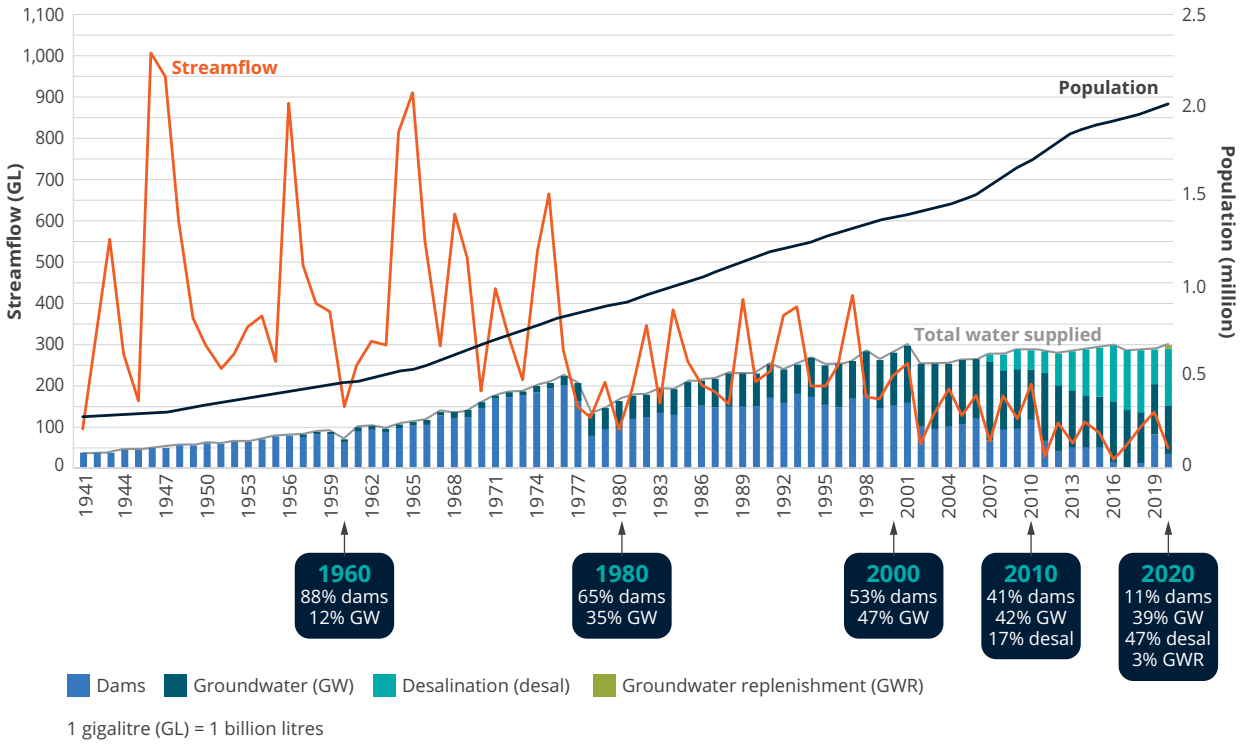
Scheme supplied water

Although it is not the only public water supply scheme in the state, the Integrated Water Supply Scheme (IWSS) is a critical, centralised infrastructure network providing water to more than 2 million people in Perth, the Goldfields and surrounding agricultural regions and parts of the South West and Great Southern regions.[8] It was originally designed to access and distribute surface and groundwater as the primary sources for potable and non-potable purposes but is now being supplemented by alternative sources. Two seawater desalination plants produce approximately 47% of the IWSS water supply, and an innovative groundwater replenishment scheme (where treated wastewater is recharged into groundwater supplies) supplements the IWSS (Figure 37). The primary source of groundwater is the Gnangara groundwater system, supplying approximately 120 GL or 37% of the IWSS drinking water per year.[9] However, it is predicted that even with successful demand management and maximum production from existing sources, a new water supply source, or increased demand restrictions, will be required within 10 years.[10]

Capital investment by the principal water service provider, the Water Corporation, across all activities, comprised 9% of the WA Government's 2021–22 Asset Investment Program, with an average annual investment of more than $750 million over the past 10 years. Commitments to water network and supply projects, which will provide greater certainty for the IWSS as it continues to be impacted by the effects of climate change, amount to approximately $497 million over the 2021–22 State Budget and forward estimates.

Major water source augmentations are expensive, with a future third desalination plant for the IWSS expected to cost well over $1 billion. Desalination and groundwater recharge are also energy-intensive and costly water source solutions. Alongside the requirement to supply water and wastewater services, service providers also need to reduce their carbon emissions and adopt low-carbon practices and technologies as they move towards meeting the WA Government's net zero emissions by 2050 aspiration. Planning for new, climate-independent water sources will need to maximise energy efficiency and source renewable energy supplies. The WA Government's 2021–22 budget aligns with this approach, with a commitment of $1.4 billion for a third desalination plant which will be fuelled by renewable energy.

Figure 37: Composition of drinking water supply by source in the Integrated Water Supply Scheme, 1941 to 2020[11]



1 gigalitre (GL) = 1 billion litres

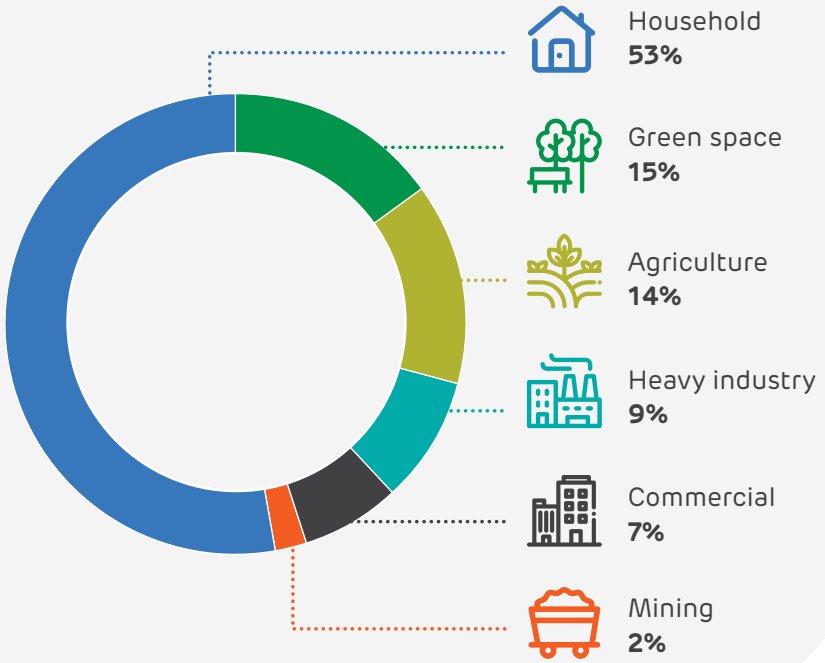
Self-supplied water

While most of the state's metropolitan water is supplied through water supply networks (generally potable), the majority of water statewide is sourced directly from the environment by the end user. Self-supplied use is where water is drawn directly by individuals, local governments and industrial, commercial or agricultural enterprises using their own water supply infrastructure, such as bores and/or dams. For example, in the Perth metropolitan area where a total of around 600 GL of water is used each year, approximately half is distributed via the large IWSS and most of the remainder involves users directly accessing their own supply of groundwater. It is estimated that garden bores collectively draw around 90 GL of groundwater taken from aquifers in the Perth to Mandurah area.[12] Self-supplied groundwater is generally used on an 'as is/where is' basis and plays an important role in supporting industry and economic growth and enhancing the liveability of communities. From 2014 to 2018, approximately 47% of total water use in Perth and Peel was attributed to uses other than household use (Figure 38).[13] In 2019–20 it was estimated that 650 GL of irrigation water was consumed within WA each year, either through self-supply arrangements or supplied by irrigation cooperatives.[14]

While urban water security is largely managed through schemes, water for agriculture is often self-supplied as groundwater or surface water under licence, although there are some areas in the state (unproclaimed areas) where water can be taken without a licence. There are also instances in proclaimed areas where exemptions may apply and where licences are not required, such as some domestic garden bores and where water is being taken from certain shallow aquifers. Statewide, water that is self-supplied by local governments, landowners and industries using their own water infrastructure comprises 65% of water use.

As a critical step in water source planning, it is essential to thoroughly understand and manage existing natural water systems. The beneficial use of natural water resources should be managed through holistic, adaptive and resilient approaches to water resource planning and allocation that recognise and address the competition for resources

Figure 38: Water used by sectors in Perth and Peel (average 2014 to 2018)[15]

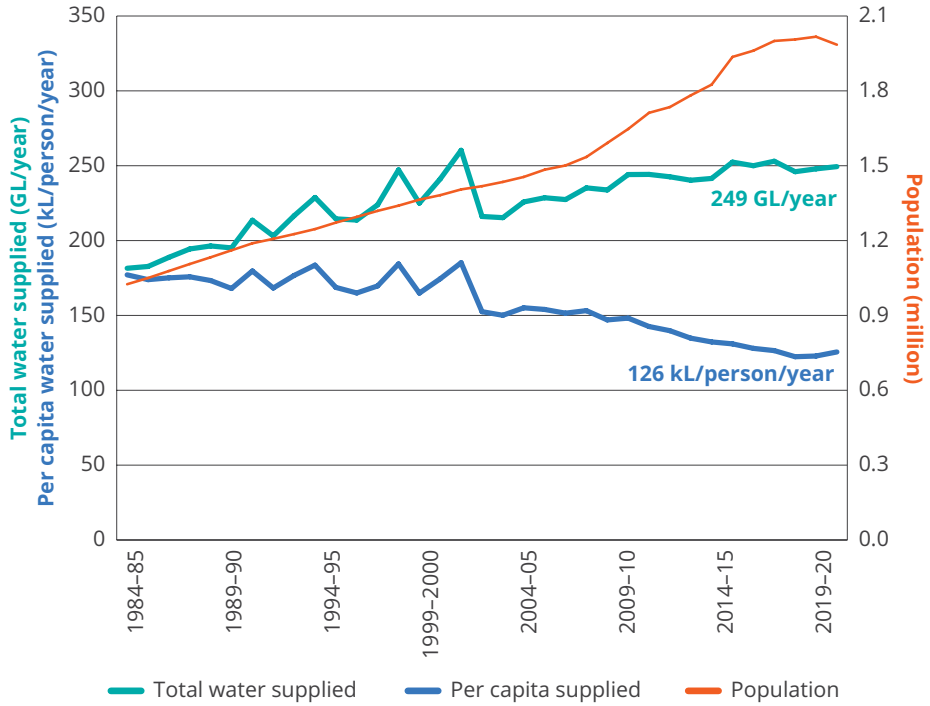


and changing availability. This is currently managed in part through the preparation and implementation of water-allocation plans. To ensure adequate and timely responses to changing circumstances, it is important that these plans are updated on a regular basis, especially for strategic water resources.

While demand management measures have been successful for scheme water (Figure 39), similar measures have not been broadly implemented for many self-supplied users.[16] There are opportunities to achieve greater

water efficiency in areas of self-supplied use, as evidenced by data that suggests that households with a garden bore use 3 to 4 times more water on their lawns and gardens than households using scheme water.[17] Robust monitoring and licensing regimes help to understand how much water is being drawn and for what uses. This is particularly important for critical water resources and those under pressure. Compliance and enforcement mechanisms for unlicensed water use are limited, presenting challenges for improving and incentivising further water efficiency gains.

Figure 39: Integrated Water Supply Scheme (total water supplied), 1984–85 to 2019–20[18]



Fit for purpose water and the circular economy

With water shortages common in Australia and other countries, there has been significant focus on the concept of fit for purpose water. This approach matches water of a certain quality to an appropriate use. *Waterwise Perth: two year action plan* acknowledges the potential of alternative (other than scheme or self-supplied water) non-potable water sources to water public open space, sporting grounds and recreational venues.[19] The plan aims for a target of 45% of the projected gap between future water demand and supply to be met by recycled and alternative water supplies, including groundwater replenishment.[20] Other jurisdictions also recognise this opportunity, with the Victorian Government exploring pricing mechanisms, innovation and infrastructure solutions that will make better use of stormwater and recycled water to support urban greening and reduce pressure on drinking water supplies.[21]

The advantages of large-scale, interconnected, urban water schemes are recognised, and the state's water entities have been successful in providing continuous and high-quality potable water to the most populated areas of WA, while also improving water efficiencies in a sector heavily impacted by a drying climate. However, as the impacts of climate change become more pronounced, it will be essential to adopt total water cycle thinking and appropriately use all available water sources, such as stormwater and wastewater, while driving more efficient practices. These opportunities and challenges will be pronounced in low-density population areas, new developments on the urban fringe, locations where there is a higher proportion of non-potable use and where large centralised systems are under pressure. Peri-urban agriculture is an example of where alternative fit for purpose water sources could supplement existing supplies. In these locations, opportunities may exist for smaller, integrated, decentralised systems to meet non-potable water needs, and for sectors that have historically depended on self-supplied groundwater to invest in systems and more effectively manage their water and wastewater. Ensuring planning and regulatory frameworks enable investment in alternative water sources will be important to optimise fit for purpose water use.



Driven by the reduced availability of groundwater and changes to environmental regulations, the Kwinana Water Reclamation Plant **recycles wastewater to supply 16.7 ML per day** of treated, industrial-grade water to industries within the Kwinana industrial area for non-potable use. This water is supplied at a lower cost than scheme water, reducing the demand on scheme and groundwater.

Pricing of wastewater services can also have an impact on the development of alternative sources of non-potable water. The uptake of infrastructure projects that produce and distribute non-potable alternatives such as rainwater, greywater and recycled wastewater has been slow for several reasons, including economic feasibility and regulatory barriers (for example, regulatory barriers to the introduction of new technologies). Wastewater services are currently priced based on gross rental values. This approach fails to recognise the true costs of service provision and leads to distortions in servicing particular geographic areas and the amount recovered through pricing. Where these distortions exist, it is very difficult to enable alternative servicing or supply models that may feasibly deliver fit for purpose water, improving long-term sustainability and enhancing circular economy outcomes. Importantly, solutions that are developed need to be, among other things, conscious of water quality (health and environmental considerations), energy use and relative costs.

In addition to fit for purpose water, opportunities exist to integrate water, energy and waste to make better use of waste products and reduce WA's carbon footprint. The Waste chapter highlights the need to reduce and reuse waste, and recognises the potential value of waste from both environmental and economic perspectives. Circular economy principles look beyond the take-make-use-dispose extractive industrial model, designing out waste and pollution and keeping products and materials in use for as long as is practicably possible and regenerating natural systems. A sustainable and circular approach to water management recognises the finite nature of water resources and the potential value of wastewater and other by-products.

While circular economy concepts such as water recycling, reuse of waste by-products and conversion of waste to energy are already being adopted to some extent in WA, there is no indication whether there is a long-term objective to realise the full potential of a circular economy in the water sector. This could include recovery of nutrients or other beneficial products from waste streams, such as phosphate for use in fertiliser or magnesium from desalination plant brine. Potential efficiencies can reduce environmental impacts and evidence-based assessments should be used to identify where circular economy options are beneficial. To fully embrace the circular economy concept, a major step change would be required across several sectors and may require changes in legislation.

Bunbury Water Resource Recovery Scheme

As part of its Integrated Water Management Strategy, Aqwest is implementing the Bunbury Water Resource Recovery Scheme, with $14.1 million allocated from the state government's WA Recovery Plan.

The scheme will provide 5.6 ML of recycled water per day to irrigate public open spaces in Bunbury and to use on major infrastructure projects such as the Bunbury Outer Ring Road.

The project involves construction of a new water recycling facility, adjacent to the Bunbury Wastewater Treatment Plant, and associated pipelines. This will alleviate the need to draw high-quality drinking water from the Yarragadee Aquifer (which is experiencing reduced recharge due to a drying climate and associated saltwater intrusion) and reduce the amount of treated wastewater discharged into the ocean.

Valuing the 'true cost' of groundwater resources (such as environmental impact and long-term sustainability), as compared to the current low economic cost of extracting and treating groundwater, remains a challenge.

WA Government support in responding to community expectations for sustainable water use practices has allowed this step forward in integrated water management in Bunbury.

Coordination and collaboration with multiple stakeholders, including the City of Bunbury, Water Corporation, Main Roads WA, and the departments of Health, and Water and Environmental Regulation, is set to bring benefits to both public and private sectors, delivering a more sustainable water future and a greener Bunbury.



The National Water Initiative provides guidance on best-practice water pricing including how to set tariffs in circumstances where there are large monopoly water service providers and an absence of water trading.[22] Principles include (but are not limited to) cost recovery, 2-part tariff structures, cost-reflective tariffs and pricing transparency. In its assessment of jurisdictions' performance against these benchmarks, Infrastructure Australia found that WA pricing was lacking in transparency and that there was insufficient evidence to determine whether prices are set to meet full cost recovery.[23] A more transparent approach to the cost of water supply and wastewater services, and how it relates to water pricing, would enable a better understanding of the true value of water, wastewater and the impacts on consumer behaviour.

A clearly articulated statewide direction for the water sector, integrated with other sectors, would support a **coordinated and contemporary approach to water management** and guide the way WA accesses and uses water.

In its *Reforming urban water* report, Infrastructure Australia identified the importance of the separation of powers between owner, operator and regulator for best-practice regulation and efficient service delivery. Between the water regulator and water service providers in WA, the lead entity for various policy and planning matters is not always well defined, evidenced by the range of planning documents outlined in Figure 40.

A range of agencies are involved in environmental regulation and, according to Infrastructure Australia's assessment, this sometimes results in conflict that may be restricting the ability to meet best practice. Further to this, while the Economic Regulation Authority, as the independent economic regulator, plays a role in licensing, it only has a limited review and advisory role in price setting.

Legislation, regulation and planning

There is currently no contemporary, long-term, statewide direction for the water sector. The last state-level water strategy has not been refreshed for 14 years. In the past, water government trading enterprises (GTEs) produced comprehensive long-term planning documents, such as Water Corporation's Water Forever suite. These plans play an important role in setting the direction for the water service providers to plan their infrastructure and service delivery programs. They should not, however, be mistaken for the government's strategic position on the state's long-term water future. As GTEs, water utilities are corporate entities with specific commercial objectives. It is important for the government, through its primary water policy agency, to provide strategic direction and guidance for water utilities and other water sector participants. A strengthened water policy and planning function (dealing with economic, social and environmental factors) within the Department of Water and Environmental Regulation is required to complement its regulatory and environmental role. This will provide appropriate planning for changing climatic, economic and social conditions throughout the state and consideration of circular economy and sustainability principles.

To further enable a progressive, resilient water sector, a modern legislative framework is required. Water resource legislation is currently complex and comprises 6 separate Acts – some more than 100 years old. While some reform measures have been progressed, there is further work to be done to develop a framework that is flexible, progressive and capable of managing water today and in the future. Legislative reform should provide the regulatory framework to deliver the state's long-term strategic water aspirations.

Governance

The IWSS is the largest water supply scheme in WA and delivers 298 GL of water per year to more than 2 million people. Other major schemes managed by the Water Corporation include the Great Southern Towns Water Supply Scheme, the Lower Great Southern Towns Water Supply Scheme and the Goldfields and Agricultural Water Supply Scheme (which is part of the IWSS).

Beyond the major schemes and water GTEs, several smaller suppliers provide drinking water to the public in parts of regional WA. Examples include local governments, resource sector companies and those supplying drinking water to remote Aboriginal communities.

The water sector is highly regulated to ensure water resources are managed sustainably, environmental impacts are controlled, consumer interests are protected and drinking water quality standards are maintained. However, not all services are regulated, with some service providers explicitly exempted from licensing requirements, such as in some remote communities, local governments and tourism developments. Key water regulators in WA include:

- **Department of Water and Environmental Regulation** is responsible for the sustainable management and protection of water resources, including preparation of strategies, policy and regulation.
- **Economic Regulation Authority** manages licensing of water services, including issuing licences, monitoring compliance and ensuring appropriate customer service mechanisms are in place. The state government can refer matters to the Economic Regulation Authority to conduct inquiries. In 2017, the Economic Regulation Authority conducted an inquiry into efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water.
- **Department of Health** regulates health-related elements of drinking water, wastewater and recycled water according to the *Australian Drinking Water Guidelines*. All recycled water schemes must be approved by the Department of Health in accordance with the *Health Act 1911*.

Licensed water service providers deliver services that include distribution of potable and non-potable water, water treatment and storage, wastewater and wastewater treatment, and drainage. The state's primary water services are provided by the following GTEs:

- **Water Corporation** is the state's principal licensed water service provider, servicing an area of 2.6 million square kilometres ranging from Perth to Kalgoorlie and parts of the South West and Great Southern regions. It owns and manages the IWSS.



- **Aqwest** is a licensed water service provider servicing the Greater Bunbury region, which extends from Myalup and Harvey in the north, and south to Capel.
- **Busselton Water** is a licensed water service provider servicing the Busselton area, which extends from Capel in the north, and south to Augusta.

In addition, large volumes of irrigation water are supplied by licensed irrigation cooperatives in the South West, Gascoyne and Kimberley regions.



Recommendations

Legislation, regulation and planning

Current regulatory and legislative frameworks have not kept pace with important improvements in modern water resource management and should be reviewed to support the uptake of new technological advancements and the application of a sustainable and circular approach to water services.

Existing legislation contains limited tools to empower the regulator to establish and enforce water allocations and trading arrangements that support the movement of water to its most valuable use. Provisions do not adequately enable creation of statutory water entitlements nor facilitate adjustment of available water volumes to accommodate changing conditions (for example drought or long-term climate change). More secure water entitlements, coupled with regulatory mechanisms to protect non-economic beneficial uses, such as water for public open space and cultural purposes, would encourage investment in water licence transfers and result in water moving to its highest value use. Allowing for trading of water in projects operating under existing state agreements, where there are opportunities to reuse excess water from mining operations for other beneficial uses, should also be addressed. Reforms should enable new water management approaches, such as treatment of wastewater, reinjection into the ground and recovery as a resource, as well as provide longer-term security of allocations and entitlements for water users.

Successive state governments since 2007 have been progressing a suite of reforms; however, this has not yet resulted in a contemporary and consolidated Water Resources Management Act. Review and consolidation of the suite of water resources management legislation, including the *Rights in Water and Irrigation Act 1914*, should be progressed as a matter of priority. These changes are required to support contemporary water management practices, more efficient investment in water sources and use, improved management of population growth, enhanced ability to deal with changes to practices and technology and better protection of the condition of water resources.[24]

While it is recognised that water sector participants undertake a raft of planning activities, there are gaps in the published strategic planning framework that make it difficult to navigate and the framework would benefit from a clearer, long-term, statewide direction (Figure 40). There is a need to consider the state's long-term water future, explore how efficiencies can be achieved through sector integration and plan for future economic uses, particularly in relation to emerging water-intensive industries such as hydrogen production. A statewide water plan was last released in 2007 and has not been refreshed since. Strategies, initiatives and targets identified in this plan should be reviewed and updated to set a contemporary vision for water in WA. Strategically important water resources such as those experiencing strong competition for allocation, those that are critical to communities and industry and/or those that have significant environmental or cultural value, should be defined and identified in a state water strategy.

Regional water strategies are also outdated, do not cover the full extent of the state's regions and do not adequately address the contemporary needs of regional communities, industries and agriculture. It is important for government (as a water service provider), communities and businesses to have increased certainty of their water security through robust planning that is based on up-to-date evidence and considers local circumstances and needs. Regional water plans should identify how water for communities and businesses will be delivered and managed, how economic prosperity will be supported and how social, cultural and environmental values of water will be balanced and protected. The *Waterwise Perth: two year action plan* has a vision for 2030 and a 2-year action plan that is strongly focused on metropolitan water efficiency measures and proposes welcome planning and policy review measures. It would be worthwhile applying a similar approach in regional areas and extending this beyond urban considerations.

What people use water for is just as important as how much water they use. Planning and regulatory frameworks should support the preservation of existing, good-quality water for drinking purposes by enabling investment in appropriately scaled, decentralised systems that distribute water for fit for purpose non-potable uses, including agriculture. The frameworks should consider infrastructure provision proactively to ensure that servicing proposed land developments are given early consideration of source availability (particularly for watering of public open space). This will help achieve long-term sustainability and resilience of WA's water supply networks. Furthermore, the current pricing structure for wastewater and drainage services introduces distortions that may be obstructing the development of innovative, low-cost water recycling schemes.

Figure 40: Recently published strategic water plans



***Waterwise Perth: two year action plan* (DWER 2019)**
Regions: Perth and Peel
Planning horizon: 2-year plan with a 10-year outlook
Focus: Water efficiency



Water Forever suite (Water Corporation 2009+)
Regions: Perth and Peel
Planning horizon: 50 years
Focus: Climate resilience, reduce water use, increase water recycling, develop new sources



***Water for growth: urban* (DWER 2016)**
Regions: WA's cities and towns
Planning horizon: 35 years
Focus: Urban water demand and supply



Regional water supply strategies (DWER)
Regions: Kimberley (2010), Pilbara (2013), Great Southern (2014), Mid West (2015), South West (2015)
Focus: Medium-term and long-term resource options

Recommendation 48

Modernise legislative, regulatory and planning frameworks for water resources and water services by:

a. prioritising the development and introduction to Parliament of consolidated and modernised water resources management legislation that:
   - supports contemporary, best-practice and responsible water resource management
   - improves the definition and security of water entitlements
   - facilitates a balanced approach to water trading (including addressing barriers in state agreements)
   - responds to evolving conditions such as climate change
   - considers the cultural and spiritual value of water to Aboriginal people when making allocation or other resource decisions

b. developing, publishing and implementing a 20-year state water strategy, in collaboration with all relevant stakeholders, including Aboriginal groups, that:
   - considers economic, social and environmental factors, including population growth, industry needs (such as growing a hydrogen industry) and key shocks and stresses, including climate change
   - defines and identifies strategic water resources
   - sets objectives and measurable targets to achieve long-term water security for the state, considering circular economy principles and multi-source water planning
   - identifies appropriately scaled solutions (local, decentralised or large scheme) that deliver optimised outcomes
   - articulates a planning and policy framework, identifying the roles of all levels of government, the water services sector and the private sector to support state development objectives
   - is reviewed and refreshed on a 5-year cycle

c. developing, publishing and implementing 10+ year regional water plans (including for Perth and Peel) in collaboration with all relevant stakeholders, including Aboriginal groups, that:
   - align with the state water strategy, regional land use plans and other relevant policies
   - respond to the economic, social and environmental drivers and issues of each region
   - consider outcomes of the strategic review of water and land-use values (see Recommendation 53)
   - are based on up-to-date science and evidence
   - address water allocation and supply, and set out infrastructure and investment requirements
   - are prioritised according to level of risk and need and are refreshed on a 5-year cycle

d. including provisions in planning and regulatory frameworks that enable investments in appropriately scaled, locally integrated alternative water supplies and wastewater systems

e. consistent with Recommendation 26 in the Planning and coordination chapter, clearly articulate water resource needs, drainage and infrastructure requirements in land-use and infrastructure servicing plans. Planning should ensure that:
   - there is early consideration of the locational availability of water resources and servicing options so that the real capital and operational costs to government are known before making planning decisions
   - opportunities to collaborate with the energy sector to plan, access and/or generate renewable energy solutions are identified
   - opportunities to use integrated water cycle planning approaches at a community level are adopted to match demand with the most appropriate source of water that is available.

Demand management

Effective water resource management is essential to safeguard the productive and sustainable use of existing water sources, particularly where WA's natural water resources are under pressure from reduced rainfall and recharge and a range of consumptive uses. In addition, significant ecosystems are dependent on groundwater and require careful management. Responsible management of natural water resources can potentially defer the need to invest in costly, climate-independent water supply infrastructure such as desalination plants.

Reducing water use is a critical element of long-term water management. A range of efficiency programs and campaigns to reduce use of scheme water have already been implemented in WA with considerable success. Water demand management programs such as Waterwise (established by the Water Corporation) have been successful in reducing consumer use of scheme water, using a range of initiatives such as sprinkler rostering, educational programs and incentivisation of water-efficient appliances in homes and businesses. The Water Corporation's Waterwise programs should not be confused with the *Waterwise Perth: two year action plan*, which is a plan for Perth to address the drying climate by changing the way water is managed in the urban landscape and to transition Perth to a waterwise city. The success of the Waterwise programs is easily understood, as scheme water is a product in a commercial model that is measured and charged accordingly.

Pricing is also a lever that can influence water use behaviour. The National Water Commission found that consumption-based pricing in other jurisdictions has contributed to a 'consistent pattern of reduced water consumption'.[25]

Where users access water directly through self-supply, the same pricing levers are not available. While it is acknowledged that self-supplied water does not have the benefit of scheme treatment and is generally only suitable for non-potable uses, in the interest of managing such a critical resource, self-supplied water (in the context of all users), should be appropriately valued. Applying measures that lead to the highest value use of the resource would be a responsible approach. There are a range of existing and potential mechanisms, such as licensing and allocation, metering, compliance, charging and water trading, that should be further considered. Any proposed reforms should take into consideration the need to support non-economic beneficial uses, such as public amenity, cultural values and environmental protection.

The Gnangara groundwater system is Perth's largest and lowest-cost source of good-quality water. In 2019–20, approximately 275 GL was drawn from the Gnangara system, of which 40% was used by Water Corporation for potable water distribution through the IWSS.[26] The remainder was drawn directly by self-supplied users – 13% by unlicensed stock and domestic bore users and 47% on licensed use for public open space and recreation, agriculture and businesses.[27]



As climate and other factors place the Gnangara groundwater system under increased pressure, it is important that land-use and water-allocation planning adapts and keeps pace. The last publicly available allocation plan for Gnangara was released in 2009, but in November 2021 the WA Government released the draft Gnangara groundwater allocation plan for public comment.

This plan estimates that to protect groundwater levels and maintain a reliable water supply, there is a need to reduce groundwater abstraction by 54 GL per year over the next decade.[28] To safeguard this critical water resource, it is necessary to finalise and implement the plan to successfully rebalance water use and availability.

Recommendation 49

Support the long-term sustainable use and management of the state's strategic water resources by:

a. reviewing self-supply arrangements for strategic water resources (as identified in the proposed state water strategy) across the state, with the Gnangara groundwater system as a priority, to:
   - quantify the amount of water being used for self-supply purposes from each strategic water source, through monitoring and metering
   - understand the economic, environmental, cultural and social value of each strategic water resource to the region and the state
   - understand future use scenarios and any impacts on the timing and scale of major investment in future water supply infrastructure, such as desalination plants
   - consider possible policy and regulatory approaches that could be implemented to ensure long-term sustainable outcomes
   - outline mechanisms to achieve improved water-use efficiency (such as improved licensing, metering, pricing, trading and compliance measures)

b. based on the outcomes of the review in Recommendation 49a, implementing recommended reform measures

c. finalising and implementing the Gnangara groundwater allocation plan.

Recommendation 50

Manage water demand by:

a. reviewing and implementing the *Waterwise Perth: two year action plan* to further improve urban water efficiency

b. developing and implementing plans, similar to the *Waterwise Perth: two year action plan,* for regional areas where benefits can be demonstrated

c. implementing and, where necessary, introducing expanded water efficiency programs, such as the water government trading enterprises Waterwise programs, to offset the development of new water sources

d. reducing water consumption through education and improved consumer awareness, including by increased use of smart meters, and applying digital technologies to optimise asset performance.

Long-term climate-independent water security

While protection of groundwater systems is essential, there is a recognised need to plan for climate-independent water sources to supplement surface and groundwater sources to ensure WA's long-term water security.

The Perth and south-western coast water security initiative is listed on Infrastructure Australia's *Infrastructure priority list 2021* as a high-priority initiative. It highlights the need to consider the impacts of declining groundwater availability for non-potable uses on urban liveability. As a result, development where alternative water supplies are needed may be constrained or more costly.

Investigations into alternative water sources, such as additional desalination plants, wastewater recycling and groundwater replenishment programs, should identify sustainable and cost-effective ways to augment supply.

With the mix of supply now including an increasing amount of costly desalinated water, the true cost of water, along with sustainability and resilience benefits, should be considered when undertaking feasibility and options assessments.

Recommendation 51

Ensure long-term water security through the timely planning and delivery of climate-independent infrastructure that provides fit for purpose and sustainable water services, including:

a. continuing detailed planning and business case development for an additional desalination plant to increase the volume of desalinated water supply to the Integrated Water Supply Scheme and meet medium-term demand projections. Planning and business cases should demonstrate how the use of renewable energy and the application of energy-efficient design, technologies and practices are being used to achieve a target of net zero emissions by 2050

b. further investigating wastewater recycling opportunities and groundwater replenishment schemes

c. based on needs identified in the proposed state water strategy and regional water plans (see Recommendations 48b and 48c) and subject to business cases, implementing climate-independent water supply solutions in regional communities as required.



Water for agriculture and food

Providing water for agriculture and food production is complex, particularly considering the state's diverse climate and water resource availability.

Water is a critical input for agricultural production and plays an important role in food security. Traditional agrifood regions are under increasing pressure to both maintain and grow existing production levels.

While climate change, and in some cases urban encroachment, are impacting the water availability in the south-western portion of the state, some eastern areas are constrained by water quality issues where most of the available water is too saline for agricultural production. Other areas, particularly in the north of the state, have both land and water resources that could support new agrifood production but require significant investment in technology and infrastructure projects to realise the opportunities.

New and alternative water sources and distribution networks should be considered to improve the industry's resilience to the impacts of climate change. This should be supported by a focus on sustainable farming techniques and modern on-farm water infrastructure to ensure water efficiency and industry self-sufficiency. It is also important to support the network of community water supplies managed by the state government, which provide emergency stock water, reliable supplies for firefighting and irrigation of regional sporting facilities and community greenspaces.

Evidence-based analysis is required to assess competing proposals for agricultural water infrastructure projects. A strategic assessment framework is needed to determine priorities based on potential value to the state, assessing viability and sustainability, and considering social, economic, environmental and cultural impacts. This will provide certainty for agribusiness, boost economic development in regional communities and support robust decision-making that may help to access funding assistance, including private agribusinesses and federal funding opportunities.

Recommendation 52

Guide investment in water infrastructure projects that enable climate resilient and self-sustainable agriculture and food industries in peri-urban and regional areas by developing a prioritisation framework. The framework should:

- be consistent with regional water planning (see Recommendation 48c)
- prioritise investment in locations that are strategically aligned with agriculture and food industry opportunities (see the Regional development chapter)
- consider social, economic, environmental and cultural impacts and opportunities.

Strategic value of land use and water

The availability of urban land for development is diminishing, particularly in the Perth metropolitan area. Much of the remaining land has some form of development constraint, including the protection of public drinking water source areas. While the importance of maintaining adequate supplies of drinking water is critical, consideration of the strategic value of water sources and land should be integrated. Water-protection measures and land-use responses should be based on risk assessments that are informed by current and robust scientific evidence, contemporary development and building techniques, and strategic valuations of land and water in the current and projected demand and supply context.

Public drinking water source areas are surface water catchments and groundwater resources that provide drinking water to cities, towns and communities throughout the state. There are many of these areas across WA, some of which are under pressure for land development due to their proximity to high-quality infrastructure and urban amenity, such as the Jandakot and Gnangara groundwater systems. The Department of Water and Environmental Regulation's policy on development in these areas notes a presumption against the intensification of land uses, to which the land-use planning system responds. The framework for the protection of public drinking water resources is extensive and includes instruments such as legislation, strategic policies and water quality protection notes. These instruments guide and assign priority areas to land within public drinking water source areas to protect the source from contamination.

This priority is reflected in the land-use planning system to ensure that public drinking water source protection areas are considered at all stages of the planning process. A suite of state planning policies protect public drinking water source areas from development and land uses that may have a detrimental impact on the water resource.

These policies address protection of all public drinking water source areas, the Peel Harvey coastal plain catchment, the Swan Canning river system and sensitive water resources. These policies are intended to ensure that planning and development considers water resource management, with an emphasis on the prevention of risks to water quality.

With growing pressure on urban land availability, an integrated strategic evaluation of water and land values is needed to develop a balanced and strategic level understanding of risks and benefits, and to inform the land-use and water-protection policy framework, including the preparation of integrated regional plans (see Recommendation 28) and regional water plans (see Recommendation 48c). Such an evaluation should be undertaken collaboratively by WA Government agencies that are responsible for land-use planning and the protection of public drinking water source areas, in consultation with relevant GTEs. The clear articulation of government's strategic position will optimise land-use outcomes while ensuring secure provision of good-quality water for generations to come.

Recommendation 53

Determine whether current policy settings remain appropriate by undertaking an integrated strategic review of water and land-use values in the Jandakot and Gnangara groundwater protection areas. The review should consider:

- balancing costs, benefits and risks across all economic, social and environmental factors
- a strong up-to-date expert evidence base
- contemporary building and development options to adequately mitigate any risks to groundwater quality
- climate change factors
- the future role of the groundwater systems as part of the Integrated Water Supply Scheme's broader water supply over the medium to long term, including potential alternative water supply options.



Waste



WA is **increasingly avoiding and recycling waste**, but much more needs to be done to achieve the state's waste reduction and recovery targets.

What IWA heard

During consultation on the draft strategy, stakeholders raised the need for stronger action to drive economy-wide transition to a circular economy. In response, content and recommendations have been amended to prioritise the legislative and regulatory reforms required to enable widespread adoption of circular economy principles in WA.

To provide greater certainty for planning and investing in modern waste and recycling infrastructure at scale, the waste and recycling industry sought clearer and faster time frames on the implementation of waste legislative and regulatory reforms to reposition waste as a resource and continue to develop markets. This has resulted in the addition of new sub-recommendations for a market development plan and reform roadmap, and the timing of relevant recommendations has been reconsidered.

The potential for the mining and resources sector to improve waste recovery was highlighted, which could also help build the scale and feasibility of regional recycling services and infrastructure in some areas. This is now reflected in amendments and a new sub-recommendation.

Waste management is one of society's most essential services, protecting our health and environment. However, approaches to managing waste are changing as the world moves towards a circular economy. Waste should no longer be seen as something worthless that is simply discarded in landfill. It is a resource with economic value that can be turned into something new. WA needs to progress policy and legislative reform and market development to create the conditions for a circular economy, and plan and invest more in infrastructure to meet the state's waste recycling and recovery needs.

Western Australians are increasingly recycling and minimising waste, but WA is falling well short of meeting targets to reduce and recover value and resources from its waste streams.[1] Much more must be done to achieve the state's vision for a sustainable, low-waste circular economy.[2]

The Australia-wide waste export bans announced in 2019 brought to public attention the significant amount of waste WA produces and the state's lack of capacity to meet waste management needs. WA lags behind South Australia (85%), Australian Capital Territory (79%), New South Wales (68%) and Victoria (68%) in its rate of resource recovery (62%).[3] WA needs to ensure the necessary planning is done to modernise and invest in the services and infrastructure required to transition much faster to a circular economy.

Countries around the world are transforming their economies from a traditional take-make-use-dispose economic model into a circular economy (Figure 41).[4]

The circular model is based on the premise that all areas of the economy should be designing out waste and pollution, and continually reusing materials where possible. Not only does this reduce the impact on the environment and the amount of waste going to landfill, it also allows us to keep extracting value and resources from products after we have consumed them and helps achieve greenhouse gas reduction targets. New technologies and processes for waste and resource recovery, and increasing rates of processing and value-adding, will drive the need for new and additional circular economy waste infrastructure.

Put simply, WA must avoid, reduce and repurpose much more of the high volume of waste that we generate. The transition to a circular economy will spur innovation to turn waste into useable materials and products, require new knowledge and skills, and create new business and job opportunities across the economy.

Figure 41: Circular economy[5]



Facilitating and accelerating this transition requires technological and policy innovation as well as new infrastructure. The Australian Academy of Technology and Engineering's 2020 report, *Towards a waste free future*, concluded that technology and policy innovation are essential to overcoming existing economic and regulatory barriers, and that Australia's skills and social readiness for innovative solutions in the waste and resource recovery sector is high.[6]

The Commonwealth Scientific and Industrial Research Organisation's *National circular economy roadmap for plastics, glass, paper and tyres 2019* identified multiple pathways that need to be pursued simultaneously to drive this change.[7] These include:

- improving product design, collection and sorting outcomes to design out waste and pollution while retaining the quality and value of materials and prevent material loss
- building capacity for reprocessing and manufacturing of recycled products, which also increases the ability to create wealth from waste domestically
- encouraging and facilitating market development to grow the circular economy, including boosting market demand for recycled products and products that contain recycled content
- harmonising standards, regulations and messaging across jurisdictions to provide consistency in governance and create sustainable materials management capability in Australia
- facilitating systemic change from linear to circular material supply chains that foster sustainable consumption and production.

The waste sector, communities, businesses and all levels of government have important roles to play in driving transition to a circular economy.

National frameworks are being implemented to support the transition to a circular economy and will consequently drive the requirement for adequate and improved waste and recycling infrastructure in WA. Frameworks such as the *National Waste Policy Action Plan 2019* and product stewardship schemes for televisions, computers, batteries and solar panels have been agreed to by state and territory governments, to be regulated under the national *Recycling and Waste Reduction Act 2020* (Cth).[8] Importantly, these frameworks and associated actions and funding also aim to assist market development for waste-derived materials. It is expected that the Australian Government will begin to require the use of recycled content in infrastructure projects as a condition of funding to promote demand for waste-derived materials.

The WA Government's Waste Avoidance and Resource Recovery Strategy 2030 (WARRS 2030), released in 2018, guides the state's waste sector and sets out a suite of actions to avoid waste and move to a circular economy.[9] WARRS 2030 is a robust strategy, reflecting international best practice and providing the context for IWA's waste infrastructure recommendations.

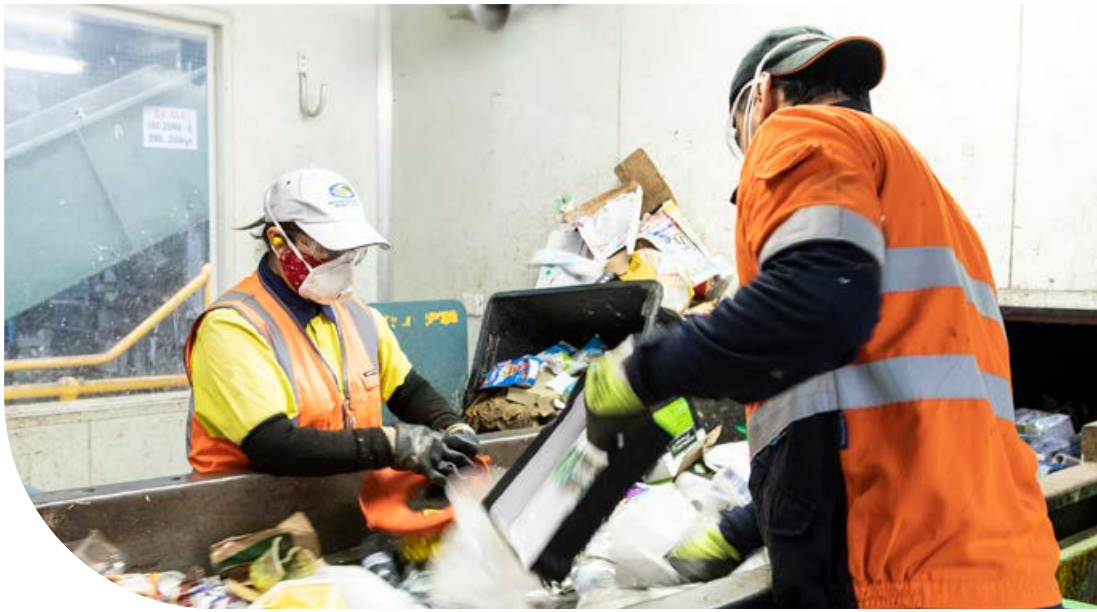
WARRS 2030 builds on WA's previous waste strategy, *Creating the right environment*, released in 2012. Both strategies set firm targets for waste avoidance, recovery and environmental protection across the 3 key waste streams: municipal solid waste, commercial and industrial waste, and construction and demolition waste. Table 3 shows the waste targets and WA's performance in achieving them.[10] Significant improvement has been achieved in reuse of construction and demolition waste, but not enough progress has been made in avoidance and recovery of municipal solid waste and commercial and industrial waste. In some cases, reuse has even declined. Much more must be done to achieve WA's waste targets.

WARRS 2030 identifies a set of focus materials that, by weight, make up more than 90% of the waste generated in WA, and in which significant improvements must be made to reach the targets. They include:

- construction and demolition materials: concrete, asphalt, rubble, bricks, sand and clean fill
- organics: food organics and garden organics
- metals: steel, non-ferrous metals, packaging and containers
- paper and cardboard: office paper, newspaper and magazines
- glass: packaging and containers
- plastics: packaging and containers
- textiles: clothing and other fabric-based materials
- hazardous waste.

WARRS 2030 also sets out several actions to improve waste management and foster a circular economy in WA, such as investigating options to promote local markets for recycled products and developing better practice guidance and standards for waste-derived products.[11] It includes undertaking a strategic review of WA's waste infrastructure (including landfills) by 2020 to guide future infrastructure investment and establishing mechanisms including funding approaches to support investments in local infrastructure.[12] It also identifies the need to investigate and report on the application of the circular economy in WA.[13]

Current attitudes and behaviours about waste and waste-derived materials can be a significant barrier to achieving a circular economy.



Education and awareness-raising initiatives and policy and legislative settings play important roles in changing habits and adopting approaches to reduce and reuse waste. The Waste Levy is an important policy instrument that was established to improve waste recovery by increasing the cost of landfill disposal to make avoiding and recycling waste more economically attractive alternatives to landfill.[14] Also, 25% of the funds generated from the Waste Levy are to be used on a range of waste and environmental initiatives.[15] Review of the Waste Levy is necessary to ensure it continues to be an effective tool in diverting waste from landfill, improving recycling rates and driving behaviour change.

WA's geographic size, relative isolation and distance to markets add to the challenge of coordinating and providing services and infrastructure across the state. Low densities and long transport distances in regional areas make it difficult to achieve economies of scale to undertake recycling, and vast areas make it easier to illegally dump waste which reduces the amount available for recovery.

Table 3: Western Australia's performance in meeting WARRS 2030 waste targets

Year	Metro municipal solid waste	Major regional centres	Commercial and industrial	Construction and demolition	Statewide recovery rate	Per capita generation (kg per person)
2010–11	39%	–	28%	31%	31%	2,764
2011–12	39%	–	41%	38%	38%	2,658
2012–13	45%	–	45%	39%	40%	2,486
2013–14	41%	–	45%	38%	39%	2,659
2014–15	39%	30%	53%	42%	42%	2,452
2015–16	36%	31%	48%	64%	49%	2,029
2016–17	32%	28%	48%	77%	52%	1,787
2017–18	37%	28%	47%	75%	51%	1,769
2018–19	34%	29%	51%	81%	57%	1,852
2019–20	31%	28%	44%	81%	58%	2,168
State targets 2020	**65%**	**50%**	**70%**	**75%**	**–**	**–**
State targets 2025	**67%**	**55%**	**75%**	**77%**	**70%**	**–**
State targets 2030	**70%**	**60%**	**80%**	**80%**	**75%**	**–**

Notes: Figures from 2019–20 are from data collected under regulation 18C of the Waste Avoidance Resource Recovery Regulations. Figures before 2019–20 are from the Waste Authority's *Recycling activity in Western Australia* annual reports, except municipal solid waste performance (major regional centres) which is from the annual census of Western Australian local government waste and recycling services. Some historical data has been revised. The data presented here supersedes all previous versions. Excludes one major regional centre due to data verification issues.

A key challenge is building enough local demand for recycled products to underpin the commercial viability and growth of a domestic recycling industry, such as:

- new products made with recycled plastics
- electronics that can be reused or new products made with materials recovered from electronic waste
- construction materials that can be reused or new products made with recycled content
- compost made with recycled organic waste
- items that are difficult to recycle, including bulk wastes such as solar panels and furniture that can be reused.

Investment in research and development will be necessary to develop products, processes, technologies, and standards and specifications to build confidence in and markets for products with recycled content. Implementing the *Waste Data Strategy*, which is a supporting document of the WARRS 2030, will also be important to improve waste data collection and reporting.[16] Providing a more granular understanding of material sources and flows will help identify opportunities to improve waste management performance and develop recycled products.

Landfills will continue to play an important role, even as WA transitions to a circular economy. WA has hundreds of landfills and the Auditor-General's 2020 report *Waste management – service delivery* notes that many are poorly managed, which impacts on the environment and the amount of waste recovered.[17] Better practice guidelines and additional resourcing are needed to lift standards and undertake compliance enforcement.[18]

WARRS 2030 acknowledges that waste-to-energy plants have a narrow role as the least preferred alternative to disposal to landfill as they reduce the amount of waste available for recycling. Accordingly, WARRS 2030 contains a target to recover energy only from residual waste from 2020. As noted in the Waste Authority's position statement on waste-to-energy released in 2020, to maximise material recovery, energy recovery should only be used for residual waste once better practice source separation approaches have been exhausted.[19] This is also consistent with advice from the Environmental Protection Authority provided in its 2018 assessment report, *Report 1623 – waste-to-energy projects*, which made recommendations on restricting waste-to-energy feedstock to residual waste.[20]

Improving waste management in remote Aboriginal communities and town-based reserves is needed to realise **environmental health, liveability and environmental benefits** and potentially create business and employment opportunities.

Ineffective waste management in many remote Aboriginal communities is a significant issue. Approximately 12,000 Aboriginal people live in 274 remote Aboriginal communities across WA.[21] Waste management in these communities is often not adequately managed, for a range of reasons, such as poorly defined roles and responsibilities, difficulty in servicing isolated communities and lack of funding to provide effective services. In collaboration with Aboriginal communities, priority action is required to implement a sustainable waste management model that addresses impacts on the environment, and the liveability and public health of Aboriginal communities. In the Aboriginal cultural heritage, wellbeing and enterprise chapter, IWA has made a recommendation to clarify, as a priority, the roles and responsibilities of entities responsible for provision of municipal services, such as waste management, in remote Aboriginal communities and town-based reserves (see Recommendation 9). A collaborative approach to addressing this issue also has the potential to provide training, employment and business development opportunities for Aboriginal communities.

Governance

All levels of government, as well as the private sector, are involved in the waste sector (Figure 42). In WA the sector is regulated by the WA Government.

The *Waste Avoidance and Resource Recovery Act 2007* and the *Environmental Protection Act 1986* are the state's principal mechanisms for waste regulation. There are 3 WA Government entities responsible for waste management:

- Waste Authority, which provides advice to the Minister for Environment and is responsible for implementing the WARRS 2030 and the administration of the Waste Avoidance and Resource Recovery Account, which holds funds collected through the Waste Levy
- Department of Water and Environmental Regulation, which is responsible for implementing programs and policies under the direction of the Waste Authority and ensuring that priority actions in the WARRS 2030 action plans are undertaken
- Environmental Protection Authority, which is responsible for undertaking environmental impact assessments and processing works approvals and licences for waste facilities that are defined as prescribed premises under Schedule 1 of the *Environmental Protection Regulations 1987*.

Local governments are responsible for collecting and managing municipal solid waste, either on a council-by-council basis or through a regional arrangement. The private sector provides waste management services and owns and operates much of the waste infrastructure across WA.

Figure 42: The waste sector



Case study

Roads to Reuse pilot project



The Roads to Reuse program highlights the opportunity for state and local government and the private sector to use recycled products to support the state's recycling targets and transition to a circular economy.

Roads to Reuse supports the supply of recycled construction and demolition products that meet strict specifications to manage risks of contaminants, such as heavy metals and asbestos. Transport infrastructure projects, including road construction, present opportunities to procure and use significant amounts of recycled products, such as Roads to Reuse products.

The Waste Authority, Department of Water and Environmental Regulation and Main Roads WA, with support from the Department of Health and the Waste and Recycling Industry WA, successfully delivered the Roads to Reuse pilot project.[22] The pilot used over 30,000 tonnes of recycled construction and demolition products in the Kwinana Freeway Northbound Widening project and Murdoch Drive Connection project.[23] Following the successful pilot, more than 50,000 additional tonnes were used by Main Roads WA prior to the end of 2020–21.

Under the program, material supplied must meet the Roads to Reuse product specification – recycled road base and recycled drainage rock – to ensure protection of human health and the environment.[24] Construction and demolition product recyclers are required to undertake rigorous sampling and testing to demonstrate that the material meets the specification.[25] Independent audits of recyclers' processes and products provide additional assurance to purchasers.[26]

Main Roads WA has found that Roads to Reuse material is strong and durable and reports time (and labour) savings during construction and potentially reduced transport impacts and costs due to recyclers being close to construction sites. Main Roads WA is also satisfied with the robust environmental assurance framework, including the independent audit, which provides consumers with confidence to use recycled products.

A number of major infrastructure projects are underway across WA, and several state agencies and government trading enterprises (GTEs) have made commitments to purchase recycled materials to develop recycling markets and support the state's waste targets. For example, DevelopmentWA has committed to producing waste management plans for projects with demolition works over $1 million and development projects over $5 million.[27] Main Roads WA has also committed to using over 200,000 tonnes of crushed recycled concrete on selected projects.[28]



Recommendations

Waste Avoidance and Resource Recovery Strategy 2030

Expediting waste reforms and market development

The waste sector is highly regulated and government will need to progress a number of reforms to create the conditions necessary for community, government and business to transition to a circular economy. The government has several levers it can pull to drive change, such as waste legislation, procurement, planning, education programs, financial incentives, waste data collection and reporting, and local government waste plans.

This Strategy recommends expediting legislative and regulatory review and reforms to enable circular economy principles to be applied, such as:

- review of the *Waste Avoidance and Resource Recovery Act 2007* to reposition waste as a resource
- development of a waste-derived materials framework to provide for the safe use of recycled products
- implementation of the Waste Data Strategy to provide a more detailed understanding of WA's waste streams.

Both government and the waste and recycling industry have roles to play in building new markets for waste-derived products to underpin the growth and sustainability of recycling industries. Developing viable markets will be necessary to support the economic feasibility and scale of the recycling services and infrastructure needed to process the large volumes of waste generated across the waste streams. To support this, government and industry will need to work together to prepare and implement a market development plan for waste-derived products, as this will require a level of planning and coordination that individual businesses will be unable to manage on their own.

Businesses that manufacture recycled products, such as compost from organic waste and construction materials from demolition waste, should undertake marketing and promotion to stimulate consumer demand across the economy for their products. Government can also play a leadership role through its procurement power to 'lead by example' and help drive market development of waste-derived products by setting targets for state agencies and GTEs to procure more environmentally sustainable and locally produced recycled products. The Roads to Reuse project highlights the potential to use recycled construction and demolition waste in infrastructure projects.[29] A range of opportunities to promote sustainable procurement could be explored, such as:

- establishing infrastructure requirements or incentives for using building or fit-out materials or products that include recycled content or are already existing and can be reused rather than sourcing new materials (for example, office furniture)
- specifying targets in building and infrastructure projects led by state agencies and GTEs for the construction industry to source materials and products that can be reused or contain recycled content (for example, major road projects)
- specifying 'design for disassembly' (for example, modular design) requirements for new and redeveloped public infrastructure projects such as schools, community housing, hospitals and special projects
- establishing longer-term waste management contracts to improve commercial viability and reduce the risk to businesses of investing in more-innovative and larger-scale waste and recycling infrastructure.

The introduction of the Waste Levy in the Perth metropolitan area has been a highly effective tool for increasing material recovery. Reviewing its application to include other regions, where it is practical and feasible to do so, would provide a financial incentive to increase waste recovery, on the basis that complementary waste recycling services and infrastructure are available to provide alternatives to landfill. The waste and recycling industry will require a forward schedule of changes to the Waste Levy and time frames for their implementation over the medium term to allow them to determine what they mean in practice and be ready to comply with the changes when they come into effect.

While WARRS 2030 is supported by annual action plans, businesses require enough time to find innovative ways to reuse waste as a resource, and to expand, upgrade and purchase infrastructure to meet any regulatory changes or requirements, such as changes to the Waste Levy. To help businesses plan and prepare for changes, they need early information and guidance on procedures, policies, infrastructure, operational requirements and timings to inform their planning and investment decision-making. As such, a longer-term roadmap to accompany WARRS 2030, which sets out the sequence and time frames for reform and market development, would provide industry with greater confidence to undertake the longer-term planning and investment in infrastructure that will be needed to meet WA's needs. More of the funds generated from collection of the Waste Levy should be used to resource the reforms and market development required to fast-track the implementation of WARRS 2030 and subsequent infrastructure investment.

Mining and resources sector waste and infrastructure

Minerals and energy comprise 94% of state merchandise exports, generated by hundreds of active onshore and offshore mining and resource projects across WA.[30] These projects generate a significant amount of waste and infrastructure throughout their lifecycle. While the mining and resources sector is not a focus of the WARRS 2030, waste and infrastructure recovery and recycling within the sector could contribute to the vision for a sustainable, low-waste circular economy.

Resource sector mining, refining and processing sites generate a variety of wastes such as organics and packaging from worker camps, hydrocarbons, batteries, tyres, conveyor belts and concrete rail sleepers (referred to below as 'site waste'), although there is limited data available on actual volumes and materials. Currently, sites are managed under legislation that does not obligate operators to recycle their waste. They are allowed to manage waste on site.

The remoteness of many sites and difficulties in transporting waste to recycling facilities is a challenge. However, expectations about pursuing environmental, social and governance principles are increasing, and continuing to manage waste in this way is becoming much less acceptable. This Strategy recommends that opportunities be investigated in partnership with the resources sector to normalise the way resource sector waste is regulated and managed to improve environmental outcomes and help build economies of scale in regional locations where it is practical and feasible to recover waste.



The mining and resources sector also produces significant industrial by-products from mining, refining and processing that have applications with commercial potential. However, resource companies are restricted from selling industrial by-products, as they may be considered as waste under current legislation. For example, mining residues have potential for reuse for a variety of applications, such as roadworks, and could replace the use of virgin materials, but they are currently required to be stockpiled on site, which can impact on the environment and lifespan of facilities. Establishing a waste-derived materials framework is a critical first step in repositioning waste as a resource, opening the potential of the resources sector and industry generally to exchange by-products where safe, and to build the consumer confidence in recycled products that is necessary for a circular economy. Such a framework would provide certainty about when waste-derived materials are no longer considered waste, and licensing for premises (and infrastructure) would not be required under the *Environmental Protection Act 1986*. It would also provide clarity on when Waste Levy requirements are not triggered and encourage the use of waste-derived materials in markets while protecting the environment.

Oil and gas projects also require significant infrastructure, such as oil and gas rigs and sub-sea structures such as wellheads and pipelines, which require decommissioning once operations have ceased. It is estimated that US $40.5 billion in decommissioning work needs to be undertaken on Australia's offshore oil and gas infrastructure, over half of which needs to commence within the next 10 years.[31] Infrastructure will require decontamination and removal, and there will likely be opportunities to reuse equipment that is still in working order as well as to recycle large volumes of material such as steel, concrete and plastics. Collaborative approaches may be required to manage the scale and complexity of decommissioning work to enhance cost-effectiveness and environmental outcomes. Facilities located near oil and gas fields, such as those off WA's north-west coast, may be required to enable infrastructure to be brought ashore to be processed before being reused, recycled or disposed. Local businesses may also have the potential to export the specialised expertise developed through undertaking this work to meet the growing need for decommissioning in South East Asia and around the world.

Local government collaborative arrangements

Local governments are responsible for managing municipal solid waste and most local governments in the Perth and Peel regions and in Greater Bunbury have collaborated to form regional councils to consolidate waste management services and infrastructure to achieve economies of scale and consistency of service delivery. However, not all local governments in the Perth and Peel regions participate in regional councils. The WA Government should investigate whether this fragmentation of regional arrangements is potentially a risk to the cost-effective provision of waste services and infrastructure. There may also be further opportunities for local governments in regional areas to collaborate through collective arrangements. As noted in the Auditor-General's report *Waste management – service delivery*, a 'lack of infrastructure planning and accurate waste and recycling data, along with guidance on better practice waste recovery has left local government entities to plan and manage community waste based on their own local needs and available infrastructure, which may not be consistent with the state's own plans and objectives'.[32] The state waste infrastructure plan, discussed below, will provide a basis to consider further opportunities for consolidation in the context of WA's future waste management needs.

Recommendation 54

Achieve the vision of a sustainable, low-waste circular economy by accelerating implementation of the Waste Avoidance and Resource Recovery Strategy 2030, including:

a. prioritising and expediting legislative and regulatory reforms, including:
   i. reviewing the *Waste Avoidance and Resource Recovery Act 2007* to reposition waste as a resource
   ii. developing a waste-derived materials framework that enables the recovery of materials derived from waste and provide for their safe use in products with recycled content
   iii. reviewing the Waste Levy, including the rate and geographical application to regional areas where feasible and practical
   iv. reducing Waste Levy avoidance and evasion practices
   v. implementing the Waste Data Strategy to improve waste data collection and reporting to provide a more detailed understanding of WA's waste streams
b. preparing a waste-derived materials market development plan that sets out actions required to grow demand for products with recycled content
c. strengthening the role of the WA public sector in supporting the circular economy through government procurement policies that set ambitious and progressively increasing targets to avoid and reduce waste generation, increase recovery and reuse of materials and purchase products with recycled content
d. presenting a clear roadmap and time frames for the implementation of waste legislative and regulatory reforms (see Recommendation 54a) and market development (see Recommendations 54b and 54c), and increasing the use of the Waste Levy funds to fast-track implementation
e. investigating opportunities to improve the way mining and resources sector site waste is regulated and managed to increase recovery
f. investigating the potential for more local governments to participate in collective arrangements to enhance the provision of waste services and infrastructure, and whether local governments not participating in collective arrangements undermines the provision of cost-effective waste management services and infrastructure.

State waste infrastructure plan

Additional metropolitan and regional waste infrastructure will be required as communities, industries and their waste recovery and recycling needs grow. WARRS 2030 stipulates development of a state waste infrastructure plan to identify long-term, statewide waste infrastructure needs. The plan would address the type and scale of waste processing infrastructure required in each region of WA. A draft waste infrastructure plan was prepared in 2014 but not released. The timeline in WARRS 2030 proposed that this would be completed by 2020, but this is now behind schedule. The plan is required urgently by government and the waste and recycling industry to help them inform planning and investment decisions and guide siting of infrastructure. This is especially relevant given national and state policy and legislative changes regarding the circular economy and waste-derived materials frameworks.

China's announcement in 2017 that it would ban all solid waste imports from 1 January 2021 highlighted the amount of waste Australia not only generates but how much it exports, because of the inadequate recycling capacity across the country. In response, the former Council of Australian Governments banned the export of waste plastic, paper, glass and tyres to accelerate action to reduce waste and stimulate a domestic recycling industry.[33]

The Australian and WA governments are now working with the private sector to modernise and expand recycling infrastructure across WA, with $70 million in joint funding announced in February 2021 to assist the development of new private facilities to recycle waste tyres, support electronic waste collection and recycling, reprocessing and sorting of plastics, and process waste paper and cardboard.[34]

The state waste infrastructure plan will need to consider population, commercial and industry trends and include a detailed analysis of material flows to identify capacity gaps for processing specific waste materials and where infrastructure should be located to meet needs and optimise logistics and costs. It will also be required to identify specific infrastructure to meet needs, such as:

- waste transfer stations and materials recovery facilities across Perth and regional areas, which will become increasingly important aggregation points for waste materials, and to sort and pre-process materials before they are sent to recycling and remanufacturing facilities in or outside WA
- recycling facilities to process wastes where there are viable domestic markets for recycled products
- facilities to store bulk waste items, such as office furniture and play equipment, until opportunities arise for reuse
- facilities to support electronic waste initiatives and product stewardship schemes, given the anticipated growth of digital and renewable energy technologies such as solar panels and rechargeable batteries and the state ban on electronic waste from landfill by 2024.

The state waste infrastructure plan should also consider:

- management of hazardous waste that can be processed in WA, including clinical-related waste (most clinical-related waste resulting from medical, nursing, dental, pharmaceutical, skin penetration and other clinical activity is transported interstate)
- risk and contingency planning that identifies approaches to mitigate risks factors that could impact on WA's waste management capacity, such as disruptions caused by waste infrastructure failure or the inability to transport waste due to road or border closures caused by shock events such as pandemics or natural disasters
- support for the increased recovery of resources sector mining, refining and processing site waste where it is feasible and practical to do so.

Avoiding poor planning outcomes will be important, as demonstrated by the siting of 2 proposed waste-to-energy plants very close to each other in Perth's south-west metropolitan region. As more players enter a growing waste recovery and recycling market, the state waste

infrastructure plan will be needed to help secure strategic sites with appropriate separation distances to protect existing and future facilities and support collocation synergies to service the waste streams.

From IWA's perspective, it is difficult to identify waste infrastructure priorities in the absence of a state waste infrastructure plan. IWA therefore recommends its preparation and implementation as a high priority.

Recommendation 55

Guide long-term planning and development of waste infrastructure by prioritising finalisation of a state waste infrastructure plan. The plan should include:

- identifying infrastructure required by material type and geographic location (at regional and sub-regional level, including remote areas and Aboriginal communities) and considering population growth and commercial and industry development trends
- considering the infrastructure required to manage and recover site waste from the mining and resources sector, in collaboration with the sector
- identifying infrastructure required to manage hazardous wastes and clinical-related wastes that are feasible to process and recycle in WA
- developing a clear implementation plan and public reporting framework that:
  - prioritises implementation findings to inform infrastructure decision-making
  - includes actions for government and industry to work together to identify and secure strategic sites and separation distances to protect existing and future waste infrastructure facilities and support opportunities for collocation.



Transport



In January 2021, there were approximately **2.3 million vehicles registered in WA** for around **2.7 million people**.[1] Meanwhile, the percentage of children who walk or cycle to school has declined from 75% in the 1980s to 20% in 2021.[2]

What IWA heard

During consultation on the draft strategy, there was broad support from stakeholders across the wide range of issues and recommendations. Stakeholders commented on the need to focus on strategic trends, better planning and non-build elements, and for these to flow more directly into the selection and preliminary assessment of a new longer-term program of large transport infrastructure projects. There was strong support for changes to the current Transport Portfolio governance arrangements.

Some feedback noted a link between proposed reforms and the hypothecation of motor vehicle licence fee revenue and fuel excise. There is a need for any such reforms to ensure ongoing adequate support for regional and local government roads, along with improved resilience, road maintenance and road safety programs, which has been reflected within this chapter.

In response to feedback on the importance of walking and new e-mobility devices, such as e-scooters and e-bikes, the focus on cycling infrastructure and design has been broadened. Stakeholders highlighted the continuing emergence of low and zero emissions vehicles and the optimal roles of the public and private sectors in harnessing opportunities in this area, and this has been explored further.

Transport networks and infrastructure across WA's more than 2.6 million square kilometres connect Western Australians to jobs, services and social opportunities. From passenger transport, which connects people and places, through to freight transport, which moves materials and produce to export and delivers vital supplies to remote communities, the state's transport system is essential to its collective economy and wellbeing.

Government aims to provide a safe, efficient, resilient, accessible and sustainable transport system. To do so, transport networks and infrastructure must be effectively integrated across modes (including road, rail, active, air and maritime), efficiently linking people to employment centres, housing, schools, universities, hospitals and tourism attractions. Achieving this goal requires a highly coordinated approach and alignment between WA's transport planning, investment, delivery, operations and governance arrangements.

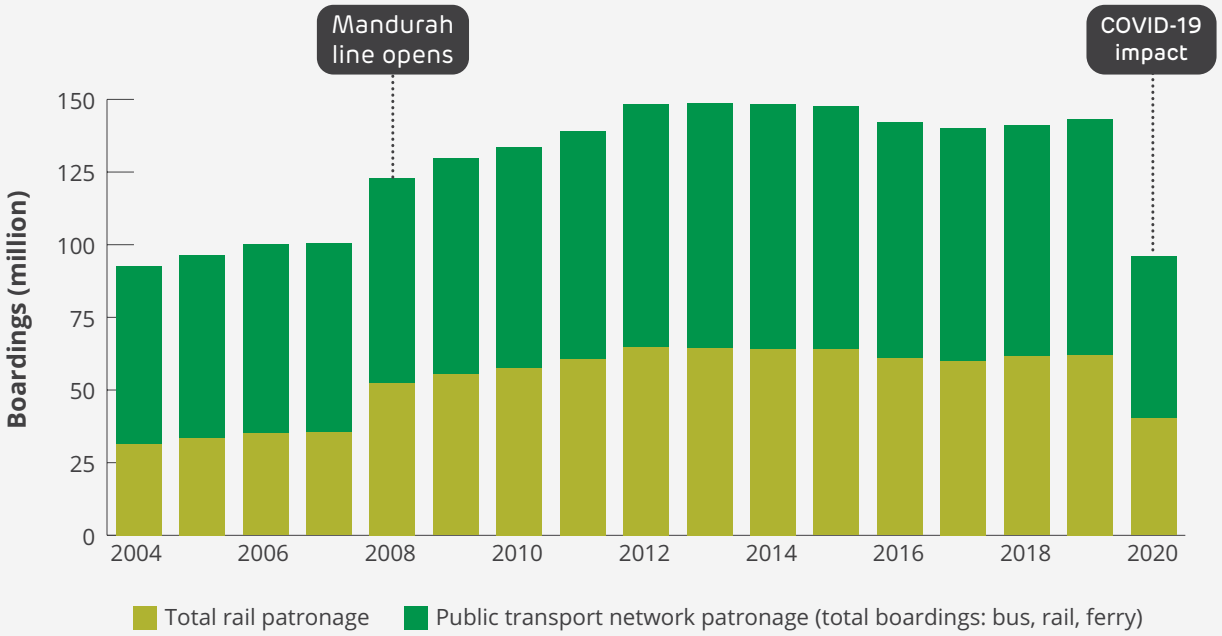
Transport forms a significant part of the WA Government's Asset Investment Program (AIP). In the decade to 2019–20, annual average road and public transport expenditure was $1.4 billion – almost one-quarter of the total public sector expenditure.[3] This increased to $3.3 billion or 41% of the AIP in the 2021–22 mid-year review, in line with the WA Recovery Plan and increased investment in roads and METRONET.[4] Transport investment will also form approximately 45% of the AIP from 2021–22 to 2024–25. It is critical that investment on this scale has an integrated, coordinated approach to optimise long-term public benefit.[5] WA can learn the lessons from costly, build-dominated infrastructure interventions in other jurisdictions by focusing on improving the efficiency of its existing infrastructure through demand management, smaller efficiency-enhancing projects and alignment of infrastructure development with long-term land-use planning. Smart investment in the sector presents opportunities for increased transport sector productivity, reductions in carbon emissions and new service delivery models to achieve desired outcomes.

As well as opportunities, the transport sector faces a number of challenges in the 20-year time frame of the Strategy. These challenges include congestion, reductions in public transport patronage, the scale of the state's transport network, road safety, technological change and, at times, a fragmented approach to transport governance and investment.

Transport infrastructure must respond to increased congestion resulting from population and economic growth, particularly in Perth. The cost of peak period congestion – increased travel time, reduced access to services and reduced economic output – was estimated at $1.5 billion per annum in 2016, increasing to $3.6 billion per annum by 2031.[6]

A current challenge in achieving efficient network operations is the widening gap between reductions in public transport patronage and network expenditure.[7] Patronage on the Transperth system has fallen from a peak of over 148 million trips in 2013 to 96 million in 2020, a reduction of approximately 30%, with patronage relatively flat between 2012 and 2019.[8] Much of this decline is attributable to the COVID-19 pandemic, which has clearly compounded this issue both in Perth and in many other cities around the world. Any ongoing significant decrease in patronage will likely lead to larger operating subsidies across the network. Conversely, road use has increased to above pre-COVID-19 levels (Figure 43).[9]

Figure 43: Transperth annual public transport patronage, 2004 to 2020[10]



Technological change is impacting almost every aspect of the sector across both the passenger and freight network. The advent of low and zero emissions vehicles, such as electric and hydrogen vehicles, are poised to significantly alter fuel consumption and road funding.[11] The choice and uptake of micro-mobility devices such as electric scooters and bicycles are increasing, and smart road infrastructure is having a positive impact on road efficiency and safety. New transport concepts such as mobility-as-a-service models have the potential to change how people travel. While it is not possible to accurately forecast how much the technology trajectory will impact road networks and public transport in the long term, WA must be prepared to respond, ensuring regulatory frameworks and infrastructure keep pace to deliver a well-functioning network.

The geography of the state also provides a challenge. Regional transport connections are vast, though often with lower demand. Roads are the most important, and often the only, link between regional communities and other centres. This is particularly relevant for remote Aboriginal communities who can be isolated both socially and geographically as a result of seasonal weather conditions. Maintaining a safe and efficient road network across the state is challenging and expensive. A significant amount of the road trauma occurring in WA takes place on regional roads and the WA road toll is high compared with

other Australian jurisdictions. Continuing to improve the safety of regional roads, in line with the Road Safety Strategy for Western Australia 2020–2030, should be a priority.

The resilience of WA's transport network is vital. Adverse events can lead to transport network failure or place additional pressure on a constrained selection of transport modes. As an example, flooding during the wet season can cause frequent road closures in the Pilbara and Kimberley regions. Similarly, recent bushfires have closed major interstate transport links between WA and South Australia. This can have serious impacts on access to regional and remote communities for passenger and freight traffic. It is important that efforts are made to increase the resilience of the critical infrastructure that underpins the network, and that greater consideration is given to planning for redundancy and network flexibility. The WA Government is working to achieve these transport goals across multiple transport agencies. In addition to the state's commercialised port authorities, WA's Transport Portfolio agencies – Main Roads WA, Public Transport Authority and Department of Transport – can sometimes operate with unaligned objectives. For example, the 3 entities use different systems for public transport and road system planning, which limits the strategic development of the state's transport system. The importance of coordination and governance has previously been recognised through various historic organisational structures. While the creation of the Office of Major Transport



WA's transport networks should move towards a **mobility-as-a-service** model to integrate journeys across all transport modes.

Infrastructure Delivery in 2020 demonstrated progress towards improved cross-agency transport infrastructure delivery in WA, further reform is needed.

In terms of opportunity, WA is well positioned to take advantage of demand for its exports from the emerging global consumer class.[12] To maintain international cost competitiveness for export products, WA needs to ensure its diverse freight and supply chains operate efficiently and minimise costs for business and consumers. Studies that complement the development of a metropolitan supply chain, linked to a new container port in the Fremantle Outer Harbour through Westport, will be integral to this.

Perth Airport is a critical transport hub, facilitating international, interstate and intrastate economic activity and trade. Longer-term planning should consider the planned expansion of Perth Airport and the potential location for a new international airport to cater for long-term growth in demand.

Collisions on regional roads contribute to a significant proportion of WA's road trauma. Progressing regional road safety treatments will contribute to achieving the state's target of **reducing serious road trauma by 50–70% by 2030**.[13]

Options should also be considered for future general aviation needs of the state, as growing urban development around the busy Jandakot Airport may potentially constrain its expansion.

The transport sector's contribution to carbon emissions is also significant.[14] A combination of technological improvements, better integrated planning and a stronger uptake of active and public transport can reduce emissions and simultaneously enhance economic and social outcomes.

The transport recommendations in this chapter have been arranged according to 5 central transport themes:

- governance and planning
- demand management
- mobility
- technology
- industry productivity and freight.

Governance

The WA Government Transport Portfolio comprises:

- Department of Transport
- Main Roads WA
- Public Transport Authority
- 5 port authorities (Kimberley, Pilbara, Mid West, Fremantle and Southern) that report directly to the relevant Minister.

The Department of Transport is responsible for integrating and enhancing the state's transport operations, regulatory functions and policy development across transport modes. Its functions include:

- vehicle, boat and driver licensing and registration
- regulation of aviation
- coastal infrastructure planning
- on-demand transport
- freight, ports and boating facilities
- transport and urban planning
- marine safety and emergency response.

Main Roads WA is responsible for the planning, operation and maintenance of state-owned roads (including bridges, tunnels and railway crossings) and provides some funding and oversight for local roads. It also manages traffic signals and signage. The state-owned road network includes approximately 18,600 km of road, valued at $44 billion.[15]

Public transport in WA is operated through the Public Transport Authority's Transperth division (metropolitan bus, rail and ferry) and various regional train and coach services. Perth's rail operations are operated directly by Transperth, while bus services are contracted to private providers. Regional services are operated through TransWA and TransRegional. The WA Government owns the rail freight network across the south of WA, although this is under a long-term private lease with Arc Infrastructure until 2049. The lease contract is managed by the Public Transport Authority.

Most of the investment in the transport network is planned and delivered though Main Roads WA and the Public Transport Authority. The Office of Major Transport Infrastructure Delivery, comprising teams from the Public Transport Authority and Main Roads WA, was established in May 2020 to better coordinate the delivery of infrastructure projects valued at more than $100 million.

METRONET has been established as a separate office within the Transport Portfolio to drive the government's commitment to expansion of the passenger rail network. Similarly, the Westport Office has been established to progress planning to deliver new container port facilities.

WA's 5 port authorities are responsible for oversight of port operations and strategic planning, with significant private sector participation and ownership of assets within port boundaries.

Case study

Transport for NSW



In New South Wales (NSW), the Department of Transport, trading as Transport for NSW, is responsible for overall governance of transport systems.

Transport for NSW was formed in November 2011 to take responsibility for all non-service delivery aspects of transport system administration in NSW, including policy, planning and funding allocation.[16] It absorbed the responsibilities of previous agencies, such as the State Transit Authority (bus service operator), the Public Transport Ticketing Corporation and transport-related functions from the NSW Department of Planning and Infrastructure.[17]

Over time, new entities such as Sydney Trains, Sydney Metro and NSW Trains were established within Transport for NSW.

In 2019, NSW Road and Maritime Services was incorporated into Transport for NSW and ceased to exist as a separate statutory body. Road and Maritime Services stated this transition would 'better integrate broader transport services with roads and maritime infrastructure to improve the lives of our customers and communities'.

The integrated structure of Transport for NSW and its responsibility for all transport modes supports a focus on cross-modal, long-term future transport planning. The agency has developed the Future Transport 2056 strategy and vision to assess transport needs for a projected NSW population of 12 million people by 2056.[18]

For further information, refer to www.transport.nsw.gov.au.



Recommendations

Governance and planning

Portfolio governance and funding

To meet integrated transport needs over the next 20 years, WA needs a strategic, mode-agnostic approach to transport network planning and delivery across all modes of transport. Interstate and international examples demonstrate a range of potential options to achieve this, from internal reforms to full-scale structural changes. While some initial progress has been made through the creation of the Office of Major Transport Infrastructure Delivery, further reform is needed. The portfolio is also undertaking a collaborative approach to developing a future Perth transport model to improve strategic metropolitan planning.

Income of approximately $1 billion per annum from the licensing of motor vehicles is hypothecated in the State Budget process for investment in road-related projects.[19] Other transport projects, including much of WA's public transport, compete with other state agencies and government trading enterprises for funding on an annual basis. The certainty of revenue flow has allowed Main Roads WA to take an effective, strategic approach to long-term planning of road infrastructure, although the guaranteed income stream has, in many cases, prioritised road projects that focus on motor vehicles. Recently, motor vehicle licence funding has been allocated to support level-crossing road works associated with METRONET. While the design and allocation of other funding sources (for example, fuel excise and traffic infringement revenue) is important to support improved transport outcomes, more consistent and longer-term allocation of motor vehicle licence funding to other transport mode projects will better enable delivery of overarching, portfolio-based transport plans and better address road congestion.

As WA's population continues to grow, it will be important to harness opportunities to balance the investment in diverse transport options, such as the current investment in METRONET, while still providing appropriate maintenance funding for the existing network, including regional and local government roads. This will require further change in existing governance and funding arrangements, with a focus on achieving safety, efficiency, accessibility, resilience and sustainability outcomes for the portfolio and supporting improved land-use outcomes in WA.

Recommendation 56

Ensure investment in transport infrastructure delivers improved transport system outcomes by:

a. further reforming governance arrangements for the Transport Portfolio to achieve an integrated, strategic, mode-agnostic approach to transport network planning and delivery across all modes of transport

b. reforming funding hypothecation legislative arrangements for motor vehicle licence revenue to fund the planning and delivery of priority projects across all transport modes, not only road-related infrastructure.

Planning

Transport Portfolio agencies and port authorities have specific, independently developed infrastructure investment plans. Significant benefits can be achieved if a system-wide approach is taken to plan and prioritise transport investment. Transport infrastructure investment plans should also be refreshed as changes occur in macro-economic conditions, demographics, climate and technology.

A new or updated regional transport plan should be developed that reflects these changes. It should also reflect region-specific freight plans, trading port accessibility and passenger network requirements and consider cross-regional strategic issues, such as direct shipping to and from the Pilbara region and Asia and road upgrades for improved freight connectivity between Perth and the Pilbara region. Existing sub-regional plans such as the Revitalising Agricultural Region Freight Strategy are valuable and should be retained to support existing infrastructure planning.

The main strategic land use and transport plan for Perth is *Perth and Peel@3.5million: the transport network*.[20] However, Main Roads WA's 20-year Road Network Development Plan, the Public Transport Authority's Station Access Strategy (in development) and the Department of Transport's Long Term Bicycle Network Plan are not sufficiently aligned to the Perth and Peel @ 3.5million frameworks to establish a single and coherent plan and list of priorities.

The 20-year Road Network Development Plan and the Public Transport Authority's Rail Growth Plan both propose significant investment to meet forecast growth in peak period demand, based on different forecasts from separate strategic transport models in separate state agencies.

IWA recommends refreshing the Perth and Peel transport plan to better align and prioritise transport infrastructure investments. This will need to consider the interrelated land-use aspects of the transport network. Identifying activity centres and train station precinct intensification opportunities linked to an urban consolidation action program, consistent with Recommendation 25 in the Planning and coordination chapter, would help drive urban infill. This could improve local amenity while supporting greater public transport patronage.

IWA is pleased to note that Main Roads WA is working with portfolio partners to develop a new, single Perth transport model, which can better inform system-wide planning. The new Perth transport model should include refreshed land-use forecasts from the Department of Planning, Lands and Heritage and focus on scenarios of future transport sector disruptions and travel demand management. This should include, but not be limited to, automated, shared and electric vehicles, pricing reforms, changing work practices, micro-mobility and mobility-as–a-service subscription models.

Recommendation 57

Guide future transport infrastructure investments into areas of strategic need by refreshing statewide strategic transport planning, aligned with land-use plans and policies, including:

a. developing, publishing and implementing a new 20-year regional transport plan, including a focus on freight supply chains across all modes and across all regions outside of Perth and Peel that builds on recent region-specific freight plans and considers strategic cross-regional issues

b. developing, publishing and implementing a new 20-year Perth and Peel transport plan that combines and prioritises all key mode-specific transport planning across Transport Portfolio agencies and embeds a diverse range of non-build, demand management and transport innovation opportunities and scenarios, and station precinct intensification opportunities

c. finalising development of the new Perth transport model, which incorporates the use of modern, diverse network usage data and establishes a seamless staffing and operational model for use across the Transport Portfolio.

Demand management

Fuel excise alternatives

The fuel excise, levied by the Australian Government, is the largest single source of road user charging revenue.[21] The current national road-charging system generated total revenue of $29 billion in 2018–19 nationally, not inclusive of toll road revenue in other jurisdictions.[22] This roughly covers the direct cost to government of road provision but not externalities, such as congestion and emissions. Fuel excise revenue is fast becoming outdated due to the uptake of more fuel-efficient vehicles, along with low and zero emissions vehicles, such as electric vehicles, plug-in hybrid electric vehicles and hydrogen fuel cell vehicles. It is a significant issue from a WA perspective, with total fuel excise transferred from WA motorists to the Australian Government in 2019–20 estimated at above $2 billion.[23] A significant decline in this revenue poses a major challenge to future national road asset management and development. Finding an alternative source of revenue to offset the projected decline in fuel excise is a challenge confronting all jurisdictions.[24]

Some jurisdictions are already pursuing reforms to impose charges for road use on low and zero emissions vehicles, which do not pay fuel excise tax.[25] However, these have been criticised by some stakeholders for discouraging the uptake of these low and zero emissions vehicles, potentially delaying significant health and climate benefits of lower transport emissions.

Alternatives to fuel excise as a major revenue source need to be investigated to address the future loss of revenue and continue to maintain safe and efficient roads. To secure community and industry support, any new charge should seek to maintain rather than increase total road-related revenue. Implementation also presents an opportunity to embed demand management functionality into any futureproofed new technology system. Any alternative to fuel excise systems will likely require national coordination. Infrastructure Australia has recently recommended a national approach to progressing distance-based road user charges to replace the fuel excise and in the longer term implementing a new user-pays charging regime.

The Strategy does not propose the introduction of toll roads in WA. Private toll roads in other jurisdictions have not generally functioned well in managing congestion. Private sector operators are incentivised to maximise revenue rather than consider congestion and equity impacts of the toll. Many tolls in Australia are levied on a fixed basis, with the user paying the same fee to use any segment of the toll road, regardless of time of day, day of the week or congestion condition.

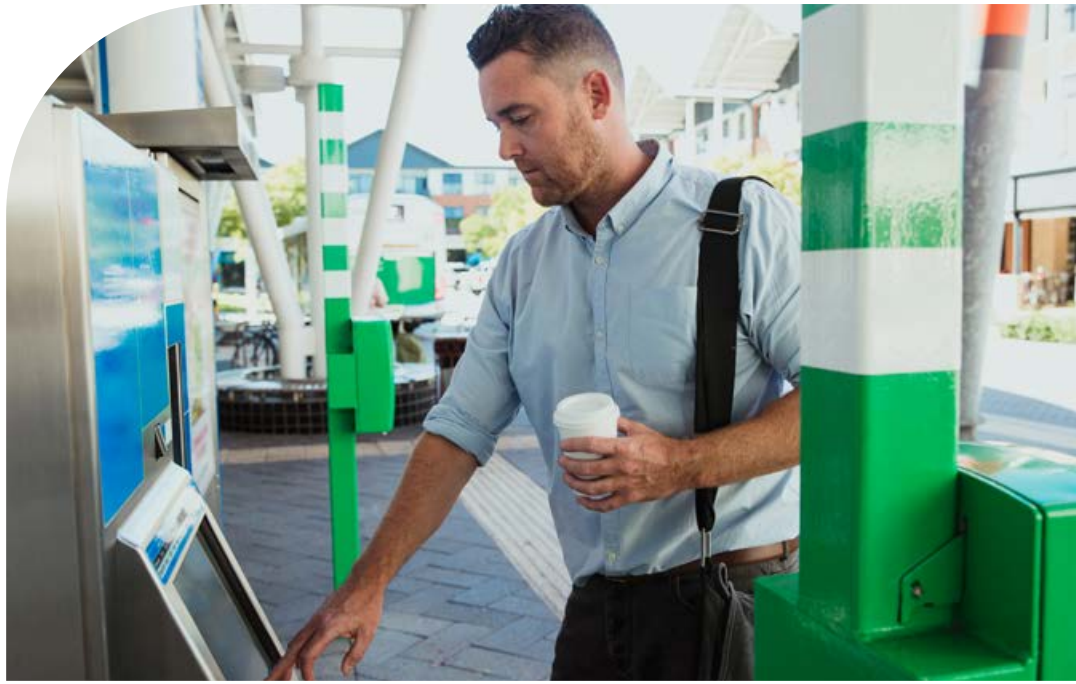
Recommendation 58

Address the future loss of fuel excise revenue by:

a. working with other jurisdictions to design a fair and nationally compatible alternative to fuel excise for low and zero emissions vehicles, with any future charging reform to be combined with other initiatives to ensure an overall net-incentive for the uptake of these vehicles

b. when designing a fuel excise alternative scheme and associated technology, ensuring that:
   - the scheme has the potential to include vehicle mass, distance, location and time-of-day pricing elements
   - total road system revenue is maintained at a stable level as a policy reform objective

c. undertaking a review to investigate the merits of location and time-of-day pricing signals being incorporated into a fuel excise alternative to improve road demand management during peak periods in Perth.



Public transport patronage initiatives

An important element of transport planning is including demand management interventions to address congestion and counteract reductions in public transport patronage.

The high level of investment in major road and rail projects has not entirely mitigated the forecast increase in transport congestion. To adequately address congestion, transport infrastructure must more strongly encourage a shift away from private motor vehicle use and facilitate alternative modes, such as active transport and micro-mobility.

There is a diverse range of demand management interventions that can be considered, including behaviour-change campaigns, improved accessibility and new business models to link transport mode options and enable smooth trip planning.

An effective example of non-build demand management is the WA-based Your Move program, which has changed behaviour, demonstrating important localised successes in increasing public transport patronage and active transport participation rates.[26] Further opportunities for regulatory reform to support the use of micro-mobility innovations such as e-scooters and e-bikes on the local road and path network, including allowing foldable devices onto all bus, train and ferry services, could help to reduce road demand and increase public transport patronage. This would build on the government's recent legislative announcements to introduce a modern safety regime for these devices.[27] Options such as the promotion of carpooling and off-peak commuting (including through off-peak public transport pricing), a Perth e-device share scheme and the removal of station parking charges should also be considered.

Digital platforms tested in other jurisdictions have demonstrated the potential future benefits of mobility-as-a-service models, linking public and private transport options in a single trip and payment model, to provide greater accessibility, efficiency and mobility for urban passenger transport. This can include access to public transport; shared, automated and electric vehicles; micro-mobility devices; and on-demand rideshare models. Public sector responses to this transport model innovation can be supported by enabling third-party access to real-time data on road and public transport network performance and conducting mobility-as-a-service subscription trials incorporating multi-modal connections to stations. The current upgrades to the SmartRider system to enable seamless card payments is another example of how new digital technology can reduce barriers to public transport and increase patronage.

Implementing an urban consolidation action program (see Recommendation 25 in the Planning and coordination chapter) to enable greater levels of appropriate urban infill housing around all station precincts and high-frequency bus corridors would support greater public transport patronage. In addition to this step, developing active transport plans that promote public and active transport for all schools, universities and TAFEs can identify active transport infrastructure gaps and pursue investments and behaviour that promote greater uptake of safe walking and cycling that is linked to public transport use where required (for longer trips).

Recommendation 59

Make better use of existing transport infrastructure, increase public transport usage and reduce road congestion by developing and implementing a public transport patronage action plan with a focus on non-build measures. The action plan should include:

- adopting behaviour-change initiatives, digital technologies, and operational and service delivery innovations, including targeted trials and mobility-as-a-service models and include these in the scope of future business cases for major road and rail infrastructure
- planning for better connectivity to educational facilities and other activity precincts.

Mobility

Road network

Cars and trucks are the dominant form of transport for households and businesses in WA. This model generally enables efficient travel and is likely to continue. However, together with urban development patterns, this model has reinforced high levels of car dependency, which contributes to road congestion, rising vehicle operating costs and high emissions.

Over time, increased penetration of low and zero emissions vehicles may help to address some of these negative environmental impacts.

Main Roads WA has sophisticated systems for asset management, real-time operations, project delivery and long-term planning. As referenced earlier in this chapter, this is underpinned by strong and consistent levels of funding for roads through the hypothecation of motor vehicle licence fee revenue. To date, significant financial resources and expertise have largely been focused on additional road development. This type of investment often provides immediate decongestion benefits but reinforces long-term car dependency.

A predominant focus on the transport efficiency of roads can also work against community expectations of public space and place-making objectives, which could be better serviced using movement and place principles in strategic planning for specific corridor development.

One area that requires continued focus is road safety. On average, 168 people are killed and 1,513 people are seriously injured on WA roads every year.[28] Consistent with the Road Safety Strategy for Western Australia 2020–2030, further measures could entail implementing traffic calming, improved road design to prevent collisions with cyclists and pedestrians, investigating lower speed limits on local roads, making intersections safer and extending regional road safety treatment programs.[29]

Resilience is an increasingly important characteristic of effective transport networks, and road network resilience is particularly crucial in regional areas where other options are unavailable. Maintaining resilient and fit for purpose networks across WA will support the economic and social integration of regional areas and support WA export opportunities. Future upgrades focused on this issue could include the Great Northern Highway in the Kimberley, fully sealing the Outback Way and improved connections to direct shipping port facilities (see Recommendation 68d). The long-term funding program by the WA and Australian governments for the progressive upgrade and sealing of the Outback Way can support network resilience by providing an additional interstate road corridor. Infrastructure Australia has also identified the Outback Way upgrade, running across 3 jurisdictions, as a nationally significant infrastructure priority.

While road investment should continue to provide fit for purpose road networks, focus should shift towards more targeted investment in safety, regional productivity, embracing technological innovations and supporting all transport modes. The cost to deliver the large number of road projects currently in planning is significant and may constrain funding available for other government priorities.

Recommendation 60

Progress targeted expansion and improvement of the road network by:

a. delivering road safety programs in line with *Driving change: Road Safety Strategy for Western Australia 2020–2030*, including urban design innovations, speed reductions on local streets where appropriate and regional road safety treatments

b. delivering regional maintenance and freight productivity programs to provide fit for purpose road networks

c. progressing targeted, high-impact programs, including intersection upgrades, expanding the use of technology on arterial roads and trials for dynamic bus prioritisation

d. progressing capacity and efficiency upgrades to freeways and major urban highways (particularly Mitchell and Kwinana freeways), incorporating all modes and greater use of technology as a priority option

e. estimating impacts from a range of potential low and zero emissions vehicles and connected and automated vehicle rollout scenarios modelling and sensitivity testing in all major transport project business cases

f. investigating the feasibility of these long-term major projects: Orrong Road, EastLink WA, Brand Highway and North West Coastal Highway upgrade and Stock Road tunnel river crossing.



Heavy rail

There is currently a high level of investment in expanding the metropolitan heavy rail passenger network. The short-term to medium-term priority for heavy rail, beyond the implementation of the current METRONET program, should be on investment to support the efficient operation of the existing heavy rail network and other transit modes, rather than further heavy rail expansion. IWA supports high capacity signalling (currently in procurement) and a program of station precinct access upgrades as a priority in the short term. New signalling will replace existing systems approaching end-of-life and enable trains to operate at higher frequencies.

A range of complementary investments for the existing rail network are set out in the Public Transport Authority's Rail Growth Plan, including station upgrades and platform lengthening on the current rail passenger network, level-crossing removals, power systems and additional stabling to accommodate the additional rolling stock coming into the network over coming years.[30]

The Rail Growth Plan is based on meeting pre-COVID-19 patronage growth forecasts. The impact of COVID-19 on patronage has been significant and patronage has not returned to 2019 levels. The longer-term impact on patronage remains uncertain, though current METRONET projects and recent reforms to public transport fares may have a positive impact. The current investment in new rolling stock and proposed investment in signalling will provide additional system capacity. This means other proposed complementary investments can be considered over the longer term, although the cascading of older rolling stock onto the 3 'heritage lines' (Armadale, Midland and Fremantle) will require careful ongoing planning. Most station platform extensions may be relatively straightforward to deliver, although the more complicated CBD stations and the underground Subiaco station will be more challenging and may be required earlier.

Providing more convenient and safer access to stations from nearby areas can also boost public transport demand. This involves improving public and active transport connections to train stations, including by supporting the use of micro-mobility devices such as e-bikes and e-scooters. It is also important to ensure station accessibility upgrades are compliant with the *Disability Discrimination Act 1992* (Cth), with lists of significant projects and minor works programs in the surrounding catchments. Responsibility for delivery of these programs requires clarification, as it currently falls across multiple transport agencies and relevant local governments.

Long-term proposals for the expansion of the heavy rail network, such as the East Wanneroo Rail Link and an orbital rail route in the Perth metropolitan area, require further early-stage feasibility investigations. This includes assessing potential costs and patronage and considering alternative modes and alignments. An underground CBD metro system is unlikely to be required for at least the next 20 years, with light rail and/or bus rapid transit a higher priority. Investigation into the viability, benefits and costs of a Bunbury Faster Rail link in the long term will support future government decision-making in relation to connectivity and land use in the South West region and potentially other regional centres.

Recommendation 61

Plan and invest in the future development of new heavy rail infrastructure by:

a. investing in high capacity signalling
b. investing in improved station precinct accessibility through public and active transport programs and improving compliance with the *Disability Discrimination Act 1992* (Cth)
c. further investigating the merit and staging of investments in the Rail Growth Plan
d. investigating the feasibility of these long-term major projects: East Wanneroo Rail Link, Bunbury Faster Rail and Perth metropolitan orbital rail route.

Light rail and bus rapid transit

With the current emphasis of public transport investment largely in the outer suburbs, the focus in the short to medium term should shift to the CBD and inner and middle suburbs to address congestion and support in meeting Perth's urban consolidation targets. Light rail and/or bus rapid transit can improve overall transport network efficiency, stimulate infill housing development and reduce car dependency.

Light rail and/or bus rapid transit can function as a new public transport mode that operates between heavy rail and regular bus services. In addition to light rail and bus rapid transit, innovative new vehicle types should be investigated. Light rail and/or bus rapid transit systems already operate in every other major city in Australia. Numerous state governments have considered light rail systems for Perth, but no system has eventuated to date.

Any new system should include a corridor running from east to west along a primary axis of the CBD, together with connections to nearby activity centres. Further strategic planning is required to select the 2 key project criteria: mode and alignment. A light rail system would be more costly but could stimulate higher value uplift and urban infill development due to the visible permanence of the route. Alternatively, a more geographically extensive bus rapid transit system could potentially deliver an equivalent or higher level of transport benefits for a similar cost. A light rail route proposed in earlier plans would link the University of Western Australia with Curtin University and Canning Bridge Train Station via the Perth CBD (the Knowledge Arc light rail corridor). This should be considered further in planning and business case development. Light rail and/or bus rapid transit should also be explored further alongside the refresh of the Perth and Peel transport plan.

Beyond this, transport agency responsibility for planning and implementing light rail, bus rapid transit and other bus priority measures should also be resolved as part of IWA's separate recommendation on a new transport plan (see Recommendation 57b). Previous transport plans have identified numerous suburban corridors for improved bus services and light rail, although the process and state agency responsibility to deliver



these remains unclear. Without clear strategic direction, local governments have independently progressed more detailed planning for a number of these corridors, such as Scarborough Beach Road and Fremantle to Murdoch.

Recommendation 62

Provide certainty for future metropolitan planning by developing a business case for light rail and/or bus rapid transit as the next stage of major public transport priority investment in Perth, particularly in the Perth CBD and inner and middle suburbs, including completing a full options assessment comparing the Knowledge Arc light rail corridor against a potentially more extensive bus rapid transit system for Perth.



Cycling and walking

When a person walks or rides a bike instead of making a car trip, it saves fuel, improves their health, avoids emissions and decreases road congestion. The increase in cycling participation during the COVID-19 pandemic has highlighted the community's interest in active transport, including walking and cycling. The uptake of new technology through electronic micro-mobility devices (such as e-bikes and e-scooters) is also increasing demand for active transport infrastructure.

While Perth has an excellent shared path network for cyclists and pedestrians in many areas, there are still very few safe cycling routes through the heart of the Perth CBD, even though this has been proposed in strategic plans for decades. The percentage of children who walk or cycle to school has fallen from 75% in the 1980s to around 20% today.[31]

While there are many contributors to this trend, a significant barrier to greater take-up of active transport is the perception of cycling and pedestrian safety and amenity. More work is required to address this issue by improving street design, traffic calming and separation between different modes (including pedestrians, cyclists and micro-mobility users) and prioritising active transport access in and between activity centres.

These issues also need to be considered in the context of the Road Safety Strategy 2020–2030.

A long-term cycle network has been developed for Perth, and agreed by state and metropolitan local governments (a total of 5,570 km of new links).[32] More than $265 million in funding has been allocated to pedestrian and cycling infrastructure over the next 4 years, with the majority going to the cycling components of major road and rail projects, and CBD projects such as the new Causeway Pedestrian and Cycling Bridge.[33] Only an average of $5 million in 50% co-funding is available annually to both metropolitan and regional local governments for local cycling infrastructure projects.[34] These projects have delivered over 18 km of local cycling infrastructure annually, on average, between 2015–16 and 2019–20.[35]

Recent investment focus has been on completing the Principal Shared Path network to the edge of the CBD, along railways and major roads. Some innovative bike projects on local streets are also rolling out, along with vehicle speed reduction trials. These are positive steps, although cycling infrastructure elsewhere frequently presents safety issues and, in some areas, is outdated. For part of their journey, people often have no option but to cycle unprotected along painted lanes on busy roads. The lack of a safe 'first and last mile' discourages potential cyclists who have safety concerns, as the probability of a fatal outcome increases substantially if a person is hit by a vehicle at speeds above 30 km per hour.[36]

Unprotected painted bike lanes continue to be built as standard practice throughout WA, even where safe and cost-effective alternatives exist. Painted lanes fall short of international best practice and do not meet Austroads national guidelines. This situation is also inconsistent with the safe system principles that underpin various road safety strategies and are designed to protect vulnerable road users through lower speeds and a safer road environment. This is a barrier to cycling becoming a major transport mode, and reduces the benefits derived from the Principal Shared Path and rail networks.

Recommendation 63

Provide enhanced cycling and walking infrastructure by:

a. allocating a greater portion of state funding to local government cycling projects that deliver strategic, continuous cross-suburban linkages, based on Perth Long Term Cycling Network priorities and equivalent regional plans, including higher state co-funding contributions, further CBD links, projects across multiple local government boundaries and safer active transport links to schools

b. seeking federal funding contributions for a program of cycling infrastructure priority projects

c. requiring application of new safe active transport infrastructure design guidelines for all state and local government projects, based on international best practice, including addressing the needs of micro-mobility device users, cyclists and pedestrians through relevant updates to the WA Planning Commission's policies and Main Roads WA's procedures for the design, review and approval of local government road works.

Technology

Low and zero emissions vehicles

Low and zero emissions vehicles are likely to replace a significant portion of internal combustion engine vehicle sales over the next 10 to 20 years. The Commonwealth Scientific and Industrial Research Organisation predicts that electric vehicles could potentially account for around 40% of Australia's vehicle fleet by 2050 under a central scenario, based on current trends and assuming little or no policy intervention.[37] This market penetration is low compared to the policy targets of many other advanced nations. Electric vehicles appear the more likely focus for urban mobility and last-mile freight, while hydrogen fuel may become more prevalent for long-haul and heavy-freight vehicles (see Recommendation 47c in the Energy chapter).

Faster uptake of low and zero emissions vehicles in WA can deliver significant environmental benefits, public health benefits from a reduction in particulates, and lower vehicle operating and maintenance costs. The 2020 State Electric Vehicle Strategy for Western Australia sets out a range of measures to support the uptake of low and zero emissions vehicles, including a 25% electric vehicle fleet target for new light vehicles by 2025–26.[38] Given the current low uptake rate both in WA and nationally compared to many other nations, this Strategy recommends further steps be taken. This should include a more ambitious state fleet electric vehicle target beyond 2025–26 to help support the development of a larger market in WA.



The increasing uptake of low and zero emissions vehicles will put pressure on fuel excise revenue. Pursuit of a nationally consistent alternative to fuel excise is recommended. Any alternative should be complemented by future measures to ensure that overall incentives for the uptake of vehicles remain. Electric vehicle batteries can also benefit the energy network by recharging during the day when significant solar power is being generated and feeding back into the grid when demand is high in the evenings. Energy Policy WA's recently released Electric Vehicle Action Plan considers the impacts and opportunities associated with electric vehicles for the energy system, with recommended actions to prepare for increased electric vehicle uptake.[39]

Recommendation 64

Reduce the environmental impacts of road infrastructure use and achieve a higher uptake rate of low and zero emissions vehicles by implementing further measures that support the State Electric Vehicle Strategy for WA, including:

a. setting a more ambitious target for the WA Government light vehicle fleet uptake
b. accelerating the transition or conversion of other state government vehicles to low and zero emissions technologies, including specialised fleets of public transport buses and emergency services vehicles
c. expanding the rollout of charging infrastructure on government land and buildings, including at train station car parks
d. supporting the private sector to provide charging infrastructure, including in the Perth CBD through the *Perth Parking Management Act 1999* and through planning system policy reforms.

Connected and automated vehicles

Connected and automated vehicles have the potential to significantly disrupt the transport system. Potential impacts include improved safety outcomes and cost efficiency across the road network, as well as reducing traditional public transport patronage, shifting parking demand and even changing private vehicle ownership patterns. The benefits will be maximised when automated vehicles are also connected with other vehicles and the surrounding road network, and if the introduction of connected and automated vehicles coincides with the rollout of low and zero emissions vehicles and new models of shared transport.

The time frames and exact manner of the penetration of connected and automated vehicles are still unclear, particularly with an anticipated transitional period in which both driverless and driver vehicles are likely to share the roads. Collaborative, ongoing work at a national level, addressing the legislative and regulatory challenges involved in enabling connected and automated vehicles to operate on the road network, needs to be progressed.

WA also has some existing comparative advantages relating to connected and automated vehicles in the public and private sectors. In addition to the WA public sector playing a significant role in legislative considerations to date, WA has established autonomous truck and train mining operations in the state's north: the Neerabup Automation and Robotics Precinct and the Collie Westrac Automation Technology Training Centre.[40]

Recommendation 65

Support the introduction of connected and automated vehicles by ensuring the anticipated future road infrastructure and related technology system requirements of these vehicles are incorporated in the scope of future transport business cases and strategic planning.

Industry productivity and freight

Westport and Fremantle Inner Harbour

The development of a new metropolitan container port is a significant undertaking that will have major implications for WA. It is on a scale that exceeds almost any other public infrastructure project in the state. Making the right decisions will impact economic activity, future trade opportunities, land use and the long-term efficiency of the metropolitan freight network. Alongside these opportunities are the multi-year impacts of such a large-scale project, including on the State Budget and the private sector's capacity to deliver the government's infrastructure agenda. The project will have impacts on the Fremantle Inner Harbour, Outer Harbour and regional ports. Effective planning and delivery across multiple works packages will require significant coordination across government.

Subsequent to the conclusions of the *Westport: future port recommendations – stage 2 report*, the WA Government has begun detailed planning to deliver a new container port terminal at the Fremantle Outer Harbour in Kwinana. This area has long been considered a likely location for this investment. It already houses various bulk freight port facilities and forms part of the economically critical Western Trade Coast, a 3,900 hectare strategic industrial region that employs 11,000 people.[41]

The timing of investment in a new port may be influenced not only by trends in container volumes and road network congestion, but also by the ageing Inner Harbour berth wall asset life, the ongoing global trend towards larger cargo ships and the opportunity for supply-chain cost efficiencies. Although the preferred location of a new container port has been identified, a number of related studies are still required.

While Westport planning has focused on future container port requirements, the Fremantle Inner Harbour also caters to various other trades, including motor vehicles, live animals, cruise ships and scrap metal. Less lucrative than containers, these trades are nonetheless important and must be catered for in the future. Future options may include consolidating all the non-container trades in North Fremantle, or also shifting these trades to the Outer Harbour, which may require further investment. Cruise shipping is anticipated to remain at Victoria Quay in the Fremantle Inner Harbour.

The timing of the development of a port at the Outer Harbour will also significantly influence the broader metropolitan freight supply chain, including optimal future investments in road, rail and intermodal terminal upgrades, which require further consideration. Westport investment decisions also need to be considered in the context of leveraging broader strategic economic development opportunities. This will require government to consider supporting strategic industry clusters around the new port in the Western Trade Coast.

As the location of all future port activities is determined, government should progress work to determine the optimal future strategic land use and transport requirements for the Inner Harbour at Fremantle and North Fremantle. Diverse new commercial, hospitality and tourism-related initiatives and projects have already been proposed. Due to the required safety buffer area, residential development is only feasible if all container trade shifts to the Outer Harbour. Changing land uses, including higher density residential development, will also have different transport impacts compared to current uses.



Recommendation 66

Complement Westport's preparations for a new container port in Kwinana by conducting further strategic planning, including:

a. refining and monitoring the estimated optimal required timing for Outer Harbour investment and operations

b. identifying the future location of non-container trades currently based in the Fremantle Inner Harbour

c. optimising the road and rail supply chain servicing the Inner Harbour

d. developing a long-term Inner Harbour masterplan to support future redevelopment, including transport network capacity

e. consistent with Recommendation 31 in the Planning and coordination chapter, progressing planning for strategic economic development opportunities in the Western Trade Coast to leverage planned Westport investment.



Australian Marine Complex

The Australian Marine Complex in Henderson is a large and strategic defence hub, and a major industrial and shipbuilding precinct near the Royal Australian Navy's Fleet Base West. It is now well established as a globally competitive agglomeration of advanced marine-related manufacturing. The Australian Marine Complex has experienced significant growth over the past 2 decades, and now accommodates over 150 businesses.[42]

Further infrastructure investment is required to cater for forecast industry demand and capture significant economic and employment growth. The opportunity for WA is significant and aligned to the WA Government's economic diversification policies. The Australian Marine Complex functions support established primary industries, in addition to opportunities within the defence sector.

Commercial and defence shipbuilding is worth approximately $3 billion per annum, growing at around 4% per annum. Approximately half of that is based at the Australian Marine Complex, which is also home to some of Australia's largest commercial and defence shipbuilders.[43]

The Australian Marine Complex forms a key part of the broader Western Trade Coast. Further investigations should consider improved regional transport connections and the relationship to nearby strategic industrial land across the Western Trade Coast.

Further capacity expansion for the Australian Marine Complex should be guided by the *AMC Strategic Infrastructure & Land Use Plan*, future capacity requirements and ongoing engagement with the defence sector and industry. The plan includes strategic infrastructure proposals, such as a large-vessel dry berth to support the construction and out of water maintenance of large-hulled vessels. This facility would support a future build and sustainment program for large-hull naval and commercial vessels. In addition, a proposed Marine and Advanced Technologies Collaboration Hub would support the delivery of technologies related to surveillance, hydrography and surface and underwater autonomous systems. WA Government commitments should be leveraged to potentially attract funding contributions from the Australian Government and the private sector.

The September 2021 announcement of a trilateral security agreement between Australia, the United Kingdom and the United States of America provides increased opportunities for defence, maritime and other industries. It may also have infrastructure implications for the Australian Marine Complex and elsewhere throughout the state. The infrastructure and industry development implications of the announcement need to be considered as part of the further planning and development of the Australian Marine Complex.

Recommendation 67

Support strategic economic development opportunities at the Australian Marine Complex by undertaking further planning and staged expansion of common-use infrastructure consistent with the *AMC Strategic Infrastructure & Land Use Plan* and industry requirements.



Direct shipping to the north

Currently, most freight destined for WA's north is shipped to Fremantle Port and then trucked to the north of the state. Enabling direct freight shipping services between Asia and ports in the Pilbara and Kimberley regions could realise significant cost savings and transform intrastate freight markets. Some direct shipping services have recently commenced.

The establishment and growth in cargo demand may increase the use and pressure on existing berths in the north of the state, which could require the expansion of general cargo port capacity. Minor upgrades, policy support and investment in the road freight network connections to relevant ports could also be required.

Recommendation 68

Enhance supply chain efficiency by supporting expansion of direct shipping services to the state's north, including:

a. assessing the viability, costs and benefits of long-term direct shipping services and associated infrastructure requirements
b. seeking Northern Australia Infrastructure Facility and private funding for any major new port facility required for direct shipping, including new common user general cargo facilities
c. funding, in partnership with the Australian Government, all relevant port facilities to have appropriate 'first point of entry' infrastructure and systems (for border control, customs and quarantine requirements)
d. planning for fit for purpose road connections to direct shipping facilities.

Freight rail and the agricultural region supply chain

Freight rail plays a central role in many of WA's key supply chains for bulk resources, agriculture and container freight. However, due to the geographic dispersion and nature of goods transported, the components of the network have distinct infrastructure needs. The northern freight rail systems carry very large volumes of iron ore and other commodities from mines to ports in the Pilbara region. These rail lines are in private ownership as part of integrated mine-to-port operations.

A separate system, the freight rail network across the state's south, is publicly owned, though it is under the long-term control of private leaseholder Arc Infrastructure until 2049. This rail system complements road freight operations, connecting the Wheatbelt region and agricultural producing areas of the south to ports, and plays an important role in facilitating competitive exports of agricultural produce. WA grain exporters currently compete year-round with emerging lower-cost Northern Hemisphere producers. Improved supply-chain efficiency helps ensure that local grain harvests can ship to international customers quickly at peak periods of demand, to secure higher prices and export earnings. Rail has a strong capacity to move large volumes efficiently during peak demand periods, while also removing trucks from roads, which benefits local communities and reduces road maintenance costs.

A good example of a strategic approach to freight productivity is the Revitalising Agricultural Region Freight Strategy.[44] It is focused on grain exports, which for some railway lines is the only commodity transported. The strategy provides clear guidance for further investment in the associated supply chain across all modes, with multiple subsequent funding allocations.

Underlying commercial viability varies across different sections of this network. The effect of leasing the state freight network has been to shift responsibility for planning and investment in network expansion to the leaseholder, with costs to be recovered from users. State agencies have therefore not prioritised holistic strategic planning for the future of the network to the same extent as other modes, such as roads, that are under direct public control. This means that the WA Government is not as well positioned when it comes to considering public funding contributions for freight rail network development proposals that emerge over time.

Changes have been approved to the Rail Access Regime, which covers the state freight network, the Public Transport Authority's urban network, the Pilbara Infrastructure railway and Roy Hill's railway. These reforms are intended to streamline processes and improve outcomes for future access seekers. Planning upgrades and maintaining the network remain the responsibility of the leaseholder, although leaseholders may be less willing to invest in network expansions or major upgrades as the end of their lease period approaches, due to insufficient payback periods.

Grain is a seasonal, high-volume commodity, with **total production varying from 14.3 to 18.2 million tonnes per annum over the last 5 years**.[45] Ninety per cent of WA's grain harvest is handled by CBH Group and approximately 60% is transported to port by rail, with the other 40% by road.[46]

A more coordinated and forward-looking approach to network planning should be pursued by state agencies. This would be supported by a new regional transport plan, as recommended in this Strategy (see Recommendation 57a). Developing principles to guide public contributions towards private sector investment (see Recommendation 40b in the Infrastructure delivery chapter) will also assist in making more informed decisions when these requests are presented to the government. Current freight rail expansion proposals include the Kalgoorlie rail realignment, which has recently been allocated business case funding.

Recommendation 69

Support long-term investment decision-making for the state's freight rail network over the remainder of the lease period, consistent with Recommendation 40b in the Infrastructure delivery chapter, by:

a. implementing a structured approach to planning and consideration of public contributions towards proposals for expansion of the network, supporting government contributions by exception under limited circumstances
b. pursuing further investigations, including for:
    i. WA Agricultural Supply Chain Improvements
    ii. Kalgoorlie Rail realignment.

Perth and Jandakot airports

Proposed investment by Perth Airport in a third runway and the consolidation of passenger terminals by 2025 will help to ensure it can service WA's aviation needs for well beyond 20 years. Even with this proposed capacity upgrade, a new civil aviation airport may be required in the very long term.

Extensive lead times are needed for planning and delivering major airport infrastructure, and airport location has significant impacts on surrounding land use and development. As such, identifying and protecting suitable sites and corridors now for a new civil aviation airport for Perth represents good long-term planning and further work will need to be progressed. This should also incorporate considerations relating to a new general aviation airport, currently serviced by Jandakot Airport, which may be required within the 20-year time frame of this Strategy.

Recommendation 70

Progress strategic planning by working with the Australian Government to plan for the long-term potential needs of a new civil aviation and general aviation airport for Perth, including the identification and preservation of sites, and associated connecting infrastructure corridors.



Housing



In 2020, **1 in 5 (200,000) households were estimated to need some form of housing assistance** from the WA Government.[1] By 2030, **45,000 additional households** are likely to need assistance.[2]

What IWA heard

During consultation on the draft strategy, there was strong support for many of the recommendations, including the importance of ongoing sustained investment and suitable housing options to contribute to functional communities and local economies. To the extent required, this has been reinforced in content amendments and new sub-recommendations.

Stakeholders raised the need for greater transparency and consistency of definitions, targets, data and reporting across the sector, and for the Strategy to expand consideration of affordable housing to ensure needs can be met across a range of circumstances. In this regard, several mechanisms identified by stakeholders have now been recommended for further government consideration.

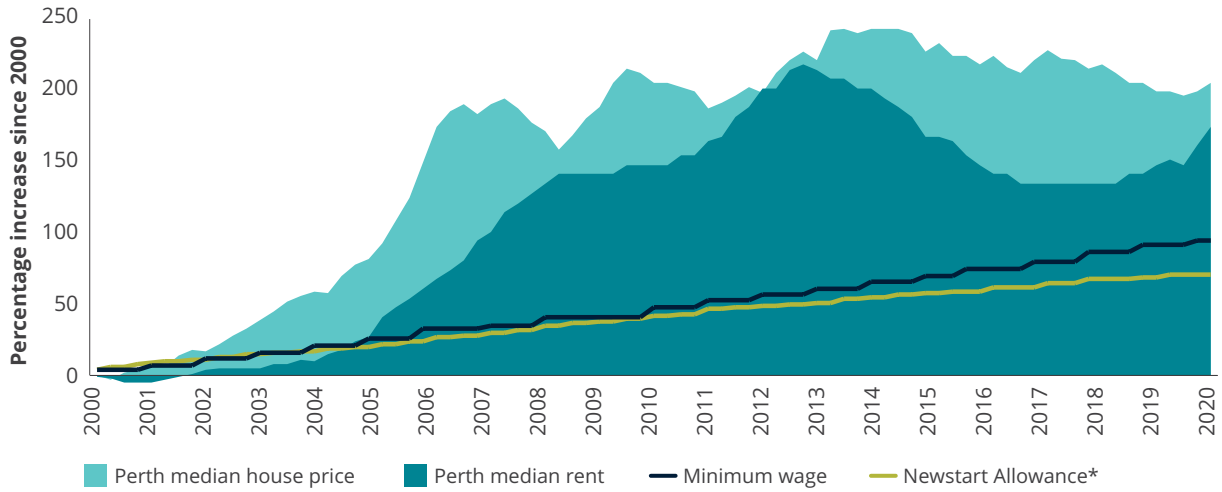
The availability, affordability and appropriateness of housing was consistently raised as a high-priority issue in the regions, heightened by buoyant economic conditions and the impacts on their ability to attract and retain a skilled workforce. In response, a new sub-recommendation draws attention to the need for government intervention in certain regional areas.

Access to appropriate and affordable housing is a critical enabler for community wellbeing and economic participation. It contributes to WA being considered a sought-after place to live and improves productivity. However, WA's population and household structures are changing, living costs are increasing and more people are seeking social housing support services.

The benefits of an effective housing system are evidenced across health and social services, as well as the justice system, as it provides a secure base from which people can participate in the workforce and contribute in the community.[3] For example, conservative estimates released in 2016 using linked WA housing and health data indicate annual savings of $16.4 million to the WA health system (or $13,273 per person) by providing housing to people experiencing, or at risk of, homelessness.[4]

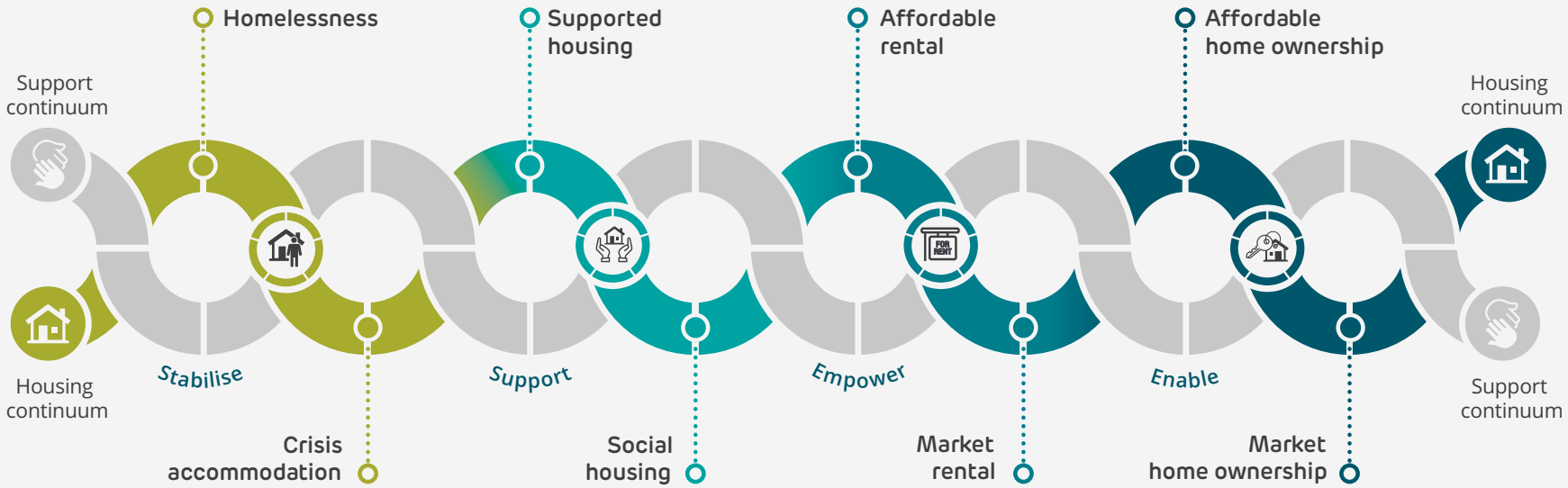
Housing affordability is an entrenched structural issue across Australia, influenced by economic and social conditions that sit outside the housing market, including population growth, household economics and access to finance. Australia is currently facing a period of peak demand for housing – amplified by the COVID-19 pandemic – affecting those most susceptible to price increases, who may be forced out of rental and ownership markets. Figure 44 demonstrates decreasing housing affordability in Perth and WA.[5]

Figure 44: Housing affordability in Perth since 2000[6]



*The Australian Government's JobKeeper Payment program commenced on 30 March 2020 and ended on 28 March 2021.
Note: Historical numbers may have been revised and have not been updated.

Figure 45: The housing continuum[7]



Housing is often described in terms of a continuum, reflecting varying levels and types of housing need and support (Figure 45).[8] Those on particularly low incomes or with high service needs require more support and a greater level of intervention. For others, less assistance is required to access housing or otherwise avoid housing stress. By its nature, the whole housing continuum needs to function to enable people to change their housing circumstance when they are able to do so. This is a key consideration for government in terms of intervention in the housing market and management of demand for supported housing. This Strategy focuses on areas that require the greatest level of government attention and investment: homelessness, social and affordable housing and regional housing.

Social housing refers to subsidised rental dwellings for very-low-income to low-income households owned or managed by the state government (public housing), or not-for-profit organisations and local governments (community housing). Together with other supported and crisis accommodation services, social housing provides a critical safety net for the most vulnerable in the community.

The *WA Housing Strategy 2020–2030* defines affordable housing as housing that households on low to moderate incomes can afford to access, while meeting other essential living costs.[9] For the purpose of consistency, this Strategy has adopted the same definition. In the context of the housing continuum, this ranges from subsidised affordable rental and ownership programs to market affordable housing. Households are said to be subject to housing stress when they spend more than 30% of their gross income on housing and fall in the bottom 40% of income distribution for WA.[10]

While the '30/40 rule' referred to above appropriately focuses attention on those most vulnerable to housing market changes, there are locations across WA where, even for people on higher incomes, there are difficulties accessing appropriate housing due to availability and cost. This is particularly prevalent in regional locations with highly cyclical economies, such as key centres in the Pilbara.

Resolving a meaningful definition for affordable housing is a matter of ongoing debate across the sector. In WA, there are inconsistencies across affordable housing targets and policies, which impacts on sector legibility as well as the monitoring and reporting of outcomes. In addition to purchase or rental affordability, successive sector strategies have recognised the importance of ensuring housing is available and appropriate.[11] This includes the opportunity for households to live in well-designed, energy-efficient, fit for purpose housing that is close to transport, amenities, services and employment. Affordable living is important for individuals and the whole community and is linked to the sustainability of urban environments.

Provision of government infrastructure should be particularly focused on the most vulnerable; however, housing has long been recognised as an issue that no state government can address on its own. Participation by federal and local governments, as well as community and not-for-profit providers and private industry, is required for a balanced system that reduces cost and maximises choice.

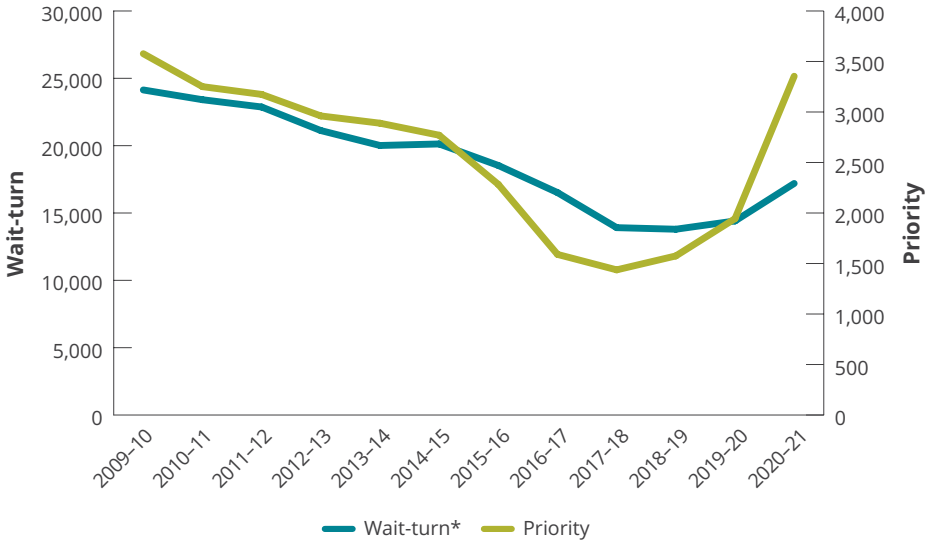
Social housing

The gap between the adequacy and availability of WA's social and supported housing infrastructure and community need is growing. This has been recognised by the WA Government in recent social housing investments totalling $2.1 billion over the next 4 years to 2024–25. Reflecting strong housing market demand, limited availability of skilled workers and materials in the housing construction sector and a depleted land asset base, the approach to boosting social housing includes limiting attrition of existing social housing stock, concurrent with delivery of new supply using modular and alternative construction methods.

On the 2016 Census night, the number of people experiencing some form of homelessness in WA was estimated to be 9,005, including 1,083 people sleeping rough and 3,871 living in severely crowded dwellings.[12] Homelessness and overcrowding are particularly acute for Aboriginal people, who make up 3.1% of WA's population and 29% of those recognised as homeless.[13]

In WA, there are approximately 42,600 social housing dwellings.[14] Around 35,200 of these are owned and managed by the Housing Authority.[15] The balance is managed and/or owned by community housing organisations (CHOs).[16] Applications for social housing assistance have been increasing. In October 2021, the social housing waitlist was 17,824, including 3,683 on the priority waitlist.[17] The general waitlist is below levels during the last resources boom (23,400 in 2010–11 and 20,100 in 2014–15).[18] However, priority waitlist numbers have returned to the same level as the last period of extraordinary market pressure in 2009–10, at well over 3,500 applications (Figure 46).[19]

Figure 46: Public housing waitlist (wait-turn and priority), 2009–10 to 2019–20[20]



*The number of wait-turn applications inlcudes priority listed applications.



By the end of 2020–21, the National Housing Finance and Investment Corporation had issued **$1.9 billion in bonds to support social and affordable housing outcomes** across Australia.[21] Only 4% of the value of these bonds have been allocated to WA via CHOs.[22] In comparison, New South Wales providers have received 45% of the total value of bonds financed by the corporation.[23]

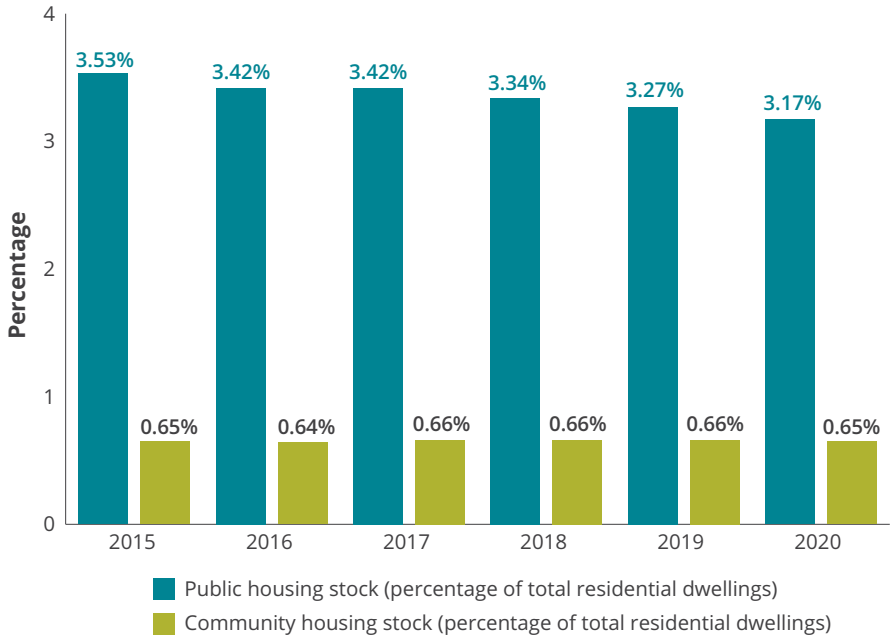
The *WA Housing Strategy 2020–2030* target is for 6% net growth of social housing by 2030 (Target 1). Given the trends, this is unlikely to adequately respond to latent and growing demand and housing stress.

WA's social housing asset base is ageing, inefficient and often misaligned with community need. A substantial proportion of state-owned housing stock is approaching end-of-life, with more than 20% over 40 years old.[24] In addition, 52% of metropolitan and 46% of regional housing stock is 20 to 40 years old.[25] Without substantial ongoing investment and maintenance, operating costs will continue to increase, and assets will be lost at a rate greater than can be replaced.

As a proportion of total housing stock, social housing (comprising both public and community housing) in WA has declined from 4.1% to 3.8% in the 5 years to 2020 (Figure 47).[26] This is compared to a national figure of 4.3%.[27] A portion of social housing stock remains vacant at any time for a range of reasons, such as significant refurbishment. Despite substantial investment, the challenge of an ageing portfolio and long-term under-investment in maintenance has meant that dwellings that are unsafe, too expensive to maintain or not fit for purpose are decommissioned, including large complexes with a significant number of social homes. This exacerbates the decline in housing stock, with 1,155 dwellings lost between the 2016–17 peak and 2019–20.[28]

CHOs make a considerable contribution to social housing provision, with collective ownership or management of approximately 17% of WA's social and supported housing stock.[29] In WA, this has remained fairly static since 2015 (Figure 47) while, in many other jurisdictions, the proportion of social housing stock that is community housing has grown. This, in part, relates to limited transfers of public housing stock, debt ceilings being reached on existing assets, regulatory settings and performance agreements. Community housing can attract diverse funding, as well as offer a more tailored service and deliver housing choice to tenants.

Figure 47: Public and community housing as a percentage of total residential dwellings, 2015 to 2020[30]



Recent WA Government housing investment

Recent WA Government investment packages to address homelessness and improve the quantity and quality of housing equate to $2.1 billion and an estimated 3,300 additional social housing properties over the next 4 years to 2024–25, including:

Social Housing Investment Fund to substantially increase and improve the stock of social housing across WA	$750 million
Regional social housing precinct renewal in Albany, Bunbury and Geraldton	$20 million
Homelessness and crisis accommodation services, including Common Ground facilities, youth crisis accommodation and partnership grants for local government	$105 million
Social Housing Economic Recovery Package, which includes new dwellings (250), refurbishments (1,500), Aboriginal short-stay accommodation facilities and expansion of family and domestic violence women's refuges	$319 million
Housing and Homelessness Investment Package, including 300 new social houses, 70 social housing property refurbishments and 200 additional shared equity homes	$150 million
METRONET Social and Affordable Housing and Jobs Package to increase the number of social and affordable homes in proximity to public transport and amenity	$394 million



Affordable housing

Affordable housing programs bridge the gap between social housing and affordability of the housing market. Along with investment in social housing, adequate support for community members who would otherwise struggle to access appropriate housing in the market is critical. Without this, there will be greater pressure on social housing. More broadly, monitoring and amending policy settings for a well-functioning housing market that is accessible to those on low to moderate incomes is vital to reduce pressure on social and affordable housing infrastructure.

Keystart is a WA home loan organisation with the WA Government as its sole shareholder. Lowering entry barriers to home ownership through reduced upfront fees and opportunities for shared equity arrangements, Keystart have supported 118,000 home loans since 1989.[31] In 2021, Keystart provided 3,977 loans valued at $1.45 billion and carried 21,300 loans valued at $5.9 billion.[32]

The National Rental Affordability Scheme has boosted access to affordable rentals for low-income to moderate-income working households. This 10-year federal subsidy incentivised landlords to rent to eligible households at 20% below prevailing market rates. The Australian Government decision to discontinue the National Rental Affordability Scheme in 2018 without a replacement program will leave a significant gap for the sector. WA will lose more than 5,000 allocations between 2018 and 2026 (Table 4).[33] Of the more than 4,000 dwelling allocations remaining in WA, 83% are in major regional centres and Perth.[34]

Table 4: National Rental Affordability Scheme allocations ceasing by calendar year[35]

	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
WA	0	50	131	266	352	1,110	920	891	1,574	**5,294***
National	198	1,218	1,368	3,059	6,360	6,619	9,178	3,998	4,591	**36,589**

*Note: over 600 incentives are still to be activated.[36]

A lack of affordable rental housing targeting key and essential workers, including childcare, retail, service industry, tourism and agricultural workforces, impacts on service delivery and the overall economy. It is an area of particular concern for regional housing sector stakeholders. Key worker housing has been provided by state and local government and CHOs, but this occurs on a discrete, project basis rather than through formal programs.

Initial affordability of dwellings at the point of construction or purchase is influenced by a wide range of factors, including location, size and condition of a dwelling, as well as land supply, planning and approval requirements, construction costs and taxation settings. The WA Government is an important and active participant in the property market. As the largest land developer in the state, its activity influences timely housing and land supply. Targets in the *WA Housing Strategy 2020–2030* are for a minimum 20% social and affordable housing in government residential developments (Target 2), and 70% residential land lots sold below the median price and 30% in the lowest quartile in government residential developments (Target 3).

There is also a connection between affordability and state and federal policy settings. Settings in the state's planning and development system including state planning policies, local planning schemes, local planning policies and building regulations, all contribute to housing and land supply, density, diversity, construction costs, design quality and costs of living. Planning policy initiatives particularly influencing the location and design of new dwellings include metropolitan infill targets and the Design WA suite of state planning policies. In metropolitan redevelopment areas under DevelopmentWA, planning policies require 12% of dwellings to be made available for social and affordable housing.

Stamp or transfer duty and land tax have been identified as financial barriers to housing activity, with reforms being progressed in several other jurisdictions across Australia. Making it easier for people to move between houses could encourage people to occupy dwellings that are better aligned to their circumstance and need at a point in time. Further, addressing land tax disincentives for the construction of innovative affordable housing solutions, such as build to rent developments, could be of benefit.

Diverse housing needs

Ensuring housing is fit for purpose requires an understanding of the diverse housing needs of a range of community cohorts. This includes disability, aged, youth, Aboriginal and single households. Long-term planning of housing programs and state government asset portfolios should be informed by housing needs assessments. In addition to targeted housing programs, a review of standards can facilitate greater inclusion in the community. The National Construction Code sets parameters for addressing inclusive and accessible design in new buildings, with current proposals for the National Construction Code 2022 to include minimum accessibility provisions for residential housing and apartments to adhere to silver standards in the Liveable Housing Design Guidelines. It will be important for WA to adopt these new requirements from 2022 without delay.

Regional housing

The availability, affordability and appropriateness of housing in regional areas is an ongoing issue in WA. Housing is an important, and often limiting, factor in attracting and retaining employees to regional areas who, in turn, support local economic activity and deliver government and community services such as health, policing and education. Some regional housing markets can be highly volatile and challenging to forecast. In locations subject to highly cyclical economies, particularly in many of WA's mining and resources centres, local housing markets can swing between acute shortages with extraordinarily high costs and gluts leading to investor exodus.

Many factors contribute to regional housing market failures in these locations, including inconsistent land supply, high costs of living and development, more transient community members seeking access to rentals rather than homes to purchase, limited investor pools and more difficult commercial project and purchaser lending criteria. Consequently, many regional areas are reliant on government participation through land development activity, as well as other interventions such as through housing delivery and management programs.



Through DevelopmentWA, the state government monitors, plans and responds to land supply needs across WA and is generally required to meet a minimum return on investment. In some instances, and where it would otherwise be unfeasible, regional land development projects by DevelopmentWA are subject to reductions on the required rate of return to manage development costs.

The state government provides affordable rental housing to government officers and some non-government organisation employees through its regional officer housing programs, and a related home ownership incentive scheme. The Department of Communities owns, manages and leases around 5,100 Government Regional Officer Housing (GROH) properties for key public sector workers in over 250 regional locations across WA.[37] Just over half are owned, and the other half are leased.[38] Officer housing is also owned and managed on a smaller scale by other state agencies, including by the WA Country Health Service, WA Police and Main Roads WA. The significant proportion of government employee housing, while essential for meeting service delivery needs, can sometimes contribute to local housing market distortions.

In some locations, employers, including local government and resource, tourism and agricultural businesses, provide housing or housing subsidies as a component of employment conditions. There are many smaller businesses, however, for whom this is not possible. Government participation in housing non-government key workers also occurs, on a discrete project basis.

Aboriginal housing

The critical importance of improved standards of living and wellbeing for Aboriginal people is well recognised. Despite a range of programs and funding streams that seek to respond to housing needs for Aboriginal people across urban, regional and remote settings, progress to improve Aboriginal housing outcomes has been slow. Poor housing quality and overcrowding remain at unacceptable levels, leading to the Closing the Gap target of increasing the proportion of Aboriginal people living in appropriately sized housing to 88%. Access to safe, good-quality housing underpins, and is fundamental to, achieving outcomes in health, education and employment, as well as community safety and economic participation.

Governance

Housing is a multi-provider system. The state government has primary responsibility for housing service provision in WA and works with federal and local governments, not-for-profit organisations and the private sector, all of which are important housing providers and enablers.

Homelessness

State government leads the funding and provision of specialist homelessness and crisis services to assist people experiencing, or at risk of homelessness. This includes wraparound services crucial to re-establish independence, positive social connections and improve financial stability, including increased employment.[39] *All paths lead to a home – WA's 10-Year Strategy on Homelessness 2020–2030* establishes the strategic direction for more homelessness services coupled with strong, effective wraparound support, underpinned by an action plan.

A diversity of not-for-profit providers are vital to the management and operation of facilities and wraparound services in the community. Some local governments also deliver targeted facilities and services in their local communities.

Social and supported housing

State government responsibilities for the policy, provision and management of social housing across WA are led by the Department of Communities, acting under the powers and responsibilities of the Housing Authority. This includes the delivery of new social housing where there are less than 30 dwellings. DevelopmentWA is responsible for the state government's commercial and land development functions, and supports the delivery of social housing projects in larger developments (greater than 30 dwellings). The *WA Housing Strategy 2020–2030* outlines 5 focus areas to lead WA to an agile housing system and applies to the breadth of housing across the continuum.

Federal funding supports housing and homelessness initiatives and boosts overall sector investments. In 2020–21, the Australian Government expects to spend around $8.4 billion nationally to improve housing and homelessness outcomes.[40] This includes around $5.5 billion in Commonwealth Rent Assistance to help eligible Australians pay their rent, and around $1.6 billion to jurisdictions through the National Housing and Homelessness Agreement, of which WA will receive $170.3 million.[41]

Registered CHOs own or manage community housing portfolios of varying size. Other not-for-profits, local government and the private sector also have different levels of involvement via service provision, asset ownership or, in the case of local government, local policy settings.

Supported and social housing caters for several specific cohorts, including people with disabilities (Specialist Disability Accommodation), people experiencing mental health issues, Aboriginal people and seniors and aged persons. National Disability Insurance Scheme funding provides for Specialist Disability Accommodation based on eligibility criteria.

The Department of Communities also continues to fund essential and municipal services in 141 remote and town-based Aboriginal communities, with an expenditure of more than $60 million in 2020–21, and provided housing services to 2,699 community houses in 112 of those communities under housing management agreements, with an expenditure of $30 million in 2020–21.[42]



Recent structural changes within the state government have reallocated the Housing Authority's commercial and land development functions to DevelopmentWA. The Department of Communities has retained responsibility for managing social and affordable housing, and delivery where there are less than 30 dwellings. **A close and coordinated effort between these state agencies is essential** to meet targets and ensure data sources and outcomes are aligned. A steering committee has been charged with responsibility for advising on the transition of assets and functions between these 2 agencies.

Affordable housing

Reflecting the breadth of matters that influence housing affordability, roles and responsibilities are more widely distributed. State responsibilities for affordable housing policy, provision and management are led by the Department of Communities.

This includes the delivery of new affordable housing where there are less than 30 dwellings and the management of GROH properties for key public sector workers in over 250 regional locations across WA. During 2021, the Department of Communities also issued 4,427 bond assistance loans to support people to access private rental housing.[43] Operating under an independent board and with the state government (the Housing Authority) the sole shareholder, Keystart home loans reduce entry barriers to home ownership via low-deposit and reduced-fee transitional home loan products. Through the Country Housing Authority, Keystart also offers housing finance options to rural and regional business owners.

A number of registered CHOs own and manage affordable housing portfolios, including projects that have attracted National Housing Finance and Investment Corporation investment to WA.

DevelopmentWA is responsible for the state government's commercial and land development functions, including to support affordable housing projects over 30 dwellings.

Some local governments provide community housing or choose to operate in the property market to fills gaps, particularly in regional towns. Local governments also participate via local policy settings that contribute to affordability.

The Australian Government provides housing assistance in the form of Commonwealth Rent Assistance, the National Rental Affordability Scheme and low-cost financing through its National Housing Finance and Investment Corporation.

The private sector's significant contribution to WA's affordable housing includes, but is not limited to, working in partnership with government to produce lower-cost housing, institutional investment to housing providers, delivering diverse and innovative housing product, and affordable private market rental.

Recommendations

Regional housing plans

Place-based analysis of housing needs, conditions, market activity and active housing programs and providers is critical to understanding and appropriately responding to housing priorities. The preparation and periodic refreshment of housing plans will enable strategic, targeted housing outcomes for each region. Recognising the challenges of housing across regional areas, these housing plans will be useful for capturing the unique housing drivers in cities, towns and communities across WA. The housing plans will provide a consistent evidence base to apply to future investment proposals, housing programs, local planning instruments and land and housing supply. Data that informs the housing plans should be maintained and be accessible for use by stakeholders.

The plans should:

- be prepared for each WA region, including the Perth metropolitan area
- reflect and respond to settlement patterns, with a focus on regional centres
- respond to community, housing, land supply and economic characteristics, barriers and opportunities
- capture government and non-government housing activity, providers, asset types and programs
- provide a vehicle to engage with the local community, stakeholders and service provider priorities and perspectives
- establish meaningful place-based housing targets and objectives
- inform asset management, including dwelling type and number, as well as renewal and maintenance activities, which in turn, will improve future strategic asset plans and business cases
- influence future housing sector strategies and policies, procurement and project delivery models.
- include housing program data to inform provision of supporting wraparound services.

Recommendation 71

Improve long-term planning and inform infrastructure investment for social and affordable housing by:

a. preparing and publishing 10+ year regional housing plans for each WA region, including the Perth metropolitan area, to provide a consistent evidence base and drive better housing outcomes across the state, to be refreshed at least every 5 years

b. conducting an initial regional housing plan pilot to resolve housing data coordination and management challenges, define requirements and establish methods of stakeholder input.

Social and affordable housing infrastructure investment

Substantial recent investment to boost homelessness services and the supply of social housing stock to 2025–26 have been welcomed by sector stakeholders. Beyond the next 4 years, the sector will require a sustained, transparent investment program to facilitate longer-term strategic asset and program planning. A robust comprehension of the existing social housing asset base will be a critical input. This should include an assessment of existing dwelling conditions, maintenance needs, opportunities to improve sustainability performance (where feasible) and further development potential. Sustained investment, informed by regional housing plans, is an opportunity for countercyclical development activity to the benefit of the economy.

Assessing the effectiveness of *WA Housing Strategy 2020–2030* targets, particularly 6% net growth in social housing, is difficult. The target is not connected to housing needs assessments or population growth. Nor does it reflect social housing as a proportion of total housing stock. Equating to only 260 additional dwellings per year, it is unlikely to adequately respond to need. Rapid changes to social housing need, WA Government investment and the wider housing market in general since 2020 necessitate broader consideration of this target and potentially other aspects of the *WA Housing Strategy 2020–2030*.

Monitoring and continued investment in affordable housing mechanisms will also be critical, particularly noting the immediate focus on social housing, the strong property market conditions, and the ceasing of significant National Rental Affordability Scheme allocations during this period. Additional affordable housing mechanisms requiring state government support may need to be considered where progress towards established targets has to be escalated. Options may include rental affordability schemes, key worker housing and continued advocacy for beneficial changes in federal government policy and taxation settings affecting access to affordable housing.

Recommendation 72

Prioritise further infrastructure investment in social and affordable housing by:

a. assessing the level of sustained investment required to accelerate the *All paths lead to a home – WA's 10-Year Strategy on Homelessness 2020–2030* and accompanying action plan, and support people experiencing or at risk of homelessness
b. undertaking a comprehensive audit of social housing assets, including assessments of housing stock condition and opportunities to extend the life of existing assets, as well as the opportunity to better use land assets
c. reviewing the social housing growth targets in the *WA Housing Strategy 2020–2030* and setting revised evidence-based net growth targets aligned to forecast need
d. monitoring and reviewing the effectiveness of affordable housing mechanisms, including rental and home ownership programs and policy settings
e. developing a sustained social and affordable housing investment program informed by regional housing plans (see Recommendation 71a) and in line with revised social housing targets (see Recommendation 72c) and existing affordable housing targets.

Social and affordable housing providers and housing choice

While the sector will always require direct government participation, social and affordable housing is an asset class capable of attracting other sources of finance and service provision. With a range of circumstances and housing needs across the community, more pathways for people to access safe, affordable housing are needed.

The state government can review existing policy, legislation and programs and leverage its assets to broaden participation of providers and investment into the sector. In addition to funding (see Recommendation 72), establishing financing opportunities can facilitate greater participation and responsiveness by other housing providers, including CHOs and local governments. There are numerous financing models that could be explored, and further investigations should carefully consider allocation of risk between participants.

Community housing organisations

CHOs are a valuable contributor to housing provision and management. They present an opportunity to secure greater levels of investment in both social and affordable housing through access to financing options, concessions and support not available to the state government. This also includes institutional investment, low-cost finance via the National Housing Finance and Investment Corporation, tax initiatives such as Goods and Services Tax concessions and capital gains discounts for investors, and eligibility of tenants to receive Commonwealth Rent Assistance.

Several areas of regulation and procedural practice are a concern for CHOs in WA. Limited progress in the transfer of additional dwellings that can be leveraged by CHOs, strict provisions relating to finance and property transactions under Community Housing Agreements and tenant allocations restricted by program streams are limiting the potential and performance of community housing in WA. Building capacity and leveraging capability of CHOs is needed, including reviewing existing Community Housing Agreements to address barriers in attraction of alternative financing and funding of new projects. During 2021, the WA Government commenced reforms to support more collaborative partnerships, including an increase in loan-to-value caps from 30% to 50% for providers operating under a Community Housing Agreement with the Department of Communities. However, there are a range of other contractual, policy and procedural improvements that should also be further considered.



Government assets

Opportunities for housing providers to more readily access leasehold government land to deliver housing outcomes would improve access and reduce project costs for housing providers, while enabling government to retain the opportunity for redevelopment or expansion, commensurate with the urban and market context at a future point in time.

Long-term rental housing choice

The private rental landscape has changed over time, with more people across a range of demographic cohorts living in private rentals for longer periods. For these people, a rental premise is potentially a long-term home. The Department of Mines, Industry Regulation and Safety is currently undertaking a review of the *Residential Tenancies Act 1987*. The legislative changes outlined in the review's Discussion Paper propose a number of reforms aimed at modernising the Act. As this process progresses, it is important that the review strikes the right balance between tenants and owners. Beyond legislative change, there should be the ability for an owner to sign a tenant for longer than 12 months on a common and commercially available contract, where that is desirable for both parties. This could provide longer-term surety for both the owner and tenant without specialist contracts, or less secure methods. Longer-term leases should remain an option for owners and tenants alike, as 6-month and 12-month leases do currently.

Recommendation 73

Enable and diversify social and affordable housing providers and housing choice by:

a. investigating government financing mechanisms, including risk profiles, to support future investment in the sector

b. reforming policy to facilitate growth of registered community housing organisations and reviewing existing Community Housing Agreements to address provisions that limit, or disincentivise, the attraction of alternative financing and funding of new projects

c. leveraging government land assets, including greater opportunities for leasehold tenure, and providing financial and yield incentives to broaden private sector and institutional investment

d. facilitating voluntary participation by tenants and owners in longer-term leases through common and commercially available contracts.

Regional housing outcomes

Housing market conditions are such that government participation in land supply and housing provision is essential in some regional locations. For these communities, the lag between identification of need and the prioritisation of a suitable program response can be a source of great frustration and local disruption, both socially and economically.

The availability of fit for purpose key worker and government officer housing is critical to respond to service need, and positively contributes to regional economic activity and liveability.

In some instances, state agencies have adopted individual employee accommodation programs outside the GROH program, creating duplication that does not represent best value to government and undermines the centralised management role of the Department of Communities. This has occurred in circumstances where GROH is unable to meet demand or GROH options are not considered suitable for the state agencies' staff accommodation requirements. Past reviews, undertaken in 2010 and 2014, found the GROH program to be costly, outdated, inefficient and not keeping pace with the needs of state agencies or employees, yet there has been limited action in optimising and improving the program.

Government participation in housing key non-government workers should be considered only where significant local housing issues warrant a discrete project response. However, there are opportunities to more holistically consider where and how government should intervene, and the costs and benefits of a range of models that could be applied. Options could include accelerated land supply, financing and partnering opportunities and direct housing provision. Greater clarity about roles and responsibilities across government will enable more timely development of any future projects, and the exploration of innovative partnerships would assist timely responses. The availability of sustained social and affordable housing investment and mechanisms in appropriate locations will also influence the need for discrete key worker projects in the future.

Recommendation 74

Respond to the need for affordable and available housing in regional areas by:

a. establishing the principles, criteria and models for government housing intervention in regional locations that are demonstrating market failure, informed by regional housing plans

b. independently reviewing all regional officer housing assets and programs across the public sector, including the Government Regional Officer Housing program, to assess and identify:
   - implementation status and application of previous reviews
   - effectiveness, efficiency and value for money, particularly in regard to duplicate programs being operated by multiple state agencies
   - opportunities to consolidate housing programs across state agencies
   - ability to respond to state agency and tenant needs
   - appropriateness of models to specific regional property markets, including the risks of negatively impacting local market conditions
   - opportunities for improvements in effectiveness, efficiency, value for money and responsiveness to the needs of agencies, tenants and regional locations

c. investigating innovative models for implementation that would provide high-quality regional officer and other key worker housing, while managing the cost to government.



Case study

North West Aboriginal Housing Fund

The North West Aboriginal Housing Fund was established in 2016 to invest $200 million into initiatives intended to increase access to affordable, suitable and stable housing options for Aboriginal people living in the Pilbara and Kimberley regions. Ultimately, the fund aims to facilitate social and economic independence and wellbeing for north-west Aboriginal people and communities through investment in diversified housing options for working Aboriginal families.



The fund has provided a mechanism for Aboriginal-led, designed and delivered housing programs to be developed with and by Aboriginal organisations and their partners, in collaboration with state government. This approach has enabled 2-way capacity building and contributes to systemic change. The fund received dozens of innovative ideas through a Request for Expressions of Interest process in 2019 and has been working with successful respondents to support them to develop their ideas.

The fund has expanded the successful East Kimberley transitional housing program with an additional 50 homes and has launched a similar 40-home program in South Hedland, branded locally as the Hedland Aboriginal Home Ownership Program. In December 2020, a $9.7 million investment in Jalbi Jiya was announced. Jalbi Jiya (meaning 'your home' in Yawuru language) is offered through a partnership with the not-for-profit company Nyamba Buru Yawuru and will provide affordable rental and home ownership pathways for Aboriginal people in Broome.

In early 2021, 2 further investments were announced: the Ganalili Accommodation and Training Facility in Roebourne, led by Yindjibarndi Aboriginal Corporation, and an Employee Housing and Career Development project in Halls Creek, led by Yura Yungi Medical Service.

All construction projects provide apprenticeships and jobs for local Aboriginal people. Over 4 years, the fund is expected to achieve:

- support for 300 Aboriginal families
- increased school attendance for at least 600 Aboriginal children
- participation in jobs and training by at least 300 adults
- apprenticeships for 30 young people
- eventual home ownership for at least 15 families.

The majority of fund expenditure is expected to be delivered via services and construction contracts with Aboriginal organisations.

For further information, refer to www.wa.gov.au/nwahf.

Aboriginal housing outcomes

New approaches are needed as a priority to accelerate culturally appropriate, Aboriginal-led housing design, management and support services and meaningful evaluation of outcomes. There is strong recognition of the importance of working directly with Aboriginal people to develop improved solutions that respond to cultural needs (see the Aboriginal cultural heritage, wellbeing and enterprise chapter).

Aboriginal housing programs that mandate co-design and direct involvement and control by Aboriginal people are occurring, although challenged by capacity and capabilities. In line with Closing the Gap and the first WA *Closing the Gap Jurisdictional Implementation Plan*, targeted action is needed to bolster the capacity and capability of Aboriginal Community Controlled Organisations and other organisations to lead and participate. Ongoing, sustained and certain investment in Aboriginal housing will enable Aboriginal organisations to plan for and be more involved in housing provision, including construction, maintenance and management. Further investment in affordable housing options and a more agile housing system is essential for WA to achieve Target 9 of Closing the Gap.

The ability to demonstrate housing need through the development of a social impact strategy can lead to continuity of funding. This would enable Aboriginal organisations to plan strategically and attract, train and retain skilled staff. Involvement of private industry in investment in Aboriginal housing also presents an opportunity for organisations to provide targeted, sustained funding and to demonstrate corporate social responsibility and commitment to the Traditional Owners and Custodians of the land from which wealth is drawn.

Recommendation 75

Improve Aboriginal housing outcomes and enable options for housing infrastructure by:

a. ensuring Aboriginal social and affordable housing activities and targets correspond with Target 9 of the *National Agreement on Closing the Gap* to increase the proportion of Aboriginal and Torres Strait Islander people living in appropriately sized (not overcrowded) housing to 88% by 2031

b. delivering sustained investments in Aboriginal housing and capacity building of Aboriginal Community Controlled Organisations to embed housing services into strategic organisational plans, attract and retain skilled staff, and deliver meaningful associated training opportunities, in accordance with Recommendation 6 in the Aboriginal cultural heritage, wellbeing and enterprise chapter

c. developing a clear, targeted social impact strategy to demonstrate housing need, to seek required funding from the Australian Government, as well as attract diverse financial participation from the private sector where possible.



Health



Clinical care only influences **16% of a person's overall health and wellbeing**.[1] Greater action is needed to address wider determinants of health, such as socio-economic factors, the built environment and climate change.[2]

What IWA heard

During consultation on the draft strategy, stakeholders strongly supported alignment of health infrastructure to the Sustainable Health Review (SHR), and the need for greater focus on prevention and community-based care to improve health and wellbeing and reduce hospital demand. The recommendations to clarify the future of ageing health infrastructure, such as Royal Perth Hospital, Sir Charles Gairdner Hospital and Graylands Hospital, were also strongly supported.

However, the need for greater recognition of the current pressures on the health system, which are likely to be exacerbated by the COVID-19 pandemic, was a strong theme. Amendments have been made to reflect this. The important role that not-for-profit organisations and local governments play in supporting public health and the health system also required greater acknowledgement, which has been reflected in the content.

A new sub-recommendation has been added in response to feedback that better approaches to managing health asset maintenance and upgrades are required. Electronic medical records have also been identified as the highest digital health priority.

The quality of the state's health, and its healthcare system, help position WA as a global location of choice. The state's long-term health infrastructure needs are being reshaped by rising demand, community expectations and major health system reforms. Accelerating these reforms will be critical to improving the community's health and resilience, easing demand on hospitals and delivering a more sustainable health budget.

The SHR is a major 10-year plan to transform WA's health system.[3] Following billions of dollars in investment in new major hospitals over the 10 years to 2021, the SHR drives the next phase of reform – aiming to transition to a more effective and sustainable health system.[4]

The state's response to the COVID-19 pandemic has highlighted the vital role the health system plays in protecting and promoting the health and wellbeing of Western Australians.

The need for systemic change across the health sector has been building for some time. WA's population is growing and ageing. The prevalence of chronic disease, obesity and mental illness is increasing. Healthcare spending has more than doubled in the last decade to cater for rising demand, but improvements in public health and acute care outcomes have not kept pace.[5]

The pressure hospital emergency departments are under from rising presentations is well publicised. Numerous systemic challenges are impacting the ability of hospitals and their emergency departments to manage patient flow and are causing congestion. Frequent presenters, an increase in complex and acute mental health presentations and delays in access to home care packages and the National Disability Insurance Scheme are some of the main factors. These underlying challenges also increase the impacts of stresses and shock events such as heatwaves and pandemics that bring additional patients into the healthcare system.

The WA Government invested significantly to increase the capacity of the health system to meet demand and address the impacts of COVID-19. While this investment is critical to respond to the pandemic and address short-term pressures, more work is needed over the medium to long term in addressing the underlying drivers of demand and stresses on the system.

Simply expanding hospitals to meet rising demand and improve health outcomes is not the solution, as this often does not address the underlying factors that are driving the demand. Hospitals are expensive to build and operate, with almost 75% of the health budget already directed at hospital services.[6] WA is at the point where additional approaches are required to manage demand on hospitals.



Over the past 20 years to 2021, 2 major reviews have shaped WA's health system. In 2004, *A healthy future for Western Australians: report of the Health Reform Committee* recommended significant reorganisation of the system and **almost $7 billion investment in major health infrastructure**, including Fiona Stanley Hospital and Perth Children's Hospital.[7] In 2017, the WA Government initiated the SHR to drive the next phase of reform, adopting final recommendations in 2019.

Finding new ways to improve health services and outcomes, ease demand on hospitals and minimise preventable rising costs to improve health budget sustainability should be high priorities for government to pursue.

Without bold health system reform, the SHR notes that State Budget health spending is projected to increase from 30% of the total State Budget in 2017–18 to 38% by 2026–27.[8] This may limit funding available for other priority areas across government.

Across Australia, health systems are facing similar challenges and, like the SHR, are embracing new models of care and advances in technology to reform the way services are provided. The SHR moves away from a model centred on hospitals and acute care to one with a stronger focus on prevention, equity, early child health, end-of-life care and seamless access to services at home and the community through the use of technology and innovation.

The SHR defines preventative health both in terms of prevention of illness and injury and prevention of hospital admissions. Preventative interventions are provided through early disease management, usually in primary care and community-based settings, or through health promotion more broadly to improve population health, to reduce health conditions and the need to treat acute illness. Community-based care refers to health services provided outside hospital settings.

Providing more integrated and accessible health services focused on prevention and early intervention can improve the quality of health care and assist in preventing people from going into hospitals. The SHR notes that in 2017–18, 51,000 (7%) of the 707,000 hospitalisations, at a cost of $368 million each year, could have been prevented if timely and appropriate health care and management had occurred in community settings.[9]

The approach to planning and delivering health care is also shifting towards collaboration and co-design of services and infrastructure with stakeholders such as health organisations, patients and local communities to support more integrated services tailored to local needs. This is particularly important given the size of WA and the diversity of its communities.

Digital technology is transforming the health sector and is central to system reform. Digital connectivity and interoperability provide the foundation for integrated, person-centric care. They give people and their healthcare providers access to medical information and advice wherever they are and whenever they need it. They also support health data linking and analytics and improve clinical decision-making and patient safety.

Mental health is a major focus of the SHR, as it is a part of the health system that requires sustained, holistic and transformational reform.[10]

There is significant unmet demand for mental health services, which is impacting the capacity of other areas of the health system. Additional community and hospital-based mental health services and facilities are required as a priority across WA.

There is also a focus in the SHR on children and young people, who represent 23% of the state's population. Building foundations for future health from the start of an individual's life has a major impact on long-term health outcomes. Addressing health risks as early as possible, through prevention and early intervention, provides greater return on investment than responding to health issues later in life.[11]

Aboriginal health is also a focus of the SHR, with recommendation 3a of the SHR calling to 'reduce inequity in health outcomes and access to care with a focus on Aboriginal people and families in line with the *WA Aboriginal Health and Wellbeing Framework 2015–2030*'.[12] The Aboriginal Empowerment Strategy also identifies health as a focus and reinforces the need to support healthy lifestyles and invest in prevention and early intervention to improve Aboriginal health outcomes. In WA, Aboriginal people experience unequal health outcomes compared to non-Aboriginal people. Their life expectancy is lower (by 13.4 years for men and 12 years for women) and childhood mortality rates are 3 times higher.[13] Health outcomes are a core component of Closing the Gap targets; however, recent progress has been limited.[14]



Digitising Western Australia's health system

Embracing digital technology is a priority to enable health system reforms, realise greater value and transform statewide service delivery.

As recommended in the SHR, in 2019 the Department of Health released the *WA Health Digital Strategy 2020–2030* (Digital Strategy).[15] It envisages a 'digitally enabled public health system' with technology facilitating integrated and interactive services, and empowering consumers to self-manage their health.

The Digital Strategy identifies a range of initiatives such as electronic medical records, data analytics, artificial intelligence and remote patient monitoring. Technology to increase telehealth and virtual services to complement in-person consultations is also proposed. Technology that enables system-wide integration should be given precedence, with electronic medical records the highest priority, to overcome fragmented information management systems that hinder the ability of medical information to accompany a patient in their journey through the health system.

It will be important for the SHR and Digital Strategy to roll out together and system-wide to support a coordinated transition towards more community-based services, which will rely on being able to share information across the health system. Establishing a digital governance framework, building capability and capacity to implement major technology projects, and reviewing processes before implementing digital solutions will be critical to success.

Health and wellbeing determinants for Aboriginal people include cultural identity, family, access to traditional lands and community functioning.

To work towards achieving Closing the Gap targets, it is critically important that healthcare models for Aboriginal people are also rebalanced towards person-centric and community-based services focused on prevention and early intervention. Health care for Aboriginal people should take a holistic approach, and it is important for facilities to support delivery of services in a culturally safe and sensitive environment. Service planning and delivery should be community-led and delivered through partnerships where possible, for example, through Aboriginal Community Controlled Health Organisations.



Increasing the focus on community-based care will have a significant influence on long-term health infrastructure planning and investment. Increasing the level of services provided outside hospitals will result in more services being delivered in people's homes or closer to where they live, such as via general practitioner clinics, primary and allied health hubs, child health hubs and supported mental health accommodation. Health care will be more convenient and accessible and help maintain people's ability to live as independently as possible. Combined with other innovations, it will also help to reduce demand on hospitals and their emergency departments and improve the cost-effectiveness of the health system by providing people other ways of accessing health care.

As identified in the SHR, the Australian Government through the WA Primary Health Alliance will need to work in partnership with the Department of Health to undertake the system-wide planning required to move services out of hospital settings and provide more care in the community. However, the SHR also notes that WA has a lower number of general practitioners per person, with 79 general practitioners per 100,000 population compared to the national average of 96 general practitioners per 100,000. The Australian Government is responsible for funding access to primary health services such as general practitioners and will need to improve access to general practitioners in WA to support implementation of the SHR.

Even with a greater focus on community-based care, hospitals will continue to be a vital part of the health system and will require sustained investment. Following a decade of major health infrastructure investment in new major hospitals such as Fiona Stanley Hospital (2014) and Perth Children's Hospital (2018), the SHR notes the health system will need to manage its asset base wisely. Even still, further planning and investment in hospitals are required. The health system is supported by several ageing facilities and clear roadmaps are needed for the future of Royal Perth Hospital, Sir Charles Gairdner Hospital, Graylands Hospital and Selby Lodge.

Long-term health services and infrastructure planning and investment is needed to translate the SHR into practice. It will be required to reconfigure health services and identify the infrastructure in line with new models of care. This planning should be informed by scenarios that account for long-term population growth and change, and modelling of how demand for hospitals and community-based services will change as a result of implementing the SHR. The future of Royal Perth Hospital, in particular, will need to be carefully considered given the role it plays in serving Perth's CBD, eastern metropolitan region and regional WA. System-wide planning will be necessary to clarify Royal Perth Hospital's long-term role.

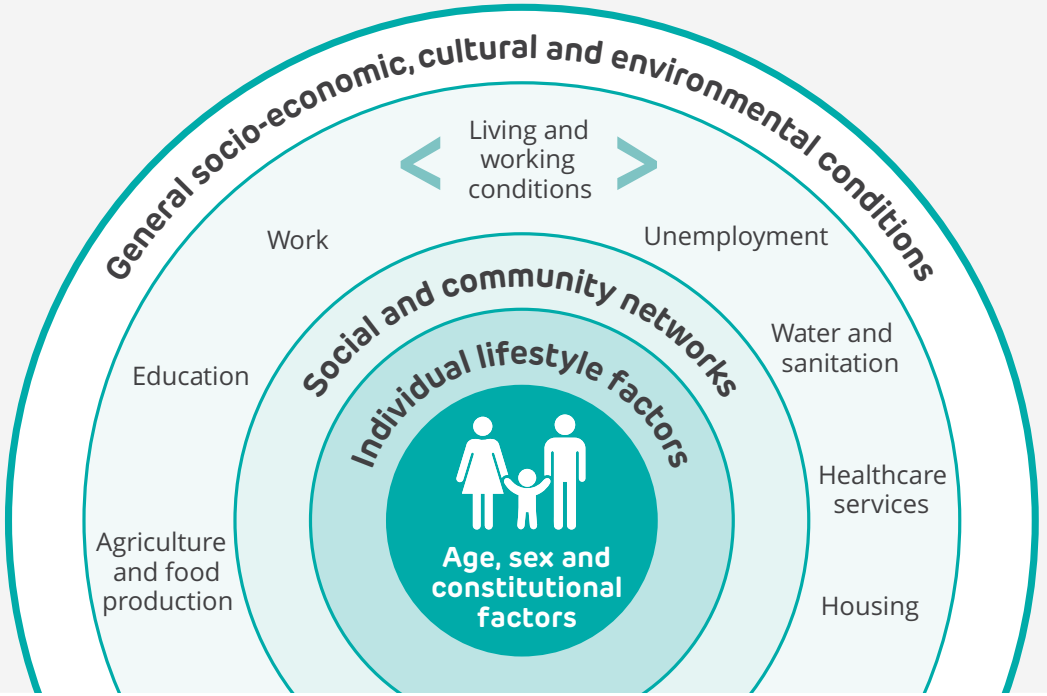
While not addressed in this Strategy, it is noted that recommendation 20 of the SHR calls for short-term to medium-term capacity pressure points in the health system to be addressed, such as those in Armadale, Bunbury and Peel–Murray.

The delivery of Fiona Stanley and Perth Children's hospitals experienced several challenges, and the lessons learned should be applied to the delivery of major health projects in the future, such as the proposed Women and Babies Hospital. The public sector will need to build internal capability and capacity to manage complex major projects. This matter is addressed in detail in Recommendation 37 of the Infrastructure delivery chapter.

The health system also has a large and ageing asset base, which potentially poses a risk to the quality of health services unless properly managed. As highlighted in the Asset management chapter, the public sector, including the Department of Health, Mental Health Commission and health services providers, also need to build asset management maturity.

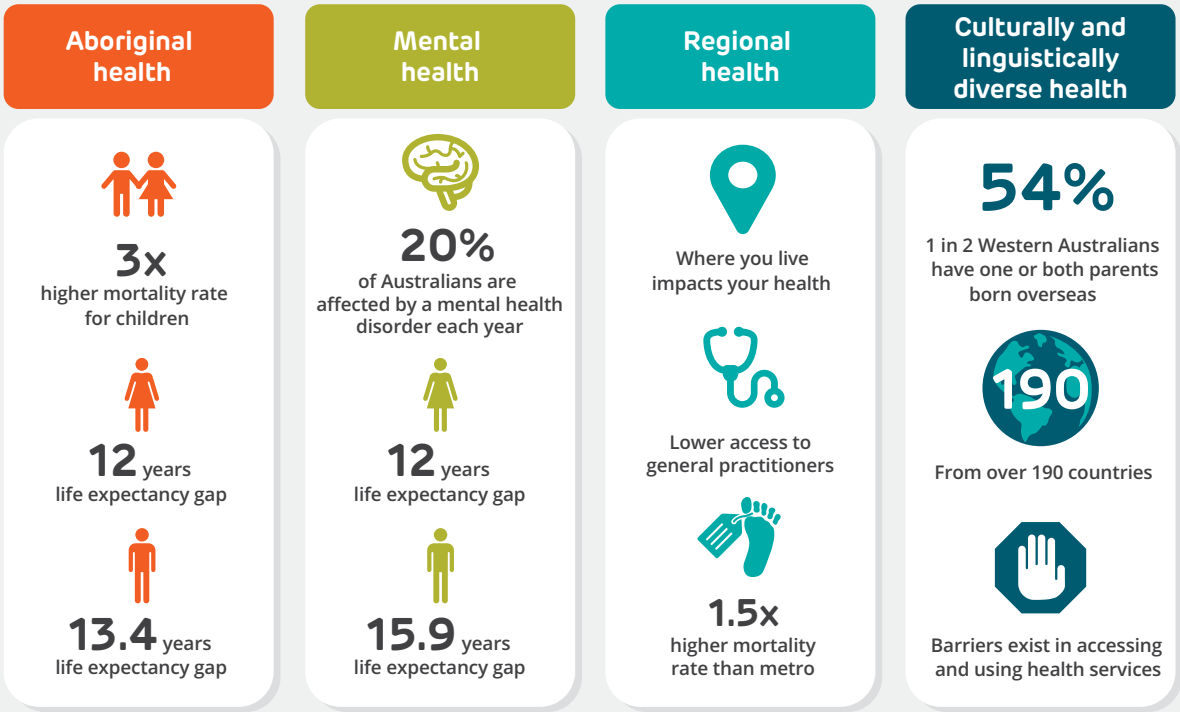
The built environment underpins community liveability and influences the wider determinants of health in many ways (Figure 48).[16] There are strong linkages between the quality of housing, safety of water and roads, accessibility of public transport and public open space and a range of health inequalities and chronic conditions, such as obesity, cancer and mental health, which cause the greatest disease burden in WA.[17] Figure 49 provides key examples of health inequality in WA.[18] Infrastructure should form part of a stronger preventative approach to protecting and promoting public health and reducing disease, illness and injuries, and demand on the health system.

Figure 48: A framework for determinants of health[19]



More must be done to ensure the places where people live, work and play (whether in the Perth metropolitan area, regional or remote communities) enable them to lead healthier lives and protect communities from harm. Acting now on a range of issues that address wider determinants of health will help to address health inequalities and improve public health overall. For example, designing neighbourhoods that are well-serviced by public transport and within a walkable catchment of community facilities and public open space (for example, 20-minute neighbourhoods), and banning advertising of junk food on public infrastructure, will promote active living and help people keep physically and mentally fit. Increasing shade and the urban tree canopy to protect people from the sun and reduce the heat island effect will help to reduce cancer and manage the impacts of climate change.

Figure 49: Key examples of health inequality in Western Australia[20]



Some Aboriginal people experience illnesses and diseases due to the poor environmental health conditions in which they live, particularly in remote areas, which is also reflected in higher rates of chronic disease. For example, in 2016, $17 million of the cost of hospitalisations in the Kimberley region was attributable to environmental factors.[21] Much-needed upgrades to infrastructure and services in Aboriginal communities can support improved environmental health outcomes. This matter is addressed in detail in the Aboriginal cultural heritage, wellbeing and enterprise chapter.

To achieve better health outcomes, the state's public health framework, including the *State Public Health Plan for Western Australia* and public health assessments, should play a more prominent role in facilitating whole of government action to protect and promote public health.[22] Aligning of government strategic plans and programs to the *State Public Health Plan for Western Australia* and applying public health assessments to infrastructure proposals would provide mechanisms to address health priorities and improve outcomes. Future infrastructure projects and programs, particularly those that are required to be referred to IWA for assessment, should also be required to consider public health impacts and outcomes.

WA also has the potential to drive world-class health innovation by capitalising on its comparative advantage in the fields of health and medical life sciences. In addition to WA's

universities, major institutes such as the Telethon Kids Institute, Harry Perkins Institute of Medical Research, Lions Eye Institute, Ear Sciences Institute Australia, Perron Institute, Australian National Phenome Centre and Institute for Respiratory Health are undertaking globally significant medical research. WA also has highly valuable data banks that are internationally significant, such as the Busselton Health Study (established 1966), the ORIGINS Project (established 2017) and The Raine Study (established 1989).[23]

WA's strong standing, both nationally and internationally, in health research is attracting world-leading researchers and their support teams to Perth, and the industry collaborates with international partners to pioneer new treatments and interventions. These are important foundations in developing world-class capability to supply growing markets for innovative health solutions. To date, WA researchers have had limited success in translating research into commercial ventures within WA, due partly to the state's lack of international-standard common-use facilities for the small-scale production required as the next step to commercialisation. Consequently, the intellectual property developed from research must be exported to progress to the manufacture and commercialisation phase. Establishing these facilities would leverage WA's strengths in innovation and help unlock the development of a health and medical sciences industry.

Aged care and disability sectors

There is a strong relationship between the health, aged care and disability sectors. Integrated planning and delivery of services and infrastructure should be carefully managed.

The aged care sector provides support to people aged over 65 in their own home, aged care or retirement villages. The Australian Government regulates, funds and subsidises the aged care sector and residential aged care places.

The Royal Commission into Aged Care Quality and Safety presented its *Final report: care, dignity and respect* in February 2021.[24] Its recommendations support increased ageing in place and in-home care, so housing design and service delivery will need to respond. Other recommendations include workforce improvements, introducing a star rating system, implementing a new Aged Care Act and accelerating in-home care packages and funding changes. Increasing the availability of home care packages will be important to reduce the number of people that have to stay in hospital while they wait for the support they need to return home. This will help relieve some of the pressure on WA's hospitals.

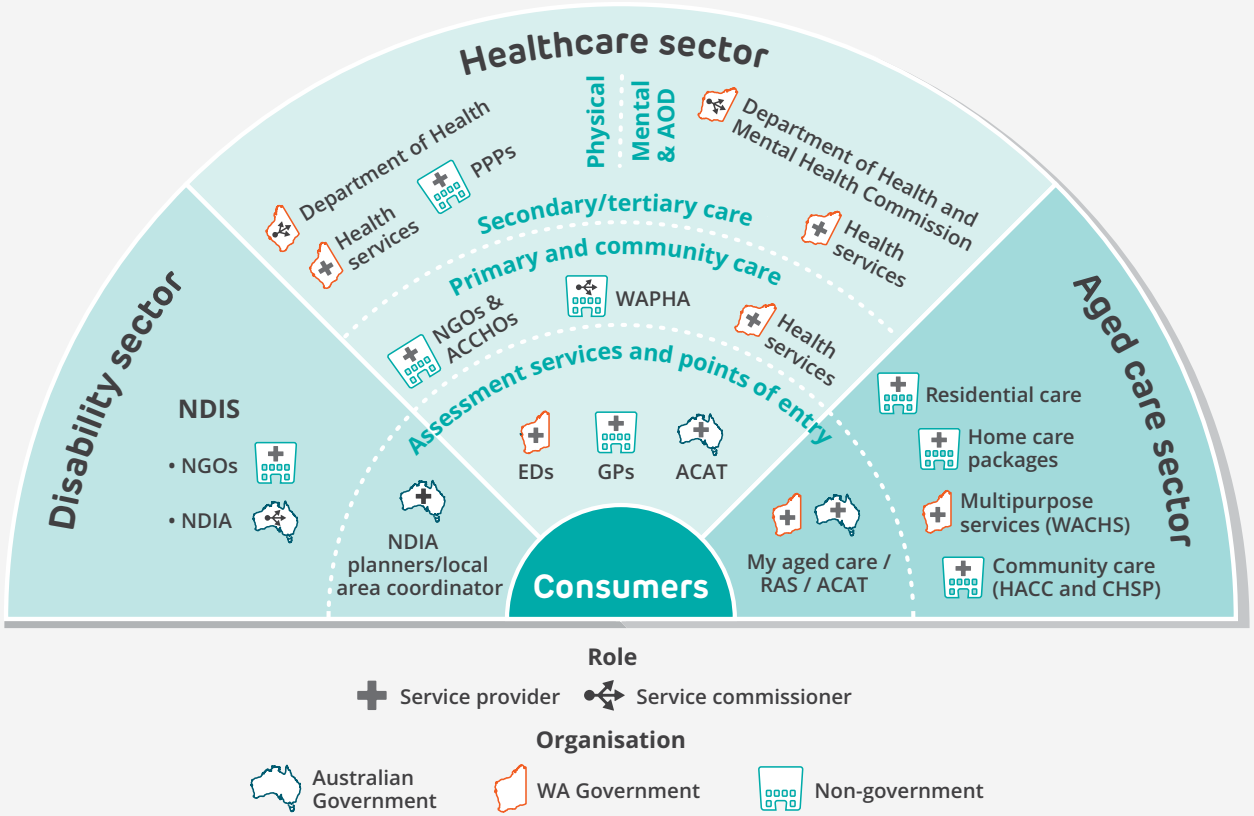
There is an undersupply of operational residential aged care beds in WA and there are major challenges in meeting demand in regional areas. IWA will monitor how the funding reforms recommended by the Royal Commission into Aged Care Quality and Safety are implemented by the Australian Government and if they result in the sustainable supply of residential aged care places.

The Australian Government also funds the National Disability Insurance Scheme, which provides people aged under 65 with support to enable them to live as independently as possible.[25] People accessing aged care and disability services are often also accessing health services. Integrating services and providing supported accommodation in community settings will continue to be important to improve care, support independence and reduce pressure on hospitals.

Governance

WA's health system incorporates a mix of services provided by government, private and not-for-profit organisations across the healthcare, aged care and disability sectors (Figure 50).[26] The system is highly interdependent and providing services is challenging, given the state's size and highly dispersed communities.

Figure 50: High-level mapping of the healthcare, aged care and disability sectors in Western Australia[27]



Within the healthcare sector:

- The Australian Government regulates and funds primary care provided through general practitioners and is guided by the WA Primary Health Alliance.
- The WA Government, through the Department of Health, provides leadership and management of the public health system. The system treats ill-health through provision of clinical services in hospitals and community-based settings. It also prevents ill-health through public health services that promote the health and wellbeing of the community and is responsible for preparing a state public health plan.
- The Department of Health and the Mental Health Commission are responsible for planning and commissioning health services from Health Services Providers (for example, North Metropolitan Health Service) that have jurisdiction over specific services or geographic areas of WA. The public health system has a large asset base with almost 90 hospitals ranging from large tertiary hospitals to smaller regional hospitals, including 3 hospitals that are managed under private–public partnerships.
- Local governments provide a range of environmental and public health services and community-based health services and are responsible for preparing local public health plans.
- The private and not-for-profit sectors play a variety of roles that support the public health system, ranging from managing hospitals and residential mental health services to providing public health programs.

Recommendations

Sustainable Health Review

IWA supports the SHR and seeks to align health infrastructure priorities with its recommendations. With almost 75% of the WA Government's health budget directed at hospital services, the system is heavily weighted in favour of hospitals and acute care.[28] The benefits from implementing the SHR's recommendations are well documented. Initiatives including redesigning the health system towards integrated, community-based care and investment in primary and mental health care and digital infrastructure are needed to transform the system. It is recognised that this refocusing will need to be carefully managed to maintain services while reconfiguring a system that is already under pressure. Modelling of the health system reforms will need to be undertaken to provide clarity on the cost-benefit position of implementing the SHR and be able to monitor whether reforms are transforming the system and improving outcomes. A number of critical SHR recommendations identified below require priority action to enable other system-wide reforms to be delivered.

The Department of Health commenced implementation of the SHR in 2019, following the WA Government's adoption of the final recommendations. However, shortly after, the department had to shift focus and resources to manage the COVID-19 pandemic, resulting in implementation falling behind schedule. While it is understood that implementation of some recommendations is occurring, limited information is publicly available on the reform implementation program and its progress.

Health outcomes, the design of clinical services and health facilities and the cost of operating the health system are intricately linked. Integrated, system-wide health services and infrastructure planning are essential to guide reconfiguration of health services in line with the SHR, and to identify the infrastructure required to support it. Planning needs to consider long-term scenarios that address factors such as population and demographic change projections and the impact of implementing the SHR. It should address resilience to climate change and preparedness for public health risks such as pandemics and involve stakeholders, medical practitioners and patients. It is anticipated that new service and infrastructure models will be trialled in many cases before they are mainstreamed across the health system, which will require new approaches to plan, manage and fund pilot projects.

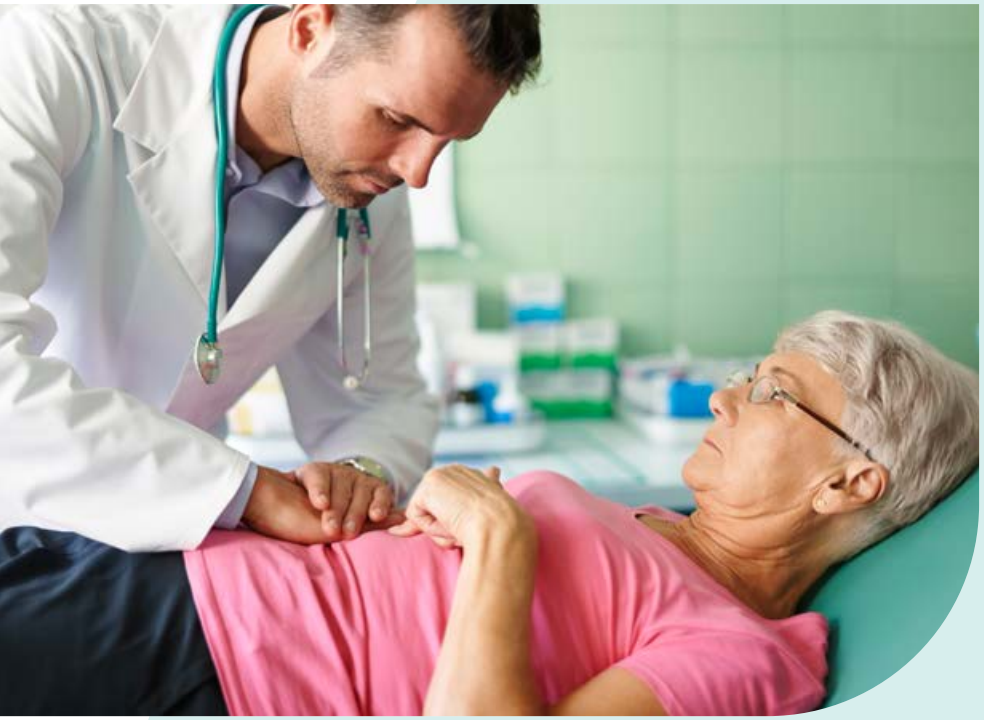
However, there are significant gaps in the system-wide planning, making it difficult to assess health infrastructure priorities, particularly over the medium to long term, which must be addressed. Recommendation 20 of the SHR identifies the need to develop a 10-year state health plan to establish contemporary system-wide planning that is focused on population health needs, contemporary models of care and robust modelling in partnership with healthcare providers across the sector. This will be important to translate the SHR into operational health planning. It is unclear whether the Department of Health and WA Primary Health Alliance have made progress on the joint planning required to reconfigure and move services out of hospitals and into primary care settings. The WA Health Clinical Services Framework 2014–2024 also needs to be refreshed as a priority to inform infrastructure planning and priorities, including options for the future of Royal Perth Hospital.

The infrastructure planning and asset management capacity of the Department of Health, Mental Health Commission and Health Service Providers must also be strengthened. Specialised expertise and experience are required to translate health services planning into infrastructure planning and the management of health assets.

In line with recommendation 18 of the SHR, establishing a sustainable funding footprint will be important to manage the health budget. It should include recurrent and capital expenditure, and targets for increasing the proportion of the health budget spent on preventative and community-based services. Preparing a system-wide strategic asset plan will also be essential to improve portfolio planning and management. This will provide a context for the Department of Health to consider priorities for the development, upgrading and maintenance of health infrastructure and how these will be managed within the sustainable funding footprint.

Case study

Reducing hospital demand in Denmark



In 2007, the European country of Denmark initiated major reforms to improve the sustainability and effectiveness of its health system by focusing on moving treatment out of hospitals and into the community.[29]

Denmark was facing a range of challenges, such as an ageing population, increasing chronic disease, technological change and rising hospital costs. To respond, Denmark reorganised its health system by providing fewer but more specialised hospitals, increasing the supply and access to primary and community care, and investing in enabling technology, such as electronic medical records and telehealth.

Between 2007 and 2017, the number of hospitals in Denmark fell from 40 to 21, and hospital beds fell from just under 4 to almost 3 per 1,000 population. However, the quality of care did not appear to decline and life expectancy continued to rise over the time frame. In 2017, the largest category of health spending was on outpatient care (mostly including general practitioner appointments and ambulatory care in and outside of hospitals), which accounted for over one-third of all health spending.

Building on this success, Denmark is targeting a 50% increase in outpatient treatment, which is expected to result in a 20% decrease in the number of days that people spend in a hospital bed. New digital technologies will continue to underpin transformation of the health system, such as the adoption of software to optimise patient flows and manage hospital capacity.

For further information, refer to www.healthcaredenmark.dk.

To manage infrastructure investment, decision-making should be supported by a prioritisation framework that considers risk throughout the lifecycle of health assets.

The Department of Health, Department of Treasury and Health Service Providers will need to work together to develop a more effective approach to managing and funding maintenance and upgrades across the health system's large and ageing asset base, including built infrastructure, plant and equipment. This will need to be underpinned by better information on the condition and future needs of built assets. The Asset management chapter provides further details on initiatives to improve the maturity and capability of asset management practices, which are applicable to the health sector.

Recommendation 76

Alleviate demand on hospitals and support budget sustainability by:

a. fast-tracking the implementation of the Sustainable Health Review to transition the health system to a person-centric, preventative and community-based public health system and ensuring there is adequate capacity within responsible agencies to support this

b. providing publicly available progress reporting at least annually on Sustainable Health Review reform outcomes to support accountability and transparency.

Recommendation 77

Address gaps in the health system service and infrastructure planning by:

a. prioritising finalisation of the review of the *WA Health Clinical Services Framework 2014–2024* to provide a basis for system-wide service and infrastructure planning

b. finalising development of the 10-year state health plan, including integrated clinical, infrastructure, public health, digital and workforce planning, to inform health service and infrastructure priorities

c. establishing an agreement for a sustainable funding footprint to support change and investment required in the health system in line with the 10-year state health plan

d. preparing an annually updated system-wide strategic asset plan that meets the requirements of the Strategic Asset Management Framework

e. completing a full review of the *Western Australian Mental Health, Alcohol and Other Drug Services Plan 2015–2025* to ensure it continues to drive long-term system reform

f. assessing options for private and/or not-for-profit healthcare providers to augment the public health system, such as public–private partnerships (where appropriate) and medi-hotels, when planning for health services infrastructure

g. strengthening lifecycle asset management maturity within the health system, including:

   i. enhancing the capacity of the Department of Health, Mental Health Commission and Health Service Providers to undertake system-wide infrastructure planning and prioritisation

   ii. consistent with Recommendation 42a in the Asset management chapter, allocating budget to enable the Department of Health, Mental Health Commission and Health Service Providers to implement fit for purpose asset management planning and systems to ensure health infrastructure, plant and equipment is functionally fit for purpose.



Safe and stable accommodation reduces pressure on hospitals

The Mental Health Commission's *A safe place: a Western Australian strategy to provide safe and stable accommodation, and support to people experiencing mental health, alcohol and other drug issues 2020–2025* recognises that safe and stable accommodation is critical to the recovery and wellbeing of people with mental health and alcohol and other drug issues.[30] However, the strategy notes that 'finding and sustaining a stable home can be problematic for people with mental illness due to housing unaffordability, insecure tenancy, poor housing conditions, low income, behavioural and social issues, stigma, discrimination and a lack of appropriate support and treatment options'.

The strategy also notes that 'while there are a range of supported housing options currently available, there is still a significant shortfall in meeting the varied needs of people with mental health and alcohol and other drug issues'. It asserts that 'the lack of appropriate accommodation and support options leads to bed blockages in clinical settings, resulting in individuals remaining in acute settings far longer than needed'.

The *2021 Mental health inpatient snapshot survey* found that, of the 647 mental health inpatients occupying a bed, 152 (23.5%) were deemed unable to be discharged because of a lack of suitable community-based accommodation and/or mental health support services.[31] This highlights the flow-on effect that the lack of social housing and supported accommodation is having on other areas of the health system and the need to address it as a priority to relieve pressure on the system.

Community-based services

Mental health is a part of the health system that is under significant pressure and should be the priority for infrastructure investment. The WA Government needs to accelerate investment in mental health services and facilities, such as community-based supported accommodation, and integrate mental health services into hospitals to address capacity shortfalls across the system. Addressing gaps in regional mental health services and infrastructure will be important to improve the quality and effectiveness of care and reduce the need for regional people to travel to Perth. New facilities should also consider the needs of Aboriginal people and support the delivery of services in a culturally safe and sensitive way.

The lack of appropriate accommodation for people with mental health, alcohol and other drug issues is resulting in patients occupying hospital beds for much longer than necessary.[32] The accommodation shortfall must be addressed as a priority, as recommended in the Housing chapter, to reduce reliance on costly acute services and release hospital capacity. There is also a growing shortfall in forensic mental health capacity to cater for people involved in the criminal justice system who are charged with offences but are mentally impaired or who are in prison and in need of specialist inpatient mental health care.[33] Recommendations 79c and 79d should be informed by outcomes of the Graylands Reconfiguration and Forensic Taskforce.

Primary and community-based care must play a stronger role in improving health care and reducing demand on hospitals. As pointed out in the SHR, many emergency department presentations could be avoided, and many hospital admissions potentially prevented, if suitable alternatives were provided in primary care and other settings. Primary care offers significant potential to manage patient health outside hospitals and support early intervention. Partnerships between health services will be essential to facilitate planning and delivery of more integrated and effective services. The development of infrastructure, enabling increased delivery of community-based health services and the collocation of primary and allied health care to improve accessibility should be a priority.

Approximately 25% of the state's population live in regional WA and can experience poorer health outcomes and mortality rates than the balance of the population. Travelling long distances to deliver or access health services is a major challenge for many people living in regional and remote communities. Digital technology services such as telehealth and remote monitoring offer significant potential to complement face-to-face consultations and improve the accessibility and effectiveness of regional health services.

Quality regional housing is important for attracting and retaining permanent healthcare staff, as well as accommodating transient staff travelling across regional health centres. The WA Country Health Service currently leases or owns over 1,000 properties, some of which are leased through the Government Regional Officer Housing program, and many require upgrades to bring them up to an appropriate standard. Recommendation 74b of the Housing chapter recommends an independent review of regional officer housing assets and programs across the public sector, including the Government Regional Officer Housing program, to identify opportunities to improve the provision of regional officer housing.

Recommendation 78

Reduce demand on hospitals by increasing investment in community-based services, including:

a. rebalancing and accelerating investment towards community-based mental health services and facilities, such as supported accommodation, and integrating mental health services into hospitals to address inpatient capacity shortfalls

b. working with the Australian Government to prioritise and expand the role of primary health care in providing more integrated, community-based health services that leverage capacity and support early intervention

c. working with the Australian Government to investigate and invest in innovative models of community-based primary health services and facilities, such as urgent-care clinics and co-located primary and allied healthcare hubs

d. expanding application of digital technologies, such as telehealth and remote inpatient monitoring, to improve health services' quality and accessibility across WA.

Targeted investment

Royal Perth Hospital

The Royal Perth Hospital dominates the East Perth precinct of the Perth CBD and comprises many buildings spread across multiple street blocks. It plays a key role in providing health services to the Perth CBD and the eastern metropolitan area and is a well-known landmark for many Western Australians. In 2004, *A healthy future for Western Australians: report of the Health Reform Committee* recommended that tertiary services located at Royal Perth Hospital be considered for relocation to another site as part of significant reorganisation of the health system.[34] However, the hospital has remained open, and despite the construction of new hospitals such as Fiona Stanley and Midland hospitals, the ageing facility continues to operate as an integral part of the health system. Strategic decisions should be made on the future of Royal Perth Hospital, especially given the increasing challenges and costs





Royal Perth Hospital and Sir Charles Gairdner Hospital are ageing assets, and improved health infrastructure portfolio planning is needed to determine priority and time frames for their future.

associated with maintaining and upgrading the ageing facility to support contemporary, technology enabled clinical services.

A roadmap is needed to guide the planning and investment in the Royal Perth Hospital site and should be progressed as a priority. It should consider:

- updated system-wide clinical services planning to clarify the hospital's long-term role within the health system
- potential redesign of hospital services to move services into primary care and community-based settings
- options to consolidate health, administration and support services on a portion of the site to maximise operational efficiency
- delivery staging and time frames that help to manage public cashflows and minimise competition for private and public infrastructure delivery capability and capacity
- investment required to extend the life of the hospital without adversely affecting health outcomes, with the goal of reducing lifecycle maintenance costs
- development of a vision and masterplan to revitalise the hospital precinct (aligned to the city opportunity plan proposed in Recommendation 27), which identifies opportunities to unlock land and reuse heritage buildings
- potential to create a health-focused research and innovation hub
- potential upgrading of McIver train station to improve accessibility to the hospital and wider precinct.

Sir Charles Gairdner Hospital

The Sir Charles Gairdner Hospital forms the key hub in the medical campus commonly known as Queen Elizabeth II Medical Centre, which is one of the largest medical centres in the Southern Hemisphere. The Perth Children's Hospital was recently completed, and a commitment has been made to develop the new Women and Babies Hospital adjacent to Sir Charles Gairdner Hospital to maximise synergies between facilities within the campus. The Sir Charles Gairdner Hospital is an ageing facility and integrating the buildings and information and communications technology systems will be necessary to support provision of seamless clinical services and maximise the benefit of co-locating these facilities. The siting of the new Women and Babies Hospital should also avoid unduly constraining the future development of Sir Charles Gairdner Hospital.

It is essential that the public sector applies lessons learned from the delivery of complex, major projects, such as Fiona Stanley Hospital and Perth Children's Hospital (including those reported in the Public Accounts Committee's *PCH – a long waiting period* and the *Special inquiry into government programs and projects*), to future projects such as the development of the new Women and Babies Hospital.[35] As identified in Recommendation 37 of the Infrastructure delivery chapter, the public sector also needs to build the skills and capacity to deliver projects of this nature as they are currently limited across the sector.

Recommendation 79

Support refocusing of the health system from hospitals and acute care to community-based services by undertaking targeted investment to modernise hospitals and address capacity gaps, including:

a. subject to Recommendation 77a, developing a roadmap for the planning and redevelopment of Royal Perth Hospital, considering any investment required to extend its life without adversely impacting health outcomes

b. subject to Recommendation 77a, developing a roadmap for the planning of and future investment in Sir Charles Gairdner Hospital

c. informed by outcomes of the Graylands Reconfiguration and Forensic Taskforce, prioritising investment to continue the services provided at Graylands Hospital and Selby Lodge through a new or redeveloped facility or facilities or other appropriate models of care, and to transition patients to suitable accommodation, where necessary

d. informed by outcomes of the Graylands Reconfiguration and Forensic Taskforce, prioritising investment in forensic mental health services to ensure appropriate, secured facilities for people with a mental illness involved in the state's criminal justice system.

Digital initiatives

WA will be unable to maximise health system reforms without implementing the vision of a digitally enabled public health system described in the Digital Strategy.[36] The Digital Strategy sets out a technology roadmap to implement several critical initiatives, such as telehealth, virtual care, remote patient monitoring and electronic medical records required to deliver benefits including person-centred care, increased community-based services and better clinical decision-making. Planning and investment in digital infrastructure to support the Digital Strategy and the electronic medical records program is a key enabler and requirement for reforming the digital platform, environment and operations of the WA health system.

Digital initiatives must be embedded within system-wide planning, and those that provide the foundations for system-wide reform, such as electronic medical records, should be prioritised.

The Department of Health should build capability and capacity to implement highly complex digital solutions. Robust planning and prioritisation of initiatives, based on a thorough audit of the health asset base, will be important to manage such a multifaceted and expensive modernisation program. The departments of Health and Treasury will need to come to early, in-principle agreement on priorities and benefits to provide clarity to proceed with developing business cases, particularly for larger initiatives.

It will also be important to progress smaller, more discrete initiatives, so that larger initiatives do not hold up ongoing implementation of the Digital Strategy.

Recommendation 80

Enable health system reforms and improve the quality and accessibility of health services in metropolitan and regional areas by prioritising and funding digital technology initiatives, identified in the *WA Health Digital Strategy 2020–2030*, subject to business cases, with the electronic medical records program the priority.

Preventative health

The state's public health framework, including the *State Public Health Plan for Western Australia* and public health assessment, should play a role in facilitating whole of government action to protect and promote public health and prevent chronic disease through strategic planning, regulatory processes and infrastructure proposals.

Part 7 of the *Public Health Act 2016* provides for the use of public health assessments to consider any public health risks or benefits that may result from implementing an assessable proposal, such as a project, program, plan or policy.[37]

Public health assessments enable the Department of Health to provide advice and recommendations on public health–related matters during the planning stages of assessable proposals to decision-makers and proponents to add value or improve the public health outcomes of proposals. The Act is being implemented in a staged manner and it is anticipated that Part 7 will not commence until 2022. Regulations are to be developed to guide application of public health assessments and provide further detail on what constitutes an assessable proposal.



To minimise regulatory burden, the regulations should allow for a preliminary assessment to be undertaken during the early planning stages of a proposal to determine if a public health assessment is warranted on the basis that the proposal presents a high risk to public health or has the potential for enhanced public health outcomes. The Department of Health should also establish capacity to support public health assessments and ensure they are completed in a timely manner and do not unduly delay proposals.

Recommendation 81

Improve public health and reduce chronic disease by enabling the built environment to play a stronger role in addressing the wider determinants of health, including:

a. aligning strategic planning and infrastructure proposals to the *State Public Health Plan for Western Australia* and reporting progress against achieving its objectives through normal reporting mechanisms, such as annual reports

b. finalising regulations required to implement public health assessments, which should be completed for significant strategic planning and infrastructure proposals that are assessed as presenting a high public health risk or have the significant potential for enhanced health outcomes.

Aboriginal health

As with other population cohorts, it is important that healthcare models rebalance from acute care to person-centric and community-based services focused on prevention and early intervention. For Aboriginal people, it is important that health care takes a holistic approach and that services are delivered in a culturally safe and sensitive environment.[38] Health facilities will need to be tailored to these new approaches. Planning and delivery of services should be led and delivered by the community where possible, for example, through Aboriginal Community Controlled Health Organisations.

Recommendation 82

Reduce Aboriginal health inequity and inequality by establishing health facilities tailored to Aboriginal needs, including:

a. supporting and funding the development of community-based primary care and allied health facilities that are designed and operated in partnership with Aboriginal communities and provide well-integrated and culturally secure wraparound services for Aboriginal people

b. providing health facilities in Aboriginal communities that are fit for purpose and have access to high-quality digital connectivity to support ongoing and improved delivery of telehealth services.

Health and medical life sciences facilities

The health and medical life sciences sector is one of the priority sectors to grow and diversify WA's economy, as identified in Diversify WA.[39] WA universities, research institutes and health service providers within the health and medical life sciences sector are undertaking world-class research and the sector has the potential to lead in areas within the field. As previously noted, the state can leverage comparative advantages in the field, such as the wealth of multiple longitudinal health and population survey data sets, world-leading early-stage research, innovative proposals for medical devices and personalised medicine, and specialised treatment trials. Common-use infrastructure arrangements have supported medical science advances in WA, such as Linear Clinical Research, a medical trials facility located on the Queen Elizabeth II Medical Centre that enables local researchers to trial leading-edge cancer treatments in an accredited environment.

Currently, there are multiple research and commercialisation opportunities that would benefit from new infrastructure and related facilities. As an early step, proponents require additional seed funding to determine feasibility, and strategically seek funding from state and federal governments and other sources to unlock commercial opportunities and public health benefits. Investment in projects, including in research and innovation precincts, can build a critical mass to create a world-class tertiary medical teaching and innovation sector and attract skilled global talent.

To realise WA's potential in the health and medical life sciences sector, in October 2021 the WA Government released the *Health and Medical Life Sciences Industry Strategy*, which sets a vision for a world-class health and medical life sciences industry and aims to build a vibrant innovation ecosystem to realise the vision.[40] The strategy encompasses 5 industry sub-sectors: digital health, medical technology, biotechnology, pharmaceuticals and health and wellness. One of the objectives to realise the vision is to 'support and enhance local medtech and pharmaceutical manufacturing infrastructure capabilities', with a focus on the 'development of testing and manufacturing facilities to enable the scale up and commercialisation of local health and medical life sciences innovations'. Government investment will be required to help implement the strategy and achieve its objectives.

Separately, the WA Government has established the Future Health Research and Innovation Fund to support a strategic long-term approach to investment into health and medical research, innovation and commercialisation.[41] The *WA Future Health Research and Innovation Fund Strategy 2020–2022* provides a vision and strategic themes to guide development of programs and initiatives that will receive investment through the fund and includes an objective to 'support new or existing infrastructure to elevate WA as an international leader in a research or innovation field'.[42]

To support implementation of the *Health and Medical Life Sciences Industry Strategy*, the WA Government should collaborate with the Australian Government, academia and the private sector to investigate opportunities for common-use facilities and co-fund facilities with appropriate governance structures and operational models. In parallel, the *WA Future Health Research and Innovation Fund Strategy 2020–2022* will focus the fund's support for critical infrastructure and platforms that have the potential to support WA in securing a greater share of national and international competitive funding to establish the state as a leader in key research and innovation areas.

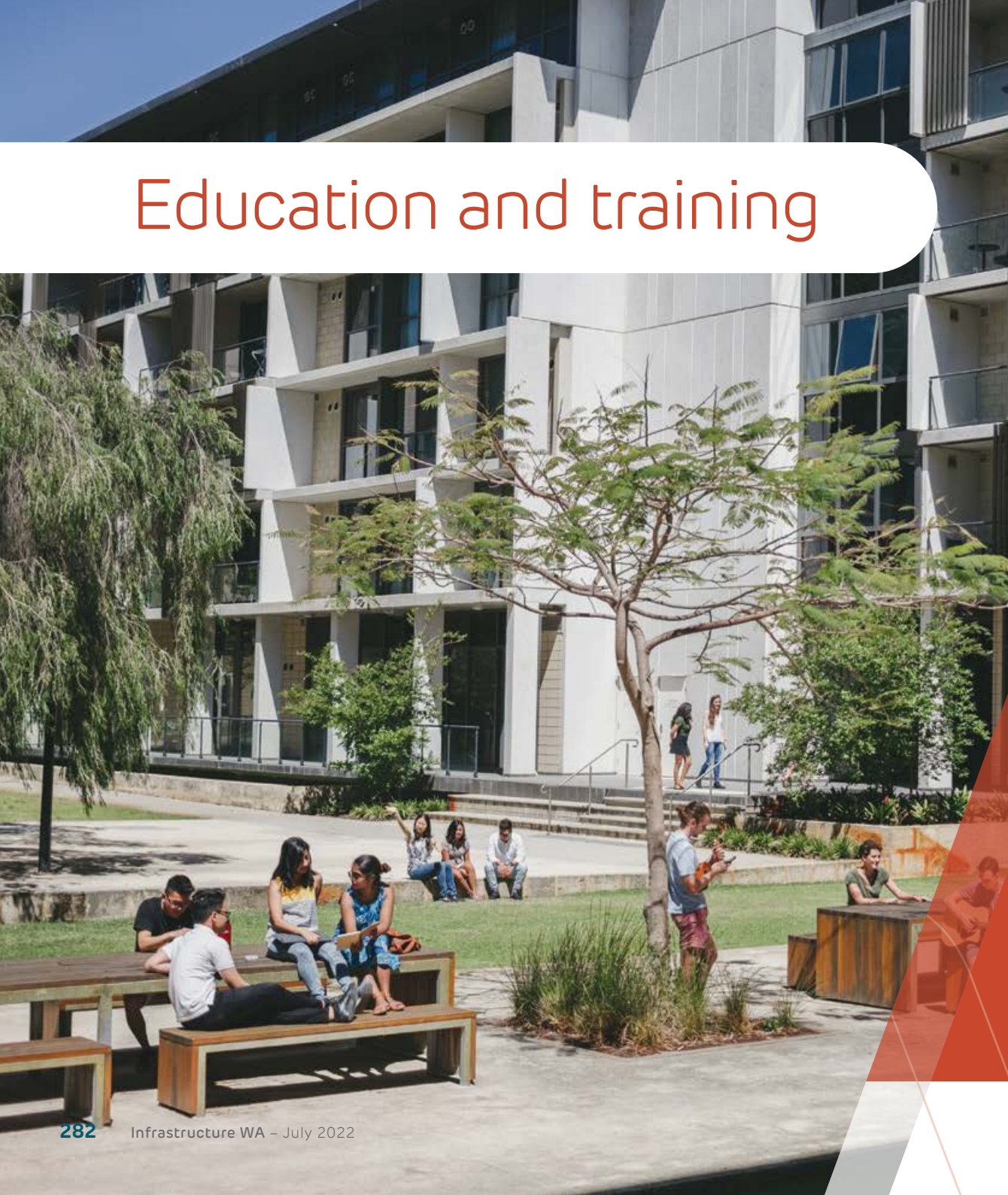
Recommendation 83

Support health and medical life sciences industry development, research, innovation and commercialisation by co-investing in health and medical life sciences facilities, subject to business cases, including:

a. establishing local medtech and pharmaceutical manufacturing infrastructure and capabilities to support the implementation of the *Health and Medical Life Sciences Industry Strategy* to develop a world-class health and medical life sciences industry

b. identifying opportunities for the Future Health Research and Innovation Fund to partner with the Australian Government, academia and the private sector to realise the infrastructure-related aims of the fund.

Education and training



Education and skills hold the key to future wellbeing and will be **critical to supporting long-term growth, tackling unemployment, promoting competitiveness** and **nurturing more inclusive and cohesive societies**.[1]

What IWA heard

During consultation on the draft strategy, stakeholders highlighted the need to better plan for future education infrastructure to accommodate growing populations. This has been addressed through inclusion of a recommendation to prepare a program-level business case to support school site acquisition. This chapter also links to relevant Planning and coordination chapter recommendations that support improved planning.

Some stakeholders were concerned with the use of transportable school buildings, particularly where they are becoming permanent assets or delivered without consideration of wider school needs. Relevant recommendations now refer to the retirement of transportable school buildings where they no longer meet contemporary requirements, and the consideration of offsite and modular construction techniques.

The importance of digital connectivity and online delivery of education and training related services as an alternative method to physical collocation at schools was raised. The importance of science, technology, engineering and mathematics (STEM) skills was also highlighted. Opportunities for online delivery, STEM and recent related investments have been further elaborated on in the Strategy. The extension of industry engagement in curriculum development and delivery to all levels of education and training was supported.

The education and training sector is a major contributor to WA's prosperity and growth and is vital in ensuring the community is well skilled.

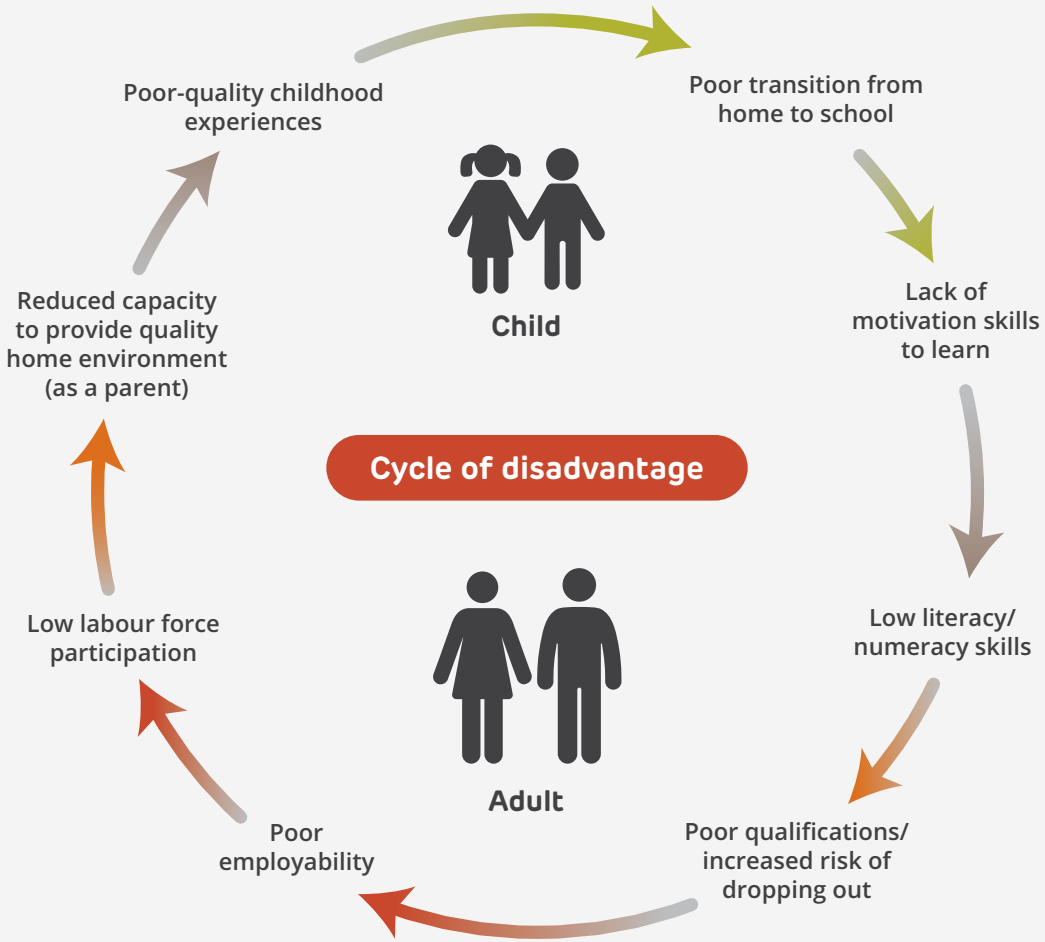
Today's students are facing a rapidly changing future and technological change will continue to be a driving influence. Automation will replace some jobs that rely on routine tasks, and the demand for skills that are difficult to automate will increase.[2] A growing proportion of jobs will need people who can interact with and coordinate people, as well as solve complex problems, think creatively and use technological tools.[3] WA's schools, TAFEs, colleges and universities are working to keep pace with this change by ensuring future workforce capabilities and skills match future need.

To adapt to this future, the sector will increasingly adopt new technologies in the classroom. Technology will see more students learning online, particularly at secondary and higher education levels. Recently, the WA Government invested in significant bandwidth increases to meet the growing demand for students to access online learning materials. The WA Government also continues to provide specialist technology and equipment at vocational education levels. However, due to the rapidly changing nature of this technology, this is becoming increasingly expensive to fund.

Models of teaching and learning (also known as pedagogies) have been evolving with changing needs.[4] Contemporary teaching methods are progressively being tailored to individual learning styles.[5] Small collaborative group learning is increasingly being used in classrooms to encourage skills such as creative and critical thinking.[6] These new methods require schools and classrooms that are designed differently.[7] Flexible classrooms and breakout spaces support these teaching and learning approaches while providing spaces that match an individual's learning needs, style and pace.[8]

The education and training sector also seeks to address inequities in society by providing educational resources to all students, regardless of their circumstances. Education throughout life can help address entrenched intergenerational disadvantage.[9] Challenges faced by children early in their lives can have negative consequences later, hindering their capacity to give their own children a better start (Figure 51).[10] The education and training sector is particularly important for Aboriginal people in helping to meet Closing the Gap targets.[11]

Figure 51: The cycle of disadvantage[12]



A cooperative effort between government agencies responsible for health, welfare, housing and education is particularly beneficial for vulnerable children as they face the greatest risk of falling behind when transitioning to school.[13] For children from disadvantaged backgrounds, or those who are developmentally vulnerable, high-quality early learning in the year before full-time school is particularly important.[14] The collocation of health, community support services and high-quality early learning can increase access to these services and help intervene in the cycle of disadvantage.[15] There is also an opportunity to provide online delivery of wraparound services at schools as non-build alternatives to physical collocation, subject to the availability of high-speed internet. These may include allied health services, for example, speech and occupational therapy. Collaborative, place-based approaches can also be used in disadvantaged areas to align complex needs with infrastructure solutions. Recommendation 6 in the Aboriginal cultural heritage, wellbeing and enterprise chapter recommends community-led processes and place-based infrastructure outcomes for Aboriginal communities.

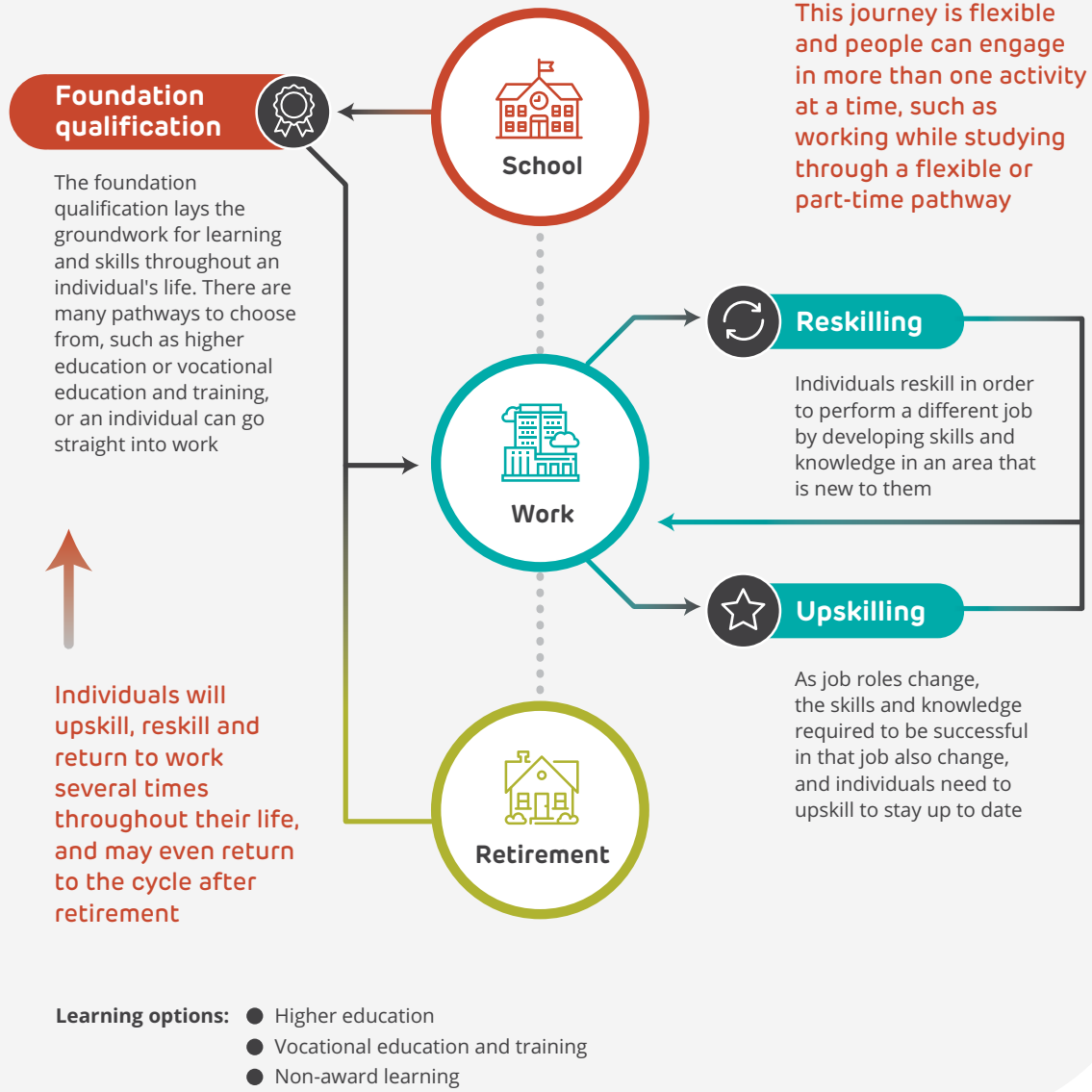
Population change is also impacting the education and training sector. Many of Perth's new and existing suburbs are experiencing high rates of population growth, resulting in a number of schools being at capacity or expected to reach capacity soon.[16] Conversely, education and training facilities in some regional and remote locations in WA are facing reduced demand as populations decline. Families and individuals often move to larger cities due to limited quality education and training in these locations. Smaller school sizes, particularly in secondary schools, reduce the breadth of the education curriculum available.[17]

If this trend continues, it will impact regional and remote WA's liveability, and some regional and remote students may be further disadvantaged compared to their city counterparts.[18] In particular, Aboriginal people in regional and remote areas are disproportionately impacted by these challenges. These issues are highlighted in the Regional development chapter, with Recommendation 21 seeking to develop regional services and infrastructure models that apply place-based approaches that allow social service agencies, such as education, to better coordinate and co-locate services.

At the vocational and tertiary education levels, lifelong learning trends are increasing the frequency and demand for training and higher education.[19] To keep pace with technology and other changes, there is an ongoing need to upskill, reskill and build knowledge multiple times throughout our lives (Figure 52).[20] To ensure training services are easily accessible by a broader range of the population, vocational training facilities are increasingly being built close to public transport nodes and activity centres.[21] The challenge of identifying and securing sites for this purpose is addressed by Recommendation 33 in the Planning and coordination chapter.

A thriving higher education and university sector is critical to WA's economic diversification and is synonymous with a prosperous economy and the state's growth.[22] WA has an opportunity to serve the emerging consumer class through growth in international education.

Figure 52: The lifelong learning cycle[23]





International education is a major economic contributor to WA, **contributing approximately $2.1 billion in export income and 12,000 full-time jobs** (1 full-time job for every 5 international students).[24]

For this to occur, highly visible, renowned universities that can compete in a global higher education marketplace are needed. While each of WA's universities has strengths, their rankings against other Australian jurisdictions that attract a higher proportion of international students suggests that there is room for improvement.

Challenges have been heightened by the impact of the COVID-19 pandemic. Faced with declining enrolments and rapid deployment and delivery of online courses, WA's universities have had to reconsider business and teaching models to ensure they remain viable. With digital-based learning likely to continue and increase, the role of physical assets and campuses will change. A more collaborative approach across WA's universities, including potential consolidation in part or whole across public universities, could reduce unnecessary duplication, increase international rankings, unlock new opportunities for campus infrastructure and bring greater administrative efficiencies.

The science, innovation and technology opportunity for WA

STEM skills are increasingly being recognised as crucial to prepare WA's future workforce for a technologically advanced and automated world.[25] Growing scientific, research and technological capability contributes to WA's business productivity, efficiency and competitiveness. More effective collaboration between industry (particularly those involved in STEM) and all levels of education and training can ensure the community benefits and is workforce ready.

Science excellence begins early, and the WA Government has increasingly invested in STEM education. The Department of Jobs, Tourism, Science and Innovation has released the *Future jobs, future skills* strategy to provide a framework for building the state's STEM skills.[26] In the recent 2021–22 State Budget, a number of STEM resources and facilities were funded to boost science in schools. There is also an opportunity to leverage and grow STEM culture and skills throughout the state through Scitech. With the importance of diversity in teams, leadership and learning, broadening the focus of STEM to include the arts (also referred to as 'STEAM') is becoming more common. Discipline-specific skills in STEM remain important and are supported by higher-order skills used in STEM, such as communication and problem-solving, as well as creativity through the arts.

Governance

Primary and secondary schools

Under the *School Education Act 1999*, the Department of Education is required to provide educational opportunities to all students throughout WA, regardless of where they live or their circumstances. The Department of Education is responsible for the strategic planning, operation and curriculum of WA Government primary and secondary schools. Strategic documents that provide guidance include:

- *Every student, every classroom, every day: strategic directions for public schools 2020–2024*, which articulates the aspirations, improvement drivers and success measures for the WA public school system[27]
- *Building on strength: future directions for the Western Australian public school system*, which details the rationale behind the commitments outlined in the strategic directions for public schools.[28]

These key strategic publications articulate the importance of collaboration with other state agencies, families and the wider community to help support student wellbeing. They also highlight the importance of intervention in the early years and facilitating creativity, collaboration and critical thinking.

To predict future school demand, the Department of Education uses spatial data from Perth and Peel @ 3.5 million, other regional plans, the Urban Land Development Outlook, structure plans and local planning strategies. Population data and development rates are also used in this process. Past trends and other forecasting methods are used to establish a final forecast of student demand for each individual school and assessment is made against the school's current and future capacity.

In conjunction with the Department of Finance, the Department of Education has developed the Secondary School Planning Guide and Primary School Standard Pattern Design Brief. The Secondary School Planning Guide provides scope to develop individual designs for each location, catering for the mix of curriculum delivered across secondary schools.

In the case of primary schools, the Department of Education uses a Standard Pattern Design Brief for new construction and refurbishment. The objectives for developing a standard pattern design are to achieve cost benefits, consistency of facilities across all locations and a rapid turnaround driven by 2-year delivery timelines. It is understood that the Department of Education reviews the Primary School Standard Pattern Design Brief twice a year in consultation with both internal and external stakeholders to ensure that the design reflects the needs for individual schools and contemporary pedagogies.



Vocational education and training

The Department of Training and Workforce Development is responsible for planning, designing and maintaining metropolitan and regional TAFEs and Jobs and Skills centres. Five TAFEs, including North Metropolitan TAFE, South Metropolitan TAFE, North Regional TAFE, Central Regional TAFE and South Regional TAFE, operate and deliver vocational education courses across 60 locations.

Unlike some other jurisdictions, which have transferred much of their vocational training to registered training providers, WA's TAFE system largely remains a provider of choice.



Strategic documents published by the Department of Training and Workforce Development include:

- *Report on the review of skills, training and workforce development*, which sets out a targeted training and skills roadmap for WA's economic recovery[29]
- *Strategic plan 2019–2023*, which sets out a high-level vision and priorities for the vocational education and training sector.[30]

The WA State Training Board, established under the *Vocational Education and Training Act 1996*, undertakes strategic activities, tasks and projects to improve the links between specific industry developments and the vocational education and training sector. The *WA State Training Plan 2021–2022* sets out the training needs of the state's industries, including 8 strategic priorities, and provides direction on investment in vocational education and training.

The Department of Finance is responsible for managing both school and TAFE infrastructure project delivery and maintenance activities, with funding through the departments of Education, and Training and Workforce Development.

Higher education and universities

While the Australian Government is responsible for university funding arrangements, the WA Government provides land and contributes funding to support capital investment. International education is identified in Diversify WA as an industry sector that presents a significant growth and diversification opportunity for the state.[31]

Private sector education and training providers

A range of private sector and not-for-profit organisations provide education and training options for individuals across primary, secondary, vocational and higher education levels. The departments of Education, and Training and Workforce Development play a role in regulating, reviewing and funding the private education and training providers.

Recommendations

School infrastructure planning and delivery

Planning

Population, demographic, land development and dwelling data sources are used by the Department of Education to predict the future demand on schools. While the projections for individual schools have a good degree of accuracy, the format that the Department of Education receives this underlying information in results in a manual and resource-intensive demand forecasting process. Data owned by entities should be current, digitised and automated to enable the Department of Education to move from individual school demand forecasts to whole-of-network school planning. Once this data is available in appropriate formats, it can be used in software that models a range of scenarios for the network of school sites and investment options. This would inform where and when to acquire new sites or amend school intake boundaries, and test the impact of non-government school demand and opportunities for shared use. Scenario modelling can also visualise the impact of infrastructure responses on the broader network of schools and calculate projected costs.

New school sites have traditionally been secured through district and local structure planning and subdivision processes. For schools in new suburbs, the planning process remains effective, but some challenges remain with unexpected demographic profiles and the timely availability of school sites. For existing suburbs, where urban infill is occurring, matching school capacity to increasing demand is more difficult. The Department of Education must seek government-owned sites that are surplus to requirements (which are rare at the scale required) or compete on the open market for suitable sites. The funding approval processes for government agencies are lengthy, making it difficult for the Department of Education to purchase privately owned sites that meet its needs in a timely manner.

Schools in inner and middle suburbs experiencing ongoing, increased enrolment demand often have several site constraints. For these schools, design solutions are increasingly required that go beyond the typical low-rise building format. Multistorey or high-rise buildings should be more widely considered and tested with the community. Modular offsite construction techniques should also be considered for the delivery of permanent facilities and learning spaces. Offsite construction methods can result in significant benefits that enable permanent, contemporary classrooms and complementary buildings to be added over time at lower cost and with minimal disruption.[32] Modular construction techniques are highlighted in Recommendation 38f within the Infrastructure delivery chapter and can better use limited land supply and address changing educational classroom requirements while also meeting constrained delivery time frames.

Schools are increasingly managing a wide range of complex social issues and can be an important conduit to families accessing other social services and infrastructure, such as health care and childcare, particularly in disadvantaged areas.[33] This infrastructure needs to be planned and designed in a way that integrates with the wider community. Co-locating education facilities with other community support and health services can make them as accessible as possible. Place-based approaches to infrastructure planning should occur to ensure local community characteristics and circumstances inform holistic and integrated decision-making and guide locally tailored infrastructure and service solutions.

A number of recommendations contained in other chapters within the Strategy, as outlined in the following, relate to planning for education infrastructure across the state.

Regional development chapter:

- Recommendation 21 (develop regional social services and infrastructure models) proposes application of a place-based approach to allow social service agencies, such as education, to better coordinate and co-locate services to ensure the service mix is tailored to changing community needs.

Planning and coordination chapter:

- Recommendation 25 (urban consolidation action program) proposes the adjustment of policy settings in infill locations to improve amenity and liveability, including those applying to schools. This should include further review of the WA Planning Commission's draft Operational Policy 2.4 – Planning for school sites to better consider school site planning in infill areas.
- Recommendation 27 (city opportunity plan) proposes a roadmap to better plan for growth and change in the Perth CBD and surrounds. There are currently no public schools operating in the Perth CBD and a limited number in surrounding areas, which are under growth pressure. Infrastructure benchmarking suggests that both primary and secondary schools will be needed in the short to medium term. The city opportunity plan should consider potential locations for education and training facilities to address this demand.



- Recommendation 28 (integrated regional plans) proposes long-term plans for land use, infrastructure and environmental needs for each region. These will consider regional infrastructure needs, including education and training requirements.
- Recommendation 33 (identify and secure strategic sites) relates to securing land for strategic infrastructure in regional locations by establishing a dedicated and recurrent fund for land acquisition. Future education and training facilities will also benefit from centrally coordinated strategic infrastructure site identification, matching state agency needs with government landholdings and enabling better use of the existing land asset base.

Delivery and maintenance

Transportable school buildings are temporary, relocatable buildings that can be used as an effective way to add capacity and cater for fluctuating enrolment demand over time. However, transportable buildings were originally meant to be used for short periods to deal with temporary demand. Permanent built facilities should be used where demand is expected over an extended time. Where possible, older transportable school buildings that no longer meet contemporary teaching and learning methods should be retired. Transportable school buildings should not restrict students' access to open sport and recreation space.

Asset management is an ongoing challenge for any government agency that has a large portfolio of facilities. The Department of Education is implementing improvements to asset management systems and practices through its pilot with the Department of Finance on the Building Asset Management Framework. Many ageing school facilities need upgrades to address functionality. As detailed in the Asset management chapter, Recommendation 42 seeks to incentivise improvements in asset management across the public sector by creating a new budget allocation to undertake fit for purpose asset management planning. This is particularly relevant in the case of ageing school infrastructure.

Recommendation 84

Improve school infrastructure planning and delivery that meets student needs by:

a. reviewing data formats, sources, accessibility and assumptions to ensure they are timely and functional for planning school demand, greenfield and infill areas
b. applying software and systems that use new methodologies (such as scenario modelling) to test innovative solutions for government schools in the context of the public and private school assets
c. preparing a program-level business case for site acquisition in inner and middle suburbs, aligned with school network planning needs
d. enabling the use of medium-rise to high-rise public vertical schools in appropriate locations, particularly engaging with stakeholders to foster broader community acceptance of this model
e. using transportable school buildings only as a temporary demand solution and not where enrolment growth is expected to continue
f. consistent with Recommendation 38f in the Infrastructure delivery chapter, considering offsite and modular construction that enables a contemporary teaching and learning environment
g. progressively retiring transportable school buildings where they no longer meet contemporary teaching and learning environment requirements
h. implementing collocation and shared use with childcare, health and community support services where possible, particularly in areas of disadvantage
i. consistent with Recommendation 42a in the Asset management chapter, allocating budget to implement fit for purpose asset management planning to ensure ageing school assets are functionally fit for purpose.

Future skills, training and funding

Training and skills are important elements for growth and development in a rapidly changing world.[34] Fostering knowledge, talent and skills is an important ingredient in WA's prosperity. To ensure WA is resilient to a more technologically complex and automated environment, and sufficiently skilled to respond to industry growth opportunities, vocational training and higher education need to be accessible and evolve.[35]

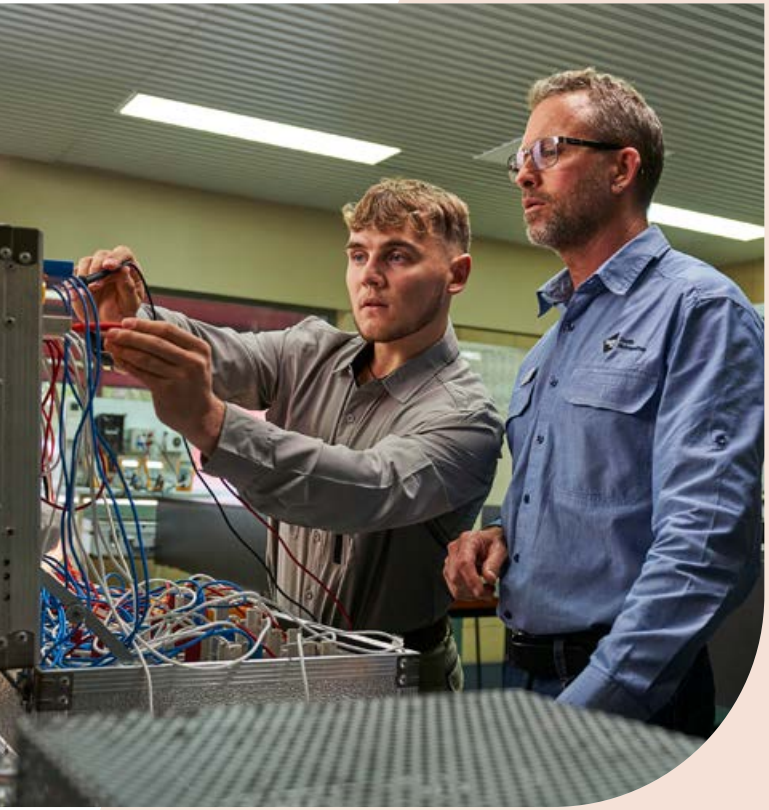
Partnerships and collaboration between state government, industry, schools, TAFEs, universities and private training providers are key to driving innovation and training that meets changing workforce needs. Early engagement between these participants is required to plan for this change and understand the associated infrastructure requirements. Greater recognition of the value of early engagement is required to build talent and a cohesive and competitive sector. The growing role of industry in curriculum development and delivery is a strong step in ensuring up-to-date, fit for purpose course content and (in some cases) equipment, which helps increase training and participation rates.

Rapidly changing technologies and innovation are impacting the facility and equipment needs of the vocational education and training sector.[36] Equipment and software are becoming increasingly technical and complex, resulting in increased costs. The sector will need to be resourced and funded to respond to different industry and sector requirements with the specialist equipment, software and curriculums it needs to keep pace with change.

Early and ongoing alignment between future workforce demand, emerging industry needs and required changes to training curriculums is critical to ensure adequate lead time is allocated for changes.[37] This is typically between 1 and 4 years.[38]

Case study

Defence industry workforce planning



Planning for future skills and qualifications in the defence industry requires consideration of extended lead times for federal defence contracts and the impact of rapid technological change. To plan for a pipeline of skilled workers to meet the changing needs of WA's defence industries, the WA Defence Industry Workforce Office was established as part of the commitment made by the WA Government in its Western Australian Defence and Defence Industries Strategic Plan.[39]

The WA Defence Industry Workforce Office leads the development and implementation of workforce development plans to support the WA defence industry, which includes close engagement with the defence industry to understand industry needs, developments and future trends. Supported by the departments of Training and Workforce Development, and Jobs, Tourism, Science and Innovation, the office works closely with a range of education and training providers, including relevant universities, to ensure that skills, education and training curriculum, equipment and infrastructure needs are met. The office's work includes formulating trades workforce strategies for the maritime defence industry. This includes boosting financial support for apprenticeship training, upskilling trade workers for defence, implementing an overarching marketing campaign to build greater awareness of defence industry career opportunities and creating specialised career guidance services at the Rockingham Jobs and Skills Centre.[40] The planning focuses on priority projects that align with the Australian Government's *2020 Force Structure Plan* and WA's defence industry capabilities.[41] Short-term to medium-term workforce requirements include occupations for structural steel and welding, metal fitters and machinists, electricians, engineers and project managers to assist with the delivery of defence sustainment and acquisition programs in WA.

For further information, refer to www.southmetrotafe.wa.edu.au.

Crucially, this investment must respond to place-based training needs with a focus on alignment with a region's major employment industries and competitive advantages. However, it must also be recognised that investment in skills and training infrastructure, equipment and staff in these dispersed regional locations can come at a higher cost. Following an inaugural skills summit in 2021, the WA Government has provided a number of skills-related investments as part of the 2021–22 State Budget, including apprenticeship incentives, increased migration and more-targeted regional skills summits.

The capability and capacity of the private sector is critical for infrastructure project delivery. WA, like other jurisdictions, is experiencing a significant increase in infrastructure activity.[42] This has recently been driven by increased public infrastructure investment and economic growth in the resources and housing industries. Skills shortages due to migration limitations are driving up costs and impacting project time frames.[43]

A mechanism that assists private infrastructure sector skills shortages is the provision of incentives for apprenticeships and traineeships in trades and office-based roles. The WA Government's Priority Start Policy aims to develop a sustainable construction workforce by setting benchmarks for the number of apprentices and trainees employed by companies working on state government infrastructure projects. Although the obligation is on head contractors to comply with the policy, it is often subcontractors that employ most apprentices and trainees.

Some companies are still reluctant to take on apprentices and trainees due to the cyclic infrastructure market and future uncertainty. Group training organisations (GTOs) address this issue by employing apprentices and trainees and placing them with host employers, such as contractors, who are engaged to deliver projects. GTOs carry out many of the trainee management functions required in training contracts, reducing the burden on the host. Benefits include creating more employment opportunities, employment continuity and improving the quality and range of training available to apprentices and trainees.[44] Under the Western Australian Group Training Program, GTOs are partially funded by the WA Government if they employ apprentices or trainees from under-represented groups, including Aboriginal people, people with a disability and women. However, despite the numerous incentives in place and opportunities for GTOs they currently represent less than 10% of the apprenticeship and trainee market.[45]

Recommendation 85

Better plan for and invest in future skills and training by:

a. involving the Department of Training and Workforce Development, TAFEs and relevant private training organisations when strategies or plans are developed for new or existing industry sectors, to ensure future curriculum is planned in a timely manner
b. establishing a dedicated and ongoing funding program for TAFE training equipment and software and facilitating industry co-contributions where appropriate
c. further encouraging apprenticeships and traineeships on public infrastructure projects by expanding the use of group training organisations, including the use of incentives and promoting the use of group training organisations
d. updating the Strategic Asset Management Framework's Strategic Asset Plan and Business Case guidelines to require projects and programs with a capital cost of $100 million or more to consider the availability of, and/or need for, skills and training.

Arts, culture, sport and recreation



WA is one of the most culturally diverse states in Australia. It is home to **people from over 190 countries who speak approximately 240 languages and dialects** (including around 50 Aboriginal languages), and around 32% of the population was born overseas.[1]

What IWA heard

During consultation on the draft strategy, clear feedback was received that sport and recreation infrastructure should be given greater consideration, resulting in new content and sub-recommendations.

There was significant feedback on the tourism strategy, 4 'jewels in the crown' and the destination management plans. Clearer links and explanations are now provided, including acknowledging that investment in the jewels does not preclude investment elsewhere.

Stakeholders suggested that an arts and culture fund is required to enable improvement of community infrastructure managed by third parties. This may be a consideration of the planning activities recommended for action. The need to acknowledge and consider the roles and responsibilities of local government was also raised and is now referenced.

A rich, diverse and vibrant arts, culture, sport and recreation (ACSR) sector is critically important to community wellbeing and the liveability of WA's cities and towns.

This sector brings the community together – challenging, inspiring, celebrating and creating opportunities for all people to participate, connect, develop new skills and enjoy new experiences. The availability, accessibility and quality of ACSR assets that enable participation in sporting, cultural and leisure activities positively contribute to economic diversity and growth. These assets are key to increasing the vibrancy and cultural depth of the state and nurturing, retaining and attracting talented people.

As well as being one of Australia's most culturally diverse states, WA's excellent lifestyle, climate and natural recreation assets have shaped the community's appetite for ACSR activities. The sector makes a significant contribution to the community's quality of life, creativity, innovation and inclusiveness. It brings positive flow-on benefits to a range of industries, including tourism, international education, creative industries, entertainment and hospitality. Each industry, in turn, contributes to the state's competitive positioning, brand characteristics and desirability as a global location of choice, and in serving the emerging consumer class.

Perth consistently features in The Economist Intelligence Unit's Global Liveability Index as one of the world's most liveable cities and was ranked sixth globally in 2021.[2] A safe, prosperous location with a high-quality lifestyle, combined with a sunny climate and natural beauty, are key contributing factors. While scoring very well in most measures, lower scores in components of the culture and environment category, which includes cultural and sporting availability, have impacted Perth's global ranking over the decade to 2021.[3]

In September 2021, the Bankwest Curtin Economics Centre released *Creativity at the crossroads? The creative industries in Western Australia*.[4] The report identified 3 areas of strategic potential (Aboriginal culture and art, creative activities and innovations that use emerging digital technologies, and the music industry) and concluded the creative industries in WA are at a significant juncture.[5] While there is a high level of interaction with arts and cultural activities in WA, the state lags and is potentially falling behind in creative output compared to other Australian jurisdictions.[6] Reaching consensus on what infrastructure is required to address these gaps is challenging. Throughout the state, there is a lack of a shared vision and coordinated approach to building liveable cities to attract residents and tourists. Views on the long-term strategic direction for the ACSR sector and its relationship to infrastructure needs and delivery vary significantly.



The COVID-19 pandemic has **greatly impacted tourism, culture and arts**, but the sector has demonstrated flexibility and innovation in its response by developing new audience experiences and leveraging technology. **The state's natural assets, public spaces and recreation facilities** have been highly valued for **relaxation, connection, exercise and wellbeing**.

Sport is the only ACSR sector component that has a long-term plan for major infrastructure (the State Sporting Infrastructure Plan), which establishes the methodology and staging for investment in existing and new state-level facilities.[7] Long-term strategic outcomes have been collaboratively set for the arts sector through the Arts Leadership Group's *Strategic directions 2016–2031*, but this document lacks clear implementation responsibilities, actions or a plan for future infrastructure investment.[8] The Department of Local Government, Sport and Cultural Industries' Cultural Infrastructure Framework 2030+ also establishes focus areas for further action but stops short of identifying infrastructure responses.[9] The associated Western Australian Cultural Infrastructure Investment Guidelines can assist in prioritising and measuring investment benefits once responses are identified. The diverse nature of the recreation element of the sector means that there is not a coordinated strategic direction set for its evolution. The Department of Biodiversity, Conservation and Attractions' Plan for Our Parks and master plans for Rottnest Island and Perth Zoo are the closest equivalents.[10]

There have been historical challenges in prioritising and integrating ACSR infrastructure into government decision-making, which can lead to under-investment, constraints in community access and limits on the potential of related economic opportunities. While work is being done within the ACSR sector to address these challenges, such as the recent Western Australian Cultural Infrastructure Investment Guidelines and the Economic Value of Cultural Infrastructure project, it will take some time before embedding better practice becomes routine.

The Economic Value of Cultural Infrastructure project is currently being undertaken by the Department of Local Government, Sport and Cultural Industries in consultation with the Department of Treasury. The project will articulate a methodology that facilitates the determination of the non-market value of WA's cultural infrastructure and assets, in line with the department's Public Value Measurement Framework and Cultural Infrastructure Framework 2030+ and the Department of Treasury's recommended methods.[11]

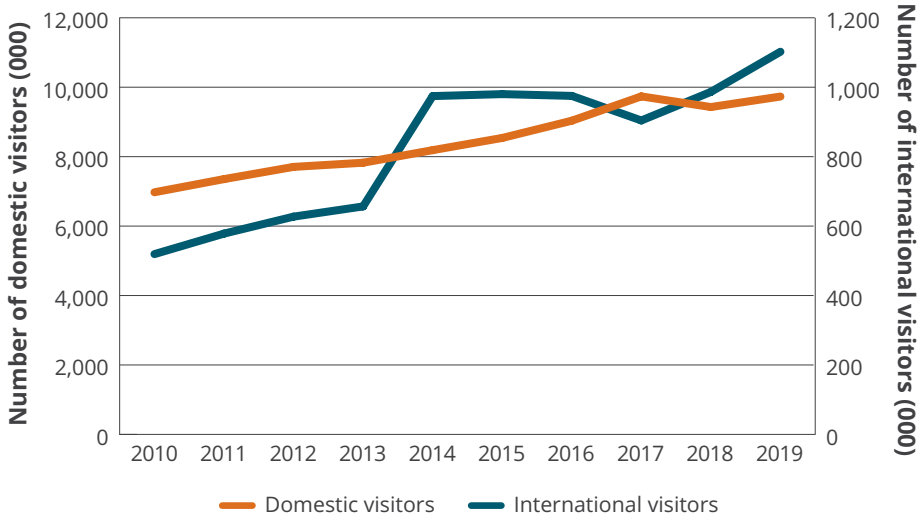
The most significant ACSR investment in the 11 years since 2010 has been focused on sporting infrastructure, including the State Football Centre (for soccer) (construction commenced in 2021), Optus Stadium (2017), State Netball Centre (2015), Perth Rectangular Stadium (HBF Park) (2013), WA Basketball Centre (2012) and RAC Arena (2012) in Perth, which is designed for mixed use but routinely hosts basketball and netball and has hosted tennis tournaments. The new WA Museum Boola Bardip (2020), Kalbarri Skywalk (2020) and State Theatre Centre of WA (2011) are some of the most significant arts, cultural and recreation investments made over the past decade. At a more localised level, the WA Government's Community Sporting and Recreation Facilities Fund has been an important source of financial assistance for community groups and local government authorities to improve infrastructure.

In 2021–22, the ACSR sector received a proportionately small budget of $233 million (3%) of the total $8 billion Asset Investment Program.[12] The WA Recovery Plan includes some additional investment; however, a significant long-term funding shortfall for asset management and new facilities across WA is a legacy of intermittent and lower levels of investment over many years.

Much of WA's ACSR infrastructure is aged, costly to maintain or due for major upgrade or replacement. The size and range of the infrastructure asset base, which includes state and culturally significant buildings, venues and spaces (many of which are heritage-listed), presents many challenges for organisations that are responsible for their management. Shortfalls in maintenance budgets and less-mature asset management practices have resulted in some assets no longer being fit for purpose and/or having higher than necessary operational costs. A drying climate and an increasing severity of natural disasters associated with climate change may result in impacts that are more prevalent for ACSR assets, particularly sporting and recreation infrastructure. This will need to be considered as part of future asset management practices.

IWA recognises the important relationship between tourism and the enabling role of ACSR infrastructure. High-quality, accessible, fit for purpose infrastructure is essential to attract increased domestic and international visitation. Tourism makes a vital contribution to regional economic growth, diversification and employment. Prior to the COVID-19 pandemic, WA's share of international and domestic visitors had continued to increase since 2010 (Figure 53).[13] This demonstrated the state's potential to grow visitation from around Australia, and globally into the future, as demand for tourism offerings grows. Tourism WA's *Jina: Western Australian Aboriginal Tourism Action Plan 2021–2025* provides further potential for growth through an agreed approach to align and collaborate cross-agency activities to grow and diversify a sustainable Aboriginal tourism sector. A sustainable Aboriginal tourism sector can help to support Aboriginal empowerment and self-determination, which has many flow-on impacts (see the Aboriginal cultural heritage, wellbeing and enterprise chapter).

Figure 53: Domestic and international visitors to Western Australia, 2010 to 2019[14]



The creative industries have been very effective in the **inventive and dynamic use of underused and unusual spaces**. The Perth Festival and the associated FRINGE WORLD Festival have indeed made an art of this. However, this does not replace the need for suitable high-quality facilities that allow people to hone and share their craft.



Governance

The ACSR sector has a complex range of asset ownership, management and governance models. The fragmentation arising from multiple organisations operating at different levels can contribute to uncertainty about roles, responsibilities and funding.

The Department of Local Government, Sport and Cultural Industries strengthens the vibrancy of the WA community and economy by supporting industry and providing ACSR policy, programs and activities. It manages a wide range of cultural, sporting and entertainment venues, land and 5 recreation camps. It also works closely with the statutory authorities within the cultural portfolio, including the Art Gallery of Western Australia, State Library of Western Australia, Western Australian Museum, Perth Theatre Trust and State Records Office of Western Australia. In addition, the department manages the maintenance of 65 buildings, 23 of which are vested with the Minister for Culture and the Arts.[15] The Sport and Recreation division works in partnership with more than 135 local government authorities, 5,000 clubs and 90 state sporting associations who also deliver, manage and use sporting facilities and recreational tracks, trails, paths, campgrounds and picnic spots.[16]

VenuesWest owns and manages 13 sport and entertainment venues on behalf of the WA Government, including the RAC Arena and Optus Stadium. VenuesWest is governed by a board that is responsible to the Minister for Sport and Recreation.

The Department of Biodiversity, Conservation and Attractions conserves the state's biodiversity and wildlife; manages parks, forests, reserves and an extensive 36,000 km road network; provides sustainable recreational and tourism opportunities; and protects communities and assets from bushfire.[17] Its governance structure includes 3 statutory authorities (Botanic Gardens and Parks Authority, Rottnest Island Authority and Zoological Parks Authority) that report to their Ministers via their boards, and the Swan River Trust and Conservation and Parks Commission. In addition to land, parks and reserves, other assets include buildings, visitor facilities and essential infrastructure.

Tourism WA, within the Department of Jobs, Tourism, Science and Innovation, works with partners across government and industry to promote and grow WA as a destination of choice, domestically and internationally. Tourism WA is governed by an independent board.

The WA Government provides significant funding to the state's premier art and cultural organisations, such as Screenwest and major performing arts companies, including the West Australian Ballet, West Australian Symphony Orchestra and West Australian Opera.

Local governments are responsible for providing a wide range of ACSR activities, funding and infrastructure, including planning, events, and facilities and land management. The Australian Government also provides funding and support to the ACSR sector.

Recommendations

Long-term planning

State arts and culture strategy

A unified and compelling strategy for arts and culture is required, with a clear link to program and infrastructure needs. There is an opportunity to review and refresh the current strategic planning in the face of the severe impacts on the sector from the COVID-19 pandemic. Given the intersection of arts and culture with so many other sectors and industries, this process should seek to identify and harness synergies relating to infrastructure. Flexibility to respond to changing societal attitudes and demands should be built into the strategy framework. The strategy must define responsibilities and the funding and resourcing for implementation required to meet the intended outcomes. Stakeholder collaboration during development of this strategy will strengthen a unified vision. This should include Aboriginal people, regional representatives, local government authorities, the arts, culture and leisure industries and other relevant stakeholders.

Recommendation 86

Guide priorities, including infrastructure and investment needs by developing and publishing a 10+ year state arts and culture strategy.

Regional-level sporting infrastructure

The WA Government funds and delivers sporting infrastructure suitable for hosting state, national and international level competitions and events. Organisations (except VenuesWest) that are responsible for the day-to-day management of these facilities are eligible for funding through the State Sporting Infrastructure Fund. In addition, funding support is provided to community-based organisations for improvement of local facilities through the WA Government's Community Sporting and Recreation Facilities Fund. These programs are important to ensure fit for purpose sporting infrastructure and should be commensurate in value with the role they are expected to provide. However, there is a gap in the planning and delivery of regional-level sporting facilities, which will be required to provide for population growth in the metropolitan area and major regional centres. Regional-level sporting facilities are defined as typically being 20 hectares or larger and have the capacity to accommodate junior and adult sporting competition and various concurrent uses.[18] In September 2021, Infrastructure Australia recognised 'there is limited provision of regional-level sporting facilities in the outer metropolitan areas of Perth'.[19]

The catchment areas for these facilities are large and often cross local government boundaries, and the infrastructure can be expensive to build, operate and maintain. This can make it difficult to translate the need into the planning, acquisition, funding and delivery of sites. The Department of Local Government, Sport and Cultural Industries has assessed the statewide need for public open space for the purposes of sport and recreation, with the next step being a gap analysis to determine the need for future provision in the sporting landscape. This work can then inform the targeted effort that is required to plan for and detail what the regional-level sporting facility infrastructure needs are and their best locations, primary functions and ongoing operational responsibilities.

This information can then cascade to land use and community infrastructure plans, and ultimately investment decisions. Opportunities for shared spaces, including multi-use and co-located spaces, should also be explored, for instance, with libraries, education facilities and activity centres. Local governments have a significant role to play in the planning, development and maintenance of regional-level sporting facilities. Collaboration with stakeholders will be necessary to secure land, plan for and deliver these multipurpose facilities.

Recommendation 87

Ensure equitable access to regional-level sporting infrastructure and inform investment priorities in the Perth and Peel regions and major regional centres by:

a. identifying gaps in the current provision of regional-level sporting and recreation facilities
b. developing and publishing a 10+ year regional-level sporting facilities plan.



Tourism WA research shows **81% of visitors to WA** are interested in **participating in an Aboriginal tourism experience**. However, fewer than 1 in 5 visitors (17%) access this type of experience, demonstrating an opportunity for the sector to respond to increasing demand.[20]

Targeted investment

Investment in the maintenance of existing ACSR infrastructure is a priority to optimise its use and accessibility for all Western Australians. Consistent, sustained funding is required to ensure the sector's large and diverse asset base is well maintained, fit for purpose and of sufficient quality into the future. Recommendations to improve asset management and funding for the state's infrastructure are contained in the Asset management chapter.

Aboriginal cultural centre

A nationally relevant and internationally recognised flagship Aboriginal cultural centre will provide a much-needed opportunity to showcase and celebrate WA's world-renowned Aboriginal culture and improve cultural understanding for Western Australians and visitors to our state. Through art, performance, experiences, tours, food and creative industries, this flagship centre would play an important role as the genesis of Aboriginal cultural journeys across the state – connecting approximately 50 existing Aboriginal cultural centres – and would respond to significant demand for cultural tourism experiences and create tangible pathways for Aboriginal enterprises.

Culturally appropriate, meaningful collaboration with Aboriginal communities across WA is required, starting with the Whadjuk Noongar people as the Traditional Owners and Custodians of the land on which the centre would stand.

This engagement should continue throughout the project, covering all facets with a focus on co-design, from concept development to site selection, design, delivery, operation and programming.

The WA Government committed $50 million of seed funding towards this project in 2021–22 and stated it would seek matching funding from the Australian Government as well as contributions from the private sector.[21]

Perth's convention and exhibition facilities

Attracting convention activity is very competitive and relies on being able to provide high-quality delegate experiences in world-class facilities. Since it opened in 2004, the Perth Convention and Exhibition Centre (PCEC) has fallen behind national and international competitors in attendee capacity and floor space. It is one of only a few major centres in Australia that are unable to host simultaneous conventions and is now the oldest facility across the country (Table 5). The lack of major investment is linked to PCEC's unique and complex operating model in which the state plays a very limited role in event attraction and funding. While the WA Government funds Business Events Perth as the organisation responsible for promoting the PCEC and other venues, it has no direct involvement in facility management or investment. With PCEC subject to a 35-year lease, government has limited levers to encourage major investment from the private sector head lessee and operators.

Business events, including **conferences, conventions and exhibitions**, provide **direct economic benefits to WA**. Between 2014–15 and 2018–19, the average spend by international visitors of this type in Australia was 2 times that of a regular business traveller and 3.5 times that of a leisure traveller.[22]

Table 5: Overview of Australia's convention and exhibition facilities market

Location	Initial cost and cost of major redevelopment (year)	Exhibition space (m^2)	Number of other rooms	Maximum plenary capacity
Sydney	$1,500 million (2016)	33,000	55	8,000
Melbourne	$129 million (1996) $413 million – expansion (2009) $305 million – expansion (2018)	39,000	60	5,564
Gold Coast	$127 million (2004) $40 million – expansion (2009)	6,000	15	6,000
Brisbane	$170 million (1994) $140 million – expansion (2012)	20,000	44	4,000
Adelaide	$39 million (1987) $400 million – expansion (2017)	13,000	24	3,500
Perth	**$225 million (2004)**	**16,632**	**23**	**2,500**
Canberra	$50 million (1989) $30 million – upgrade (2007)	2,400	13	2,460
Cairns	$80 million (1996) $30 million – expansion (1999) $176 million – expansion (2022 scheduled completion)	4,560	22	5,000
Darwin	$110 million (2008)	4,000	13	1,500

For WA to improve its standing when a more stable conference and event market resumes after COVID-19, increased capacity is needed to enable at least 2 major events to be hosted concurrently. Among other benefits, the value of expansion also flows through to increased precinct activation and programming in the city, as well as better use of hotel capacity.

Investment in the expansion of conference and event facilities (whether on the current site or elsewhere in the Perth CBD) must be coupled with a comprehensive review of ownership and operational arrangements to ensure that optimum value is derived from infrastructure investment and wider economic benefits are maximised. Ongoing participation by the WA Government in asset investment and event attraction will likely be required, in line with interstate models.

Perth Convention Precinct

The Perth Convention Precinct includes a range of major civic, service and transport infrastructure and facilities, including the PCEC, major corporate head offices, hotels, Elizabeth Quay bus and train stations and significant public car parking. It falls well short of a legible, comfortable and connected destination to support world-class convention experiences. Regardless of potential expansion of convention facilities at the current PCEC site, the Perth Convention Precinct requires an agreed redevelopment framework and a funded program of works to address complex tenure issues, improve integration and connectivity with the Swan River, Elizabeth Quay and Perth CBD, and address the suitability and capacity of existing infrastructure.



In 2018–19, **tourism generated 100,900 jobs and injected $12.2 billion into WA's economy**, measured by gross state product.[23] In the year ending December 2019, 24.2 million day trips were taken within the state and 12 million overnight (domestic and international) visitors came to, or travelled within, WA.[24] **Together, these visitors spent $11 billion in the state, of which $5.2 billion (48%) was spent in regional WA.**[25]

Perth Cultural Centre

The Perth Cultural Centre is home to several of WA's most significant cultural assets, including the Art Gallery of Western Australia, State Theatre Centre of Western Australia, State Library of Western Australia and the new WA Museum Boola Bardip. Established in the early 1980s, the Perth Cultural Centre's concentration of major cultural institutions in proximity to the CBD and major transport links is unique among Australian capital cities. Despite attracting an average of 4.5 million visitors a year, its ageing facilities, poor urban design and ongoing public safety concerns are major asset management issues.

The opening of the new WA Museum Boola Bardip in 2020 and AGWA Rooftop (the Art Gallery of Western Australia's rooftop activation) are catalysts for further transformation of the precinct. The Cultural Precinct Taskforce, established by the Department of Local Government, Sport and Cultural Industries in 2019, is charged with supporting development of the precinct as a tourism hub for WA's cultural diversity, as well as considering immediate and short-term maintenance and activation to maximise the visitor experience. A $20 million investment announced in September 2020 for precinct improvements and visioning as part of the Perth City Deal will enable planning of the redevelopment to continue; however, significant further funding, estimated to exceed $150 million, will be required to achieve the project vision.

State sporting infrastructure

Sport provides direct social and economic benefits to WA. Sporting clubs and activities bring people and communities together and the positive impact of an active lifestyle on physical and mental health is widely understood. The State Sporting Infrastructure Plan is reviewed every 5 years, with the last comprehensive review occurring in 2019. Each review is conducted in consultation with industry and considers trends, issues, future facility requirements and alignment with state and national objectives. The plan provides a planning framework with principles that align with the Strategic Asset Management Framework, a hierarchy of needs and prioritised

proposed state-level capital works over the short, medium and long term. Delivery of the plan's priorities, subject to further planning and business cases, will ensure the WA Government continues to maximise its investment in sport infrastructure for state, national and international level competition.

Recommendation 88

Optimise use, improve accessibility and ensure facilities are fit for purpose by increasing investment in existing and new arts, culture, sport and recreation infrastructure, including:

a. delivering an internationally significant flagship Western Australian Aboriginal cultural centre in Perth, subject to a business case
b. improving the capacity and quality of convention and exhibition facilities in the Perth CBD to attract high-capacity national and global events, subject to a business case
c. completing planning to redevelop the Perth Convention Precinct
d. redeveloping the Perth Cultural Centre to improve civic infrastructure and the public domain, subject to a business case
e. delivering priority capital works proposed in the State Sporting Infrastructure Plan, subject to business cases.

Tourism

Long-term state tourism strategy

Tourism WA currently works on a 2-year strategic planning horizon, with its most recent Two-Year Action Plan concluding in 2019–20. Historically, these plans have focused on major event attraction and destination marketing. While these functions are vital, there is a need for a more holistic picture of how the industry is, or should be, evolving over the longer term, together with the governance, infrastructure and policy settings to enable this.

Despite uncertainty generated by the COVID-19 pandemic, a significant opportunity exists to develop a new state tourism strategy that not only focuses on WA's recovery in the short term but ensures the state is ready to harness growth when more regular travel patterns resume after the COVID-19 pandemic. A 10+ year strategic planning horizon would guide sound development of future public tourism attractions, provide clarity for private and public investment priorities and set a cross-government approach for tourism growth. In doing so, it would establish a shared agenda for a range of enabling infrastructure that is planned and delivered across various state agencies, including the Department of Biodiversity, Conservation and Attractions and Main Roads WA.

Nature-based activities and adventure tourism are major attractors for tourists within and to WA. Expansive land and marine assets contain the recreation infrastructure through which these activities are enjoyed. While outdoor recreation infrastructure projects tend to cost less to establish or build, they have a significant ongoing maintenance requirement. Consideration of recreational infrastructure will be an integral component of the tourism strategy and destination management planning and activation.

As the key mechanism to identify the state's tourism infrastructure needs, the tourism strategy will guide and inform planning activities (such as destination management plans for identified locations) and subsequent investment decisions.

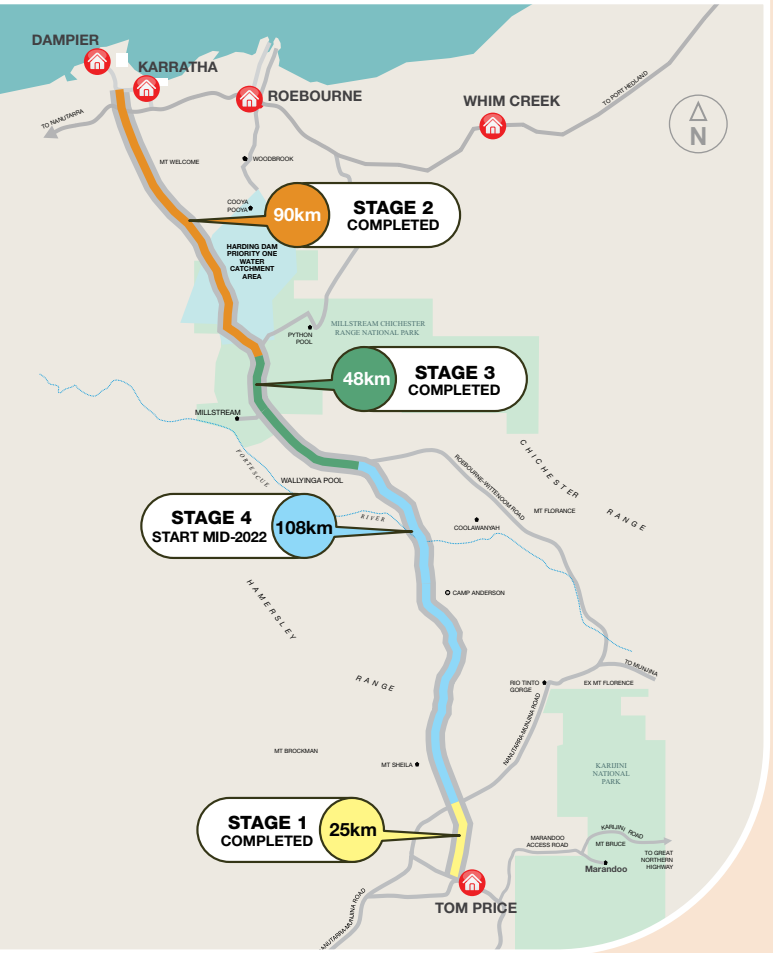
Recommendation 89

Guide tourism precinct and infrastructure development and investment by developing and publishing a 10+ year state tourism strategy that sets a vision and targets for tourism growth and the associated infrastructure requirements.

Case study

Manuwarra Red Dog Highway

Figure 54: Stages of sealing of Manuwarra Red Dog Highway[26]



Main Roads WA is sealing 271 km of the Manuwarra Red Dog Highway between Karratha and Tom Price.[27] Stages 1 to 3 are complete, with work on the final 108 km (Stage 4) due to commence in mid-2022 (Figure 54).[28]

This project delivers many benefits, including improved connectivity, safety and reduced travel time. It also presents an opportunity to grow the tourism industry in the Pilbara and leverage the richness of the region's unique cultural and environmental features through provision of greater access to 2 of WA's premier national parks – Karijini and Millstream Chichester.

Karijini National Park, with its many gorges, is well-known and visited. In 2020–21, total visitor numbers significantly increased to over 510,000.[29] The WA Government recently made a $16 million investment commitment to improve access and visitor facilities. Most of those funds will upgrade access roads, with around $2 million spent on new or upgraded visitor facilities.[30] The Department of Biodiversity, Conservation and Attractions estimates that an additional $4 to $5 million is required to improve Karijini's access roads and car parks.[31] It has also identified over $6.2 million in unfunded future infrastructure required to support increased visitation, such as new campgrounds, paths and trail upgrades, interpretation shelters and signs.[32]

Visitation to Millstream Chichester National Park has remained steady for some years, with over 40,000 visitors in 2020–21.[33] Further increases are expected when the sealing of the highway is complete.[34] The Department of Biodiversity, Conservation and Attractions has estimated that over $5.8 million in additional facilities is needed to support an expected rise in visitor numbers.[35] However, to 2022–23, the Department of Biodiversity, Conservation and Attractions has only planned for $600,000 in capital investment for infrastructure improvements within the park.[36]

It is crucial that investment in tourism-related infrastructure in Karijini and Millstream Chichester national parks is commensurate with the expected additional visitation enabled by the sealing of the highway. Delivery of this infrastructure by the time highway upgrades are complete will not only ensure that access and attractiveness of the destinations to visitors are sustained, but that the natural environment is protected from the impacts of increased patronage.

For further information, refer to www.mainroads.wa.gov.au.

Tourism destination infrastructure

State government investment should be focused primarily on WA's 4 established and successful 'jewels in the crown' tourism destinations. While funding and opportunities should not be limited exclusively to these locations, the 4 jewels listed below are proven drawcards for inbound visitation (international and domestic) and have the largest potential return on investment:

- the Perth region (including Rottnest Island)
- the South West region
- the Ningaloo Coast (including Exmouth)
- the Kimberley region (including Broome).

While other locations and regions across WA offer varying degrees of tourism opportunities, these 4 destinations are the state's major tourism attractors for domestic and international visitors.[37] This analysis is based on historical data and does not necessarily capture potential aspirations that other locations or regions may have in the future.

The state's natural and cultural attractions are critical in supporting ongoing tourism success and economic diversification. Delivering a network of well-connected, high-quality attractions and destinations will help cement WA's position as an attractive tourism destination and improve visitor access to its many natural wonders, cultural icons and built facilities. Identifying statewide tourism destinations for investment will capitalise on regional strengths and signal to the public and private sector where government intends to focus future infrastructure funding, in turn enabling private sector investment, such as accommodation, hospitality venues and key worker housing.

Tourism-related infrastructure is delivered by a range of state agencies and for purposes that may not be primarily driven by facilitating a tourism outcome. At present, investment decisions in one form of tourism-related infrastructure (for example, road upgrades) often overlook the flow-on impacts of increased visitation, and funding is not provided to fully realise wider infrastructure requirements (for example, car parks, visitor facilities, signage and information). As outlined in Recommendation 36d in the Planning and coordination chapter, early cross-agency engagement and integrated business cases are required to ensure access and activation coincides with investment in essential and critical infrastructure.

Destination management plans, developed in collaboration with relevant stakeholders (for example, Traditional Owners and Custodians, industry and local government authorities) for each of the 4 jewels, should align detailed needs across all infrastructure types (for example, housing, utilities, transport and ACSR), taking into consideration the capacity and constraints of current infrastructure. These plans would assist the WA Government to identify opportunities for cross-agency engagement and coordinated provision of infrastructure. Depending on the timing of implementation of other recommendations within this Strategy, they should demonstrate alignment with the proposed 10+ year tourism strategy (see Recommendation 89) and be informed by the proposed regional development strategic framework (see Recommendation 19 in the Regional development chapter) and integrated regional plans (see Recommendation 28 in the Planning and Coordination chapter).

Recommendation 90

Drive increased international and domestic visitation prior to the release of a 10+ year tourism strategy by investing in the 4 jewels in the crown of WA's tourism offering, including:

a. preparing destination management plans that expand on existing clusters of attractions and enabling infrastructure; consider long-term supply, demand and capacity goals; and detail a program of new or upgraded infrastructure, amenities and attractions for the:
   - Perth region (including Rottnest Island)
   - South West region
   - Ningaloo Coast (including Exmouth)
   - Kimberley region (including Broome)

b. investing in the infrastructure program detailed in the destination management plans for the 4 jewels, subject to business cases

c. consistent with Recommendation 36d in the Planning and coordination chapter, capturing the wider impacts of investment decisions on tourism-related infrastructure.

Justice and public safety



Over the past 2 decades, offences against the person have **more than doubled**.[1]

Demand for emergency services continues to increase, in part due to longer and overlapping bushfire seasons in the north and south of WA.

What IWA heard

During consultation on the draft strategy, stakeholders raised the importance of the sector collaborating with and recognising the role of local governments, people with lived experiences and social service providers. Amendments have been made to reflect this feedback throughout this chapter and, where relevant, the wider Strategy.

The wellbeing of people that interact with the justice system was a concern, particularly in relation to children and people with mental illness, and this has been referenced.

Stakeholders also stressed the importance of infrastructure resilience and digital connectivity for emergency responders, resulting in a closer consideration in the Strategy.

With the largest policing jurisdiction in the world, along with court and corrective services spanning the state, the task of maintaining law and order is a large one for WA's police and justice systems.[2] In times of need, police and emergency services, supported by other government agencies, ambulance services and an extensive network of volunteers, manage multi-agency responses to serious incidents and natural disasters. Service delivery across the sector is increasingly complex for a range of reasons.

Policing and justice systems are intricately linked to a range of social, health and economic drivers. People's interactions with these systems can be impacted by how easily they can access safe housing, adequate education, and cultural and sporting opportunities, and maintain an appropriate standard of health (including mental health) and employment stability. These links are well recognised globally, with countries including New Zealand, the United Kingdom, Canada and Finland adopting 'justice reinvestment' and preventative measures.[3] Vulnerable communities, particularly from low socio-economic backgrounds, may also be more sensitive to shocks and stresses, and therefore providing additional resilience support is vital for their long-term sustainability.

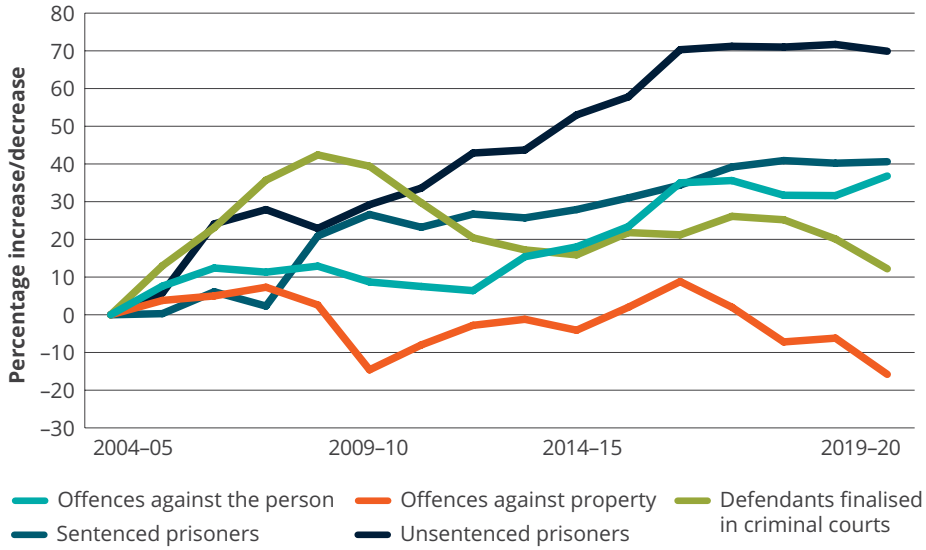
Trends and issues facing broader society are often reflected in criminal activity and correctional facilities.[4] The nature of crime is changing – offenders are finding new ways of using technology to commit crime, and offenders are, on average, older and many are struggling with mental health, drug and alcohol issues.[5] This is changing how police and justice systems provide services and the infrastructure they use.

Over the past 2 decades to 2020–21, offences against the person have more than doubled, while offences against property have fallen by around one-third.[6] However, this has not translated into less demand for police. Increases in family and domestic violence, drug and alcohol offences and mental health issues have had a direct and significant impact on the nature of policing.

The number of defendants finalised in criminal courts rose from 68,553 in 2004–05 to 78,089 in 2019–20.[7] The prison population grew from 3,482 in 2004–05 to 6,770 in 2019–20.[8] During the same 15-year period, the proportion of prisoners awaiting trial or sentencing rose from 15.9% to 27.2%, reflecting the flow-on impact of high demand for court services on the prison system.[9] In 2020–21, the median time to bring a trial for criminal matters to the Supreme Court of Western Australia was 53 weeks (25 weeks above the 28-week target).[10] In the District Court of Western Australia, it was 54 weeks (22 weeks above the 32-week target), and in the Magistrates Court of Western Australia, it was 24 weeks for criminal and civil matters (5 weeks above the 19-week target).[11]

These results can be attributed to a range of factors, including the complexity of civil and criminal matters, operational constraints and the impacts of the COVID-19 pandemic. Figure 55 shows the change in these numbers but cannot fully demonstrate the complexity of the police and justice task.

Figure 55: Crime, court and prison trends in Western Australia, 2004–05 to 2019–20[12]

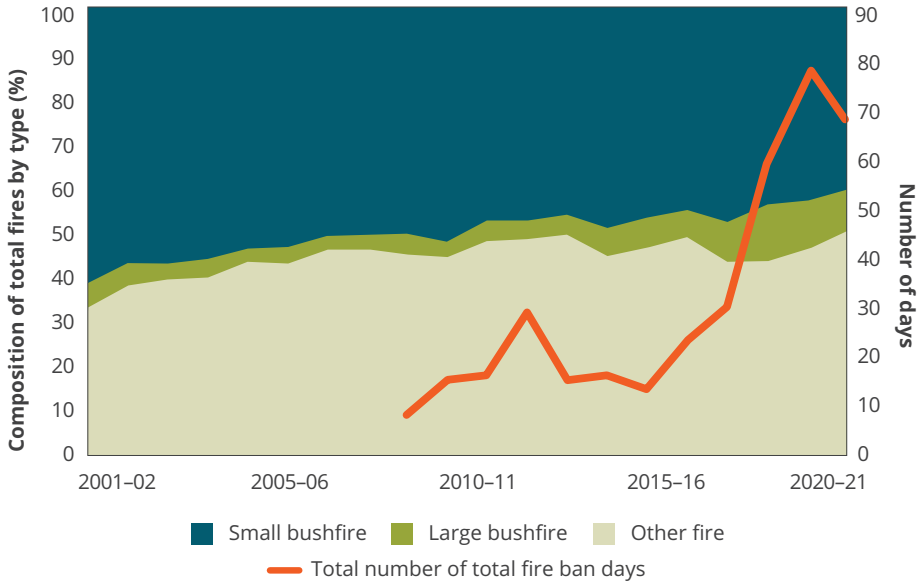


The nature of crime is changing – offenders are finding new ways of **using technology to commit crime**, and offenders are, on average, older and **many are struggling with mental health, drug and alcohol issues**.[13]

As well as policing criminal matters, the WA Police Force, in conjunction with the Department of Fire and Emergency Services, also has responsibility for leading the response to incidents and natural disasters. More incidents are occurring in dense and increasingly congested urban areas and locations that are remote and difficult to access. Increases in other incidents also place additional pressure on service delivery (for example, road crashes and rescues, false calls and alarms, and other rescue and medical responses).[14] Combined with a range of shock events, including natural disasters and cybercrime, which are further exacerbated by chronic stresses such as civil unrest and climate change, these incidents place heightened demand on emergency services and require well-planned and resilient infrastructure such as telecommunications networks and supply chain assets.[15]

Over the past 20 years, the Department of Fire and Emergency Services and its predecessors have responded to a fairly stable number of fire and other incidents, although the composition of incidents is changing and annual large bushfire numbers are volatile.[16] For example, in 2001–02, WA experienced 901 large bushfires, 10,402 small bushfires and 5,602 other fires.[17] In 2020–21, the state had 668 large bushfires, 3,157 small bushfires and 4,918 other fires (Figure 56).[18] While total fire bans, weather patterns, community education and a shared responsibility approach have reduced small bushfire events, large bushfires have a significant impact on emergency responders, broader communities and supply chains. For example, the bushfires in the Goldfields–Esperance region in the summer of 2019–20 closed the Eyre Highway, significantly disrupting primary industry, transport logistics suppliers and tourists.[19] A hot and dry climate results in bushfires that are more intense, larger and longer.[20]

Figure 56: Fire types, 2001–02 to 2020–21; total fire ban days, 2009–10 to 2020–21[21]



As our population continues to grow, demand for justice and public safety infrastructure and services is expected to increase. This is a critical issue facing police and justice, with the departments of Justice and Treasury forecasting increasing prisoner volumes over the next 10 years.[22] Demand for emergency services will also continue to increase, particularly due to longer and overlapping bushfire seasons in the north and south of the state, sea-level rises resulting in increased flooding events, and water shortages in some areas driving demand for alternative firefighting methods.

WA's forecast population growth over the next 20 years will place increasing demand on fire and emergency services, police, courts and corrective services.

Other infrastructure challenges faced by the justice and public safety sector are often interrelated. Many WA Police Force premises need to operate 24/7, with special security arrangements. Over one-third are beyond an average life of 30 years, particularly in the regions. Police in remote areas face isolation, with large distances to cover between stations. The 2020 WA Government commitments for an injection of 950 additional police officers, partly attributable to the increased demand for policing services in the COVID-19 response, have significant flow-on infrastructure effects (for example, officer housing and police station accommodation) that were not fully planned or funded in parallel, as well as downstream impacts on other sectors and services including courts and correctional facilities.[23]

Furthermore, many Department of Justice courthouses are ageing and heritage-listed, with high maintenance and refurbishment costs needed to meet modern requirements. Prisons are of varying ages and standards and some do not offer an appropriate level of rehabilitation and diversionary programs, including those that are culturally appropriate.

In addition, the Department of Fire and Emergency Services' built infrastructure is ageing in many cases, which presents challenges for capability to withstand increasing natural disasters and the need for maintenance and refurbishment. This challenge also provides an opportunity to embed consideration of resilience into upgraded and new emergency response infrastructure. New and unexpected shock events (both climate-related and otherwise), underpinned and exacerbated by ongoing stresses, will occur in the future. As both the urban environment and nature of emergency incidents changes, there is also the need to ensure capacity to upskill for a broad range of hazard and situational responses. Additionally, there is a need to improve coordination and collaboration between WA's infrastructure, land-use planning and fire and emergency services to meet operational needs, achieve alignment around location and ensure accessibility and resilience (see recommendations 23 and 34 in the Planning and coordination chapter). This is particularly important when planning for new types of infrastructure or new developments in high exposure areas, where sometimes the focus can be on amenity and return on investment rather than ensuring the sustainability and resilience of the community.



Governance

There are 3 main agencies responsible for providing policing, justice and emergency services:

- The WA Police Force has a broad responsibility to enforce the law in the community and on the roads, prevent crime and protect the community. It also manages and coordinates multi-agency emergency responses, which can range from search and rescue to the State of Emergency declared in March 2020 for WA's response to the COVID-19 pandemic.
- The Department of Justice is primarily responsible for providing justice, legal and corrective services support to the community, judiciary, Parliament and government. This includes, but is not limited to, court and tribunal services, corrective services, advocacy, trustee services, policy advice and legislative drafting.

The **increase of 950 WA Police Force personnel** will place pressure on stations, courts, correctional facilities and regional housing. This is a key example of the need to understand and respond to planning interdependencies.[24]

- The Department of Fire and Emergency Services provides a critical role in coordinating emergency responses to natural disasters and other incidents, such as structure collapses, road crash recoveries and marine rescues. Operational personnel are supported by a large network of volunteers.

The sector has a large fixed-infrastructure asset base, including over 450 owned facilities and over 150 leased premises. This comprises police stations, storage compounds and holding facilities, equine and canine facilities, courthouses, prisons, correction centres, work camps and farms, a juvenile detention centre, youth community and justice facilities, career fire stations, volunteer fire stations and buildings, radio towers, training centres, office accommodation and a variety of leased facilities. Many of the sector's assets have specialist facility requirements, for example, ammunitions storage and custody cells.

The cross-cutting themes chapters cover many issues that are relevant for the justice and public safety sector, particularly in relation to digital connectivity, Aboriginal wellbeing, climate change, planning and coordination, and asset management.

There is a range of other government agencies and non-government organisations providing justice and public safety services, which the Strategy does not address in detail. These include not-for-profit organisations, local governments, ambulance services and other government agencies that provide emergency response support.

Case study

Olabud Doogethu program (all of us together)



Aboriginal youth incarceration and recidivism is a significant issue for the north-west of the state, particularly the Kimberley. It is difficult for youth offenders to break the cycle without support and intervention. Faced with youth justice funding pressures in 2017, the Shire of Halls Creek found a new solution in Olabud Doogethu, the first justice reinvestment site in WA.[26] The program's aim is to reduce youth incarceration rates and improve outcomes for young people in the shire.

The program includes an outcomes framework, individual community plans and various teams offering support and services to individuals and families. In its first 15 months (from May 2019), the team of Youth Engagement Night Officers and the daytime Aboriginal Parent Support crew saw a 58% reduction in burglary offences in the Halls Creek town site and a 28% reduction in stealing offences.[27] Contributing to these results are training activities and support, including traineeships, Learning on Country Coordinators, free entry to the Halls Creek swimming pool, an Intensive Case Management Team and early childhood intervention initiatives.[28]

Reports attribute the success of the program to:

- local decision-making – the Shire of Halls Creek asked residents what youth justice initiatives they wanted and Aboriginal leaders co-designed the program
- cultural security – the Night Officers were selected from local family groups, and they are youth workers, not police officers
- cross-government and community collaboration.

Future opportunities identified to enhance the program include increasing female representation in the Night Officers team, and the potential to tailor similar programs to the requirements of other in-need communities.

For further information, refer to www.olabuddoogethu.org.au.



The cost to house an adult offender in custody is **$354 per day**.[29] The cost to manage an adult offender through community supervision is just **$36 per day**.[30]

Recommendations

Demand management and prevention

The rates of imprisonment and recidivism across many parts of the community are high and, in the case of Aboriginal people, deeply concerning.[31] It could be argued that just building more infrastructure, such as courthouses and prisons, to meet these pressures is not sustainable and that increased actions are needed in the areas of early intervention and prevention to reduce demand on the sector's infrastructure while maintaining appropriate levels of community safety. The high rates of recidivism are of particular concern and greater efforts would seem necessary to ensure that individuals who are released from custody are equipped with the right skills, and have a clear, supported and culturally appropriate pathway out of the justice system. This is particularly relevant for Aboriginal people who have experienced profound and ongoing intergenerational trauma due to high rates of imprisonment, as well as historical disempowerment, which has led to a level of distrust in law-and-order systems.

Young people who enter the criminal justice system often have complex needs and vulnerabilities that can be amplified by spending time in custody. Those that spend time in custody will often reoffend, resulting in further demand on traditional justice system services and infrastructure. An increase in the minimum age of criminal responsibility is a current national policy consideration. This may have positive impacts on recidivism through later life and may also have infrastructure and service delivery implications.

In 2020–21, the cost to keep an adult offender in custody was $354 per day.[32] In contrast, the cost to manage an adult offender through community supervision was $36 per day.[33] The diversion of some of these funds to justice reinvestment programs and non-traditional corrective services, in addition to dedicated investment, has the potential to create long-term positive change.[34]

Examples of **early intervention, prevention and non-traditional justice programs, services and strategies** include Target 120, Barndimalgu Court, Kimberley Juvenile Justice Strategy, Yiriman Project, Work and Development Permit Scheme, Bennett Brook Disability Justice Centre, WA Police Youth Policing Division and multi-systemic therapy, among many others.



For example, in Perth, the Wandoo Rehabilitation Prison's Modified Therapeutic Community – Alcohol and Other Drugs Program has resulted in the prison recording the lowest recidivism rate of any Australian prison, at less than 1%.[35]

Culturally appropriate initiatives, co-designed with Aboriginal people, are needed to respond to the high incarceration rates of Aboriginal adults and young people (40% of adult prisoners and 75% of young people in custody).[36] Targets to reduce these rates are detailed in Closing the Gap, along with a commitment to establish a policy partnership on justice (adult and youth incarceration) between federal and state and territory governments and Aboriginal and Torres Strait Islander representatives.[37]

Infrastructure Australia discussed the benefits of prevention and early intervention in the 2019 Australian Infrastructure Audit, which identified the justice reinvestment project in Bourke, New South Wales. This project was the 'first major pilot project in Australia for an Aboriginal-led, place-based justice reinvestment model, which redirected funding from crisis response, adult prison and youth detention centres towards preventative, diversionary and community development initiatives'.[38] The *Maranguka justice reinvestment project: Impact assessment* reported promising results in reducing demand on policing and justice services, along with positive economic impacts.[39]

Through the Our Priorities: Sharing Prosperity program, the WA Government set cross-agency targets to reduce:

- the number of Aboriginal adults in prison
- the number of youth offenders who return to detention within 2 years of release
- the proportion of the WA population who have taken an illicit drug in the 12 months prior to measures being taken.[40]

While this program has now been deferred indefinitely, the WA Government should build on the momentum created across a range of social services agencies. A review of these targets should inform development of future whole of government targets, along with appropriate monitoring and reporting mechanisms of progress against targets. This should align with the Closing the Gap targets and the *Closing the Gap Jurisdictional Implementation Plan*.

Establishing agreed whole of government targets will require efficient and collaborative cross-agency governance arrangements and frameworks. It should also involve collaboration with social service providers, people with lived experiences and local governments (who have specific community safety responsibilities). Over the years, there have been many programs and activities undertaken in early intervention, prevention and rehabilitation by both government and the private sector. This has occurred at local, state, national and international levels; however, a long-term, collaborative and consistently funded state approach does not currently exist. Harnessing the strengths, benefits and lessons learned from previous work, including tools, models and data sources, will potentially assist in building evidence for the consideration of future programs and activities.

Recommendation 91

Reduce demand for police, courts and corrective services, and associated infrastructure by establishing and implementing specific cross-agency stretch targets, measures to achieve these targets and publicly reporting progress against these targets each year. The targets should:

- seek to reduce the need for additional built infrastructure
- focus on measures related to prevention, early intervention, rehabilitation and reducing recidivism
- expressly address over-representation of Aboriginal people in the criminal justice system.

Integrated and collaborative planning

Planning and investment decisions for future infrastructure should account for early intervention and preventative initiatives, as well as policy settings, to determine the timing, sequencing and demand for new police complexes, courthouses and correctional facilities. The development of new infrastructure and the associated design of support programs should be based on evidence-based, best-practice approaches to prevent reoffending.

Precincts and shared facilities can provide beneficial alternative service delivery models that incorporate other government agencies and private providers (for example, mental health providers and other social services). However, they also present challenges in terms of the responsibility for asset management. The Armadale Courthouse and Police Complex, due for completion in 2022, aims to improve the security and efficiency of custodial services through a shared custody area.[41] Parkerville Children and Youth Care's child advocacy centres in Armadale and Midland provide specialist services to reduce the harmful impacts of trauma from abuse, which includes collocation with police and child protection workers.[42]

Recommendation 21a in the Regional development chapter recognises the need for integrated, place-based planning and delivery models for social services that are more responsive to the changing needs of regional communities. Recommendation 32 in the Planning and coordination chapter supports a shared policy framework for multi-user infrastructure corridors and facilities, precincts and shared facilities, which can provide opportunities to deliver complementary services to local communities. This should also include negotiation of a single point of accountability for asset management as part of the planning process. Recommendation 79d in the Health chapter recognises the need for investment to take into consideration the infrastructure and support needs of people with a mental illness who are involved in the criminal justice system.

In regard to fire and emergency services, cross-agency collaboration can deliver land-use, urban and major infrastructure planning (both public and private) that is coordinated and can help improve incident response times and access to incidents. Improved planning across the sector should

consider the use of offsite and modular construction techniques where benefits can be achieved, in line with Recommendation 38f in the Infrastructure delivery chapter. This may provide cost-effective and efficient options for the timely replacement of ageing and unfit for purpose facilities.

In terms of justice services, the Long Term Custodial Infrastructure Plan has provided the Department of Justice's corrective services with a strong planning foundation. Finalisation of a prison network design concept model will help balance and evaluate the need for centralised versus regionalised justice services and provide a basis to replicate similar plans to courts and police, aiding long-term infrastructure prioritisation and outcomes. Through a greater focus on incorporating these documents into strategic asset plans, agencies will be able to better communicate their strategic priorities to government. Long-term infrastructure planning within the sector will also benefit from continued application, and ongoing development and alignment of modelling (including for example, the WA Prisoner Model and Justice Pipeline Model).

Improved, integrated planning across the sector will result in agency infrastructure plans that recognise and address the interdependencies between and across agencies. A digital-first approach will support increased collaboration across the sector and with other government agencies. It will also support the trend towards digital service delivery.

Recommendation 92

Improve justice and public safety infrastructure planning with a focus on the interdependencies of police, courts and correctional facilities by:

a. pursuing collocation opportunities with government and non-government providers to establish precincts

b. improving alignment and cooperation between the Department of Justice and WA Police Force to manage shared assets, including ageing regional facilities

c. updating and maintaining the Long Term Custodial Infrastructure Plan based on a finalised prison network design concept model, and including a range of alternative demand scenarios that capture potential diversionary activities, based on appropriate modelling tools

d. progressing long-term planning (equivalent to the Long Term Custodial Infrastructure Plan) for courts and police facilities.



Targeted investment

Broome Regional Prison

Replacement and relocation of Broome Regional Prison, which is in very poor condition, is recognised as a strategic priority. In March 2020, the Office of the Inspector of Custodial Services reported that many limitations continue to exist with the current prison infrastructure, including mixing male and female prisoners, health and safety issues and challenging maintenance requirements in a prison already unfit for purpose.[43] Planning for the new Broome Regional Prison to date demonstrates the use of network design principles, engagement with Traditional Owners and Custodians in identifying site options and providing input to concept designs to ensure culturally appropriate facilities, and consideration of complementary support services and programs, such as inclusion of child-safe standards to ensure the needs of young people in custody are met. The finalisation of a business case should be progressed as a priority.



Emergency Management Training Centre

The current WA Emergency Management Training Centre is past its useful life and has increasing maintenance requirements and deteriorating specialised infrastructure. Legislative changes in the past 3 decades have introduced a range of emergency management responsibilities for which the current facilities and infrastructure cannot provide training. Released in October 2020, the *Royal Commission into National Natural Disaster Arrangements report* draws attention to the need for consideration of national and jurisdictional education, research and training facilities in the development of a national approach for recovery competencies and professional pathways, including for upskilling local government and non-government organisations.[44] The ability of fire and other emergency services to respond to incidents using contemporary and effective methods is crucial. The finalisation of a business case that assesses a range of feasible options should be progressed as a priority to inform investment timing and the preferred option.

Government Radio Network

Further investigation of the phased rollout of the Government Radio Network to multiple agencies should continue while seeking to avoid obsolescence arising from other telecommunications innovations and exploring opportunities for digitisation across the sector.

Tranche 1 of the project (funding announced in October 2020) addresses the replacement of critical, failing radio equipment for frontline responders, but significant funding is still required for further tranches.[45] The Government Radio Network will ensure WA meets federal requirements and provides an opportunity to bring emergency services onto a single platform. The finalisation of a business case should be progressed as a priority to inform investment timing and the preferred option.

Future projects

Potential future projects into the medium and long term, such as the WA Police Headquarters, Kununurra Police Complex, State Forensic Centre collocation with Midland Police Complex, Maylands Police Complex, criminal and civil courts in the Perth CBD and metropolitan area, Karratha Courthouse redevelopment and other initiatives should be considered in strategic asset plans and informed by comprehensive planning and business cases.

Digitising the sector and considering changes to operating models, including national data sharing, agile security through predictive crime mapping, increased mobile policing and real-time information delivery, will also help to reduce demand on physical infrastructure, tailor justice and public safety services and improve accessibility. Technology solutions are already aiding the sector to track and respond to crime and provide efficiencies in court and corrective services. Future planning will benefit from a digital-first approach to all aspects of the infrastructure lifecycle (see Recommendation 2 in the Digital connectivity and technology chapter). Pursuing digitisation opportunities and applying a digital-first approach in the sector must be balanced to not further disadvantage vulnerable Western Australians and those who live in rural and remote areas who experience significantly limited technology access, including people who live in remote Aboriginal communities that have limited digital connectivity.

Recommendation 93

Improve facilities and increase capacity by investing in fit for purpose and contemporary major justice and public safety infrastructure, including:

a. replacing the Broome Regional Prison, subject to a business case
b. replacing the WA Emergency Management Training Centre, subject to a business case
c. further investigating the phased rollout of the Government Radio Network, subject to a finalised business case.





Summary of Strategy recommendations

Understanding the recommendations

For ease of reference, a list of abbreviated recommendations is provided in the summary table on the following pages. For the full recommendations, readers should refer to the relevant chapter of the Strategy. The components of each recommendation are shown separately. These are specific actions that require implementation and monitoring, referred to as sub-recommendations. Also presented for each recommendation or sub-recommendation is:

- a suggested lead state agency and/or government trading enterprise(s) (GTE) responsible for leading implementation
- the time frame by which implementation is to be completed
- an indication of where implementation of the recommendation or sub-recommendation will result in an ongoing action for the WA Government
- alignment against the 10 Strategy objectives.

While the recommendations and sub-recommendations outline the action(s) required, they should be read in conjunction with the contextual information provided in each chapter. IWA will consider this contextual information when monitoring and reporting on the WA Government's implementation of the Strategy's supported recommendations.

The Implementation and future activities chapter outlines how the WA Government will implement the Strategy, including the process for the WA Government to respond to the recommendations, and IWA's role of reporting annually on the progress of implementing the recommendations (to the extent the recommendations are supported by the WA Government). Although completion and full implementation of certain recommendations may not be required for some time, IWA will provide details on their progress in its annual monitoring report, and assess if recommendations are on track for completion.

Where IWA suggests a state agency or GTE to lead implementation of a recommendation in the summary table below, this is a suggestion only and does not form part of IWA's recommendation. This recognises that the WA Government may assign the lead role to an alternative state agency or GTE. IWA intends to assist the WA Government throughout implementation of supported recommendations. Many recommendations will require a response and action from one or more state agencies or GTEs in addition to the suggested lead. In particular, some of the recommendations from the cross-cutting theme chapters are broadly applicable across relevant public entities, noted as 'all agencies and GTEs' in the summary table.

Summary of recommendations matrix

Legend

The full SIS objectives are:

1. Support a strong, resilient and diversified economy
2. Maximise regional strengths to unlock strategic opportunities for WA
3. Support access to social services and improve Aboriginal wellbeing
4. Enable environmental sustainability and resilience, and address climate change
5. Maximise wellbeing, liveability and cultural strategic opportunities for our community
6. Enhance cross-government coordination and planning
7. Support population growth and change
8. Embrace technology, data and digital connectivity
9. Enhance infrastructure delivery and develop skills for the future
10. Get the most from our infrastructure and improve maintenance

Summary of recommendations		Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
					1	2	3	4	5	6	7	8	9	10
Digital connectivity and technology														
1.	**Elevate WA's focus on accelerating digital transformation and connectivity infrastructure by:**													
a.	allocating a lead state agency for digital technology adoption	DPC	2022							✓		✓		
b.	developing and implementing an integrated statewide plan for digital connectivity, supported by a prioritisation framework	DPC, DPIRD	2023							✓		✓		
c.	developing a collaboration model, adopting a coordinated WA Government approach to federal programs and private sector investment	DPC	2023							✓		✓		
d.	providing multi-year WA Government funding and leveraging Australian Government co-investment opportunities for prioritised digital initiatives	DPC, DPIRD	2032							✓		✓		
2.	**Apply a digital-first approach to all stages of the infrastructure lifecycle by:**													
a.	developing a digital-first smart infrastructure policy	IWA	2023									✓		✓
b.	amending the SAMF's SAP and Business Case guidelines requiring application of the digital-first smart infrastructure policy to $100M+ projects and programs	IWA, Treasury	2024									✓		✓
c.	undertaking annual public reporting on digitisation of infrastructure	IWA	2032	Yes								✓		✓
3.	**Improve cybersecurity practices for state-owned and regulated infrastructure owners and operators, including:**													
a.	clearly articulating state and federal government cybersecurity obligations	DPC	2022							✓		✓		
b.	implementing mechanisms to mandate application of the Western Australian Cyber Security Policy by GTEs	Treasury	2024							✓		✓		

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
c. updating the SAMF's SAP and Business Case guidelines to require infrastructure strategies, plans and business cases to comply with the Western Australian Cyber Security Policy and *Security of Critical Infrastructure Act 2018* (Cth)	Treasury, IWA	2022							✓		✓		
4. Develop digital capabilities within state agencies and GTEs, including:													
a. prioritising development of state privacy and information sharing legislation	DPC	2024							✓		✓		
b. establishing a whole of government digital platform	DPC, Landgate	2024							✓		✓		
c. developing a WA Government data management and asset information policy	DPC	2024							✓		✓		✓
d. assigning a centralised lead state agency responsible for developing and retaining data science capabilities within government	DPC	2026							✓		✓	✓	
5. Undertake an assessment of WA's science and research infrastructure needs	DJTSI	2025		✓					✓		✓		
Aboriginal cultural heritage, wellbeing and enterprise													
6. Embed and support engagement with Traditional Owners and Custodians by:													
a. developing and implementing engagement guidelines	DPC	2025	Yes			✓			✓				✓
b. updating the SAMF's SAP and Business Case guidelines to require preparation and publication of an Aboriginal engagement strategy for $100M+ projects and programs	Treasury, IWA	2022				✓			✓				✓
7. Strengthen application of the Aboriginal Procurement Policy, including:													
a. establishing targets that also consider contract value	DoF	2024				✓			✓			✓	
b. providing updated guidance, education and training for procurement and other public sector officers involved in procurement decision-making	DoF	2026				✓			✓			✓	
c. implementing mechanisms to mandate application of the policy by GTEs	Treasury	2024				✓			✓			✓	
d. setting new incremental procurement stretch targets in the policy over time	DoF	2024				✓			✓			✓	
8. Progressively build capacity and capability of Aboriginal businesses by developing and implementing complementary and proactive measures	DoF	2024	Yes			✓						✓	
9. Improve the quality and resilience of infrastructure and services provided in remote Aboriginal communities and town-based reserves, including:													
a. developing a sustainable funding model and investment framework that considers whole of lifecycle asset costs for state government infrastructure	Treasury, DoC	2023				✓							✓

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
b. ensuring state agencies and GTEs share information relating to the delivery of state government infrastructure and services	DPC	2025				✓					✓		✓
c. investigating opportunities for the private sector to fund, deliver, operate and maintain infrastructure and services	Treasury	2032				✓						✓	✓
d. evaluating outcomes of the Bidyadanga Land Activation Pilot Project and assess suitability for application in other Aboriginal communities	DPC, DPLH	2023				✓			✓				✓
e. accelerating the regularisation of water and wastewater services to the Water Corporation and power services to Horizon Power	DoC	2032				✓			✓				✓
f. establishing and implementing a tiered regulated water, wastewater and power service standard for remote settlements	DPC	2024				✓			✓				✓
g. clarifying the roles and responsibilities of relevant entities for provision of municipal infrastructure and services	DoC	2024				✓			✓				✓
h. determining appropriate funding arrangements for the provision of municipal infrastructure and services	Treasury	2026				✓			✓				✓
i. Investigating and pursuing opportunities for local Aboriginal residents to be trained to deliver operations and maintenance services for infrastructure	DPC	2025				✓						✓	✓
Climate change and sustainability													
10. Implement the WA Government's policy for net zero emissions by 2050, including:													
a. strengthening the net zero emissions by 2050 aspiration to become a firm target and establishing interim emissions reduction targets	All agencies and GTEs	2023					✓		✓				
b. preparing and implementing net zero transition plans	All agencies and GTEs	2025	Yes				✓		✓				
c. preparing and implementing sectoral emissions reduction strategies	All agencies and GTEs	2025	Yes				✓		✓				
11. Strengthen and expand WA Climate Policy programs to develop carbon farming and sequestration markets, including:													
a. assigning a lead state agency to coordinate the program of works, including development of a WA carbon farming strategy and carbon farming industry development plan	DPC	2026					✓		✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
b. exploring opportunities to expand carbon farming to government-managed land outside of the conservation estate	DBCA, DPLH	2032	Yes				✓						
c. supporting Aboriginal empowerment through land management and custodianship in carbon farming initiatives	DPLH	2032	Yes			✓	✓						
12. Implement a statewide approach to climate change adaptation for existing infrastructure, including:													
a. expanding the Climate Science Initiative to require statewide coverage and update it regularly	DWER	2023	Yes		✓		✓						
b. requiring all state agencies and GTEs to develop climate change adaptation plans	All agencies and GTEs	2025					✓		✓				
c. developing guidance to progress the further development of sectoral adaptation actions	DWER	2026					✓		✓				
d. requiring relevant state agencies and GTEs to develop sectoral adaptation plans	DWER	2027	Yes				✓		✓				
13. Implement methods of accountability and coordination across state agencies and GTEs, including:													
a. annual public reporting of progress on mitigation and adaptation actions via responsible Ministers	All agencies and GTEs	2025	Yes				✓		✓				
b. introducing infrastructure-related mitigation and adaptation actions performance measures in DG and CEO accountability mechanisms	DPC	2025	Yes				✓		✓				
c. regular public reporting of the state's emissions and estimated emissions reductions through implementing sectoral emissions reductions strategies	DWER	2025	Yes				✓		✓				
14. Incorporate sustainability into the SAMF, including:													
a. updating the SAP Guidelines to require state agencies and GTEs to include projects and actions identified in climate change strategies and plans in their SAPs	Treasury, IWA	2022					✓		✓				
b. updating the Business Case Guidelines for $100M+ projects and programs to require business cases to: • quantify Scope 1, 2 and 3 emissions • align to emission reduction goals and pathways • demonstrate potential climate change impacts and adaptation actions	Treasury, IWA	2022					✓		✓				
c. updating the Business Case Guidelines for $100M+ projects and programs to require completion and publication of sustainability tool certification	Treasury, IWA	2022				✓	✓	✓					

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
15. Develop a sustainability bond framework	WATC	2024		✓		✓	✓						
16. Develop and implement a shared environmental and heritage information system for priority locations	DWER	2026	Yes				✓		✓				
17. Replace the current system of acquiring environmental offsets separately for major projects with a coordinated bioregional approach, including:													
a. identifying priority conservation areas	DBCA	2024					✓		✓				
b. implementing and administering centrally coordinated funds	DBCA	2024	Yes				✓		✓				
18. Develop an overarching urban forest program, including:													
a. assigning a lead state agency	WAPC, DPLH	2022					✓		✓				
b. embedding program evaluation	WAPC, DPLH	2024					✓		✓				
c. extending the existing Urban Canopy Grant Program	WAPC, DPLH	2026					✓		✓				
d. partnering with local governments, community groups and other land managers	WAPC, DPLH	2026					✓		✓				
e. further reviewing existing planning policy settings with regards to the treatment of trees in new greenfield and infill developments	WAPC, DPLH	2025					✓		✓				
Regional development													
19. Implement a regional development strategic framework that identifies state and regional priorities and guides whole of government action and investment	DPIRD	2023			✓				✓				
20. Improve transparency of government regional investment by reporting all regional expenditures and geographic distribution in the State Budget	Treasury	2023	Yes		✓				✓				
21. Develop regional social services and infrastructure models that are more responsive to the changing needs of communities across regional WA, by:													
a. applying integrated, place-based approaches that allow social service state agencies to better coordinate and co-locate services and infrastructure	DPC	2027				✓			✓	✓			
b. investigating the application of a hub-and-spoke approach	DPC	2027				✓			✓	✓			
c. piloting potential regional social service and infrastructure models	DPC	2027				✓			✓	✓			
d. undertaking a social services and infrastructure needs assessment	DPC	2027				✓			✓	✓			

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
Planning and coordination													
22. Review the effectiveness of existing and proposed infrastructure facilitation and coordination models within 5 years of operation	IWA, DPLH, WAPC	2032							✓				
23. Establish a single digital government approvals system, including:													
a. providing a single access platform that offers standardised information for infrastructure approvals	Treasury	2026							✓		✓		
b. staging updates to the platform, to create a single lodgement portal	Treasury	2032							✓		✓		
24. Implement a program to review and modernise infrastructure-related legislation and progress targeted amendments	Treasury	2027	Yes						✓				
25. Prepare and implement an urban consolidation action program, including:													
a. identifying significant barriers to increasing urban consolidation and developing a clear roadmap that outlines intended outcomes, responsibilities and time frames	WAPC, DPLH	2024							✓				
b. reviewing and adjusting policy settings to support infill locations	WAPC, DPLH	2025				✓		✓	✓	✓			
c. planning incentives that support infill development	WAPC, DPLH	2025				✓			✓	✓			
d. implementing purchaser support to facilitate increased infill development	Treasury	2025	Yes			✓			✓	✓			
e. providing funding and support for development of precinct plans for key infill locations	WAPC, DPLH	2026	Yes						✓	✓			
f. identifying and prioritising infrastructure capacity upgrades and coordination needed to support infill development	WAPC, DPLH	2025	Yes						✓	✓			✓
g. transparently reporting progress towards achieving infill targets	WAPC, DPLH	2023	Yes						✓	✓			
26. Embed rigorous infrastructure appraisal in the planning decision-making framework, including:													
a. underpinning future reviews of Perth and Peel @ 3.5 million and development of integrated regional plans (see Rec 28) with analysis of the capital and operational costs of infrastructure provision and the extent this will likely be carried by the state	WAPC, DPLH	2023	Yes						✓	✓			
b. staging and prioritising development fronts and identifying a clear implementation strategy in land-use plans	WAPC, DPLH	2026	Yes						✓	✓			

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
c. preparing infrastructure servicing plans where proponents seek to depart from staging plans or are outside land identified for future development	WAPC, DPLH	2024	Yes						✓				
d. ensuring rezoning proposals for greenfield land are considered in the context of land supply and demand	WAPC, DPLH	2023	Yes						✓				
27. Prepare a city opportunity plan that sets an agreed strategic framework for the Perth CBD and immediate surrounds, including:													
a. developing a clear and compelling long-term vision for the city	WAPC, DPLH	2025						✓	✓				
b. identifying major precincts, other significant redevelopments and infrastructure that will contribute to city growth and activation	WAPC, DPLH	2025						✓	✓				
28. Progressively prepare, in order of priority, 20-year integrated regional plans	WAPC, DPLH	2032			✓				✓	✓			
29. Establish and implement state priority areas, including:													
a. developing and publishing a prioritisation framework	WAPC, DPLH, DJTSI	2023			✓				✓				
b. endorsing the framework and state priority area locations at a whole of government level	WAPC, DPLH, DJTSI	2024							✓				
c. extending the redevelopment functions and powers of the *Metropolitan Redevelopment Act 2011* to non-metropolitan areas	DevWA	2025			✓				✓				
30. Ensure the protection of strategic land uses, infrastructure and resources inputs by:													
a. finalising and gazetting the draft SPP4.1 – Industrial Interface	WAPC, DPLH	2022							✓				
b. reviewing the EPA's Guidance Statement 3 to align with the finalised SPP4.1	DWER	2024							✓				
c. protecting, preserving and maintaining flexible uses in key industrial sites	WAPC, DPLH	2027	Yes						✓				
d. reviewing the effectiveness of SPP2.4 and the updated SPP4.1 after 5 years	WAPC, DPLH	2027							✓				
e. updating and maintaining basic raw material resource mapping	DMIRS	2032	Yes				✓		✓				
31. Facilitate and coordinate investment in industrial and technological precincts by:													
a. prioritising the finalisation of land assembly, approvals, development contribution arrangements and other preparatory works	WAPC, DPLH, DevWA, DJTSI	2026	Yes						✓				
b. applying state land use planning system tools in a more consistent and proactive manner to industrial and technological precincts	WAPC, DPLH, DevWA, DJTSI	2026	Yes						✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
c. establishing an assessment process for the funding of strategic enabling infrastructure that facilitates private investment (consistent with Rec 40)	DevWA, DJTSI	2025							✓				
d. planning for long-term land needs, with a priority on additional heavy industrial land in the Perth metropolitan area, and completing investigations into the South West Advanced Manufacturing and Technology Hub	DevWA, DJTSI, SWDC	2026	Yes		✓				✓				
32. Develop and implement a shared-use policy framework and guidelines for multi-user infrastructure corridors and facilities	IWA	2032							✓				
33. Identify and secure strategic sites, including:													
a. establishing a fund for regional land acquisition	Treasury	2024			✓				✓				
b. centrally coordinating strategic infrastructure site identification	WAPC, DPLH	2024	Yes						✓				✓
34. Establish a single, agreed set of common planning assumptions, including:													
a. providing, at a minimum, assumptions on population, demographics, housing, economy, employment, human services use, utilities use, transport, land use and climate	WAPC, DPLH, Treasury	2024							✓		✓		
b. setting out agreed data sets and guidance material for their application	WAPC, DPLH, Treasury	2024							✓		✓		
c. embedding them in the SAMF's SAP and Business Case guidelines as required for use	Treasury, IWA	2024							✓		✓		
d. updating them regularly and making them publicly available	WAPC, DPLH, Treasury	2024	Yes						✓		✓		
35. Improve 2-way public and private sector information sharing about infrastructure capacity by:													
a. developing statements of opportunity	IWA	2032	Yes						✓			✓	
b. undertaking place-based assessments of future public and private sector infrastructure intentions with an initial pilot conducted on the Pilbara	IWA	2026	Yes						✓			✓	
36. Support improved infrastructure planning and decision-making by:													
a. establishing a mechanism to embed and communicate the required use of and compliance with the SAMF	Treasury	2023							✓				
b. ensuring business case decision-making is considered by Cabinet's ERC and that business cases contain content as required by the SAMF	Treasury	2023	Yes						✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
c. providing a centralised fund to support development of prioritised business cases	Treasury	2022	Yes						✓			✓	
d. updating the SAMF's Business Case guidelines to require consideration of interrelated infrastructure needs with other state agencies and GTEs	Treasury, IWA	2022							✓				
e. requiring a benefits management plan be completed, and ensuring IWA undertakes a post-completion review for all projects and programs required to undergo MIPA	Treasury, IWA	2022	Yes						✓				✓
f. updating the SAMF's SAP and Business Case guidelines to strengthen requirements to demonstrate consideration of this Strategy and relevant strategic planning documents in the development of SAP and business case content	Treasury, IWA	2022							✓				
g. ensuring SAPs are at the centre of an annual process involving: i. systematic analysis of all SAPs by Treasury and IWA ii. undertaking analysis and preparing content to inform the annual 10-year state infrastructure program iii. engagement by Treasury to provide feedback for ongoing improvement	Treasury, IWA	2022	Yes						✓				
Infrastructure delivery													
37. Strengthen project assurance processes, governance and public sector skills for the delivery of major projects by:													
a. developing a risk-based project assurance process	DoF	2023	Yes									✓	
b. ensuring chairs of major project steering committees have time to prepare for, attend and lead steering committee meetings and deliberations	DPC	2023	Yes									✓	
c. enhancing the capacity of the DoF to provide expert teams within less-experienced state agencies and GTEs	DoF	2024	Yes						✓			✓	
d. developing and rolling out project management standards for adoption by state agencies and GTEs	DoF	2032							✓			✓	
38. Make incremental improvements to procurement policies and practices, including:													
a. further developing and implementing procurement models for major projects	DoF	2032	Yes									✓	
b. implementing contract packaging strategies that support market participation	DoF	2025	Yes									✓	
c. developing a policy under which the WA Government would contribute to all or part of the bid costs of unsuccessful tenderers	DoF	2024										✓	

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
d. further reviewing and refining the Market-led Proposals Policy	DoF	2023										✓	
e. considering and implementing program procurement approaches	DoF	2032	Yes						✓			✓	
f. considering the use of offsite and modular construction techniques	All agencies and GTEs	2027	Yes									✓	
g. establishing a cross-agency infrastructure procurement coordination mechanism	DoF	2032	Yes						✓			✓	
39. Improve project cost management, including:													
a. establishing clear standards for setting project delivery time frames and cashflows at a program level	Treasury	2027							✓			✓	
b. replacing individual project-based contingency management with a whole of government (or whole of state agency or GTE) based approach	Treasury	2025	Yes						✓			✓	
40. Review the potential to use private sector finance and funding sources, including:													
a. investigating asset recycling through divesting suitable assets	Treasury	2032	Yes									✓	✓
b. developing whole of government principles to inform the prioritisation of state funding contributions where these facilitate strategic private sector investment	Treasury, DJTSI, DPC	2025		✓					✓			✓	
Asset management													
41. Improve asset management practices across the public sector, including:													
a. formalising and funding the DoF's role as functional lead for asset management	DoF	2025							✓				✓
b. progressively expanding the Building Asset Management Framework pilot initiative	DoF	2026							✓				✓
c. requiring all state agencies and GTEs to develop fit for purpose asset management practices	All agencies and GTEs	2027							✓				✓
d. undertaking a review within 5 years to assess progress on maintenance outcomes and determine whether additional measures are required	Treasury	2027							✓				✓
42. Incentivise improvements in asset management across the public sector by:													
a. establishing a new budget allocation to implement fit for purpose asset management planning, capability building and systems	Treasury	2023	Yes						✓				✓
b. establishing an asset lifecycle investment fund or similar incentive mechanism	Treasury	2032	Yes										✓

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
Energy													
43. Evolve the Whole of System Plan and ensure implementation actions are transparent by:													
a. updating modelling inputs and assumptions in relevant scenarios	EPWA	2023		✓			✓		✓				
b. publishing a short-term to medium-term implementation plan for the most likely scenario, which is updated periodically	EPWA	2023	Yes						✓				
44. Prepare a North West Interconnected System energy futures report	EPWA, DJTSI, DevWA	2032			✓		✓		✓			✓	
45. Accelerate a dedicated program of energy storage, micro-grids, virtual power plants and standalone power systems	EPWA, Energy GTEs	2023					✓		✓				
46. Ensure the legislative and regulatory framework enables energy outcomes that aligns with broader public policy outcomes by:													
a. reviewing and revising legislation, regulations, codes, guidelines and associated decision-making documents and processes to address targets and objectives in a manner that does not unduly disadvantage first or last movers	EPWA	2024		✓			✓		✓				
b. reviewing the effectiveness of guidance and assessment for investment proposals	EPWA	2023		✓					✓				
c. establishing a policy position on the role of government and the private sector in funding, financing and delivery of enabling infrastructure (consistent with Rec 40)	Treasury, DTJSI, DPC	2025		✓			✓		✓			✓	
47. Support the development of the state's hydrogen industry by:													
a. accelerating reform of legislation, standards and policies	DJTSI	2025		✓			✓						
b. investigating options for stimulating domestic market demand	DJTSI	2025		✓			✓						
c. investigating the feasibility of a hydrogen refuelling network on key freight routes	DJTSI	2025		✓			✓						
d. publicly reporting the *Western Australian Renewable Hydrogen Roadmap*'s actions on an annual basis	DJTSI	2025	Yes	✓			✓						
e. investigating the feasibility of and prioritising large-scale hydrogen industry precincts, including i. conducting detailed projections (consistent with Rec 43a) ii. coordinating activities for development readiness of precincts iii. establishing a clear policy position on the role of government and the private sector in funding, financing and delivering enabling infrastructure (consistent with Rec 43a) iv. developing and implementing a staged program of hydrogen industry enabling infrastructure	EPWA, DJTSI, DevWA	2025	Yes	✓			✓		✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
Water													
48. Modernise legislative, regulatory and planning frameworks for water resources and water services by:													
a. prioritising the development and introduction to Parliament of water resources management legislation	DWER	2024					✓		✓				
b. developing, publishing and implementing a 20-year state water strategy	DWER	2024					✓		✓	✓			
c. developing, publishing and implementing 10+ year regional water plans	DWER	2027			✓		✓		✓	✓			
d. including provisions in planning and regulatory frameworks that enable investments in alternative water supplies and wastewater systems	DWER, WAPC, DPLH	2032					✓		✓				
e. clearly articulating water resource needs, drainage and infrastructure requirements in land-use and infrastructure servicing plans (consistent with Rec 26)	WAPC, DPLH	2023	Yes				✓		✓				✓
49. Support the long-term sustainable use and management of strategic water resources by:													
a. reviewing self-supply arrangements for strategic water resources, with the Gnangara groundwater system as the first priority	DWER	2027					✓		✓				
b. based on outcomes of the review of self-supply arrangements (see Rec 49a), implementing recommended reform measures	DWER	2032					✓		✓				
c. finalising and implementing the Gnangara groundwater allocation plan	DWER	2022					✓		✓				
50. Manage water demand by:													
a. reviewing and implementing the *Waterwise Perth: two year action plan*	DWER	2022					✓		✓				
b. developing and implementing plans similar to the *Waterwise Perth: two year action plan* for regional areas	DWER	2026			✓		✓		✓				
c. implementing and introducing expanded water efficiency programs	Water GTEs	2027	Yes				✓		✓				
d. reducing water consumption through education and improved consumer awareness	Water GTEs	2027	Yes				✓				✓		✓
51. Plan and deliver climate-independent infrastructure that provides fit for purpose and sustainable water services, including:													
a. continuing planning and business case development for an additional desalination plant for the Integrated Water Supply Scheme	Water Corp	2024					✓		✓	✓			
b. further investigating wastewater recycling opportunities and groundwater replenishment schemes	Water GTEs	2027					✓		✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
c. based on needs identified (see Recs 48b and 48c) and subject to business cases, implementing climate-independent water supply solutions in regional communities	Water GTEs	2032	Yes		✓		✓						
52. Develop a prioritisation framework to guide investment in water infrastructure projects for agriculture and food industries in peri-urban and regional areas	DPIRD	2023			✓		✓						
53. Undertake an integrated strategic review of water and land-use values in the Jandakot and Gnangara groundwater protection areas	DWER, WAPC, DPLH	2026					✓		✓				
Waste													
54. Accelerate implementation of the Waste Avoidance and Resource Recovery Strategy 2030, including:													
a. prioritising and expediting legislative and regulatory reform including: i. reviewing the *Waste Avoidance and Resource Recovery Act 2007* ii. developing a waste-derived materials framework iii. reviewing the Waste Levy, including rate and application to regional areas iv. reducing Waste Levy avoidance and evasion practices v. implementing the Waste Data Strategy	Waste Authority, DWER	2025					✓		✓		✓		
b. preparing a waste-derived materials market development plan	Waste Authority, DWER	2025					✓						
c. setting targets in government procurement policies on waste generation, material recovery and reuse and use of products with recycled content	Waste Authority, DWER, DoF	2025					✓						✓
d. presenting a roadmap and time frames for the implementation of waste legislative and regulatory reforms (see Rec 54a), market development (see Recs 54b and 54c), and increasing the use of the Waste Levy funds	Waste Authority, DWER	2023					✓						
e. investigating opportunities to improve the way mining and resources sector site waste is regulated and managed	Waste Authority, DWER, DMIRS	2025					✓						✓
f. investigating the potential for more local governments to participate in collective arrangements	DWER, DLGSCI	2024							✓				✓
55. Prioritise finalisation of a state waste infrastructure plan	Waste Authority, DWER	2024					✓		✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
Transport													
56. Deliver improved transport system outcomes by:													
a. further reforming governance arrangements for the Transport Portfolio	Transport Portfolio	2025							✓				
b. reforming funding hypothecation legislative arrangements for motor vehicle licence revenue	Transport Portfolio	2026							✓				✓
57. Refresh statewide strategic transport planning, including:													
a. developing, publishing and implementing a new 20-year regional transport plan	Transport Portfolio	2024			✓				✓	✓			
b. developing, publishing and implementing a new 20-year Perth and Peel transport plan	Transport Portfolio	2024							✓	✓			✓
c. finalising development of the new Perth transport model	Transport Portfolio	2025							✓		✓		
58. Address the future loss of fuel excise revenue by:													
a. working with other jurisdictions to design a fair and nationally compatible alternative to fuel excise for low and zero emission vehicles	Transport Portfolio	2032					✓		✓				
b. when designing a fuel excise alternative scheme and associated technology, ensuring that: • the scheme can include vehicle mass, distance, location and time-of-day pricing • total road system revenue is maintained at a stable level	Transport Portfolio	2032					✓		✓		✓		✓
c. undertaking a review to investigate the merits of location and time-of-day pricing signals being incorporated into a fuel excise alternative	Transport Portfolio	2032									✓		✓
59. Develop and implement a public transport patronage action plan with a focus on non-build measures	Transport Portfolio, WAPC, DPLH	2027				✓			✓	✓	✓		✓
60. Progress targeted expansion and improvement of the road network by:													
a. delivering road safety programs in line with *Driving change: Road Safety Strategy for Western Australia 2020–2030*	MRWA	2032	Yes					✓					✓
b. delivering regional maintenance and freight productivity programs	MRWA	2032	Yes	✓	✓								✓
c. progressing targeted programs expanding the use of technology on arterial roads and trials for dynamic bus prioritisation	Transport Portfolio	2032	Yes	✓						✓	✓		✓

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
d. progressing capacity and efficiency upgrades to freeways and major urban highways	Transport Portfolio	2032	Yes	✓						✓	✓		✓
e. estimating impacts from potential low and zero emissions vehicles and connected and automated vehicle rollout scenarios modelling and sensitivity testing in all major transport project business cases	Transport Portfolio	2024					✓		✓			✓	
f. Investigating the feasibility of long term-major projects: Orrong Road, EastLink WA, Brand Highway and North West Coastal Highway upgrade, and Stock Road tunnel river crossing	Transport Portfolio	2032		✓	✓					✓			
61. Plan and invest in the future development of new heavy rail infrastructure, by:													
a. investing in high capacity signalling	PTA	2032		✓						✓	✓		✓
b. investing in improved station precinct accessibility and improving compliance with the *Disability Discrimination Act 1992* (Cth)	Transport Portfolio	2032				✓	✓		✓	✓			
c. further investigating the merit and staging of investments in the Rail Growth Plan	Transport Portfolio	2032		✓			✓			✓			
d. investigating the feasibility of long term major projects: East Wanneroo Rail Link, Bunbury Faster Rail and Perth metropolitan orbital rail route	Transport Portfolio	2032		✓	✓					✓			
62. Develop a business case for light rail and/or bus rapid transit as the next stage of major public transport priority investment in Perth	Transport Portfolio	2032		✓		✓			✓	✓			
63. Provide enhanced cycling and walking infrastructure by:													
a. allocating a greater portion of state funding to local government cycling projects	Transport Portfolio	2032	Yes			✓			✓	✓			
b. seeking federal funding contributions for a program of cycling infrastructure priority projects	Transport Portfolio	2023	Yes			✓				✓			
c. requiring application of new safe active transport infrastructure design guidelines for all state and local government projects	Transport Portfolio, WAPC, DPLH	2027	Yes			✓			✓	✓			
64. Implement further measures that support the State Electric Vehicle Strategy for Western Australia, including:													
a. setting a more ambitious target for the WA Government light vehicle fleet uptake	DoF, DWER	2025					✓		✓				
b. accelerating the transition or conversion of other WA Government vehicles to low and zero emissions technology	PTA, DFES, WAPOL, DoF, DWER	2032	Yes				✓		✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
c. expanding the rollout of charging infrastructure on government land and buildings	DoF, Transport Portfolio	2032	Yes				✓		✓				
d. supporting the private sector to provide charging infrastructure	Transport Portfolio, WAPC, DPLH	2032	Yes				✓		✓				
65. Ensure the anticipated future road infrastructure and related technology system requirements of connected and automated vehicles are incorporated in the scope of future transport business cases and strategic planning	Transport Portfolio	2032							✓		✓		
66. Complement Westport's preparations by conducting further strategic planning, including:													
a. refining and monitoring the estimated optimal required timing for Outer Harbour investment and operations	DoT	2024		✓					✓				
b. identifying the future location of non-container trades currently based in the Fremantle Inner Harbour	FPA, DoT	2024		✓					✓				
c. optimising the road and rail supply chain servicing the Inner Harbour	Transport Portfolio	2024		✓					✓				✓
d. developing a long-term Inner Harbour masterplan	DoT	2024		✓					✓	✓			✓
e. progressing planning for strategic economic development opportunities in the Western Trade Coast (consistent with Rec 31)	DJTSI, DevWA	2024	Yes	✓					✓			✓	
67. Undertake further planning and staged expansion of common-use infrastructure at the Australian Marine Complex	DJTSI, DevWA	2027		✓					✓				
68. Support expansion of direct shipping services to the state's north, including:													
a. assessing the viability, costs and benefits of long-term direct shipping and associated infrastructure requirements	PPA, KPA, Transport Portfolio	2032		✓	✓				✓				
b. seeking Northern Australia Infrastructure Facility and private funding for any major new port facility required for direct shipping	PPA, KPA, Transport Portfolio, DJTSI	2032		✓	✓				✓				
c. funding relevant port facilities to have appropriate first port of entry infrastructure and systems	PPA, KPA, Transport Portfolio	2032		✓	✓				✓				

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
d. planning for fit for purpose road connections to direct shipping facilities	PPA, KPA, Transport Portfolio	2032		✓	✓				✓				
69. Support long-term investment decision-making for the state's freight rail network over the remainder of the lease period (consistent with Rec 40b), by:													
a. implementing a structured approach to planning and consideration of public contributions towards proposals for expansion of the network	Transport Portfolio	2027		✓	✓				✓				
b. pursuing further investigations, including for: i. WA Agricultural Supply Chain Improvements ii. Kalgoorlie Rail realignment	Transport Portfolio	2023		✓	✓				✓				
70. Plan for the long-term potential needs of a new civil aviation and general aviation airport for Perth	WAPC, DPLH	2032		✓					✓				
Housing													
71. Improve planning and inform investment for social and affordable housing by:													
a. preparing and publishing 10+ year regional housing plans for each WA region	DoC, DPLH, WAPC	2026			✓	✓			✓				
b. conducting an initial regional housing plan pilot	DoC, DPLH, WAPC	2023			✓	✓			✓				
72. Prioritise further investment in social and affordable housing by:													
a. assessing the level of investment required to accelerate *All paths lead to a home – WA's 10 year Strategy on Homelessness 2020–2030* and accompanying action plan	DoC	2023				✓		✓		✓			
b. undertaking a comprehensive audit of social housing assets	DoC	2024				✓		✓		✓			
c. reviewing social housing growth targets in the *WA Housing Strategy 2020–2030* and setting revised evidence-based net growth targets	DoC	2023				✓		✓		✓			
d. monitoring and reviewing the effectiveness of affordable housing mechanisms	DoC	2025				✓		✓		✓			
e. developing a sustained social and affordable housing investment program (see Recs 71a and 72c)	DoC, DevWA	2032	Yes			✓		✓		✓			
73. Enable and diversify social and affordable housing providers and housing choice by:													
a. investigating government financing mechanisms	DoC, Treasury	2024				✓				✓			✓

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
b. reforming policy and reviewing existing Community Housing Agreements	DoC	2023				✓			✓				
c. leveraging government land assets and providing financial and yield incentives	DoC, DevWA	2032	Yes			✓			✓				✓
d. facilitating voluntary participation by tenants and owners in longer-term leases	DMIRS	2023				✓				✓			
74. Respond to the need for affordable and available housing in regional areas by:													
a. establishing the principles, criteria and models for government housing intervention	DoC	2024			✓	✓							
b. independently reviewing regional officer housing assets and programs across the public sector	DoC	2024			✓	✓							✓
c. investigating innovative models for implementation of regional officer and key worker housing	DoC	2025			✓	✓						✓	
75. Improve Aboriginal housing outcomes and enable options for housing infrastructure by:													
a. ensuring Aboriginal social and affordable housing activities and targets correspond with Target 9 of the *National Agreement on Closing the Gap*	DoC	2026	Yes		✓	✓							
b. delivering sustained investments in Aboriginal housing and capacity building of ACCOs (see Rec 6)	DoC	2032	Yes		✓	✓							
c. developing a social impact strategy	DoC	2024			✓	✓							
Health													
76. Alleviate demand on hospitals and support budget sustainability by:													
a. fast-tracking implementation of the Sustainable Health Review	DoH	2023				✓				✓			✓
b. providing publicly available progress reporting at least annually on Sustainable Heath Review reform outcomes	DoH	2023	Yes						✓				✓
77. Address gaps in the health system service and infrastructure planning by:													
a. prioritising finalisation of the review of the *WA Health Clinical Services Framework 2014–2024*	DoH	2022							✓				
b. finalising development of the 10-year state health plan	DoH	2023				✓			✓	✓			✓
c. establishing an agreement for a sustainable funding footprint	DoH, Treasury	2024							✓				✓
d. preparing an annually updated system-wide SAP that meets the requirements of the SAMF	DoH	2023	Yes						✓				✓

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
e. completing a full review of the *Western Australian Mental Health, Alcohol and Other Drug Services Plan 2015–2025*	MHC	2025				✓			✓				
f. assessing options for the private and/or not-for-profit healthcare providers to augment the public health system	DoH	2023	Yes						✓				✓
g. strengthening lifecycle asset management maturity, including: i. enhancing the capacity of the DoH, MHC and Health Service Providers to undertake system-wide infrastructure planning and prioritisation	DoH, MHC, Health Service Providers	2025							✓				✓
ii. allocating budget to implement fit for purpose asset management planning and systems (consistent with Rec 42a)	Treasury	2023	Yes						✓				✓
78. Increase investment in community-based services, including:													
a. rebalancing and accelerating investment towards community-based mental health services and facilities	MHC, DoH	2025	Yes			✓							✓
b. working with the Australian Government to prioritise and expand the role of primary health care in providing integrated, community-based health services	DoH	2023	Yes			✓			✓				✓
c. working with the Australian Government to investigate and invest in innovative models of community-based primary health services and facilities	DoH	2023	Yes			✓			✓				✓
d. expanding application of digital technologies, such as telehealth and remote inpatient monitoring	DoH	2027	Yes			✓							✓
79. Targeted investment in hospitals to modernise facilities and address capacity gaps, including:													
a. developing a roadmap for the planning and redevelopment of Royal Perth Hospital (subject to Rec 77a)	DoH	2025				✓			✓	✓			✓
b. developing a roadmap for the planning of and future investment in Sir Charles Gairdner Hospital (subject to Rec 77a)	DoH	2032				✓			✓	✓			✓
c. prioritising investment to continue the services provided at Graylands Hospital and Selby Lodge	MHC, DoH	2032				✓				✓			✓
d. prioritising investment in forensic mental health services	MHC, DoJ, DoH	2032				✓				✓			✓
80. Prioritise and fund digital technology initiatives identified in the *WA Health Digital Strategy 2020–2030*, subject to business cases, with the electronic medical records program the priority	DoH	2032	Yes			✓				✓	✓		✓

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
81. Enable the built environment to play a stronger role in addressing the wider determinants of health, including:													
a. aligning strategic planning and infrastructure proposals to the *State Public Health Plan for Western Australia* and reporting progress against objectives	DoH, DPLH, Treasury	2032	Yes					✓	✓				✓
b. finalising regulations required to implement public health assessments for significant strategic planning and infrastructure proposals	DoH, DPLH, Treasury, EPA, DLGCSI, IWA	2032	Yes					✓	✓				✓
82. Establish health facilities tailored to Aboriginal needs, including:													
a. supporting and funding the development of community-based primary care and allied health facilities	DoH	2032	Yes			✓			✓				
b. providing health facilities in Aboriginal communities that are fit for purpose and have access to high-quality digital connectivity	DoH	2032	Yes			✓					✓		
83. Co-invest in health and medical life sciences facilities, subject to business cases, including:													
a. establishing local medtech and pharmaceutical manufacturing infrastructure and capabilities	DJTSI	2026	Yes	✓		✓					✓		
b. identifying opportunities for the Future Health Research and Innovation Fund to partner with the Australian Government, academia and the private sector	DoH	2027	Yes	✓		✓			✓				
Education and training													
84. Improve school infrastructure planning and delivery by:													
a. reviewing data formats, sources, accessibility and assumptions for planning school demand in greenfield and infill areas	DoE, WAPC, DPLH	2023				✓			✓		✓		
b. applying new software and systems that use new methodologies	DoE	2025				✓			✓		✓		
c. preparing a program-level business case for site acquisition in inner and middle suburbs	DoE	2023				✓		✓	✓	✓			
d. enabling the use of medium-rise to high-rise public vertical schools in appropriate locations	DoE	2025	Yes			✓		✓		✓			
e. using transportable buildings only as a temporary demand solution, and not where growth is expected to continue	DoE, DoF	2032	Yes			✓				✓			
f. considering offsite and modular construction (consistent with Rec 38f)	DoE, DoF	2027	Yes			✓						✓	

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
g. progressively retiring transportable school buildings when they no longer meet requirements	DoE	2032	Yes			✓							
h. implementing collocation and shared use with child care, health and community support services	DoE	2032	Yes			✓			✓				✓
i. allocating budget to implement fit for purpose asset management planning (consistent with Rec 42a)	DoE	2027	Yes			✓			✓				✓
85. Plan for and invest in future skills and training by:													
a. involving the DTWD, TAFEs and relevant private training organisations when strategies or plans are developed for new or existing industry sectors	DTWD	2024	Yes	✓		✓			✓			✓	
b. establishing a funding program for TAFE training equipment and software and facilitating industry co-contributions	Treasury	2032	Yes			✓					✓	✓	
c. further encouraging apprenticeships and traineeships on public infrastructure projects by expanding the use of group training organisations	DTWD	2032	Yes	✓								✓	
d. updating the SAMF's SAP and Business Case guidelines to require $100M+ projects and programs to consider skills and training	Treasury, IWA	2022				✓			✓			✓	
Arts, culture, sport and recreation													
86. Develop and publish a 10+ year state arts and culture strategy	DLGSCI	2025		✓				✓	✓				
87. Ensure access to regional-level sporting infrastructure and inform investment requirements by:													
a. identifying gaps in current regional-level sporting and recreation facilities	DLGSCI	2025						✓	✓	✓			
b. developing and publishing a 10+ year regional-level sporting facilities plan	DLGSCI	2025						✓	✓	✓			
88. Increase investment in existing and new infrastructure, including:													
a. delivering an Aboriginal cultural centre in Perth subject to a business case	DLGSCI	2032				✓		✓					
b. improving the capacity and quality of convention and exhibition facilities in the Perth CBD subject to a business case	DPLH, DoF	2032		✓				✓					
c. completing planning to redevelop the Perth Convention Precinct	WAPC, DPLH	2032		✓				✓	✓				
d. redeveloping the Perth Cultural Centre subject to a business case	DLGSCI	2025		✓				✓	✓				
e. delivering priority capital works in the State Sporting Infrastructure Plan subject to a business case	DLGSCI	2032						✓		✓			

Summary of recommendations	Suggested lead agencies	Time frame for completion	Ongoing	Alignment with Strategy objectives									
				1	2	3	4	5	6	7	8	9	10
89. Develop and publish a 10+ year state tourism strategy	DJTSI (Tourism WA)	2024		✓	✓			✓	✓				
90. Invest in the 4 jewels in the crown of WA's tourism offering, including:													
a. preparing destination management plans	DJTSI (Tourism WA)	2025		✓	✓			✓	✓				
b. investing in the infrastructure program detailed in the destination management plans subject to a business case	DJTSI (Tourism WA)	2032		✓	✓			✓	✓				
c. capturing the wider impacts of investment decisions on tourism-related infrastructure (consistent with Rec 36d)	DJTSI (Tourism WA)	2022		✓	✓			✓	✓				
Justice and public safety													
91. Establish and implement cross-agency stretch targets, measures to achieve these targets and publicly report progress against these targets each year	DPC, DoJ, WAPOL	2023				✓			✓	✓			
92. Improve infrastructure planning with a focus on the interdependencies of police, courts and correctional facilities by:													
a. pursuing collocation opportunities with government and non-government providers	DoJ, WAPOL	2026				✓			✓	✓			
b. improving alignment and cooperation between the DoJ and WAPOL to manage shared assets	DoJ, WAPOL	2026				✓			✓				✓
c. updating and maintaining the Long Term Custodial Infrastructure Plan	DoJ	2024				✓			✓	✓			
d. progressing long-term planning for courts and police facilities	DoJ, WAPOL	2024				✓			✓	✓			
93. Invest in fit for purpose and contemporary infrastructure, including:													
a. replacing the Broome Regional Prison, subject to a business case	DoJ	2024				✓				✓			
b. replacing the WA Emergency Management Training Centre, subject to a business case	DFES	2032		✓					✓	✓			
c. further investigating the phased rollout of the Government Radio Network, subject to a finalised business case	WAPOL	2032							✓	✓	✓		

Glossary and shortened forms

Glossary

Term	Definition
Aboriginal; Aboriginal and Torres Strait Islander	Within WA, the term 'Aboriginal' is used in preference to Aboriginal and Torres Strait Islander, in recognition that Aboriginal people are the original inhabitants of WA. The term 'Aboriginal and Torres Strait Islander' may be used in the national context.
Active transport	Active transport relates to physical activity such as travel by foot, bicycle and other non-motorised vehicles undertaken as a means of transport. It also relates to public transport, as it often involves some walking or cycling to pick-up points and from drop-off points.
Agribusiness	A business in the agricultural sector that ranges from small specialist producers and growers to large-scale production of crops and livestock.
Artificial intelligence	Technology that can perform tasks defined by humans without needing explicit guidance.
Automation	The use or introduction of automatic equipment in a manufacturing or other process or facility.
Big data	Extremely large data sets that may be analysed computationally to reveal patterns, trends and associations, especially relating to human behaviour and interactions.
Blue hydrogen	Blue hydrogen is produced when natural gas is split into hydrogen and CO_2 either by steam methane reforming or auto thermal reforming. The CO_2 is captured and stored.
Blue infrastructure	Refers to beaches and waterways, such as harbours, lakes and rivers, and the facilities that support them, including foreshores, surf lifesaving and water recreation clubs, jetties and wharves.
Bond	A type of debt-based investment, where an investor loans money to government, in return for an agreed rate of interest. Government can use bonds to raise funds that can be spent on infrastructure. Investors obtain a low risk investment and a set return.
Bottom-up approach	An approach applied by IWA during the development of the Strategy that involved reviewing the status of WA's existing public infrastructure base and the relevant legislative and policy settings. The approach included a review of: • infrastructure related strategies, plans and legislation held by state agencies and government trading enterprises • formal submissions received during the Discussion Paper and draft strategy process • other feedback received during the consultation program through formal stakeholder groups and events.
Build initiatives or recommendations	Initiatives or recommendations that relate to the concept, approval or delivery stages of an infrastructure project or program. This includes business case development, funding decision, procurement, delivery, operation, renewal or disposal of an infrastructure project or program.

Term	Definition
Build to rent (alternative housing model)	A model whereby developers finance and construct housing, usually apartments, and rather than selling off individual units, they retain them to rent to tenant households. Rents may be set at market or affordable rates (potentially with government support to fill any funding gap).
Circular economy	A circular economy retains the value of materials in the economy for as long as possible, reducing the unsustainable depletion of natural resources and impacts on the environment.
Co-locate (verb), collocation (noun)	The placement of different types of infrastructure in a single location.
Comparative advantage	The ability of an economy to produce goods and services at a lower opportunity cost than trade partners.
Competitive advantage	The factors that differentiate an entity and allow it to produce favourable goods or services, which then sets that entity apart from its competition.
Consolidated account	The account where all moneys due to the state government from taxes, charges, imposts and other sources is held. It is the primary (but not only) account from which the state government allocates spending through the State Budget.
Cross-cutting themes	Matters that apply to multiple infrastructure sectors and across the infrastructure lifecycle.
Curtailment	A reduction in the output of an energy generator from what it could otherwise produce given available resources. Curtailment seeks to balance the energy supply and demand within the constraints of an energy network.
Cybersecurity	The act of protecting networks, devices and data from unauthorised access or criminal use and the practice of ensuring confidentiality, integrity and availability of information.
Demand management	Techniques used to divert, delay or avoid the need for more costly added capacity or new infrastructure assets. These techniques can include pricing strategies such as time-of-use tariffs, behaviour-change initiatives or early social intervention.
Desalination	The process of removing salt and impurities from seawater to produce fresh water.
Determinants of health	The range of personal, social, economic and environmental factors that influence health status.
Digital connectivity	Access to a fast and reliable internet connection (fixed or mobile) that enables users to benefit from smart and digital services.
Digital divide	The divide in society that is created by different levels of access to information and communication technologies, caused by a range of factors including accessibility, affordability and capability, and resulting in unequal opportunities for wellbeing and economic prosperity.
Digital-first	A concept that refers to a shift in organisational culture away from traditional approaches to digital solutions, addressing any new opportunity or problem by considering a digital solution, as either an alternative or an enhancement to conventional methods.

Term	Definition
Digital transformation	The adoption of digital technologies used to improve processes and productivity, deliver better customer and employee experiences, manage business risk and control costs.
First point of entry	A place determined as eligible to land international vessels, travellers and goods, as defined in the Australian Government *Biosecurity Act 2015* (Cth). For the purposes of this Strategy, IWA also includes immigration port of entry in this definition.
Functional economic areas	A geographic area that shares similar economic factors and relatively contained interdependencies such as commuter or trade patterns.
General aviation	A range of operations that are not commercial air transport services. This includes aerial work (such as agriculture, photography, surveying, search and rescue), instructional flying and recreational flying.
Global megatrends	Macroeconomic and geostrategic forces that have a disruptive effect across the world and are shaping society's current and future challenges and opportunities.
Gnangara Mound	One of 3 main aquifers that make up Perth's Gnangara groundwater system; the common name given to Perth's unconfined superficial aquifer.
Green hydrogen	Also referred to a renewable hydrogen, green hydrogen is produced by splitting water by electrolysis powered by renewable energy sources, such as wind or solar, without CO_2 as a by-product.
Green infrastructure	The range of natural and built landscape assets that incorporate natural vegetation. It includes areas of public and private land, such as parks, fields, verges, rooftop gardens, green facades, walking and cycling tracks, sporting ovals, trees and backyards.
Heritage lines	Common collective term used for the Armadale, Fremantle and Midland rail lines which were built in the 19th Century and service establish suburbs around the Perth metropolitan area.
Hypothecation, hypothecated funding	The payment of government funds into a dedicated account, established for the specific purposes for which the funds are imposed and which can only be used for those purposes.
Indigenous	Only used if referencing other bodies of work that use the term 'Indigenous'. Refer to the 'Aboriginal; Aboriginal and Torres Strait Islander' glossary entry for further detail.
Infrastructure lifecycle	Describes the stages across the life of an infrastructure asset, from the initial planning stage through to retirement or disposal.
Internet of Things	Everyday devices that connect to the internet to send and receive data, such as domestic appliances, security and metering systems, and agricultural and factory equipment.
Just transition	A process that seeks to ensure that the benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically. This could include countries, regions, industries, communities, workers or consumers. In the WA context, a just transition is generally applied to the coal-fired power industry and the community located in the Collie region.

Term	Definition
Justice reinvestment	The redirection of expenditure and effort from traditional justice services and infrastructure to evidenced-based targeted interventions that achieve cost savings through reduced offending and imprisonment, which can then be reinvested in further social and criminal justice improvements.
Machinery of Government	A change that occurs when a state government decides to modify the way public service responsibilities are managed. These changes can involve the movement of functions, resources and people from one government agency or government trading enterprise to another.
Major infrastructure proposal, project, program	An infrastructure proposal, project or program with a capital cost greater than $100 million.
Medi-hotel	Provider of accommodation and hotel services for self-caring patients who are accessing acute hospital services.
Mobility-as-a-service	The integration of various forms of transport services into a single mobility service accessible on demand, through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations.
Mode-agnostic approach	An approach used in transport planning that seeks to ensure transport infrastructure considers multiple transport modes suited to user needs rather than particular modes such as vehicles, trains, freight or buses.
Native title	The communal, group or individual rights and interests of Aboriginal peoples and Torres Strait Islanders in relation to land and waters, possessed under traditional law and custom, by which those people have a connection with an area which is recognised under Australian law.
Net zero emissions	Achieving a neutral balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere. Achieving net zero emissions includes the production of some emissions, as long as they are offset by a process that removes greenhouse gas emissions (carbon sequestration) to reach net zero.
Non-build initiatives or recommendations	Initiatives or recommendations that relate to infrastructure legislation, regulation, strategy, planning or policies.
Off-grid	Energy users who are not connected to the main electricity grids, including the SWIS or NWIS.
Peri-urban	An area that surrounds a metropolitan area or city and is neither urban nor rural in the conventional sense.
Place-based	Place-based approaches target specific geographic areas and population groups that share common characteristics and issues in order to tailor collaborative responses to their unique requirements.
Portfolio management approach	The coordinated management of one or more portfolios to achieve organisational strategies and objectives, including processes by which an organisation evaluates, selects, prioritises and allocates its resources to best accomplish organisational strategies and objectives. A portfolio is a collection of programs, projects and operations managed as a group to achieve strategic objectives.

Term	Definition
Potable (and non-potable) water	Potable water is water that is safe to drink. Non-potable water is not safe to drink but can be used for other purposes, such as watering public open space and for industrial processes.
Primary health care	Generally the first point of contact people have with the health system. It can be provided in the home or in community-based settings, such as in general practices and community health centres. The types of primary health care services delivered are broad ranging, such as health promotion, prevention and screening, early intervention, treatment and management.
Project assurance	The independent and objective oversight of the validity, quality and integrity of processes across the infrastructure lifecycle. Assurance processes seek to provide confidence to stakeholder that infrastructure projects and programs are well planned, managed and deliver intended benefits.
Public realm	A space to which the general public has right of access.
Regularisation	In relation to water, wastewater and power services, regularisation describes the transition to licensed and regulated services.
Renewable hydrogen	Also referred to as green hydrogen, renewable hydrogen is produced by splitting water by electrolysis powered by renewable energy sources, such as wind or solar, without CO_2 as a by-product.
Resilience	The capacity of infrastructure and communities to resist, absorb, accommodate, recover, transform and thrive in response to shocks and stresses, in order to realise positive economic, social and environmental outcomes.
Scenario planning	A strategic planning method that envisages and tests what the future might hold for an organisation, industrial sector, society, economy or the state by attempting to identify the major drivers that will shape the future and assessing their impact.
Scope 1 emissions	Direct greenhouse gas emissions from sources that are owned or controlled by an organisation or government entity. For example, emissions from burning fuel in a government agency's vehicle fleet.
Scope 2 emissions	Indirect greenhouse gas emissions from the generation of purchased electricity consumed by an organisation. For example, government buildings consume electricity with consumption controlled by that government entity. However, emissions from the burning of coal are produced at the electricity generation facility.
Scope 3 emissions	Other indirect greenhouse gas emissions that are a consequence of the activities of the organisation or government entity but occur from sources not owned or controlled by the organisation or government entity. These are also referred to as 'enabled' emissions that occur upstream or downstream of an organisation's or government entity's activities. For example, in the case of the transport sector, upstream Scope 3 emissions for Main Roads WA would include emissions from the extraction and transport of materials used in the construction of roads. Downstream Scope 3 emissions would include emissions from vehicles using Main Roads WA roads.
Shocks	Sudden, sharp events that have the potential to disrupt the services supplied via infrastructure, for example, bushfires, pandemics and terrorist attacks.

Term	Definition
Smart infrastructure	Infrastructure that uses technology and data to optimise performance, increase capacity and achieve a greater return on investment.
Social services	Services provided by government or the private sector for the benefit of the community, such as education, training, health, housing, justice and emergency services.
State infrastructure program	In line with the IWA Act, an annual 10-year state infrastructure program that gives a medium-term view of infrastructure priorities and investments to support greater visibility beyond the 4-year State Budget cycle.
Stresses	Long-term, chronic conditions that impact physical assets, organisations or communities. Stresses also include the increasing interdependencies between critical infrastructure that can exacerbate the impact of shock events, for example, ongoing climate change impacts, economic downturns and political uncertainty.
Supply chain	A system of organisations, people, activities, information, infrastructure and resources involved in supplying a product or service to a consumer or customer.
Telehealth	The use of telecommunication technologies to provide telemedicine, medical education and health education, often, but not limited to, the provision of these services over distances or to remote areas.
Top-down approach	An approach applied by IWA during the development of the Strategy that involved a strategic review focusing on the long-term (20-year) outlook for WA. The approach included the development of a Strategy vision, review of global megatrends and strategic economic opportunities for the state. The approach also analysed the infrastructure needed to achieve the vision and the strategic economic opportunities.
Triple bottom line approach	A commonly used approach that considers and balances environmental, social and economic impacts (positive and negative).
Urban consolidation; urban intensification	The process of increasing or maintaining the density of housing in established areas.
Urban heat island effect	Where the ambient temperature of an urban area is significantly higher than that of surrounding rural or natural areas, due to human and energy activity, and reduced tree canopy cover.
Value-adding	The economic enhancement an entity gives its products or services before offering them to customers.
Waitlist – priority	The list of public housing applicants eligible for priority housing assistance (ahead of the wait-turn waitlist) due to urgent need, for example, family domestic violence, reuniting a child with their family or homelessness.
Waitlist – wait-turn	The general waitlist for public housing, where applicants wait their turn to be offered accommodation.

Shortened forms

ACAT	aged care assessment team
ACCHO	Aboriginal Controlled Community Health Organisation
ACSR	arts, culture, sport and recreation (IWA infrastructure sector)
AEMO	Australian Energy Market Operator
AIP	Asset Investment Program
AOD	alcohol and other drug
BORR	Bunbury Outer Ring Road
CBD	central business district
CHO	community housing organisation
CHSP	community health service provider
COP26	2021 United Nations Climate Change Conference of Parties
draft strategy	*Foundations for a stronger tomorrow, State Infrastructure Strategy draft for public comment*
ED	emergency department
ESG	environmental, social and governance
GP	general practitioner
GROH	Government Regional Officer Housing
GTE	government trading enterprise
GTO	group training organisation
HACC	Home and Community Care
HIVE	Health in a virtual environment
ICT	information and communications technology
IWSS	Integrated Water Supply Scheme
LNG	liquefied natural gas
NBN	national broadband network
NDIA	National Disability Insurance Agency
NDIS	National Disability Insurance Scheme
NGO	non-government organisation
NSW	New South Wales
NWIS	North West Interconnected System
PCEC	Perth Convention and Exhibition Centre
PPP	public–private partnership
RAS	Regional Assessment Service
RCM	Reserve Capacity Mechanism
RfR	Royalties for Regions
SAMF	Strategic Asset Management Framework
SAP	Strategic Asset Plan
Service priority review	*Working together: one public sector delivering for WA*
SHR	Sustainable Health Review
STEAM	science, technology, engineering, arts and mathematics
STEM	science, technology, engineering and mathematics
Strategy	State Infrastructure Strategy
SWIS	South West Interconnected System
TAFE	Technical and Further Education
WA	Western Australia
WA Climate Policy	Western Australian Climate Policy
WAPHA	WA Primary Health Alliance
WARRS 2030	Waste Avoidance and Resource Recovery Strategy 2030
WEM	Wholesale Electricity Market
WOSP	Whole of System Plan

Shortened forms for WA Government entities

DBCA	Department of Biodiversity, Conservation and Attractions
DevWA	DevelopmentWA
DFES	Department of Fire and Emergency Services
DJTSI	Department of Jobs, Tourism, Science and Innovation
DLGSCI	Department of Local Government, Sport and Cultural Industries
DMIRS	Department of Mines, Industry Regulation and Safety
DoC	Department of Communities
DoE	Department of Education
DoF	Department of Finance
DoH	Department of Health
DoJ	Department of Justice
DoT	Department of Transport
DPC	Department of the Premier and Cabinet
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DTWD	Department of Training and Workforce Development
DWER	Department of Water and Environment Regulation
Energy GTEs	comprises Horizon Power, Synergy and Western Power
EPA	Environmental Protection Authority
EPWA	Energy Policy WA
FPA	Fremantle Port Authority
Health Service Providers	comprises Child and Adolescent Health Service, East Metropolitan Health Service, North Metropolitan Health Service, South Metropolitan Health Service, WA Country Health Service, Health Support Services and PathWest Laboratory Medicine WA
IWA	Infrastructure WA
KPA	Kimberley Ports Authority
Main Roads WA / MRWA	Main Roads Western Australia
MHC	Mental Health Commission
PPA	Pilbara Ports Authority
PTA	Public Transport Authority
Regional Development Portfolio	comprises Department of Primary Industries and Regional Development, Kimberley Development Commission, Pilbara Development Commission, Gascoyne Development Commission, Mid West Development Commission, Wheatbelt Development Commission, Peel Development Commission, South West Development Commission, Great Southern Development Commission, Goldfields–Esperance Development Commission, Regional Development Council and WA Regional Development Trust
SWDC	South West Development Commission
Transport Portfolio	comprises Department of Transport, Main Roads WA and Public Transport Authority
Treasury	Department of Treasury
WACHS	WA Country Health Service
WAPC	Western Australian Planning Commission
WAPOL	Western Australia Police Force
WATC	Western Australian Treasury Corporation
Water Corp	Water Corporation
Water GTEs	comprises Aqwest, Busselton Water and Water Corporation

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Appendix A

Developing the Strategy vision

Substantial change will influence WA's strategic position and infrastructure demand over the next 20 years. The Strategy is underpinned by an assessment of WA's long-term strategic outlook to provide insight into the state's infrastructure needs and priorities and inform the Strategy vision. Because the future is unpredictable, IWA applied a scenario-planning approach to identify global megatrends and local drivers of change likely to impact WA. This included identification of risks and the development of a series of scenarios. This process helped to pinpoint opportunities and challenges and identify potential infrastructure responses. Deloitte Access Economics assisted IWA with scenario planning and the findings are documented in *State Infrastructure Strategy scenario planning*.[1]

The following pages provide an overview of the global megatrends and 6 opportunity areas that underpin the Strategy vision.

Global megatrends – disruption and the impetus for change

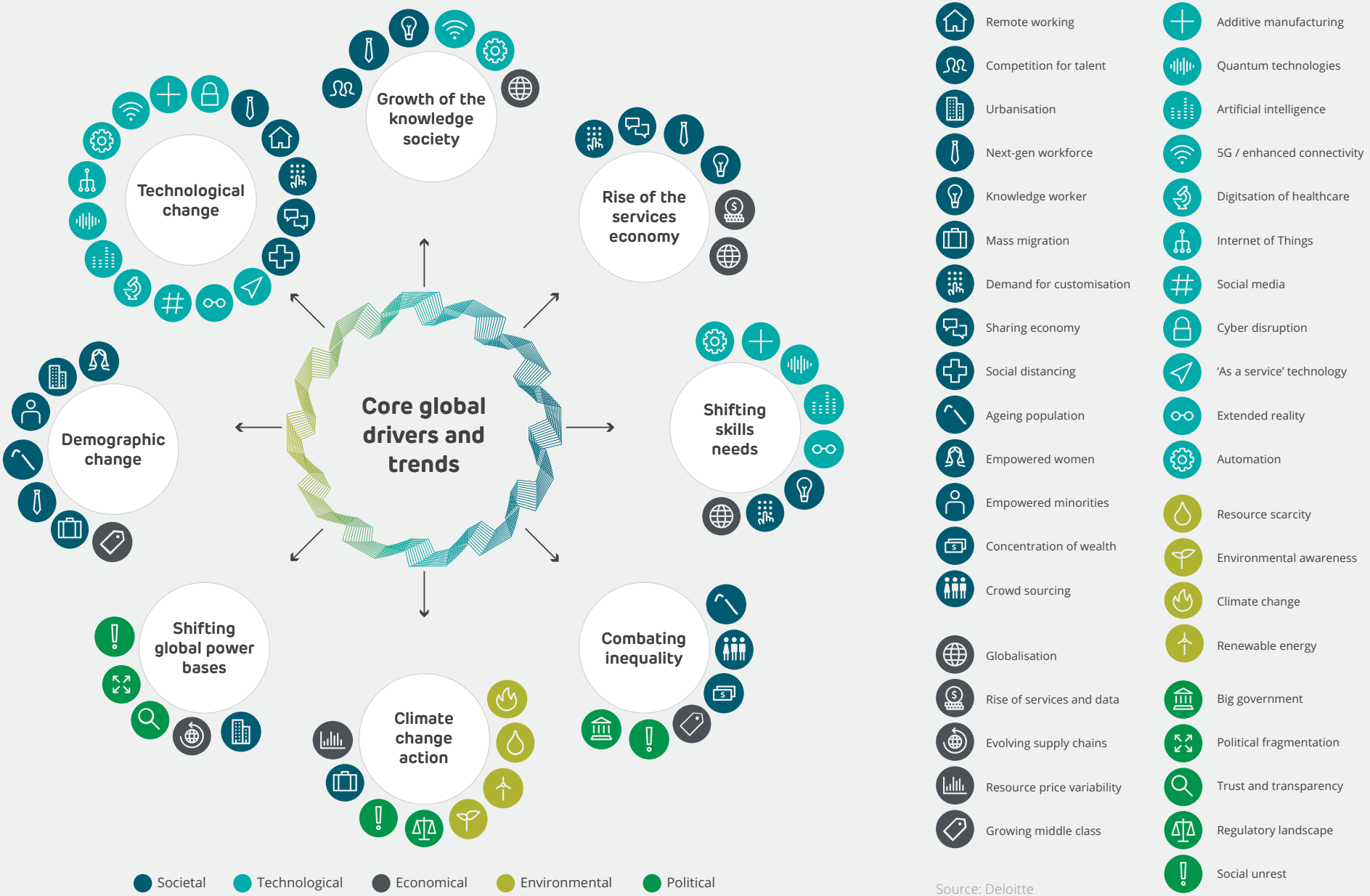
WA's society, economy and environment are part of an interconnected national and global economy. Thirty-nine identified trends have been grouped into 8 overarching global megatrends that will shape infrastructure demand and the vision for WA (Figure A1).[2] These trends represent challenges and opportunities for WA and provide insight into ways to build the resilience of infrastructure to change. While in some instances they increase exposure to shock events, such as cyberattacks and extreme weather events, they can also drive progress and innovation, such as increased security capacity due to the growing service economy and implementation of renewable energy to mitigate climate change.

These megatrends are:

- **Demographic change**: By 2040, the United Nations predicts that almost 20% of the world's population will be older than 60.[3] The world is also getting richer, with 9 out of 10 of the next billion new middle-class consumers expected to live in Asia.[4] Developing economies are driving the rise in global middle classes and demand for higher-quality goods and services, such as tourism and clean food.
- **Technological change**: At current and expected rates of technological change, governments, corporations and communities are likely to require full digitisation to prosper. Advances in technology are changing the way our economies and day-to-day lives function. Adoption of new technology and digital business models has been accelerated by the move to online interaction in response to the COVID-19 pandemic.
- **Growth of the knowledge society**: Intellectual property and human capital are highly prized, more so than land, labour or financial assets, and have significant implications for the way we create and capture value. An estimated 86% of jobs created in Australia in the next decade are likely to be knowledge worker jobs.[5]
- **Rise of the services economy**: Service-based value chains are rising in importance and value, growing the global trade in services, which is intrinsically linked to the growing knowledge society. With the rise in the services economy, investment has shifted from physical assets to research and development, data, software, patents and new business models.
- **Shifting skills and needs**: The services economy values cognitive and interpersonal skills, and places a premium on technology, cybersecurity and artificial intelligence. The workforce will need to reskill as digital literacy and interpersonal and cognitive skills become increasingly important in knowledge economy jobs.
- **Combating inequality**: Inequalities in wealth, power and opportunity are accelerating, particularly as middle-class incomes stagnate or decline. The growth of the knowledge society must bring with it equity of access to prevent social fragmentation.
- **Climate change action**: Demand for action on climate change brings opportunities for new value chains, particularly in energy, with the next 20 years set to bring significant shifts in renewable energy, water efficiency and urban design. Increasing mitigation initiatives are driving new industries and technologies, as is the process of adapting to more extreme temperatures and more frequent and more severe weather events such as bushfires, cyclones, heatwaves, floods and storm surges.
- **Shifting global power bases**: Combined, China and India's economic force continues to influence the global balance of power. By 2025, one-fifth of the world's working-age population will be Indian.[6] New economic drivers are shifting the balance of corporate and commercial power in favour of technology firms. The emergence of China on the world stage is also influencing the global balance of power and geopolitical competition has the potential to increase volatility.



Figure A1: Global megatrends and drivers of change



Source: Deloitte

Strategic economic opportunities

Economic drivers have had large impacts in shaping WA's economic and population growth trajectory. The resources sector in particular has dominated the state's development over the past 60 years. IWA expects that this sector will continue to play a major role in shaping WA over the next 20 years. Whether it will generate the same rate of growth as has been seen in recent years is open to debate. Taking opportunities and setting policies that will see greater economic diversification will be important in shaping how WA performs economically in the next 2 decades. IWA has identified 6 strategic economic opportunities representing promising drivers for WA's long-term economic diversification and growth. These opportunities emerge where global megatrends and the state's economic strengths intersect, and form the foundation of the Strategy's vision and underlying infrastructure planning assumptions of the Strategy.

A global location of choice

WA can take advantage of its liveability, stable governance and strong economic outlook to position the state as a global location of choice to live, work, visit and invest, accelerating skilled worker immigration. WA's high standard of living is partly due to the quality and accessibility of its healthcare and education services. Recreational activities are also key attractors, with unique cultural offerings and world-class natural assets contributing to the state's enviable lifestyle. These attributes are complemented by comparatively affordable housing that makes WA an attractive option for international migrants. WA already has the highest concentration of international migrants of any Australian jurisdiction and is highly rated in global liveability assessments.[7] With the global shift towards the knowledge and service economy, WA must attract and retain skilled migrants to diversify human capital and drive productivity. Infrastructure will be required to improve the liveability and attractiveness of places with high demand for skilled workers, and ensure communities remain people-focused places that support physical and mental wellbeing.



It will be especially important for regional areas to attract skilled migrants to address skills shortages, diversify human capital and drive productivity. Regional centres with high liveability, meaningful employment options and inclusive communities will be well positioned to do this. Locations close to Perth that have an affordable cost of living, availability of health and education services, comfortable climate and diverse lifestyle options are likely to have strong appeal to a broader cross-section of migrants. More remote centres may require a targeted approach to migration attraction, underpinned by high-quality employment and career opportunities, and essential services and infrastructure, such as digital connectivity, health, education and affordable housing.

Serving the emerging consumer class

WA can capitalise on a range of strengths to meet the rising demand from emerging global middle classes for higher-value tourism, agriculture and food, international education, and cultural goods and services. As large developing countries such as China and India increase in prosperity, changing tastes and expectations regarding nutrition, recreation and education will continue to emerge, resulting in increased demand for new goods and services such as tourism and clean foods. Over the last 10 years, WA has significantly grown the value of non-mining merchandise to ASEAN (Association of Southeast Asian Nations) countries and China, and has built a brand as a provider of clean and premium food exports. There are substantial opportunities to capitalise on natural attractions and the hospitality industry to serve domestic and international demand for travel experiences. Infrastructure will be required to support the development of world-class tourism experiences in highly desirable strategic locations that appeal to high-value interstate and international tourists. Enhancing the infrastructure that brings WA's produce to emerging markets and supports efficient supply chains is seen as a priority.

International and domestic tourism

The Perth region (including Rottnest Island), as the metropolitan centre of the state and the entry hub for tourists, has been identified as one of 4 'jewels in the crown' of WA tourism. The other 3 are located in regional WA: the South West, the Ningaloo Coast (including Exmouth) and the Kimberley (including Broome). Regional areas have a significant opportunity to continue building WA's tourism industry by attracting interstate and international visitors to world-class tourism experiences. A coordinated approach should be taken when investing in infrastructure to improve access to attractions through complementary supporting infrastructure such as visitor facilities, car parks, signage and information.

Agriculture and food

Areas with available agricultural land, water, existing infrastructure and human capital will be well positioned to supply growing markets for high-quality, niche agrifood exports. The South West and Great Southern regions have well-established agrifood industries, and the Kimberley and Peel can take advantage of their agricultural land and water to expand agricultural and processing activities. WA also has growing trade surpluses in crustacean and live animal exports.

International education

WA's international education sector generates significant export income for the state, with India, China and Malaysia combined comprising almost 40% of the market.[8] To grow this market, WA will need to develop its tertiary education sector so it can offer safe study environments that deliver flexible and collaborative teaching models to increase international rankings and unlock new opportunities.

Promoting and leveraging Aboriginal cultural heritage and enterprise

Aboriginal people are the Traditional Owners and Custodians of WA, and the state bears evidence of Aboriginal occupation dating back at least 50,000 years.[9] Around 39% of WA's Aboriginal and Torres Strait Islander population live in the Perth metropolitan region, while the remainder are dispersed throughout the state.[10] This wealth of heritage, culture and land management knowledge is a unique asset. IWA's vision is that Aboriginal heritage flourishes as part of WA's vibrant cultural identity, and is recognised domestically and internationally as part of WA's brand. Aboriginal collaboration and knowledge should underpin new social enterprises, business opportunities and WA's land stewardship to guide WA to a more inclusive and sustainable future. Infrastructure offers a range of opportunities to contribute to Aboriginal empowerment, build self-determination and improve outcomes for Aboriginal people.

WA will be able to capitalise on growing demand for goods and services that leverage Aboriginal enterprise, culture and heritage or are provided by Aboriginal business. Regions such as the Kimberley and Pilbara, that have a high proportion of the state's Aboriginal population and operating businesses, and significant natural and cultural attractions, are already well placed to meet growing demand for Aboriginal cultural experiences that can drive growth of tourism business opportunities.

A leader in the transition to net zero emissions technologies

As the world transitions to greater use of renewable energy, WA's comparative advantage in solar and wind energy can enable cheap power for energy-intensive industries. Infrastructure is critical in supporting the growth of the renewable energy industry. As a global energy powerhouse, WA possesses the know-how, capital and impetus to transition its domestic industry to net zero emissions by 2050 and become a global renewable energy generator, complementing its existing global energy exports with renewable energy exports.

Regional WA has the potential to realise these opportunities, especially in areas that offer a strong mix of solar and wind energy such as the Pilbara, Gascoyne and Mid West regions. Production of renewable hydrogen for domestic and export markets is also a significant opportunity, particularly in locations that can leverage infrastructure, such as the South West Interconnected System and North West Interconnected System, and industrial land and common user ports, to support economies of scale and global supply chains.

Approaching the technology frontier

WA can leverage its internationally recognised expertise in its mining, equipment, technology and services; petroleum engineering and technical services; and medical research and life sciences sectors. These efforts will drive research, defence technology, innovative product development and advanced manufacturing. WA is known as an incubator of knowledge and innovation for resource extraction, and the associated value-adding services and products including equipment manufacturing, computer and software systems design, telecommunications and remote operations. Building on these skills, the state is well placed to create a robust technology startup and investment ecosystem. Infrastructure will be required to support growth in science and innovation, technology and advanced manufacturing.

The opportunity to drive innovation and competitiveness also extends to areas where there are growing industry clusters specialising in mining and petroleum technologies and radio astronomy. Establishing innovation hubs in larger centres such as Bunbury and Karratha will provide platforms for industry, academia and government to collaborate, accelerate research and development, and create opportunities for regional development and specialisation. WA will also need to invest in the implementation of the Industrial Lands Strategy including development and expansion of industrial and technology precincts, and in strategic enabling infrastructure to facilitate private investment.

Value-adding for strategic commodities

WA has a comparative advantage in resources and primary industries. With stable institutions, a favourable operating environment and rich resource endowment. The state's extensive solar, wind and wave resources together with its vast land area give WA the potential to provide sources of reliable renewable power which could support energy-intensive green manufacturing processes. Infrastructure such as that which improves the efficiency of global supply chains and builds capacity in strategic resource and agricultural areas supports the realisation of these opportunities.

The state's agriculture and food sector has the potential to expand its export footprint through increasing productivity in high-value products. Emerging advancements in lithium battery technology align well with the opportunity to process more of WA's raw materials in the future. Areas supporting supply chains for mineral and agricultural commodities, which can provide access to cheap and reliable power, industrial land and export infrastructure, will be in a position to take advantage of these opportunities.

Endnotes

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