GOVERNMENT OF WESTERN AUSTRALIA

Infrastructure Western Australia

Foundations for a Stronger Tomorrow

State Infrastructure Strategy

Draft for public comment



July 2021

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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.

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From the Chairperson

On behalf of the Board, I am very pleased to present Foundations for a Stronger Tomorrow, Infrastructure WA's first draft State Infrastructure Strategy.

It is the culmination of more than a year of intensive work – consultation, research and analysis – and delivers, for the first time, a holistic picture of how Western Australia's social, economic and environmental potential could be realised through state-wide strategic infrastructure planning and delivery.

This Strategy addresses Western Australia's infrastructure trends, needs and priorities for the next two decades. It will guide infrastructure investment decisions being taken right now, and over the medium to long term. It will look ahead of political cycles. It will help maximise the value of every dollar spent – making Western Australia an even more attractive and fulfilling place to live, invest and visit.

Quality infrastructure underpins our economic prosperity and almost every element of our enviable lifestyle. The provision of State infrastructure is the responsibility of Government and its relevant agencies. Until the establishment of Infrastructure WA in 2019, there was no whole of government approach to the development of infrastructure proposals over a medium to long-term horizon.

The Strategy delivers that strategic and comprehensive analysis and advice. It outlines the essential infrastructure needs and priorities for the State, sets a clear foundation for growth and prosperity, and addresses a raft of challenges and opportunities. Managing demand for infrastructure through early intervention, better coordinated planning through data collection and sharing, and optimising the existing asset base before building new infrastructure, are all themes emerging from our recommendations. Once finalised, the Strategy will be reviewed and updated at least every five years.

Sectoral areas of significant focus include infrastructure that: helps improve health and housing outcomes; delivers enterprise and opportunity for Aboriginal people; paves the way for a renewable energy industry; diversifies the economic base; and addresses the impacts of climate change. The Strategy reaches beyond the metropolitan area and delivers a state-wide roadmap for long-term success and prosperity, acknowledging the rich potential of our regional areas.

Preparing the Strategy as the global COVID-19 pandemic hit was a timely reminder of how quickly demand for infrastructure can shift and the critical importance of flexibility and adaptability in our planning and delivery of key infrastructure.

This Strategy does not just present a long list of infrastructure projects. What is clear is that we must build this State's infrastructure pipeline on firm foundations and with a long-term view. While a number of significant and strategic projects and programs are identified, the Strategy highlights good planning already underway, and identifies gaps in thinking, planning and delivery which need addressing.

The preparation of the Strategy has involved a wide-ranging program of collaboration and consultation.

I would like to thank the many State and local government agencies, industry groups and hundreds of individuals from across metropolitan Perth and regional Western Australia who have made submissions, challenged our thinking and worked with us in imagining a very bright future for this State – and what infrastructure we need to help achieve that vision. I would also like to take

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this opportunity to thank the Board for its support, and the Infrastructure WA team for their hard work and dedication.

In the months ahead, we will again turn to these same stakeholders and ask for feedback on the responses and recommendations contained in the Strategy. There will be a particular focus on those areas that will most impact them – and future generations in their community or field of endeavour. We plan to finalise the inaugural Strategy by the end of 2021 for submission to the Premier.

Please take up our invitation to comment so that, together, we can ensure Western Australia's infrastructure leads to a prosperous, liveable and resilient community.

John Langoulant AO
Chairperson



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To assist with navigation, an overview of the structure of the Strategy and the content of each section is provided below.

Executive summary — A high-level summary of the Strategy

How to get involved — Details on how to make a submission

Strategy vision and infrastructure outlook — Strategy 2042 vision and outlook for infrastructure

Introduction — Infrastructure WA basics, Strategy objectives and scope

Methodology — Overview of the process to develop the Strategy and recommendations

Next steps — Details on the process to finalise the Strategy, and implementation matters

Seven cross-cutting themes — Seven individual chapters providing detail on matters impacting multiple infrastructure sectors. **These chapters include detailed recommendations.** The cross-cutting themes are:

1. Digital connectivity and technology
2. Aboriginal cultural heritage, wellbeing and enterprise
3. Climate change and sustainability
4. Regional development
5. Planning and coordination
6. Infrastructure delivery
7. Asset management

Nine sectors — Nine individual chapters providing detail on sector-specific matters. **These chapters include detailed recommendations.** The sectors are:

1. Energy
2. Water
3. Waste
4. Transport
5. Social and affordable housing
6. Health
7. Education
8. Arts, culture, sport and recreation
9. Justice and public safety

Summary of Strategy recommendations — **Summary table of all recommendations** including timing, suggested lead State Government agency/ies and Government Trading Enterprise/s, and alignment with Strategy objectives

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Executive summary

Each year, government invests billions of dollars in infrastructure to meet the needs of society, the economy and the environment. 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 draft 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 about how to address them. As the draft of the first Strategy, this document provides the framework for improving the State's public infrastructure system – addressing 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 to futureproof the State and provide greater investment certainty for industry and for the thousands of people who work in the infrastructure sector in Western Australia (WA).

As the first Strategy, this document provides the **framework for improving the State's public infrastructure system**.

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While there are many examples of good work being done, necessary first steps must be taken to improve the infrastructure development processes across the public sector. This will provide Government with better information from which it can identify priority infrastructure investments, from a whole of government perspective – investments that will better serve WA over the longer term and support the State in meeting agreed Government objectives, such as economic diversification.

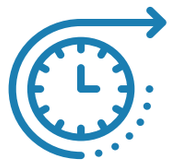
IWA's work in this first Strategy has been impacted by the limited availability of State Government agency, statutory authority (collectively referred to as State agencies) and Government Trading Enterprise (GTE) infrastructure plans that extend beyond the annual State Budget's forward estimates period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

While this is understandable, given such coordination in the infrastructure development process has not previously always been a focus of State agencies and GTEs in WA, it does mean that the first Strategy focusses largely on getting the basics right. This includes ensuring future infrastructure investment decisions are based on quality data and, in the meantime, the right decisions are taken to increase the value from our existing infrastructure assets over the long term. Getting the basics right is critical. It is important to focus on improving the investment decision-making system so that long-term planning is consistent, aligned and evidence based.

Building our way out of an increasing demand for infrastructure is unaffordable and cannot be the only solution. And what infrastructure is built, should be built to last. In addition, what is built today will still be operating in several decades, serving a society, economy and environment which may be quite different from what 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 identifies a number of strategic projects and programs for investment or investigation, but it is not just a long list of projects. A significant number of the priority initiatives IWA has recommended this time around are concentrated over the next five to ten-year period. This will provide the framework and foundations for IWA to build upon with further recommendations in future updates of the Strategy.

The final Strategy recommendations, which are expected to be completed by the end of 2021, will form the basis of IWA's advice to Government, and inform other functions such as IWA's role to assess major infrastructure proposals, and the Government's preparation of the annual ten-year State Infrastructure Program.



Infrastructure that is built today will still be operating in several decades, **serving a society, economy and environment which may be quite different to now.**

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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 released at a time when the public sector is subject to an unusual level of uncertainty and pressure, and when attention is necessarily focussed more on immediate management and planning priorities, and less on longer-term planning.

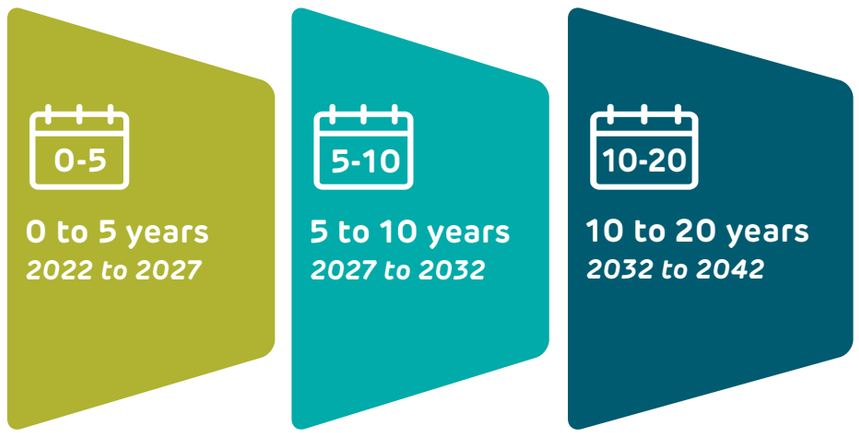
While IWA has recognised and carefully considered those factors in framing its recommendations, the Strategy also underlines the importance of evidence-based, long-term planning to maximise value and best serve the WA community.

Economically, the State has performed well during the pandemic. A combination of relative certainty in business conditions, generated by the containment of community transmission, Government management of the pandemic, Federal and State Government stimulus and the strength of the State's resources sector, have been significant in supporting WA's economic performance.

Infrastructure investment has been a primary policy tool for economic stimulus at the State and Federal levels. Considerable effort has been directed from many State agencies and GTEs to develop stimulus measures. They are currently tasked with delivering an expanded Asset Investment Program. The original target timeframes 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 focussed on delivering the large volume of current projects and programs.

Implementation timeframes for completing the Strategy's recommendations, therefore, extend over three time periods, 0-5 years, 5-10 years and 10-20 years (Figure 1). Moving forward, the final Strategy will provide a framework to enable the public sector to develop its infrastructure plans and programs in a more coordinated and comprehensive manner. The recommendations in this Strategy which have a 0-5 year focus are almost exclusively non-build actions. 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 focussed recommendations are essential to establishing these longer-focussed plans across all State agencies and GTEs.

Figure 1: Strategy timeframes



Public infrastructure represents approximately 20 per cent of total public and private infrastructure investment across the State.[1] It provides the facilities for essential social and economic services to be provided to the community and industry. The delivery of public infrastructure is, of course, heavily influenced by conditions in the broader economy. Governments participate as clients in the construction market, competing against the much larger number and value of private sector projects to secure private sector contractor capacity.

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Delivering greater certainty to the infrastructure industry and the thousands of people who work in it, in relation to the longer-term direction and pipeline of work, will be assisted by:

- the Government's articulation of how it will implement and prioritise the final Strategy's recommendations, including releasing an annual State Infrastructure Program with a ten-year outlook; and
- monitoring and annual public reporting on progress in implementing the final Strategy's recommendations.

Further detail on the infrastructure-related impacts of the COVID-19 pandemic is provided in the Introduction.

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.

The WA population is forecast to grow from around 2.7 million today to 4.3 million by 2042, an increase of 60 per cent.[2] This is based on a return to open borders and net immigration 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, presenting different challenges and a need to adopt new models to provide infrastructure and services in alternative and more efficient ways.

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



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Demographic trends indicate relatively low birth rates and a greater percentage of the population aged 65 years or over. 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 and shifts in temperature. 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 State Government's stated aspiration, 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 greater agility in the provision of government services by enabling data-informed and quick-response decision-making, and flexible service delivery models. Digital transformation can be harnessed in WA to create competitive advantage, efficiencies and jobs, as evidenced in other jurisdictions. A digital-first approach should be embedded throughout the infrastructure lifecycle to maximise the value of infrastructure. However, technologies also give rise to greater risks of digital disruption, such as increased cybercrime, warranting a strong risk-based management approach.

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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 strategic opportunities where these global megatrends and strengths intersect. These opportunities formed the foundation of IWA's 2042 vision – driving the State towards a more diversified economy and prosperous society over the long term.

The six strategic opportunities identified 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

Working with these six 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 key 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, where needed.

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.

Key findings

The Strategy is broken into chapters that address seven cross-cutting themes and nine infrastructure sectors. As wide as those areas of focus may be, there are key findings that underpin most of IWA's recommendations.

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.

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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 justice and public safety; waste; water; and transport sectors 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 146.

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 focussed on the short term 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 draft 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 key 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, integrated planning, and well-informed decision-making by government, will also support greater investment certainty for industry.

The review and improvement of the State Government's Strategic Asset Management Framework is strongly recommended to guide State agency and GTE planning. IWA appreciates, however, the resource implications

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for 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 sectoral or cross-cutting theme 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; social and affordable housing; waste; transport; land use, arts and culture 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 investment 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 key focus for this first Strategy. IWA has considered the *Western Australian Climate Policy: A plan to position Western Australia for a prosperous and resilient low-carbon future* (WA Climate Policy) in developing the Strategy's recommendations, seeking to embed the policy, and accelerate the implementation of key elements as they relate to infrastructure.

In line with this policy, key recommendations include embedding the net zero emissions by 2050 aspiration as a de facto target for all State agencies and GTE's assets and activities; and developing net zero transition plans and sectoral emissions reduction strategies. IWA also recommends the development of sectoral adaptation plans to identify climate change risks and measures to adapt to current and future climate change impacts.



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

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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 developing government data management and asset information policies, processes, platforms and standards to enable data sharing and analysis to address two pressing challenges – management of the existing asset portfolio, and planning and prioritising new infrastructure. 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.[3] 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. 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, with significant maintenance backlogs, a lack of asset management data, and a short-term focus on funding new projects being common features. Challenges in meeting the growing

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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 should 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, and embed a digital-first approach to all aspects of the infrastructure lifecycle.

Identifying major infrastructure projects and programs

While the Strategy places a strong focus on non-build system improvements, IWA also recommends investment in a number of strategic projects or programs, subject to further planning and business case development, and further investigations for numerous other major projects and programs. Further, the Strategy recommends measures to improve project assurance, governance and skill development, while modernising procurement and cost management.

The Strategy recommends investing in major projects and programs across the social and affordable housing; transport; justice and public safety; water; and arts and culture sectors. IWA also recommends that essential infrastructure in remote Aboriginal communities and town-based reserves be upgraded.

Strategy recommendations

IWA has made 88 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, focussing 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.



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.**

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How to get involved

Gaining your feedback is a critical step in finalising the Strategy for submission to the Premier. Release of this Strategy for public consultation provides an opportunity for IWA to understand, from the perspective of stakeholders, whether it is focussed on the right matters, and whether it sets the State on the right path to maximising the value of our infrastructure.

The input and advice of many stakeholders has already helped to shape the Strategy. From October 2019 to June 2021, IWA engaged a broad range of stakeholders on a wide range of matters that impact infrastructure in some way, including through its Discussion Paper released in June 2020. IWA values the information provided by stakeholders and the time taken to engage – it is important that this continues as IWA finalises the Strategy.

The **input and advice** of many stakeholders has already helped to shape the Strategy.

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Public consultation on a draft of the Strategy provides an opportunity to refine and sharpen the recommendations where necessary, and identify any gaps. While IWA is happy to receive feedback on any infrastructure-related matter, we are particularly keen to receive feedback on whether:

- you support IWA's recommendations for each sector and cross-cutting theme and, if not, your reasoning;
- any major/critical elements are missing from the recommendations;
- the recommendations are achievable, and whether there are major barriers to implementation;
- the completion timeframe proposed for each recommendation is appropriate, too long, or too short;
- the recommendations work well together as a complete set; and
- any further information or evidence is available and can be provided to support or counter any of the recommendations.

As part of the eight-week public consultation period, IWA has organised a range of activities to allow stakeholders to find out more about the Strategy. Further details on opportunities to engage with IWA on the Strategy can be found on IWA's website: infrastructure.wa.gov.au/draftstrategy.

How to provide feedback

IWA strongly encourages feedback through our online submission form, however, stakeholders are also welcome to contact us through email, post, phone or LinkedIn. Public consultation is open from **21 July** to **15 September 2021**. Late submissions will not be considered.

To make an online submission please visit: https://consultation.infrastructure.wa.gov.au/

For enquiries relating to making a submission please email iwaconsultation@infrastructure.wa.gov.au or call 08 6552 5229. Written submissions should be sent to:

Infrastructure WA
Locked Bag 3001
WEST PERTH WA 6872

Please note that IWA reserves the right to publish all submissions unless marked specifically as confidential, in which case confidentiality will be maintained within the limits of the *Freedom of Information Act 1992* and other legal obligations. For more information on the process to finalise the Strategy, see Next steps.

Keep in touch with us

We encourage you to get in touch with us at any time:
email: enquiries@infrastructure.wa.gov.au phone: 08 6552 5229

You can keep up to date on IWA's activities through LinkedIn or by signing up to IWA's e-newsletter through the below website.

https://www.infrastructure.wa.gov.au/

www.linkedin.com/company/infrastructurewa

This publication can be made available in alternative formats and languages on request.

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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 – to establish a vision for the State out to 2042. By doing so, we will create a framework to understand 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 which no one can accurately foresee. The vision, therefore, also provides a framework within which these unanticipated developments might be managed.



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Vision statement

WA is a sought-after place to **live, work, 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 from its former self. 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 florished as part of a vibrant WA cultural identity, recognised domestically 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 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 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.

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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 built from a strong focus on oil and gas, minerals, exploration and mining services, to a much broader scope, with WA 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, study, work 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.

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Outlook for Western Australia

The following table presents key 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	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.[4] • 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.	• Due to its digital transformation, the State 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 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 to result in significant cost savings.
 **Aboriginal cultural heritage, wellbeing and enterprise**	• Aboriginal cultural heritage is a rich and enduring resource, with its benefits and opportunities only just starting to gain wide acknowledgement. • Similar to other Australian jurisdictions, WA has made limited progress in meeting Closing the Gap targets. • 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 State Government aspires to achieve enhanced climate resilience and net zero emissions by 2050. • 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 aspiration 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.

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	Today	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 per cent infill target for Perth and Peel but much further work is required to unlock barriers, increase amenity and incentivise development in established urban areas; in turn, leading to better use of existing infrastructure.	• 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 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 longer-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.

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 Asset management	• The level of maturity in asset management practice varies considerably across the WA public sector, 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 in lieu of building new ones. • Asset information and data is inconsistent and often inaccurate, making assessment of the existing asset base and quantification of issues difficult.	• The State's asset base is well understood, managed and maintained resulting in better service provision and reduced asset replacement 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 technology 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 not yet a viable solution to baseload supply. • WA dominates the country's liquefied natural gas (LNG) output and Australia has become the largest exporter of LNG.	• Gas remains a component of the State's base energy system but WA has domestically 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 aspiration. • Households and businesses are increasingly adopting off-grid renewable energy generation and storage options. • The resource extraction industry transitions from diesel to renewable energy, enabling value-adding through downstream processing.
 Water	• Large centralised systems provide highly treated drinking quality water for all-purpose use. • Water supply mix is dominated by desalination and groundwater, with wastewater recycling and replenishment schemes also contributing to a degree. • Water demand management policies are having some success in reducing water consumption, with further measures and increased targets identified.	• 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 combines to achieve water efficiency targets. • Implementing full water cycle management, including reuse and waste minimisation, has resulted in optimised use of multiple water sources.

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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 is placing pressure on waste management. • Community attitudes toward waste are shifting, however remain a major barrier to increased waste avoidance and recovery.	• WA has embraced a sustainable, low-waste circular economy that values waste, is producing less waste and reusing and recycling 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, support efficient supply chains, international trade and export industries.
Social and affordable housing	• There is an increasing unmet demand for social housing. • Social and affordable housing planning and investment does not account for regional 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 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.
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 greatest need. • WA's health system is focussed on treatment in acute hospitals and growing expenditure may negatively impact on other areas of the State Budget. • Protecting Western Australians from the COVID-19 pandemic is a current system-wide focus.	• WA's population is healthier, supported by a health system that focusses on patient-centred, preventative and community-based services where appropriate. • Advanced technologies and a digital approach underpin a modern, integrated care and personalised health system delivering safer, more efficient and higher quality healthcare. • The medical research sector has grown as a share of the WA economy, and provides a steady supply of high-value research opportunities for international students.

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 **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 and WA industries are increasingly collaborating to understand curriculum and training needs. • Changes to funding and reduced migration as a result of COVID-19 is impacting on the financial viability of the State's universities.	• The international education sector is thriving and growing to meet or exceed targets. • Through a range of strategic measures, implemented by the State, 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 CBD and across well-connected urban areas.
 **Arts, culture, sport and recreation (ACSR)**	• WA has a wide variety of ACSR facilities, however, some existing assets are no longer fit for purpose due to historical under-investment. • Opportunities for enhanced liveability, creativity and economic activity are lost to WA in some cases, due to a lack of enabling ACSR infrastructure. • WA's long-term tourism outlook is unclear, and tourism-related activities are not always well coordinated to achieve integrated industry outcomes.	• The recognition of WA's natural beauty, vibrant arts, Aboriginal cultural offerings and strong sporting identity has resulted in a booming tourism trade, meeting or exceeding targets. • WA's world-class and contemporary suite of ACSR venues attract events and performances, audiences and participants from around the world. • Investment in ACSR infrastructure has resulted in a thriving and diverse creative arts sector, high participation rates and improved liveability.
 **Justice and public safety**	• Increasing demand, exacerbated by COVID-19 (for example, border control), has resulted in a significant increase in police officers. • WA has the second highest imprisonment rate in Australia, and the highest Aboriginal and Torres Strait Islander imprisonment rate. • Increasing temperatures and shifting rainfall patterns are resulting in longer bushfire seasons, other climate change impacts, and placing increasing pressure on fire and emergency services.	• 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 are resilient and highly skilled, supported by modern communications and trained to deal with a wide range of incidents.

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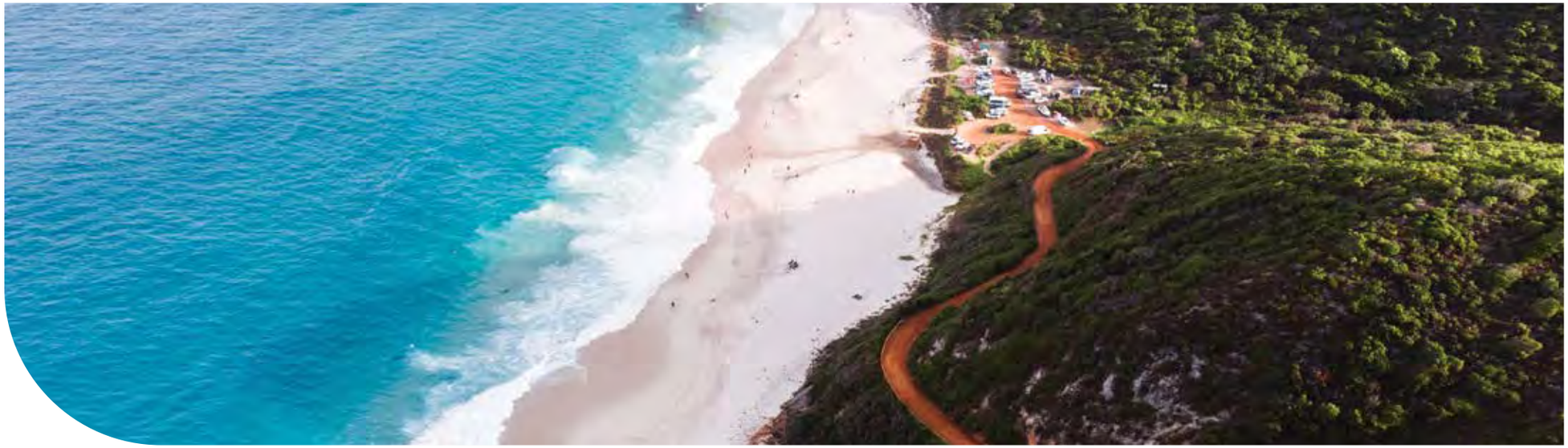
	Today	Tomorrow – 2042
Society, economy and environment		
Society	• WA's population is 2.7 million, with approximately 75 per cent of the State's population residing in the Perth metropolitan area, and 25 per cent in regional WA (inclusive of the Peel region).[5] • WA's population growth is largely driven 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 per cent in 2019-20, the second highest growth rate of all Australian capital cities.[6]	• WA's population is around 4.3 million, an increase of 60 per cent since 2021.[7] Continuing strong population growth is a major 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.[8] An ageing population has increased demand for health, aged care, disability services, accessible transport and housing services.
Economy	• WA's Gross State Product was $316.3 billion in 2019-20 or 15.9 per cent of Australia's Gross Domestic Product.[9] • WA's economy is more dependent on exports than any other state or territory in Australia. WA's top five export markets are China (55.6 per cent), Japan (9.7 per cent), United Kingdom (6.5 per cent), South Korea (5.4 per cent) and Singapore (4.2 per cent).[10] 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.[11] • 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.[12] • The resource sector's share of WA Gross Value Add (GVA) has grown.[13] However, the sector's share of WA employment has decreased due to new technologies. Service industries such as healthcare and social assistance contribute more to GVA and employment, outpacing agriculture and construction.[14] • Infrastructure has strengthened global competitiveness and 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.

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	Today	Tomorrow – 2042
Environment	• WA is internationally renowned for its biodiversity. WA has eight of Australia's 15, and one of the world's 36, biodiversity hotspots.[15] 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. • WA is highly vulnerable to climate change. Average temperatures have already risen about one degree Celsius over the past 100 years.[16] • Increasing action to mitigate climate change and achieve net zero emissions by 2050 is creating potential for WA to pursue renewable energy opportunities.	• The intrinsic value of WA's environmental assets is well recognised. The State balances sustainable development with conservation and enhancement for future generations. • Carbon farming opportunities provide opportunities to revegetate previously cleared land, particularly in the grainbelt regions and maritime areas. • Infrastructure investment in renewable energy and other initiatives reduces WA's greenhouse gas emissions in line with net zero by 2050 aspiration. Measures to adapt infrastructure to climate change impacts have been successful. However, climate change continues to impact infrastructure in a variety of ways through including: – an increase in average and maximum temperatures; – sea level rise, intensifying storms and coastal inundation; and – changing rainfall patterns with increase rainfall in the north and interior and decreasing rainfall in the south.



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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 infrastructure strategy in place is important because it enables the State 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 implementation pathways has arguably never been more important.

Infrastructure WA

IWA is a statutory authority tasked with providing expert advice and assistance to the State 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 (to commence from 1 January 2022);
- 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; and
- reviewing and reporting to the Premier on completed infrastructure projects.

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State Infrastructure Strategy

The IWA Act requires IWA to prepare a Strategy at least every five years. The 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; and
- 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.

Once finalised, IWA is required to monitor and report on Government's progress in implementing the Strategy's recommendations, on an annual basis.

The Strategy is comprised of a number of key elements, headlined by the Strategy's 2042 vision (Figure 2). Further detail on the approach to developing the Strategy is outlined in the Methodology chapter.

Figure 2: Key Strategy elements



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

Interaction with Infrastructure Australia

Infrastructure Australia – the Federal Government's independent advisory agency – is IWA's primary interface between Federal and State governments.

The State receives funding contributions from the Federal Government, particularly for infrastructure and services relating to the transport, health and education sectors.

Infrastructure Australia is scheduled to release the 2021 Australian Infrastructure Plan in mid-2021, which will provide recommendations on priority infrastructure reforms across the nation for implementation at both a federal and state level. The Plan is complementary to this Strategy.

IWA also coordinates the State's submissions to Infrastructure Australia in close collaboration with relevant State agencies and GTEs.

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Strategy objectives

IWA's objectives for the Strategy indicate the critical areas of focus over the next 20 years. Required under IWA's Act, these objectives have been applied, along with other criteria, to guide the formulation of the recommendations. The ten objectives are expressed below and should be viewed through an infrastructure lens. They will continue to guide the finalisation and implementation of the State Infrastructure Strategy.

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.

Maximise regional strengths to unlock strategic opportunities for Western Australia

Regional initiatives and industries that build on a region's (or multiple regions') strengths and that support long-term, state-wide 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 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, and 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.

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Enable environmental sustainability and resilience, and address climate change

Carbon emissions and their impacts on the environment of WA's infrastructure have been reduced. Climate change mitigation and adaptation is considered in all infrastructure planning, resulting in resilient systems that 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 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 informs decision-making and optimises 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.

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Figure 3: Infrastructure sectors



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 nine sectors (Figure 3). This catagorisation allows for the identification of themes and interdependencies common to many sectors.

Infrastructure has both tangible and intangible elements that can be broadly categorised into build and non-build considerations. The Strategy focusses 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 which 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, strategic opportunity areas and ten objectives. The threshold that will trigger IWA's assessment of major infrastructure proposals, being a capital cost of $100 million or greater, does not apply to the Strategy.

Cross-cutting themes

In considering the impact of external drivers on infrastructure sectors, as well as each sector's relationship to others, seven cross-cutting themes emerge which influence WA's infrastructure agenda and underpin the Strategy. These themes (outlined further in their individual chapters) are:

1. Digital connectivity and technology
2. Aboriginal cultural heritage, wellbeing and enterprise
3. Climate change and sustainability
4. Regional development
5. Planning and coordination
6. Infrastructure delivery
7. Asset management

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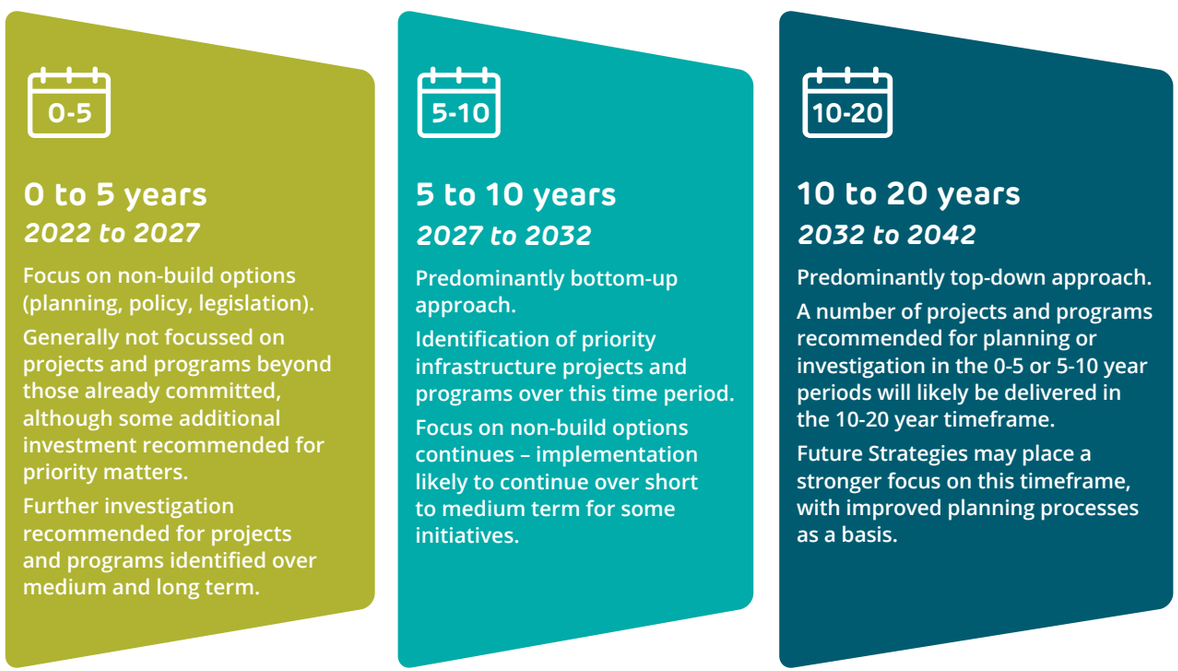
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Strategy timeframes

The Strategy's 20-year timeframe has been divided into 0-5, 5-10 and 10-20 year periods, as illustrated in Figure 4. As this Strategy is strongly focussed 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 focussed on initiatives over the 0-5 and 5-10 year periods. As processes mature and the quality of relevant infrastructure plans improve, it is likely that future Strategies will place a stronger focus on the medium to longer term. Implementation completion timeframe/s and the suggested lead State agency or GTE for each recommendation are outlined in the Summary of Strategy recommendations at the back of this document. Through its annual monitoring and reporting role, IWA will report on progress towards implementing each recommendation according to the relevant completion timeframe.

Figure 4: Strategy timeframes





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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@3.5million* 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.

As IWA provides objective advice to Government, a number of recommendations seek to strengthen, add to or refresh these strategies, plans or policies, to support improved consistency and alignment of strategic planning processes.

Impact of COVID-19

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

Quarantine capabilities have been put to the test, with hotels and hospitality facilities often being used for quarantine purposes in the absence of purpose-built facilities. Much of the quarantine task has fallen to state governments, who have worked closely with the Federal Government to contain outbreaks. National Cabinet statements in 2020-21 indicate that any state and territory proposals to develop purpose-built quarantine facilities will need to meet specific criteria when seeking Federal support, and will be expected to identify potential sites that can bring together healthcare, logistics and law enforcement aspects to minimise risks. Given that the Strategy does not generally include short-term build recommendations, IWA has not sought to address potential investments in purpose-built quarantine facilities at this stage.

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.

In the June 2020 quarter, after the initial shutdown measures, the WA economy contracted by 6.4 per cent, with a loss of 103,000 jobs.[17] Fortunately, WA has effectively managed the virus, allowing for a gradual recovery that was bolstered by the Government's *WA Recovery Plan* which included a $3.4 billion commitment to infrastructure investment.[18] The retail trade had rebounded and State and Federal Government investment led to a significant increase in activity in the construction industry, and supported increased regional investment in 2021.[19] By the 2020-21 Mid-Year Review a general government operating surplus of $2.2 billion was forecast, $1 billion higher than budget forecasts.[20] Unemployment had decreased to 4.7 per cent in May 2021, the lowest recorded in the State since December 2013.[21]

Nevertheless, some industries have experienced decline – agriculture, farming and fishing industries suffered from the lack of seasonal labour, while education and training were impacted as closed borders excluded international students. Retail trade, tourism and arts and recreation services also contracted. The resources industry, however, was able to continue operations and provided significant economic stability for both WA and the nation.

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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 road freight driven by online shopping, but a decrease in domestic and international aviation due to border closures and travel restrictions. COVID-19 has also affected passenger transport use, as more people worked from home 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.

The health sector responded quickly to COVID-19. Testing and treatment facilities were expanded. Monthly telehealth consultations jumped from around 30,000 in February 2020 to over 90,000 in March 2020 and, in October 2020, remained 169 per cent higher than in October 2019.[22] Between July and November 2020, mental health related emergency department attendances increased by 4.1 per cent compared to the same period in 2019.[23] Other social services were also impacted including education where 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 below one per cent, and increasing waiting lists for public housing.[24]

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.[25]

COVID-19 has had significant implications for infrastructure across many sectors, both in terms of present-day 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 focusses on initiatives, projects and programs that will deliver social, economic and environmental benefit to support long-term resilience.

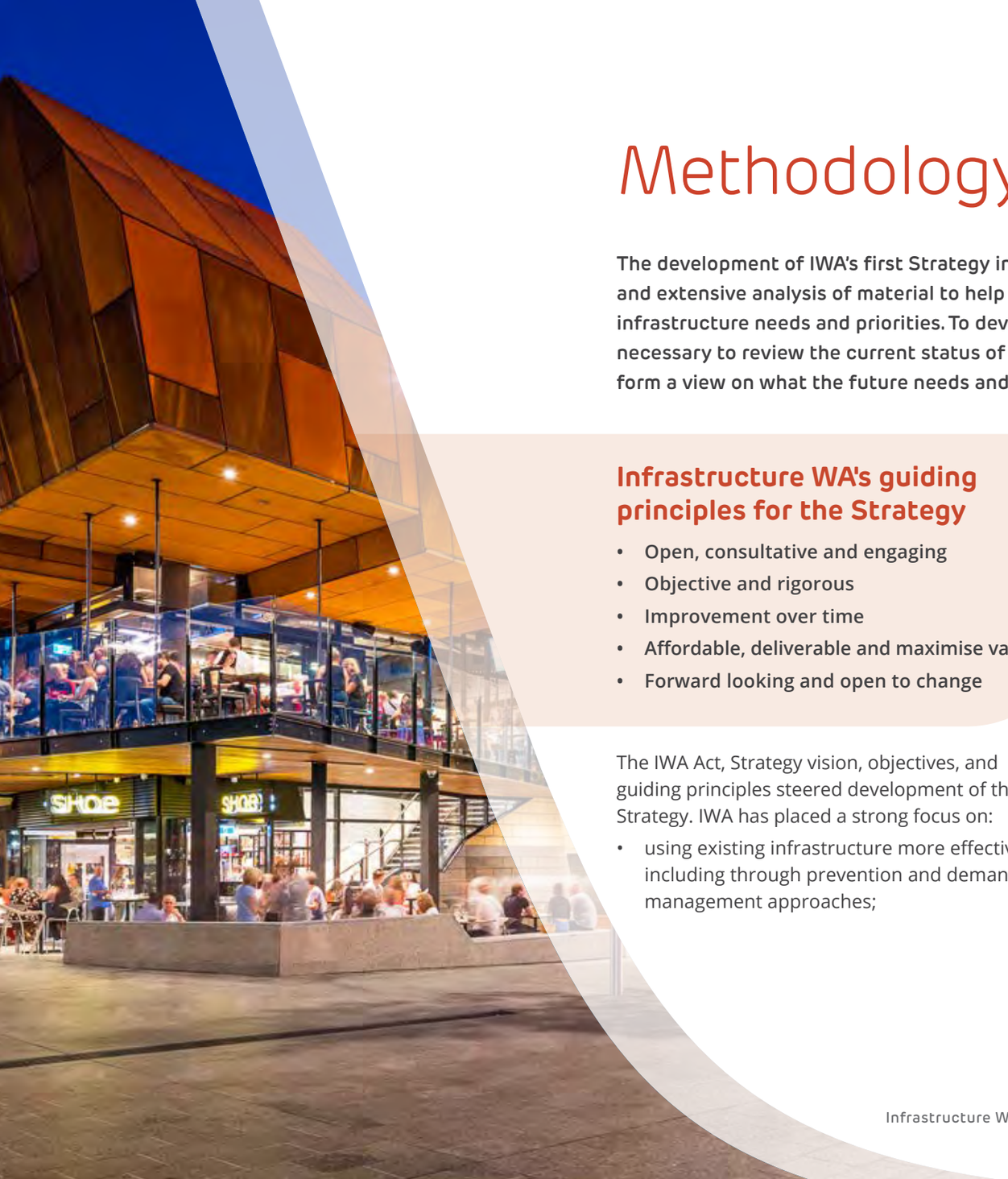


Developing this Strategy in the context of COVID-19 is an opportunity to capitalise on positive impacts, and **ensure infrastructure investment can contribute to long-term recovery and resilience.**

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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;
- applying a triple bottom line approach;
- understanding the baseline of existing infrastructure networks and processes; and
- considering the affordability and deliverability of the recommendations, particularly in the current COVID-19 pandemic context.

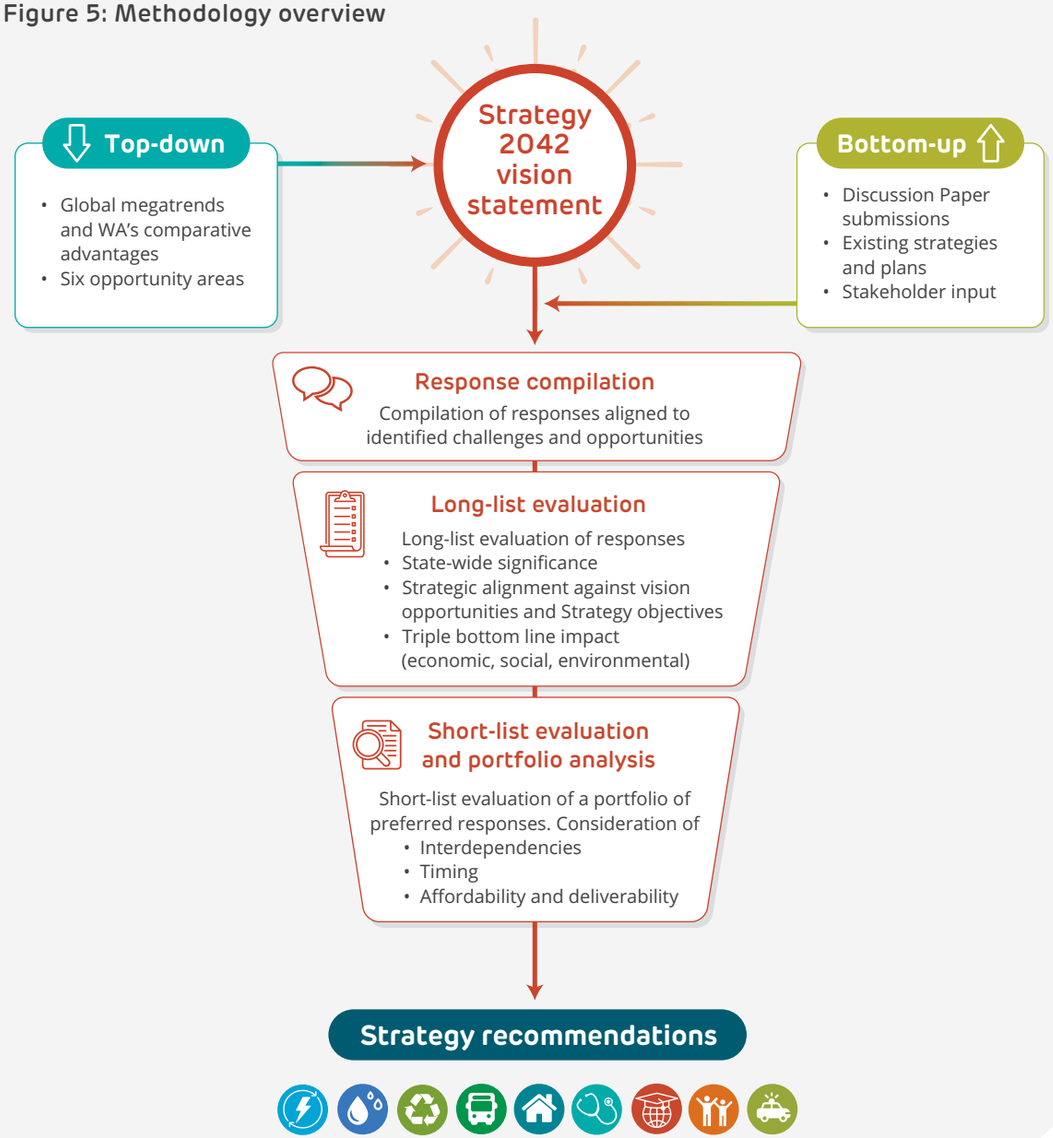
As outlined in *A Stronger Tomorrow State Infrastructure Strategy Discussion Paper* (Discussion Paper), IWA applied a hybrid top-down/bottom-up approach in developing the Strategy. This was informed by a bottom-up assessment of the short to medium-term outlook over the next ten years, and a strategic top-down assessment focussing on the long-term outlook out to 20 years. An overview of the methodology is shown at Figure 5.

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Figure 5: 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 (refer 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.

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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 focussed 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 State agencies and Government Trading Enterprises (GTEs) infrastructure strategies and plans.

Other material was considered to gain benefit from wider viewpoints and alternative approaches relevant to each infrastructure sector and cross-cutting theme, including Infrastructure Australia's *An Assessment of Australia's Future Infrastructure Needs: The Australian Infrastructure Audit 2019* (Australian Infrastructure Audit), industry research, stakeholder input and other jurisdictional strategies and publications.

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 draft 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 sector and cross-cutting theme.

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

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

This approach was compared against 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 State Government's Strategic Asset Management Framework.

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

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 6).

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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.

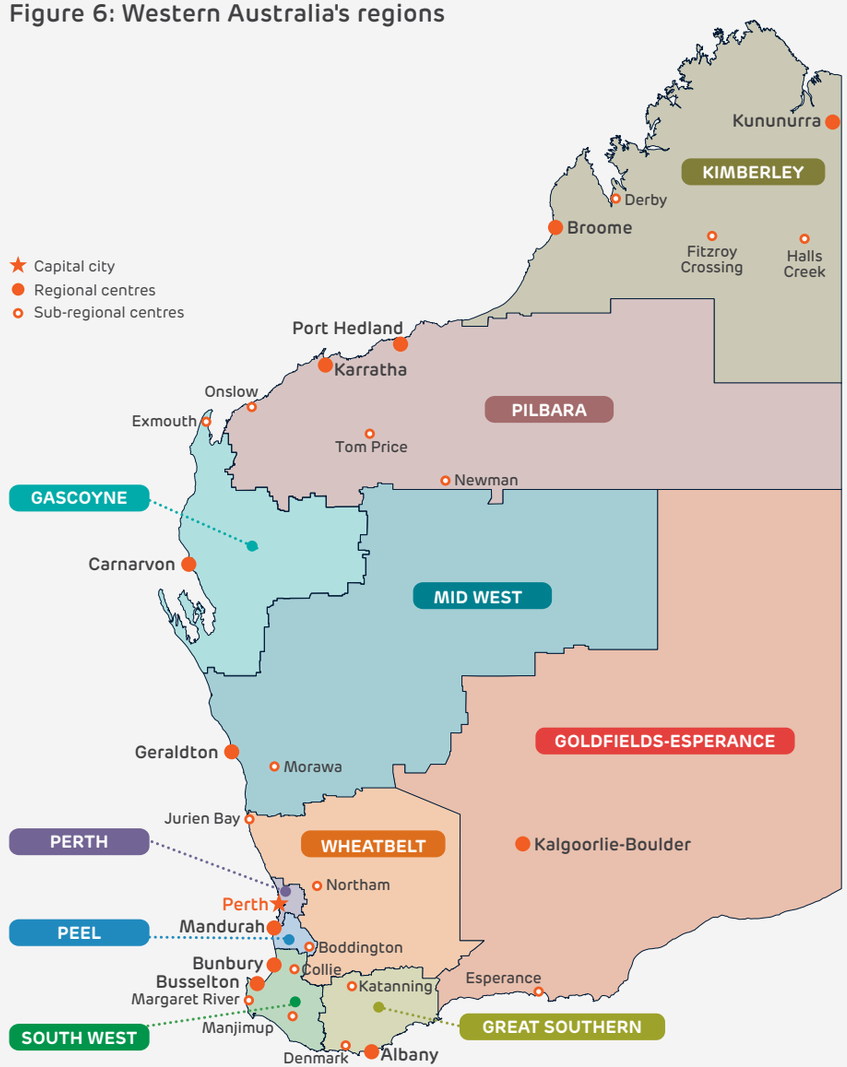
Successful ongoing regional development in WA is a complex challenge and infrastructure alone certainly cannot deliver the total solution. IWA reviewed a range of regional strategic documents and plans and consulted with regional communities. Cross-regional data analysis was undertaken to better understand how each region was placed to leverage megatrends and maximise strategic opportunities. The Strategy is focussed 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 Federal Government's Northern Australia agenda and is a focus area within Infrastructure Australia's 2021 Australian Infrastructure Plan, scheduled for release in mid-2021.

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 road houses, 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 the ability to concentrate investment in infrastructure to generate significant benefits.

Figure 6: Western Australia's regions



Note: As at 27 May 2021, the Shire of Wiluna falls within the Goldfields-Esperance region.

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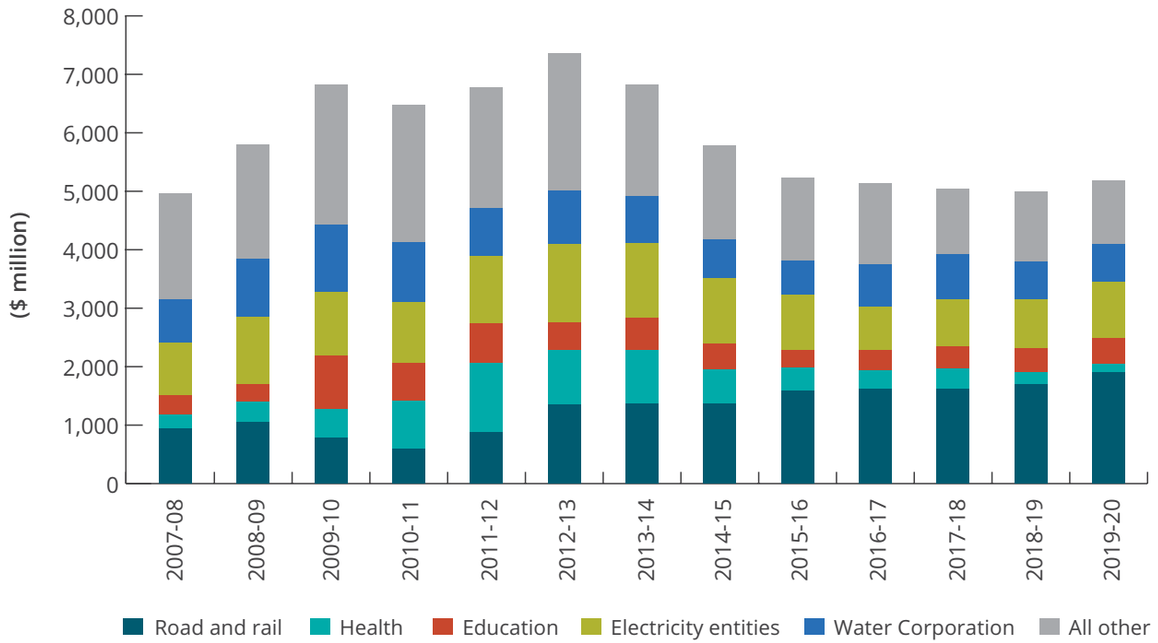
Affordability and deliverability

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 draft recommendations, including by reference to the Financial Strategy Statement under the *Government Financial Responsibility Act 2000*. The Financial Strategy Statement in the 2020-21 State Budget lists several targets for the Government. The most relevant asset-focussed target related to this Strategy is to increase the net worth (net assets) of the total public sector, with which the Strategy is consistent.

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 timeframe 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's Asset Investment Program (AIP) has averaged approximately $6 billion per annum (Figure 7). 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 macroeconomic conditions. With the current focus on the State's continued recovery from the pandemic, a four-year AIP of $28.9 billion is forecast over the current forward estimates

Figure 7: State Government Asset Investment Program 2007-08 to 2019-20 [26]



period to 2023-24. In combination with other unique current pressures on the public sector, this increase presents some short-term challenges for capacity and deliverability.

The AIP is also the key reason for the projected increase in total public sector net debt, from $35.4 billion at 30 June 2020 to $40.2 billion at 30 June 2024 (as outlined in the *2020-21 Pre-election Financial Projections Statement*). As noted in the Statement, this is considered an affordable increase in the State's net debt levels, reflecting: a relatively modest net debt to revenue ratio (particularly compared to other jurisdictions); net debt as a share of the economy (Gross State Product) that is well below levels in other jurisdictions; historically low interest rates on the State's borrowings; and a general government sector that is in an operating surplus position, with these surpluses representing an important source of non-debt funding for infrastructure.

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Public infrastructure investment is allocated across many sectors. This is reflected in the diversity of Strategy recommendations (Figure 8). 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 focussed on ensuring value for money outcomes across the overall AIP in future years.

The AIP represents the Government's full investment commitments for the four-year Budget forward estimates, leaving minimal funding capacity for additional short-term infrastructure investments. Almost all of the recommendations in the Strategy over the 2022-27 period are focussed on non-build actions (Figure 9). These include many areas of infrastructure planning to inform subsequent potential investments. Some non-build recommendations may have associated costs. In many instances agencies may be able to address these as part of their core activities, from within existing budget allocations. State agencies and GTEs will have five years to complete short-term recommendations from when the Government responds to the final Strategy, which is anticipated around mid to late 2022.

This reaches beyond the current period of heightened work and focus associated with the COVID-19 pandemic.

Beyond this period, some greater flexibility and capacity is available to the State to determine new infrastructure priorities. Where IWA has recommended a build response, further planning and business case development is generally required to prove up 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 horizon are affordable and deliverable.



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Figure 8: Recommendations by cross-cutting theme and sector

(recommendations and sub-recommendations)

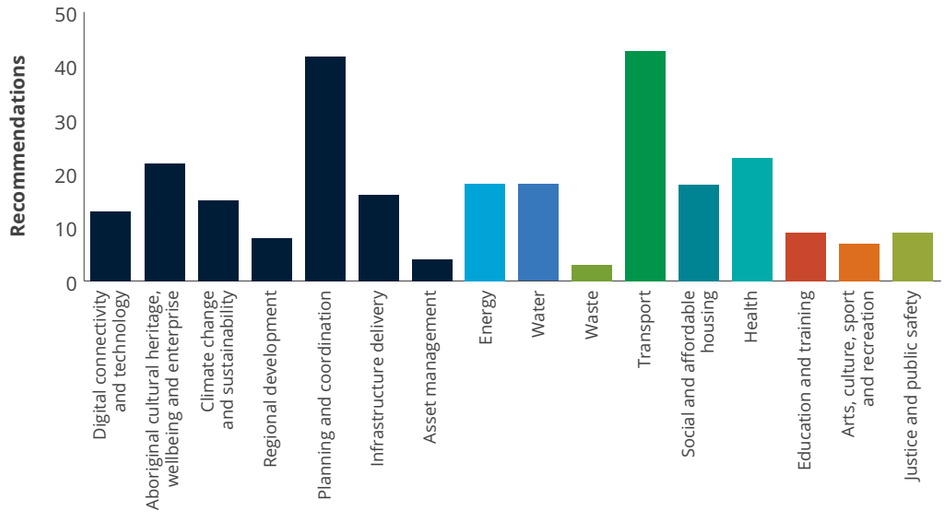
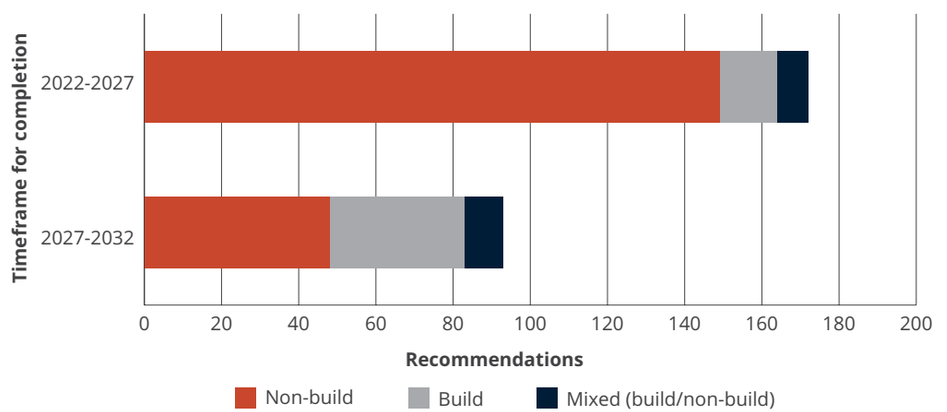


Figure 9: Recommendations by timeframe for completion and type

(recommendations and sub-recommendations)



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Stakeholder consultation and engagement

In developing the Strategy, IWA undertook extensive consultation with a broad range of stakeholders. Committed to capturing their expertise and perspectives, IWA welcomed the knowledge they shared through valuable input, technical advice and peer review.

IWA's consultation and engagement program enabled it to better establish a vision for WA and gain insights into stakeholders' views and priorities. Over the period from July 2020 to May 2021, IWA hosted or attended over 100 agency meetings and ran more than 25 workshops across the State. IWA recognises the value of developing strong and enduring relationships with its stakeholders to support the development of the Strategy and as its implementation progresses. IWA also acknowledges that different channels of communication are necessary to facilitate open and meaningful interactions, and has employed a range of forums such as workshops (face to face and online), roundtables, information sessions, stakeholder working groups, expert panels and one on one meetings.

IWA's Discussion Paper, released in June 2020, was a key mechanism in formulating the foundations of the Strategy, proposing the guiding principles, objectives and methodology for its development. The public consultation program supporting the Discussion Paper included extensive engagement with community, industry, State agencies and GTEs and attracted 143 formal submissions over an eight-week consultation period. Further feedback was collected via a range of engagement activities.

A rich and diverse range of perspectives was captured in this process and, through an analytical process, were translated into a Consultation Outcomes Report published in December 2020. The report detailed feedback received to 22 consultation questions.

To facilitate examination of matters in greater detail, IWA convened three stakeholder groups to help shape the Strategy. These groups have met several times throughout the Strategy's development and provided valuable insights. These groups include:

- **State Agencies Working Group** – formed to ensure key State agencies and GTEs were kept informed on progress of the Strategy, and to provide input and assist with its development. Membership included representatives from 21 central, policy and larger infrastructure delivery State agencies and GTEs.
- **External Stakeholders Reference Group** – established to ensure industry was informed on the progress of the Strategy, and to provide input on strategic matters as requested. Membership included representatives from 23 peak industry bodies with interests in one or multiple infrastructure sectors or themes of the Strategy.
- **Strategic Expert Panel** – formed to provide independent and technical expertise in an advisory capacity. Membership included six individuals with skills and expertise in the areas of technology/innovation, business/finance, Aboriginal engagement, environment, and social services.



Over the period from July 2020 to May 2021, **IWA hosted or attended over 100 agency meetings and ran more than 25 workshops across the State.**

IWA also recognised the value of existing networks within government and industry and built relationships with groups such as the WA Regional Development Alliance (representing the nine Regional Development Commissions from across the State), and the Aboriginal Advisory Council of WA. Ongoing consultation with these and many other stakeholder groups will enable IWA to develop a deeper understanding of the specific issues relevant to their sectors and interest areas and will continue to inform IWA's work.

IWA's ongoing engagement program has been integral in the formation of recommendations that are well-informed, evidence based, holistic, and collaborative in their response to the future infrastructure needs of WA.

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Finalising the Strategy

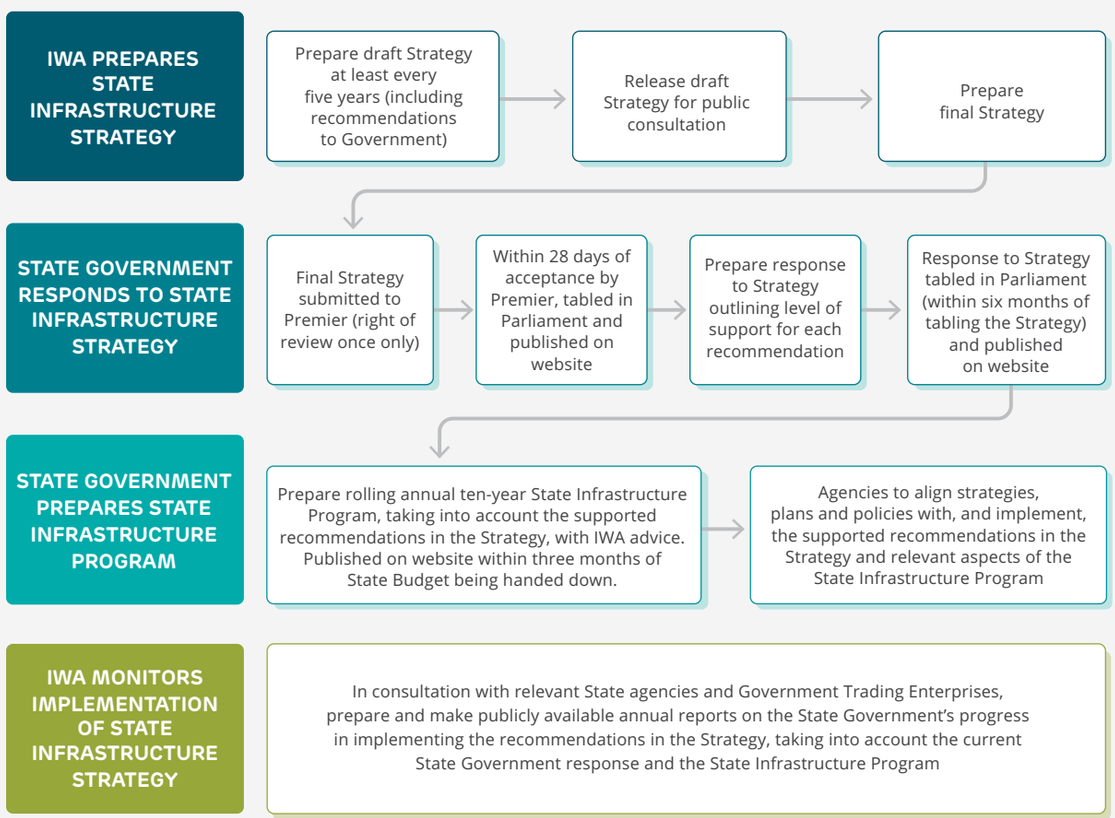
Release of the Strategy is a significant milestone, but in many ways it is the start, rather than the end, of the journey. IWA will now embark on a public consultation process – the feedback from which will be reviewed and considered in finalising the Strategy. At the same time, IWA will continue analysis, engagement and environmental scanning to ensure our recommendations are current, appropriate, affordable and sequenced effectively.

The final Strategy will then be provided to the Premier for acceptance and tabling in Parliament. Within six months of tabling, the Government must outline its response to the recommendations of the Strategy, including reasons for any recommendations which it does not support in full. Supported recommendations will transition to delivery by relevant State agencies and Government Trading Enterprises (GTEs). The full process, as required by IWA's legislation, is set out in Figure 10.

Implementing the Strategy

The recommendations and sub-recommendations outline the action/s required for implementation of the Strategy, and should be read in conjunction with the contextual information provided in each chapter.

Figure 10: State Infrastructure Strategy process



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IWA will work with affected State agencies and GTEs to develop an implementation plan for each recommendation that is supported by Government. IWA's contribution may range from an observation and monitoring role, to becoming an active participant in the delivery by others, or as the responsible lead State agency in some cases.

While the timeframe 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 implementation of the Strategy's recommendations.

Monitoring progress

Annual reporting on government's progress in implementing the supported recommendations of the Strategy is required by the IWA Act. To truly understand the value of the Strategy, and how it needs to be adapted over time, analysis of progress against outcomes rather than just actions is also required.

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

Monitoring will help to:

- 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 that the Strategy and infrastructure priorities are aligned to;
- understand how change is affecting WA and identify emerging infrastructure opportunities and challenges for the State; and
- identify where changes to future, updated State infrastructure strategies are required.

The framework will align with, and draw upon, data collected through the monitoring frameworks of relevant State agencies and GTE's, strategies, plans, programs and projects to track progress.

Relationship to the annual ten-year State Infrastructure Program

When the Strategy is finalised, in line with the IWA Act an annual ten-year State Infrastructure Program (SIP) is to be prepared by Government that gives a medium-term view of infrastructure priorities and investments to support greater visibility beyond the four-year Budget cycle. The goal is to create confidence, awareness and preparedness of the State's infrastructure pipeline. IWA will work with relevant State agencies and GTEs to complete this.

It is expected the SIP will detail projects and programs drawn from the Strategy, State agency and GTE 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 SIP may point to needs and options to address them rather than propose specific infrastructure solutions, particularly in the medium term. As with recommendations within this Strategy, initiatives featured in the SIP 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 first SIP is expected to be prepared within three months of the release of the State Budget for the 2023-24 financial year.

Applying the Strategy to Infrastructure WA's other functions

Once finalised, 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 items for consideration at the federal level by Infrastructure Australia in preparing the annual Infrastructure Priority List; and
- identifying initiatives that require further investigation or advice to Government.

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Digital connectivity and technology

In 2018, CSIRO estimated that digital innovation could deliver **$315 billion in gross economic value** to Australia over the next decade.[27]

Digital connectivity and technology are rapidly changing just about every aspect of our lives. Technology is transforming how government and commercial services are accessed and delivered; redefining business models, supply chains and labour markets; and breaking down physical and social barriers. Embracing digital by enabling data-informed and quick-response decision-making, and supporting flexible service delivery models, will result in a more agile government. The growing and enabling role of digital technology across all infrastructure sectors warrants a strong and committed government focus.

Every year, the State Government spends billions of dollars building, operating and maintaining infrastructure. As one of the State's largest expenditure items, it is critical to optimise the efficiency and effectiveness of these assets. By adopting a digital-first approach to service delivery mechanisms there is the opportunity to de-risk infrastructure investments, improve overall outcomes, and reduce costs in many cases.

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Embedding digital tools and thinking offers a new opportunity to deliver benefits at every stage of the infrastructure lifecycle.

It is also important that the State 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, the country ranked seventh out of 16 countries across 24 indicators and, over two years, fell in rank in more than half of the indicators.[28] The importance of digital connectivity was highlighted by the unexpected isolation caused by the COVID-19 pandemic, when telecommunications networks experienced peak data demand growth across WA by more than 50 per cent. The speed at which the sector adjusted to meet the challenge was impressive and it demonstrated how nimble and responsive government can be in delivering more essential services through online platforms and programs.

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 up-to-date data in long-term infrastructure planning. Internationally and domestically, there are many examples which demonstrate how efficiencies can be achieved. 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 a 0.5 to 0.7 per cent increase in annual Gross Domestic Product over a 5-year period, rising to 1 to 2.7 per cent over the subsequent 10 years, and growing to 3 to 6 per cent after 15 years.[29]

What is digital?

There are a range of definitions for 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; and
- 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 as an asset class that transforms infrastructure systems into information generators and enables more efficient asset management practices.



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**. The contribution of digital technology to Gross Domestic Product is expected to **grow by 40 per cent** between 2018 and 2023.[30]

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Digital connectivity and the digital divide

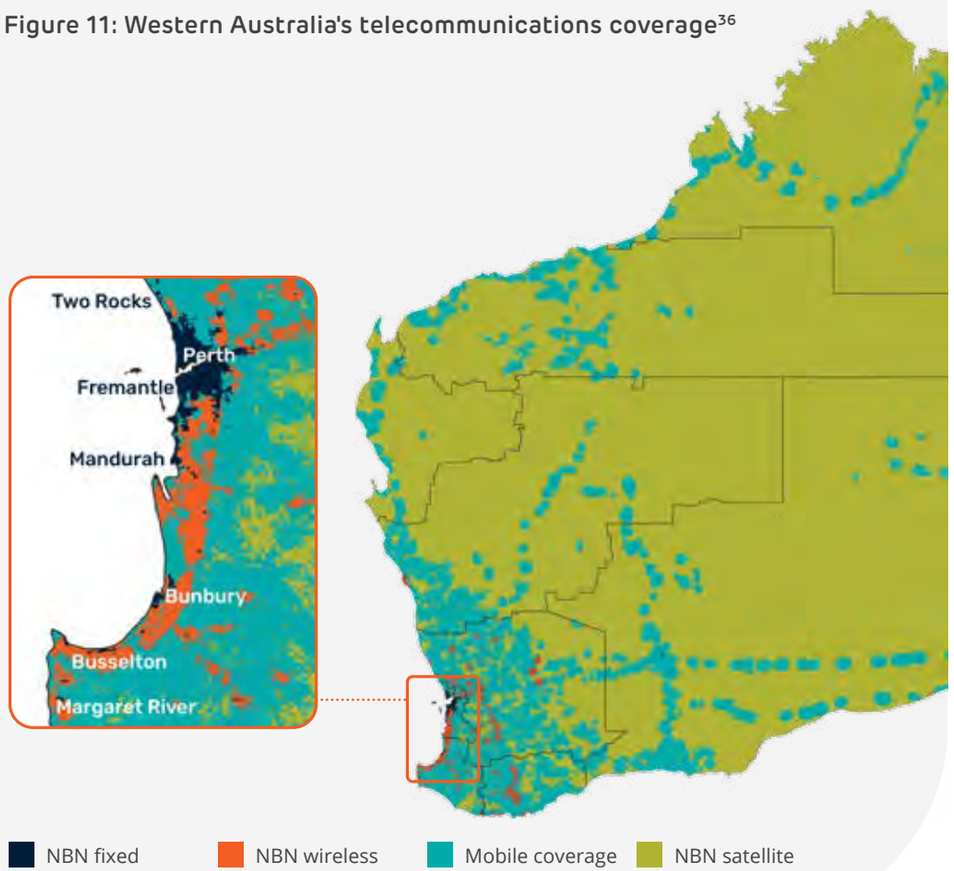
Aside from the Federal Government's national broadband network (nbn™), telecommunications infrastructure is largely delivered by the private sector. NBN Co's multi-technology mix model has resulted in satellite service coverage for large areas of WA which, due to frequent service dropouts, bandwidth (speed and contention) and latency issues, poses challenges in meeting current and future connectivity demand.[31] To meet the demand of 95 per cent of households nationwide, Australia's bandwidth requirements are estimated to more than double over ten years, from 24 megabits per second in 2018, to 56 megabits per second in 2028. Average household data demand is estimated to nearly quadruple from 199 gigabytes per month to 767 gigabytes over the same period.[32]

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 per cent of WA (geographically) has no mobile coverage (Figure 11).[33] These shortfalls create a digital divide between metropolitan, regional and remote areas, and in vulnerable communities the gap is widening. While WA ranks third in the nation on the *Australian Digital Inclusion Index 2020*, the score for 'Other WA' (58.2), which represents a large geographic portion of the State, is seven points lower than Perth (65.2).[34]

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.

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.[35]

Figure 11: Western Australia's telecommunications coverage[36]



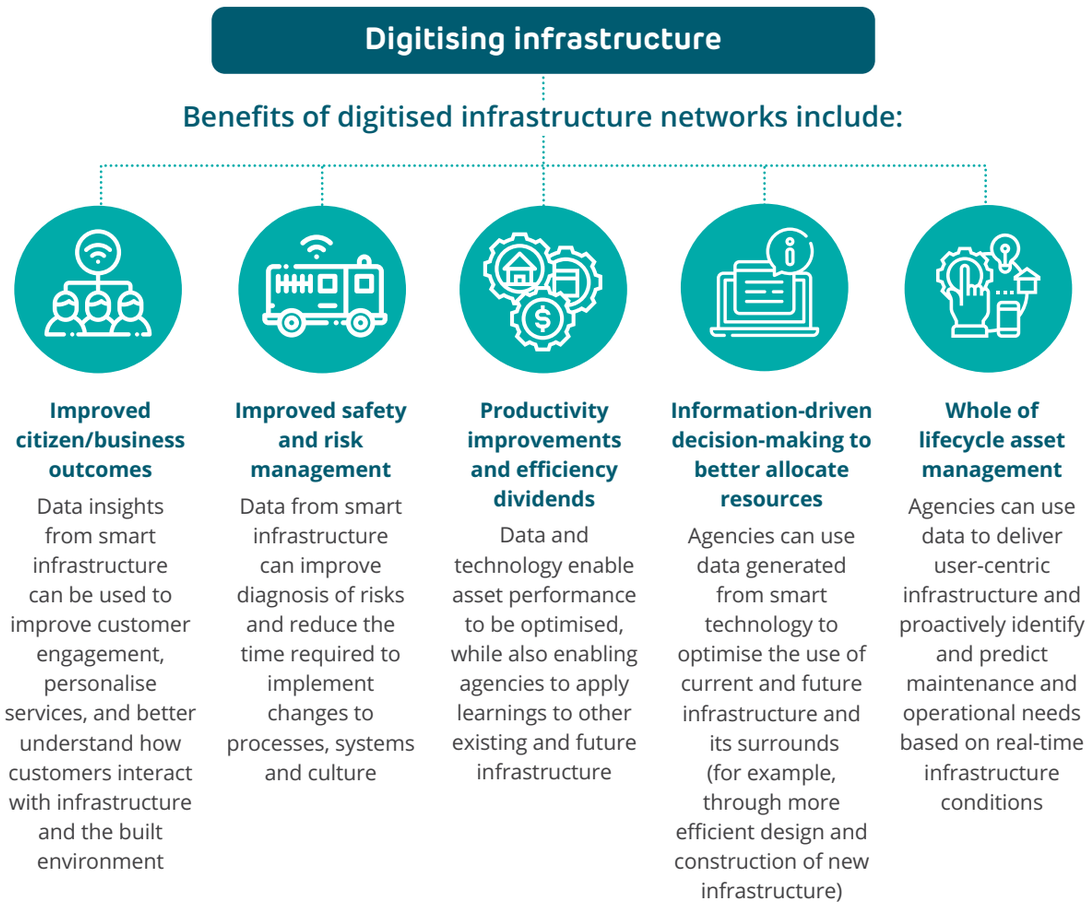
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A digital-first approach – the case for digitising infrastructure

The benefits of digital in an infrastructure context are evidenced in a range of settings around the world. Benefits range from better business outcomes to improved safety, operating efficiencies and better lifecycle management. Sophisticated use of Building Information Modelling technology was estimated to have saved the Government of the United Kingdom the equivalent of $4 billion over a six-year period. Going forward, the Digital Built Britain initiative will apply a new model of digitisation that will provide the platform for a full cross-integration of the built environment sector.[37] Even greater savings are potentially possible from sharing data to inform whole of lifecycle planning for related projects, and demonstrating value and efficiencies created through optimisation and automation.

Adopting a digital-first approach will assist in de-risking infrastructure investments and improving returns. Embedding digital tools and thinking will deliver benefits at every stage of the infrastructure lifecycle (Figure 12). 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 12: The benefits of digitising infrastructure



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WA's capacity to **digitise and create value from infrastructure assets** depends on the success of its underlying capabilities.



The volume and value of data being generated is ever-increasing, with many public and private sector entities holding large and powerful data sets comprising static and real-time information. A key 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. 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, and achieving the right balance between data security and data sharing is needed to enable innovation and to realise value. For State-owned and regulated infrastructure, a continuous focus is needed on setting and implementing clear cybersecurity standards that 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

State Government investment in telecommunications infrastructure has been relatively modest and largely focussed on addressing the digital divide, particularly through leveraging Federal 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 WA. A prioritisation framework to guide future investment decision-making, coupled with effective cross-government coordination, is needed to support improved outcomes.

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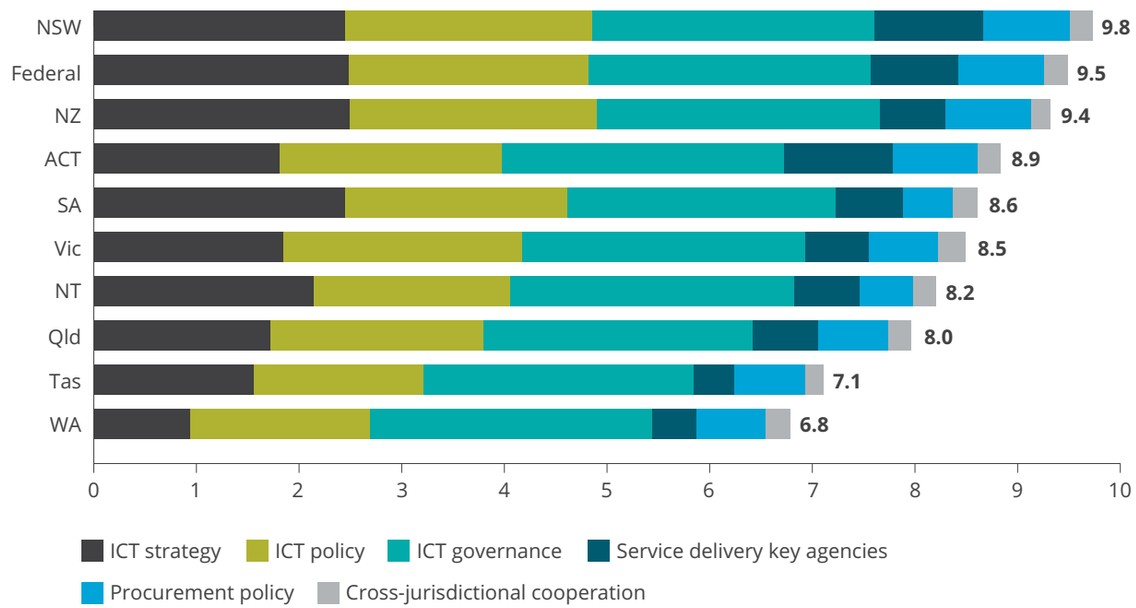
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The Office of Digital Government (within the Department of the Premier and Cabinet) addresses digital inclusion gaps in its *Digital Inclusion Blueprint* discussion paper. This initiative is a good example of the strategic direction required to address the impacts of digital exclusion, but its implementation is currently unfunded. 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 (NSW) Government is progressing the $400 million NSW 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.[38]

WA ranks lowest on the Digital Government Readiness Indicator.[39] Numerous factors contributed to this low ranking, including expiration of the *Digital WA: Western Australian Government Information and Communications Strategy 2016-2020*, the lack of a central service delivery State agency and continuing to operate without adequate privacy legislation (Figure 13). The Government has since released its *Digital Strategy for the Western Australian Government 2021-2025* (June 2021) and has a further opportunity to expand on its *Whole of Government Digital Services Policy* and establish a whole of government service delivery portal.

Figure 13: Digital Government Readiness Indicator 2021[40]

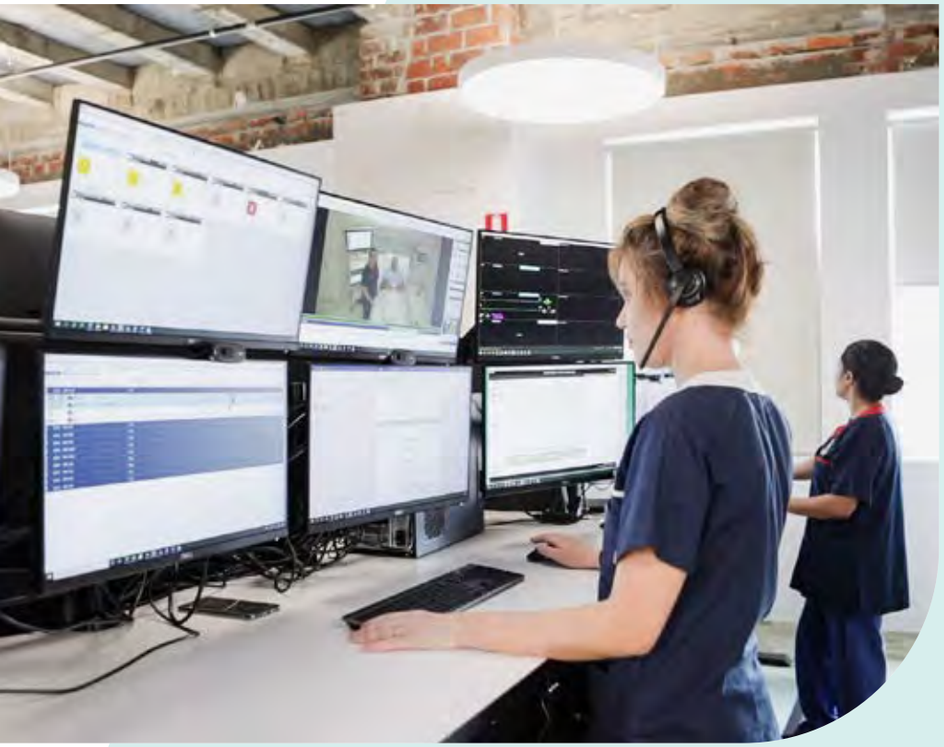


Without stronger action on digital matters, WA risks falling further behind other jurisdictions and not realising the economic and social dividends that digital connectivity and technology provide. Government needs to develop a strong governance agenda and be agile in its planning and decision-making to keep pace with demand and make quicker infrastructure planning and management improvements.

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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. The HIVE is staffed by clinical experts and provides 24/7 continuous monitoring of vulnerable patients located at Royal Perth and Armadale hospitals.

The service is enabled by 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 the patient, HIVE clinicians and staff are notified. HIVE clinicians use a two-way audio-visual system to intervene and support staff to care for the patient.

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

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Governance

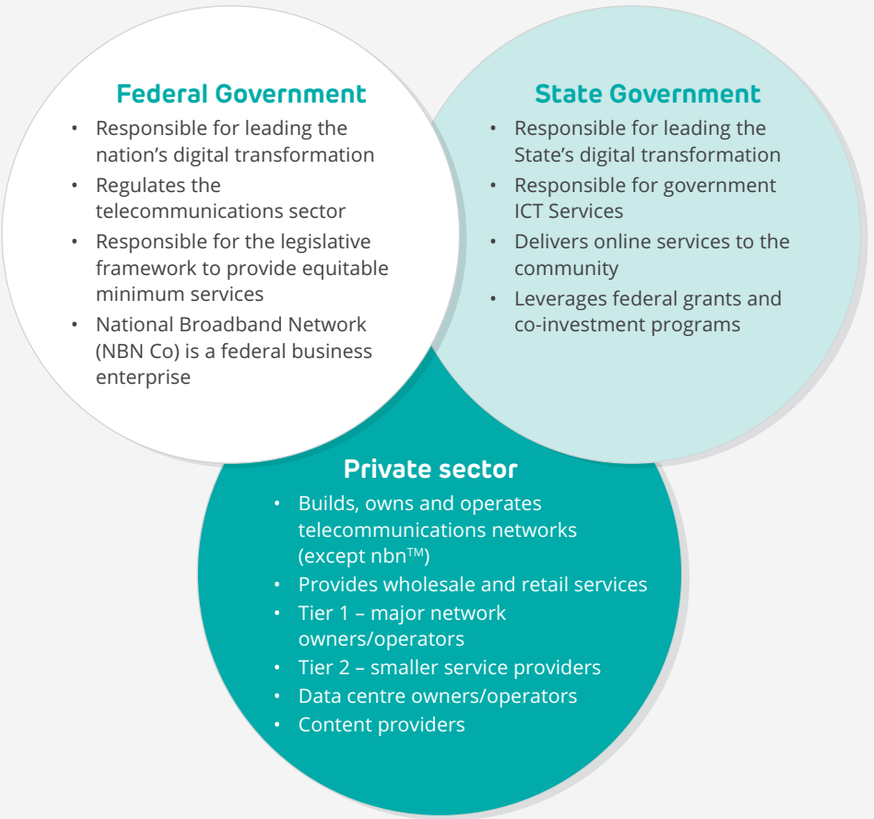
Provision of telecommunications infrastructure is regulated by the Federal Government. Apart from the nbn™, the majority of services provided to consumers are delivered by the private sector (Figure 14). Services provided to end users can be broadly separated into two areas – mobile phone and internet (or broadband) 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), which 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, and given additional investment requirements and lower concentration of customers in regional areas, it is unlikely 5G will be commercially viable outside of 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, with a primary objective to ensure all Australians have access to fast broadband at affordable prices, with the least cost to taxpayers. In accordance with the *NBN Co Statement of Expectations* (2016), 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 per cent 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.[41]

NBN Co provides 121 points of interconnect across Australia to connect users within a local area. 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 back-haul 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.

Figure 14: Telecommunications sector roles



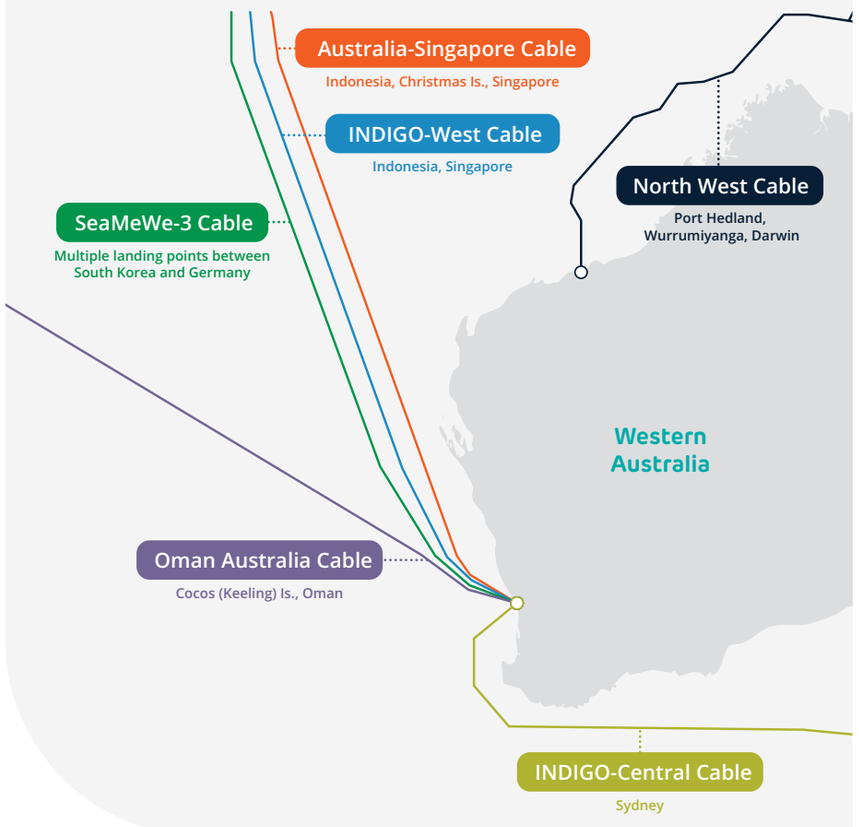
In the future, the emergence of mobile 5G technology and low earth orbit satellite technologies may offer alternative options for end users of internet services.

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.

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Two other areas of major influence for digital connectivity are the availability of international optical fibre cable routes and data centres. Served by four international submarine cable routes and a national Perth–Sydney submarine cable route, Perth is well positioned as an internet hub location (Figure 15). Outside of Perth there are few data centres and no international submarine cable landings in WA, which can impact the ability to support low-latency, high-bandwidth applications.

Figure 15: Subsea cables[42]



Recommendations

Timeframe for completion: 2022-2027 2027-2032 2032-2042

Prioritise digital transformation

Maintaining and increasing WA's global competitiveness through digital transformation requires prioritised investment in digital connectivity infrastructure. Strategic and coordinated State Government intervention in the digital and telecommunications sector will address the most pressing needs of the State to build the basis for a strong digital future. A centralised and strengthened role for government is needed to coordinate state-wide investments where market forces are failing to deliver the infrastructure to bridge the digital divide and to build digital prosperity.

Digital connectivity is a core strategic asset and enabler of economic development and social equity. The digital future is characterised by a fast-changing technological landscape. Due to this pace of change, the likelihood of future 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 State 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 connectivity in business cases;
- coordinated procurement to leverage government spend on telecommunications services;
- a whole of government approach to leveraging nbn™ investments; and
- co-investment with the private sector and the Federal Government.

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Recommendation 1

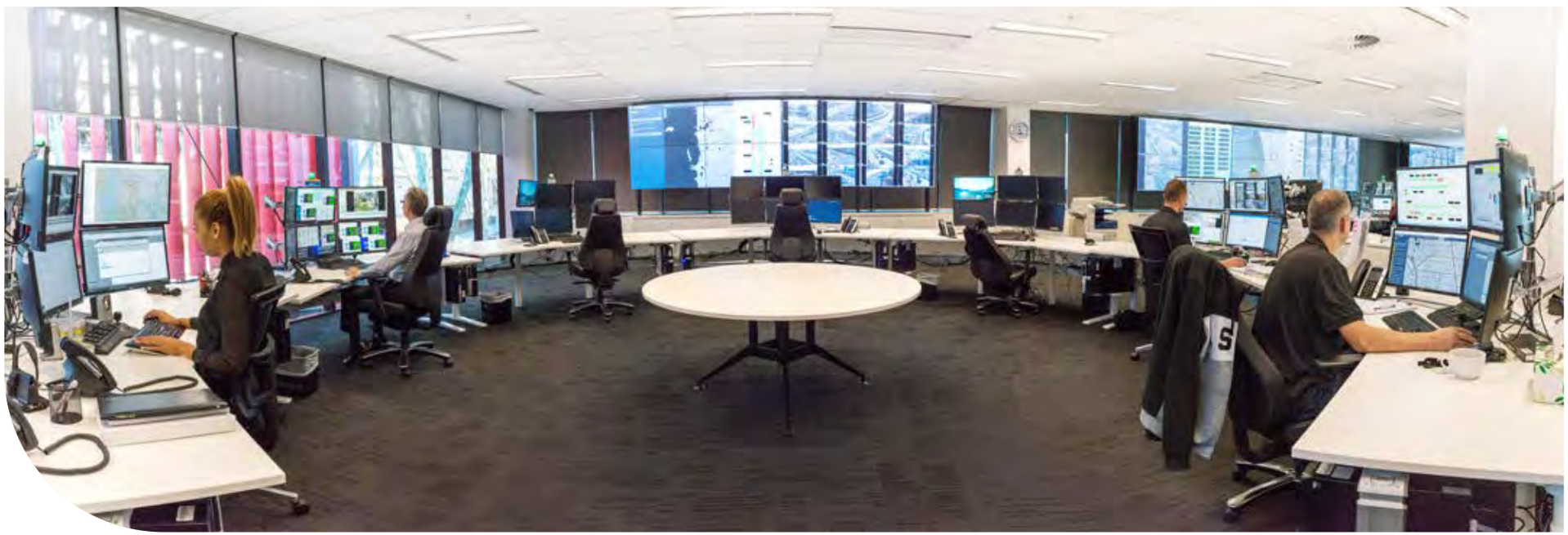
Elevate WA's focus on accelerating digital transformation and the priority given to underlying connectivity infrastructure by:

a. assigning a lead State agency to proactively increase digital technology adoption and ensure digital services are more accessible and responsive to community and business needs. This role should have a state-wide, whole of government focus, preparing the State to accelerate development and adoption of digital technologies; ●

b. as a priority, establishing and implementing an integrated, state-wide plan for digital connectivity, supported by a prioritisation framework to guide future government investment, to achieve economic (including productivity) and social benefits; ●

c. developing a collaboration model, adopting a coordinated State Government approach to current and future Federal programs – including nbn™ – to effectively leverage and/or incentivise private sector investment; and ●

d. providing multi-year State Government funding and leveraging Federal Government co-investment opportunities for initiatives that have been prioritised in the state-wide plan for digital connectivity. Initial focus should be 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. ●



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A digital-first approach

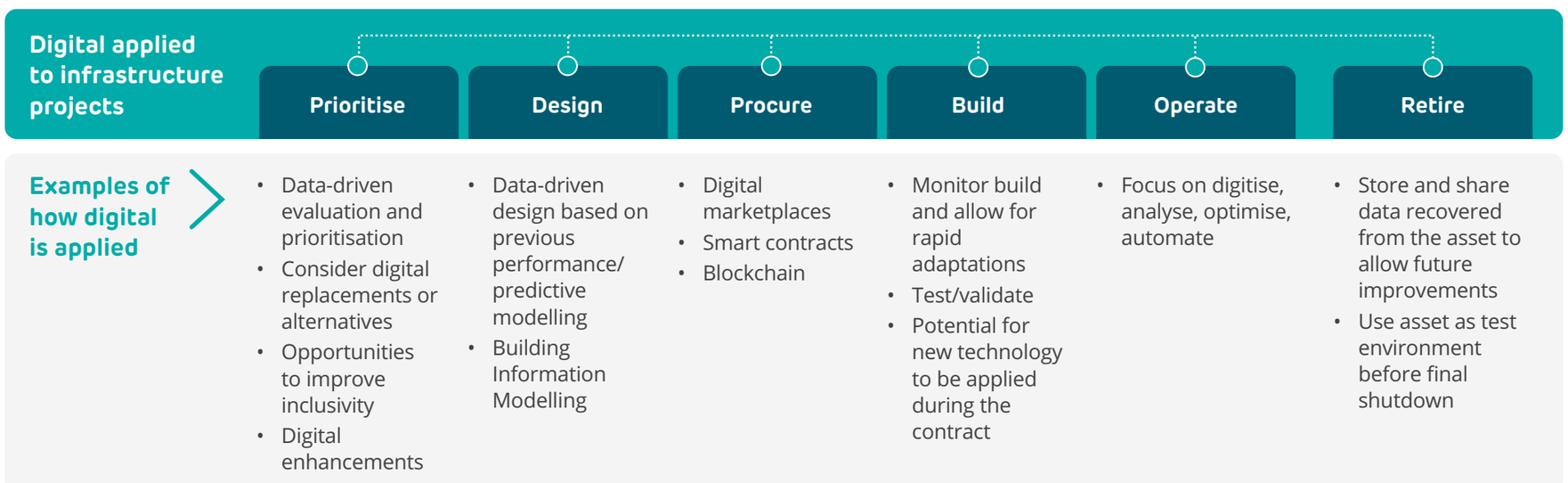
Embedding digital tools and thinking throughout the infrastructure lifecycle will deliver improved safety and risk management, increased productivity and efficiency dividends, and optimise resource allocation (Figure 16). For example, a digital twin which replicates a physical asset or real-world process, 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 17).

Infrastructure digitisation proposals should be supported by cost-benefit assessments to determine the potential return on investment from digitisation scenarios, taking into consideration commercial, environmental and social factors. A decision not to 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 to 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 on digitisation; and
- operate and maintain phase: optimisation and automation achieved, data collection and management controls and potential value created/ efficiencies generated.

Figure 16: Application of digital across the infrastructure lifecycle

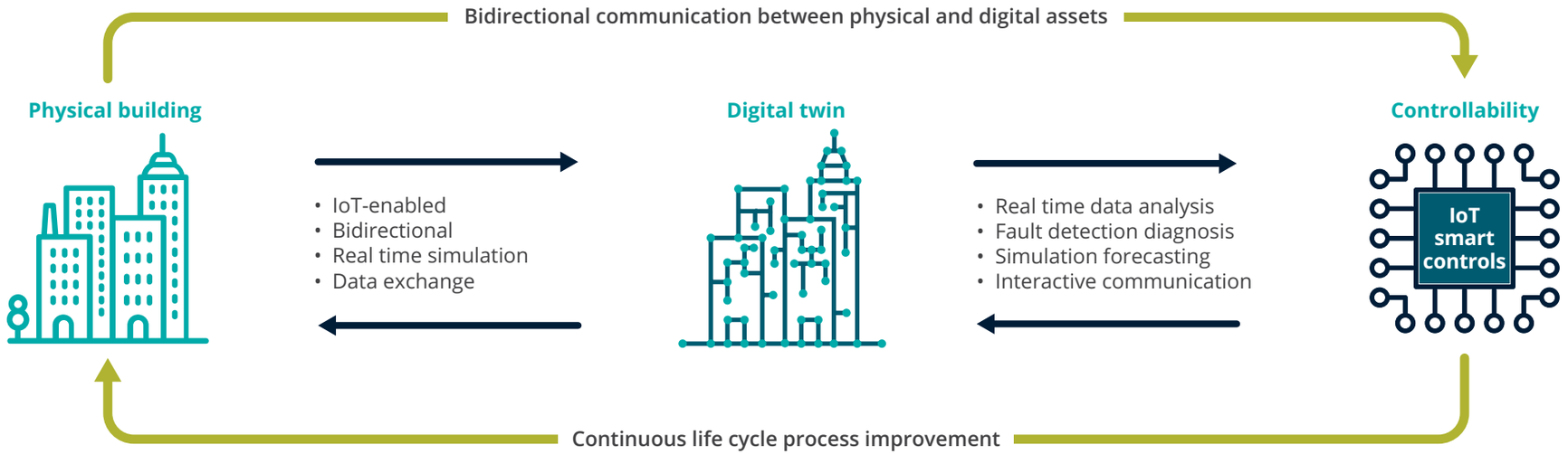


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Figure 17: Digital twins in the built environment[43]



Recommendation 2

Take a digital-first approach to all aspects of the infrastructure lifecycle, from planning through to retirement of assets by:

a. developing and adopting a digital-first lifecycle process including best-practice guides, templates and frameworks for strategic planning and prioritisation as part of a government commitment to data-driven decision-making. For projects and programs with a capital cost of $100 million or more, State agencies and Government Trading Enterprises should be required to embed and apply the digital-first lifecycle process through updates to the Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines, over a phased rollout, starting with agencies demonstrating early wins and digital maturity; ●

b. establishing a smart infrastructure policy to ensure infrastructure is planned, built and operated efficiently using the latest technology, maximising return on investment. This should set minimum requirements to embed smart technology in all new and upgraded infrastructure where the return on investment can be demonstrated and outline generic smart technology requirements applicable to all infrastructure including Internet of Things and Building Information Modelling; and ●

c. reporting publicly on digitisation of infrastructure, based on information from relevant State agencies and Government Trading Enterprises. Indicators for this end-to-end reporting should include prioritisation, design, procurement, build, operational and maintenance phases. ●

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Cybersecurity

Cybersecurity is a major focus for State agencies and GTEs. The Federal Government's *Security of Critical Infrastructure Act 2018* currently applies to specific entities in the electricity, gas, water and ports sectors. The Security Legislation Amendment (Critical Infrastructure) Bill 2020 seeks to expand the scope of the 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; healthcare and medical; space technology; transport; and water and sewerage. As at July 2021, the Bill was being reviewed by the Federal Parliamentary Joint Committee on Intelligence and Security.

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). As infrastructure systems become increasingly digitised, the risk of cyberattack also increases – threatening the availability and uptime of critical services and security of personal and commercial data. The Centre provides guidance on essential mitigation strategies for industrial control systems.

The Cyber Security Unit within the Office of Digital Government (WA) is leading and coordinating whole of government cybersecurity initiatives to protect the integrity of government systems and grow cybersecurity maturity across the public sector. WA needs to ensure the resilience of its infrastructure and protect critical assets by adopting a best-practice approach to cybersecurity, and setting and adhering to clear standards for major infrastructure assets. State Government attention to this matter should be strengthened to ensure owners of critical infrastructure implement appropriate mitigation measures to protect against cyber risks to information and operational technology.

Recommendation 3

Set and proactively implement clear cybersecurity standards for State-owned and regulated infrastructure to manage critical risks and support digital transformation by:

a. assigning a single State agency responsible for working with government infrastructure owners and operators (as well as other regulators) to: ●
   i. develop a state-wide cybersecurity policy for infrastructure, with standards;
   ii. monitor and enforce the policy and standards; and
   iii. clearly articulate State and Federal governments cybersecurity obligations to government infrastructure owners and operators.

b. updating the Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines, to require infrastructure strategies, plans and business cases for projects and programs with a capital cost of $100 million or more, to appropriately address cybersecurity risks, compliant with relevant federal and state legislation and policies. ●

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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 from which infrastructure owners and operators can draw to embed digital into infrastructure assets.

Asset information is currently inconsistent and lacking in some areas, making it difficult to understand asset needs and develop fit for purpose, risk-based asset management plans. This, in turn, makes it difficult to prioritise and address maintenance pipelines. More sophisticated asset information, including data on usage, 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.

Recommendation 4

Develop digital capabilities within government to ensure optimal operation and security of current and future infrastructure by:

a. prioritising development of State privacy and information sharing legislation that recognises the dual objectives of protecting personal/commercial information while leveraging maximum value from the State's information and data;
b. further developing State Government data management and asset information policies, processes, platforms and standards to enable data and information sharing and analysis (including real-time data) and help address two pressing challenges – management of the existing asset portfolio, and planning and prioritising new infrastructure; and
c. assigning a centralised lead role responsible for developing and retaining data science capabilities within government. This includes developing a comprehensive workforce strategy which maps the public sector's current and future digital workforce needs, an integrated plan to meet those needs, as well as detailing specific skills required across infrastructure lifecycle considerations.



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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. In 2018, the Indigenous **child mortality rate** was **141 per 100,000** which is twice the rate of non-Indigenous children. The **employment rate** was around **49 per cent,** compared to 79 per cent for non-Indigenous Australians.[44]

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 effect real change and achieve better outcomes. By promoting and leveraging Aboriginal cultural heritage and enterprise, Aboriginal wellbeing will be supported into the future.

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The *National Agreement on Closing the Gap* (Closing the Gap) includes a range of socio-economic targets that have an impact on life outcomes for Aboriginal and Torres Strait Islander people, including education, child mortality, employment and life expectancy. Progress on reducing disadvantage has been largely unsuccessful despite significant government investment, both at a federal and state level. 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 failure. A new approach is needed to deliver improved life outcomes; one that places culture at the centre, embraces inclusive and genuine partnerships, and structurally changes the way government works with Aboriginal and Torres Strait Islander people.[45]

Infrastructure planning, design, delivery, operation and maintenance offers a range of opportunities for Aboriginal empowerment and self-determination, to improve outcomes for Aboriginal people. 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 and communities is a key focus of *A Path Forward: Developing the Western Australian Government's Aboriginal Empowerment Strategy* (consultation paper). The consultation paper proposes a vision 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. This will help to improve social, economic, health and cultural outcomes for Aboriginal people. It includes six strategic elements which place Aboriginal culture at the centre (Figure 18). IWA looks forward to the future release of the Aboriginal Empowerment Strategy.

Figure 18: Strategic elements of empowerment[46]



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.[47]

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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 three key themes and subsequent recommendations addressed in this chapter that require both central and multi-agency responses. These are:

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

   Infrastructure is vital to support social and essential services and improve Aboriginal wellbeing. 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.

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 the above key 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, equitable access to services, and in closing the digital divide.
- **Social and affordable housing:** Aboriginal people often face common housing issues across WA, 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 housing is fundamental to achieving outcomes in health, education, employment and community safety.[48]

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- **Health:** Aboriginal people across WA do not always have access to culturally-appropriate healthcare. Aboriginal people experience unequal health outcomes compared to non-Aboriginal people, ultimately resulting in rates of lower life expectancy and higher childhood mortality.[49] There is an urgent need for government to address this inequity in partnership with Aboriginal people and communities to improve health outcomes.[50]
- **Education:** Education outcomes are significantly lower for Aboriginal people than non-Aboriginal people.[51] 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.[52]
- **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. Early intervention, diversion and rehabilitation initiatives provide the opportunity to improve outcomes.



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Governance

Many agencies 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 State 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 the Closing the Gap Refresh, and undertaking dialogue between Aboriginal communities and the State Government regarding Aboriginal recognition, and Aboriginal and non-Aboriginal reconciliation.[53] Membership comprises 12 Aboriginal leaders representing diverse regions, organisations, areas of expertise and genders.



A number of State 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. Key responsibilities include the development of a whole of government Aboriginal affairs strategy, shaping the State's approach and engagement with native title groups and Aboriginal communities, and implementing 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 a large number of locations. In addition, they also provide housing services for Aboriginal 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 ten per cent (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.

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Recommendations

Timeframe for completion:
● 2022-2027 ● 2027-2032 ● 2032-2042

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 which 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. 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 or lead agencies of projects and programs with a capital cost of $100 million or more, should prepare an Aboriginal engagement strategy. With the requirement for an engagement strategy to be embedded in the Strategic Asset Management Framework, they should also be published and address, at a minimum: cultural recognition and interpretation; design; governance and decision-making structures; engagement process; identification of stakeholders; training, employment and enterprise opportunities or targets as part of the project or program; and strategy reporting and/or evaluation measures.



Beyond projects and programs with a capital cost of $100 million or more, this engagement should be embedded across all stages of the infrastructure lifecycle. This can be done through preparation of Aboriginal engagement strategies by State agencies and Government Trading Enterprises (GTEs) that 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.

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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. The focus is on long-term, consistent and genuine engagement with the Aboriginal community, throughout the planning, design and operational phases of each project. The framework of five engagement streams puts cultural, business, job and land access outcomes for the Aboriginal community at the centre. The streams are:



- Noongar cultural recognition;
- Noongar cultural input into place making;
- Aboriginal procurement;
- Aboriginal employment; and
- 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 five 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, for the delivery of major transport infrastructure on Noongar land, its principles 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

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The Government is reviewing the *Aboriginal Heritage Act 1972* and has released the draft Aboriginal Cultural Heritage Bill 2020 for consultation. The draft Bill seeks to reflect contemporary Aboriginal cultural heritage management principles and practices and reset the relationship between Aboriginal people, industry and other land users. By aligning State legislation with Federal native title laws, Aboriginal people will be able to negotiate outcomes for projects and opportunities on their land.

Recommendation 5

Develop and implement guidelines to embed and support early, inclusive, genuine and culturally-appropriate engagement with Traditional Owners and Custodians addressing all stages of the infrastructure lifecycle, including:

a. promoting community-led processes and place-based infrastructure outcomes for Aboriginal communities, wherever possible; ●
b. including guidance to identify and understand, at an early stage, native title and cultural heritage implications of infrastructure proposals; ●
c. aligning with principles of the State Government's proposed Aboriginal Empowerment Strategy; and ●
d. for projects and programs with a capital cost of $100 million or more, requiring the proponent or lead agency to prepare and publish an Aboriginal engagement strategy as part of the updated Strategic Asset Management Framework Business Case guidelines. ●

Recommendation 6

Following consultation, prioritise the Aboriginal Cultural Heritage Bill's passage through Parliament, and its subsequent implementation. ●

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



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For every dollar spent with an Aboriginal business, **$4.40 worth of economic and social value is created for Indigenous communities**. Higher-value contracts are important to grow Aboriginal business capability, and sustainability, and to provide greater employment opportunities.[54]



Aboriginal procurement, participation and business development

As a major employer, capital investor, asset manager and purchaser of goods and services, the State 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 per cent of 15- to 24-year-olds and 62 per cent of 25- to 64-year-olds in employment and/or training within the next decade.[55]

The State Government's *Aboriginal Procurement Policy* was introduced in 2018, and revised in July 2021. The Policy mandates progressive targets for the awarding of government contracts (valued at $50,000 or more) to registered Aboriginal businesses. The Policy commenced with a target of three per cent of government contracts by the end of June 2021, increasing to four per cent by 2024. In 2019-20, State agencies awarded 5.55 per cent of all contracts to Aboriginal businesses.[56] Although there have been significant achievements by individual State agencies to date, a number have not met current targets and will have to work harder in engaging with the Aboriginal business sector.

While the Policy has been successful, further reviews should consider inclusion of region-specific and/or industry-specific targets. Higher-value contracts are important to grow Aboriginal business capability, and for those businesses to become more sustainable

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and provide greater employment opportunities. This could be supported through inclusion of contract value targets in the Policy. Lifting State agency and GTE awareness of the capacity, capabilities and breadth of services available from Aboriginal businesses is a key challenge. Building the cultural competency of the public sector, and encouraging greater uptake of unconscious bias training should also be addressed.

Initiatives implemented by the private sector should also 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, 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 *Western Australia Industry Participation Strategy* and *Buy Local Policy*, which aim to enhance the opportunity for local industry, particularly small or medium enterprises, to compete for government work, comprise a number of initiatives that could be considered and/or expanded for Aboriginal businesses. This could include, for example, recruiting local content advisers, providing advisory services and establishing a capability building fund.

Recommendation 7

Improve and increase the participation and growth of Aboriginal businesses through reforms to, and greater application and compliance with, the State Government's *Aboriginal Procurement Policy* and practice by:

a. establishing targets that are also based on contract value, rather than only the number of total contracts;
b. expanding the policy through incorporating Aboriginal employment requirements and Aboriginal business subcontracting and joint venturing provisions into the government supply chain;
c. considering the application of region-specific and/or industry-specific targets;
d. strongly encouraging greater uptake of unconscious bias training for procurement and other relevant public sector officers involved in procurement decision-making;
e. implementing mechanisms to mandate application of the policy by Government Trading Enterprises; and
f. subject to application and outcomes of Recommendations 7a-c, setting new procurement stretch targets (over and above current overall performance levels) in the Policy over time.

Recommendation 8

For projects and programs with a capital cost of $100 million or more, require the proponent or lead agency to establish Aboriginal employment targets as part of works to plan and deliver these projects and programs, including through updates to the Strategic Asset Management Framework Business Case guidelines. Targets should be embedded in contracts and lead agencies should incorporate ongoing and transparent compliance reporting on performance against targets (for example, through annual reports).

Recommendation 9

Develop and implement complementary and proactive measures to progressively build capacity and capability of Aboriginal businesses. This should include consideration of new initiatives similar to, or expansion of, existing initiatives established to support implementation of the *Western Australian Industry Participation Strategy* and *Buy Local Policy*.

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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.[57] 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.

Funding, governance and land tenure

The past decade has seen significant uncertainty for funding of remote Aboriginal communities and town-based reserves, with Federal Government funding ceasing under completion of the *National Partnership Agreement on Remote Indigenous Housing* in 2018. The State Government is now solely responsible for provision of baseline services to Aboriginal communities in WA.



Through the Remote Essential and Municipal Services program, the Department of Communities provides a large number of Aboriginal communities with basic essential services, including maintaining housing, power, water and wastewater infrastructure, community roads, and waste management. 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 over 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 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. 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.

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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 State 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.



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 – which 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

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Access to **safe, effective and reliable water, power and wastewater services is essential** to liveability in any community. Providing those services in remote Aboriginal communities is a particularly significant challenge that successive governments have grappled with, often with mixed results.[58]



Power, water and wastewater services

Many remote Aboriginal communities and town-based reserves are provided with unlicensed and unregulated essential services, including drinking water that is of inadequate quality and in some cases, unsafe.[59] The Department of Communities, Horizon Power and Water Corporation are working collaboratively to better understand the condition of infrastructure within these communities. While this is progressing, the State Government must accelerate the 'regularisation', of power, water and wastewater services to ensure services are safe, reliable, efficient, equitable and fit for purpose. This will continue over the medium to longer 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 government on investment required.

Municipal services

Remote Aboriginal communities and town-based reserves receive few, if any, municipal-type services such as maintenance of roads, parks and sporting facilities, and provision of waste management services. 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, however this is 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, playgrounds and swimming pools are often poorly maintained, with funding not often available for ongoing operation and maintenance. Waste management facilities and services are ineffective or non-existent, which contributes to poor environmental health outcomes for people residing within 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, which may provide opportunities for Aboriginal Community Controlled Organisations and build local capacity.

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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 10

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

a. prioritising development of a sustainable funding model and investment framework that considers whole of lifecycle asset costs, including recurrent funding to allow for the operation and proactive maintenance of assets; ●

b. establishing a mechanism to enable State agencies and Government Trading Enterprises to share relevant information relating to the delivery of infrastructure and services to remote Aboriginal communities and town-based reserves. This mechanism should be consistent with recommendations relating to sharing of government information (Recommendation 4b in the Digital connectivity and technology chapter), and to improve efficiency and coordination; ●

c. investigating opportunities, during planning and business case development, for the private sector to fund and/or participate in the delivery, operation and maintenance of infrastructure and services in remote Aboriginal communities and town-based reserves; and ●

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

In relation to water, wastewater and power infrastructure and services:

e. accelerating the regularisation of water and wastewater services to the Water Corporation and power services to Horizon Power, to ensure remote Aboriginal communities and town-based reserves are provided with licensed and regulated services. Works should be prioritised based on agreed criteria; and ●

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

In relation to municipal infrastructure and services such as roads, waste management, and sport and recreation facilities and services (for example, community swimming pools):

g. providing transparent clarification as a priority of the roles and responsibilities of relevant entities for provision of municipal infrastructure services such as roads, waste management and recreation facilities; and ●

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

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Climate change and sustainability

Today's planning, design and investment decisions for long-life infrastructure must be made in the context of a **net zero emissions future.**

Under the Paris Agreement, much of the international community, including Australia, committed to take actions to limit global warming to well below two degrees Celsius – preferably 1.5 degrees – compared to pre-industrial levels. Across Australia, this has been followed by jurisdictions setting net zero greenhouse gas emissions (emissions) reduction targets by 2050.

Each jurisdiction has taken a different approach as to how firm or aspirational their targets are, with some supporting their position through interim targets or through dedicated legislation. While a net zero emissions target has not yet been set by the Federal Government, a commitment has been made to reduce emissions to 26 to 28 per cent below 2005 levels by 2030. In addition, many major private sector companies are now setting their own targets to achieve net zero emissions and leverage the opportunities of a low emissions economy.

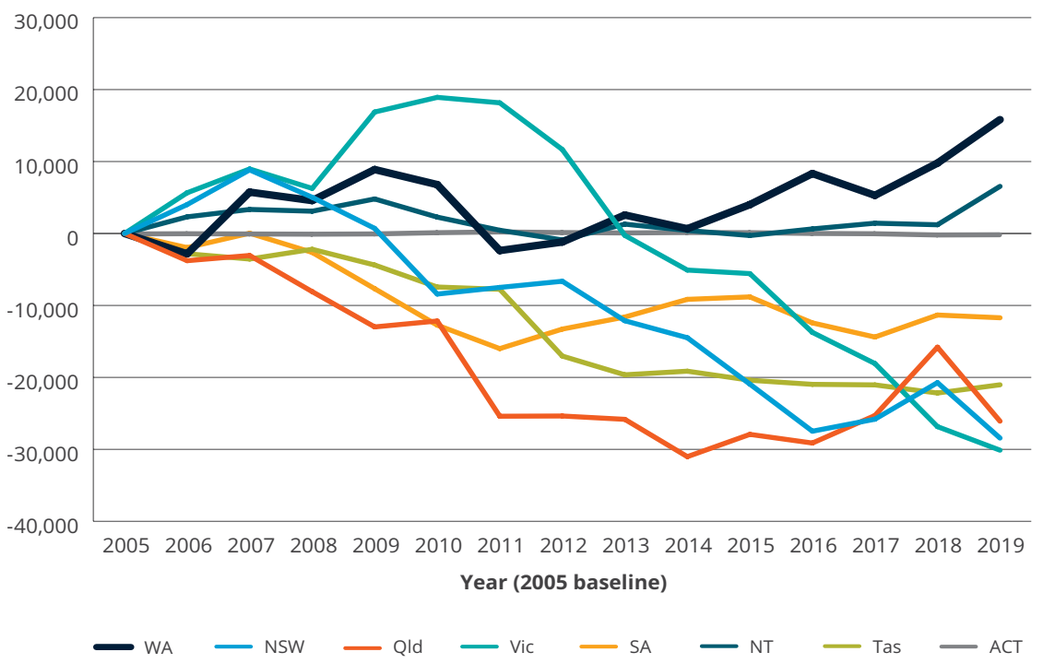
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For WA, reducing its emissions to reach net zero emissions by 2050 is both a challenge and an opportunity. As shown in Figure 18, a number of jurisdictions have begun decarbonising their economies, despite population and economic growth. Since 2005, WA's emissions have increased by 30 per cent (Figure 19), primarily attributed to production growth in the resources industry.[60] WA's transport emissions have also increased, driven by growth in population and vehicle numbers.[61]

Figure 19: Change in Australian jurisdictional emissions (kilotonnes CO2-e)[62]



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 stands to risk 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.

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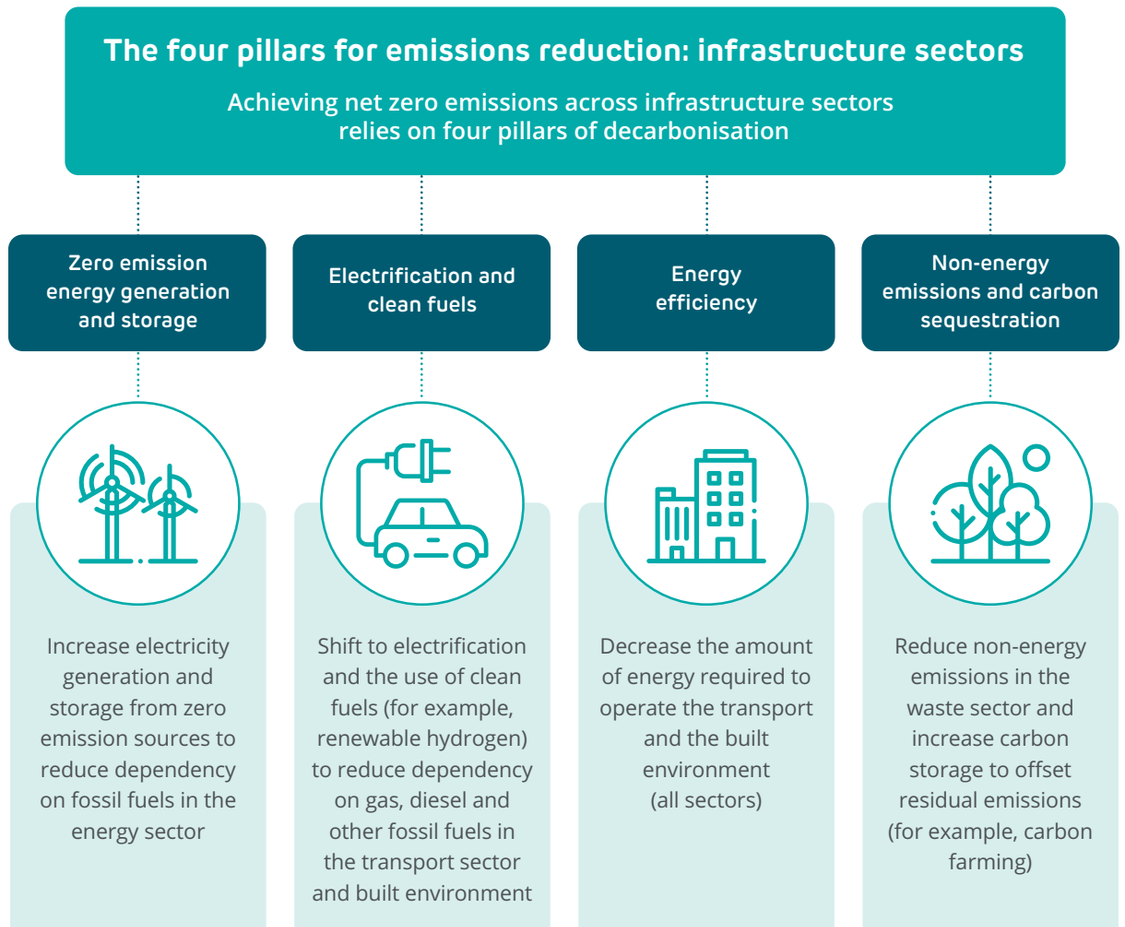
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There is considerable opportunity, however, for WA to progress towards net zero emissions by 2050 while ensuring the State's economy continues to remain strong and competitive. The State has access to some of the best renewable energy resources in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

With around 70 per cent of Australia's emissions associated with infrastructure-based projects, infrastructure has a very large role to play in transitioning to net zero emissions by 2050.[63] Using the four pillars of decarbonisation (Figure 20), a range of emissions reduction actions should be taken across sectors, including:

- transitioning energy generation to renewables, adopting renewable energy storage and influencing energy demand (refer to 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 (refer to the Transport chapter); and
- improving sustainability and efficiency performance in the built environment.

Figure 20: Four pillars of decarbonisation[64]



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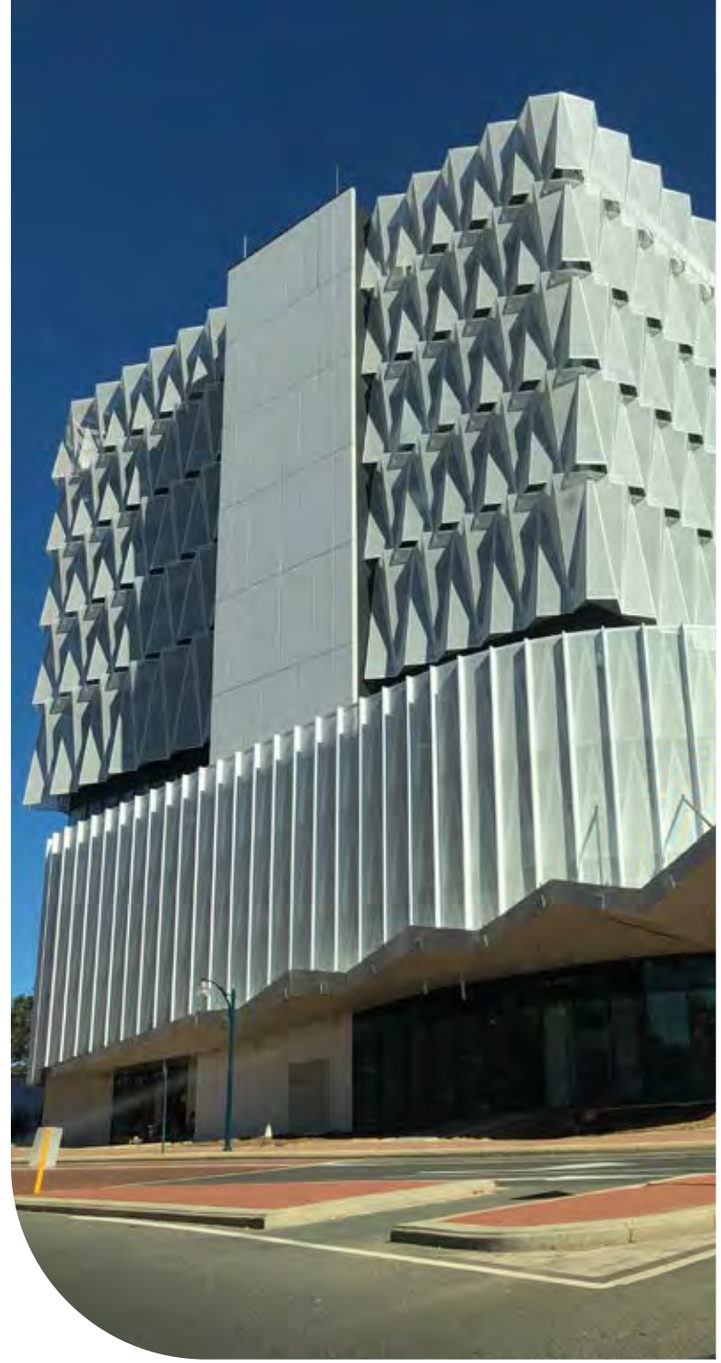
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Policy and infrastructure decision-making processes should focus on these areas to ensure the State Government is leading the transition to net zero emissions by 2050. While there are upfront capital costs associated with infrastructure sector emissions reduction, low carbon technologies are, in many cases, becoming more cost-effective than fossil fuel-related alternatives. Reducing emissions through energy efficiency also reduces infrastructure operation costs for 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.[65]

At the same time as reducing infrastructure sector emissions, the resilience of existing and planned assets to manage the risks that climate change poses to infrastructure, the people that use it and the economy must be increased. Essential infrastructure in key sectors, such as housing, transport, energy and water, are potentially at risk from sea level rise, coastal inundation, intensifying weather events and bushfires. The State Government has 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. State Government can show leadership and drive change through its buildings and assets – owned, leased and constructed – 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 industry, change can be achieved by accelerating transition to the National Construction Code 2022 which will possibly 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.



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Governance

Climate policy and assessment

In 2020, the State Government released the WA Climate Policy, which commits to working with all sectors of the economy to achieve net zero emissions by 2050 and outlines actions to support emissions reduction and enhanced climate resilience.[66] The Department of Water and Environmental Regulation is responsible for coordinating a suite of actions under the WA Climate Policy, with implementation actions distributed across a range of State agencies. As WA has not established firm, economy-wide interim or 2050 targets through legislation, government-led climate action relies on the initiatives set out in the WA Climate Policy.

This Strategy seeks to build on these actions by embedding and accelerating initiatives across infrastructure sectors, particularly through the leadership of agencies and GTEs.

The *Greenhouse Gas Emissions Policy for Major Projects*, which pre-dates the WA Climate Policy, also includes an aspiration for the State to reach net zero emissions by 2050.[67] 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.[68] 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 State Government's aspiration.

Climate change adaptation planning has also begun to be reflected in a number of policies and initiatives across State agencies, 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.[69] The Department of Treasury is currently preparing a Climate Risk Framework that will establish principles to be applied universally, with the intention that agencies will self-assess risk levels and report to government.

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Climate change mitigation and adaptation in State agency and Government Trading Enterprise infrastructure planning

In developing this Strategy, IWA undertook a review of State agencies' and GTEs' strategies and Strategic Asset Plans. Most plans did not communicate that climate change mitigation and/or adaptation considerations had factored in 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 Report 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 – sustainability is sometimes considered at individual State agency or project levels. Sustainability certification is being applied for 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 and consistent framework. In the absence of an agreed position, DevelopmentWA has been applying the Global Reporting Initiative Standards in its Annual Sustainability Report for a number of years to assess performance against sustainability measures.

Recently, the Western Australian Treasury Corporation has been working with State agencies and GTEs to prepare an Environmental, Social and Governance Framework. The framework should articulate the State Government's credentials and desire for continuous improvement, with a view to increasing interest in State bonds. These frameworks are becoming increasingly important to investors in supporting their capital decisions and ensuring they meet ethical outcomes.

Recommendations

Timeframe for completion:
● 2022-2027 ● 2027-2032 ● 2032-2042

Embed and action Western Australia's net zero emissions by 2050 aspiration

IWA views the State Government's aspiration for whole of economy net zero emissions by 2050 as a de facto target. As such, its achievement is at risk given the approach taken by most State agencies so far. A critical review of the contribution that each State agency and GTE makes to emissions reduction within its existing and planned asset base, the role of their suppliers, as well as the influence that State Government has on the emissions profile of other parties, is essential.

Key actions from the WA Climate Policy that embed greenhouse gas reductions in State Government infrastructure assets and broader activities include:

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

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Limited detail is provided as to the methodology, timing or requirements for these plans and strategies in the WA Climate Policy. Development of net zero emissions transition plans and sectoral emissions reduction strategies should be accelerated, with cost-effective greenhouse gas reduction actions appropriately funded and resourced.

Recommendation 11

Implement the State Government's policy for net zero emissions by 2050 by:

a. embedding the net zero emissions by 2050 aspiration as a de facto target for all State agencies' and Government Trading Enterprises' infrastructure-related assets and activities;
b. preparing and implementing net zero transition plans as required by the *Western Australian Climate Policy* by an agreed deadline. The plans should:
   i. include interim targets for Scope 1 and 2 emissions associated with facilities under the State agency's or Government Trading Enterprise's operational control;
   ii. identify actions that deliver a triple bottom line benefit for Scope 1 and 2 emissions reductions which are supported by the identification of timing, funding and resources[70];
   iii. include mechanisms for State agencies and Government Trading Enterprises to report progress against targets and implementation actions on an annual basis;
   iv. be supported by funding, resources and public sector capability training; and
   v. contribute to public annual reporting on whole of government progress of the plans; and
c. preparing and implementing sectoral emissions reduction strategies as required by the *Western Australian Climate Policy* by an agreed deadline. The sectoral emissions reduction strategies should:
   i. be prepared under the direction of the Department of Water and Environmental Regulation with authority of a Cabinet decision;
   ii. clearly identify government policies and processes that impact economic sector emissions and the changes required to those policies and processes consistent with the sectoral emissions reduction strategies;
   iii. include analysis of opportunities for State agencies and Government Trading Enterprises to influence embodied, operational and enabled emissions;
   iv. account for enabled emissions through infrastructure design and assessment processes, and prepare infrastructure to accommodate emerging low and zero carbon technology and transitions;
   v. identify cost-effective emission reduction actions, along with associated requirements for funding and financing, resources and public sector capability training; and
   vi. be supported by an annual public report that details 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.

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Progress and expand government initiatives on carbon farming to support a market for carbon sequestration demand

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. 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 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.

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

- the Carbon for Conservation Initiative: which provides opportunities for carbon farming service providers to work with the State Government to restore degraded areas of the conservation estate (Department of Biodiversity, Conservation and Attractions);
- the Carbon Farming and Land Restoration Program: that targets the uptake of carbon farming in the 'South West agricultural zone' (Department of Primary Industries and Regional Development);
- Problem and Opportunity Statements: for 50,000 hectare expansion of softwood plantation estate in the next decade (Forest Products Commission); and
- enabling access to the Federal Government's Emissions Reduction Fund: for human-induced regeneration on pastoral leases, and savannah burning (emissions avoidance) methods for Crown land in the Kimberley (Department of Planning, Lands and Heritage).

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



Recommendation 12

Strengthen and expand existing programs outlined in the *Western Australian Climate Policy* to develop carbon farming and sequestration markets. This should include:

a. assigning a lead agency to coordinate the program of works, including development of a Western Australian carbon farming strategy and carbon farming industry development plan across agencies 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; and ●

c. supporting Aboriginal empowerment through land management and custodianship in carbon farming initiatives. ●

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An integrated, state-wide approach for climate change adaptation

Climate change impacts on infrastructure sector assets will continue to occur 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 resilience of new assets, to disruptive climate-related events and chronic climate trends. Doing 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 Government policy and operations. These include the:

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

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, its infrastructure and communities. Due to the complexity of climate change adaptation and cross-sector implications, there is a need for state-wide 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

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and opportunities to manage or reduce climate impact risks on infrastructure. Plans should be developed for key systems such as health, transport, energy, water and the built environment and be led by the key agencies 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 state-wide 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.

Recommendation 13

Implement a state-wide approach for climate change adaptation for existing infrastructure by:

a. expanding the Climate Science Initiative to require state-wide coverage across all regions (not just priority regions). The initiative should be updated regularly to incorporate new information;
b. requiring all State agencies and Government Trading Enterprises to develop a climate change adaptation plan to enhance the climate resilience of assets, operations and services under their control. This includes analysis of place-based climate change impacts, a risk assessment of vulnerable assets and the infrastructure requirements to increase resilience to potential climate change impacts for assets at risk. Infrastructure resilience requirements should be embedded by State agencies and Government Trading Enterprises in Strategic Asset Plans and business cases;
c. as part of the development of the Pilot Sectoral Adaptation Plan outlined in the *Western Australian Climate Policy*, developing guidance that enables agencies, in partnership with Government Trading Enterprises and peak industry bodies, to progress the further development of sectoral adaptation actions; and
d. requiring State agencies and Government Trading Enterprises, in partnership with the private sector, to develop sectoral adaptation plans beyond the pilot plan as outlined in the *Western Australian Climate Policy*. The plans should enable sectoral stakeholders and infrastructure asset owners to identify climate change risks and measures to adapt to current and future climate change impacts. Agencies responsible for development of the plans should report implementation progress on an annual basis.

Government coordination for climate change mitigation and adaptation

The State Government can greatly assist climate action by leading and coordinating sector-wide and state-wide action. The Government can also facilitate communities and organisations working together to understand and address challenges. The Department of Water and Environmental Regulation has been charged with this responsibility through coordinating the 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 annual performance reports would assist.

Recommendation 14

Implement effective methods of accountability and coordination across State agencies and Government Trading Enterprises to support climate change mitigation and adaptation, such as regular public reporting of progress by the responsible Minister and including performance measures in Directors General and Government Trading Enterprises Chief Executive Officers' accountability mechanisms.

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

Embed sustainability into the infrastructure decision-making process

Embedding sustainability considerations into the infrastructure decision-making process is important. IWA's legislative requirements reflect this significance, and require assessment of triple bottom line outcomes when considering WA's infrastructure needs. 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, delivery and operational phases.

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. Once the investment decision has been made, 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 agencies, a consistent approach is required to influence greater sustainability outcomes for infrastructure.

Recommendation 15

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

a. through updates to the Strategic Asset Plan guidelines, require State agencies' and Government Trading Enterprises' Strategic Asset Plans to include:
   i. a hierarchy of strategic responses including: (1) reducing demand on infrastructure assets before (2) improving productivity of existing infrastructure; and then (3) increasing infrastructure supply through smarter, more sustainable build options; and
   ii. projects and actions identified in climate change strategies and plans including the net zero transition plans, sectoral emissions reduction strategies, climate resilience action plan, and relevant adaptation plans;

b. through updates to the Business Case guidelines, for projects and programs with a capital cost of $100 million or more, require business cases to:
   i. clearly identify environmental, social and economic impacts (positive and negative);
   ii. 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;
   iii. align to emission reduction goals and pathways identified in net zero emissions transition plans and sectoral emissions reduction strategies (once developed); and
   iv. demonstrate potential climate change impacts on the assets, and adaptation actions to reduce infrastructure vulnerability and increase resilience; and

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

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Sustainable finance is increasingly becoming a focus of financial markets, with over US$800 billion in green, social or sustainable finance in place by 2020 to support improved environmental, social or governance outcomes. A large portion of WA's infrastructure will directly support positive environmental or social outcomes and can be funded using sustainable finance sources.

Environmental, Sustainable and Governance (ESG) investment (also known as green, sustainable, or socially responsible investment) refers to investing finances in projects and programs that prioritise positive environmental, social or governance outcomes. Private-capital ESG investment in government projects and programs is increasingly becoming a focus of financial markets, including banks and superannuation funds, because of their low investment risk, good returns and positive ESG impacts. State governments can raise funds for sustainable projects and programs, including public transport, renewable energy, energy efficient buildings and water infrastructure, issuing green, social or sustainable bonds. A large portion of WA's government-funded infrastructure, including many of those planned for and recommended in this Strategy, will directly support positive environmental, social and governance outcomes, and could potentially qualify as eligible projects to be financed by green, social or sustainable bond issuance.



Ideally, state governments aim to run an operating surplus sufficient to fund infrastructure priorities. However, most governments, including WA, borrow to fund a portion of infrastructure priorities. Good access to financial markets is important to sustain investment by the State, and the Government should look for opportunities to diversify its investor base, including through green, social or sustainable bond issuance. To progress this opportunity, the Western Australian Treasury Corporation, on behalf of the State, should finalise the development of a Sustainability Bond Framework to support asset identification, reporting regimes and plans to raise funds to support the delivery of sustainable infrastructure priorities.

Recommendation 16

Develop a Sustainability Bond Framework to facilitate green, social or sustainable bonds funding.

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Regional development

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 working together to leverage collective strengths will best-position the State to realise this Strategy's vision. Considerable flow-on opportunity will come from strengthening the regional development approach to unlock economic potential and achieve a step change in outcomes over the next 20 years.

WA is Australia's largest state and comprises ten regions – **Kimberley, Pilbara, Gascoyne, Mid West, Wheatbelt, Peel, South West, Great Southern, Goldfields-Esperance and Perth**. The nine regions outside of Perth are home to 25 per cent of WA's population, generate approximately 40 per cent of the State's Gross State Product, and are an integral part of WA's rich cultural identity.[71]

During the last resources investment boom (2007 to 2013), the State Government focussed on activating major mining, oil and gas projects and invested significantly in the liveability of regional communities. The focus for the next 20 years will ideally be on diversifying and growing regional economies and communities. As many of WA's comparative advantages are located in the regions, they have a vital role to play in driving the State's next phase of growth. Action and investment must be well coordinated to focus collective efforts on this complex task, otherwise WA will fail to fully realise the opportunity to unlock growth and achieve positive long-term regional outcomes.

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IWA recognises various initiatives that have been taken in recent years to foster greater collaboration between the regions and to better align regional development aspirations with the State's wider development objectives. The recommendations in this chapter seek to build on this work to ensure stronger outcomes for the regions and the State into the future.

WA's ten regions are highly diverse, with a range of social, environmental and economic strengths, as well as inequalities such as life expectancy, unemployment, and digital accessibility. Figure 21 identifies WA's ten regions. The regions are highly interdependent, with social and economic linkages spanning regional boundaries and global markets.

Perth is WA's most developed region, and is the largest 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 industries and close gaps in regional outcomes.

In WA, regional development is focussed on the nine regions outside of 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 outcomes for the regions and the State. It should enhance regional productivity by strengthening and developing industries to generate sustainable growth and employment. It should also address gaps in social services, which are critical to regional communities' wellbeing and liveability, and their ability to attract and retain people.

Regional communities, businesses and all tiers of government have respective and important roles to play. IWA's regional consultation shows that communities and businesses are mindful of global change and the opportunities it presents. Changes in international markets and shifts in global power bases will influence regional economies and a collaborative approach to embrace change, diversify economies and build thriving communities is required.

Government regional development roles in Western Australia

The Regional Development Portfolio is responsible for leading regional development, and comprises:

- Department of Primary Industries and Regional Development: 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 nine Commissions are the lead agencies responsible for promoting and coordinating the social and economic development of WA's nine regional areas outside of Perth;
- Regional Development Council: established under the *Regional Development Commissions Act 1993*, the Council consists of the chairs of the nine Commissions and is the key advisory body to the Government on regional development issues; and
- WA Regional Development Trust: 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 Fund and any other matters referred to it by the Minister.

This is in addition to those State agencies with overarching responsibilities (for matters including economic development and planning) and others with state-wide responsibilities (such as health, education, water and power).

The nine 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.

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

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Building on Western Australia's regional strengths

The same global changes driving the need to build a more diverse and resilient economy are also creating new strategic opportunities for which WA, and many of its regions, are well placed.

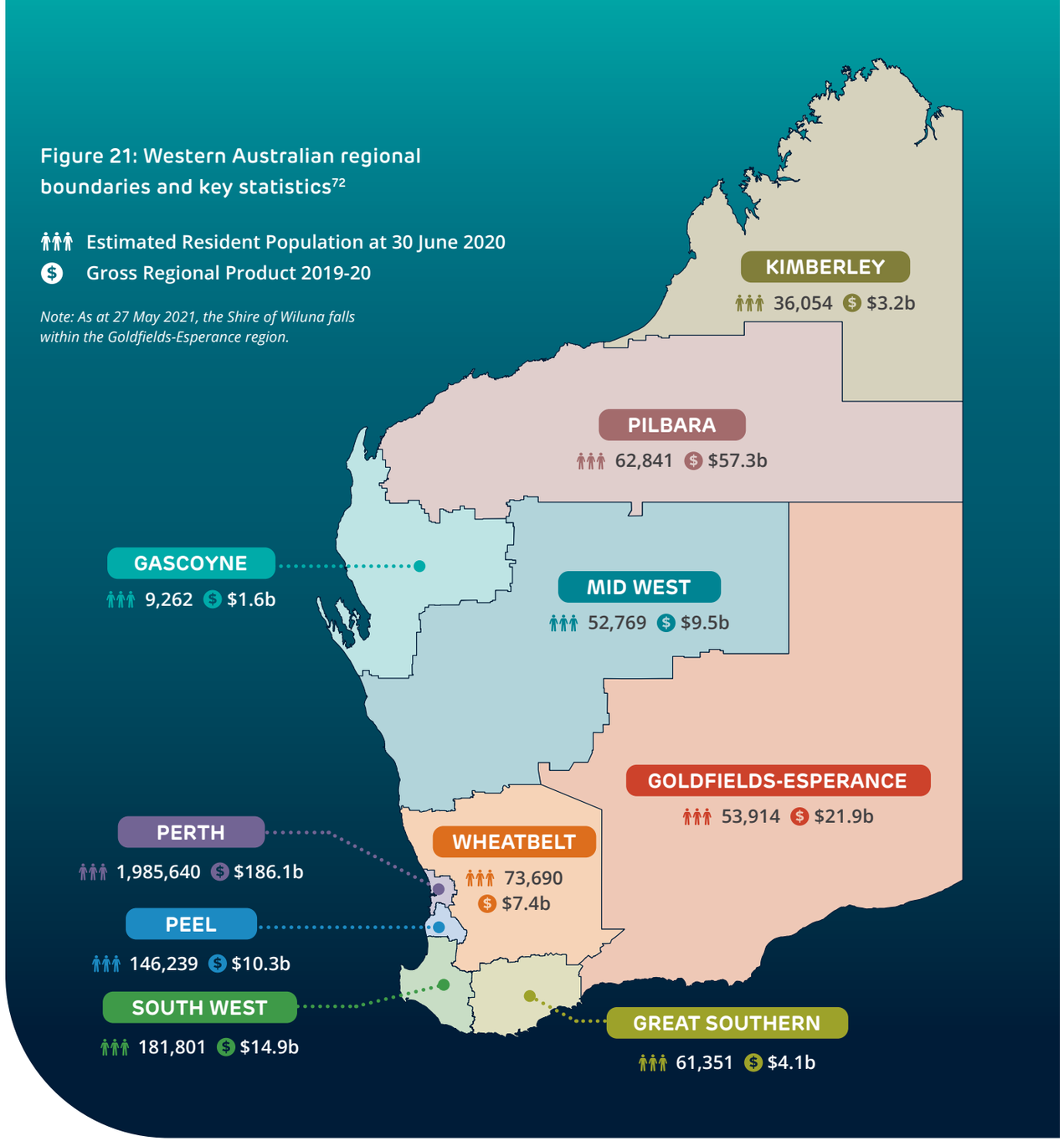
The six strategic opportunities identified in this Strategy align with *Diversify WA*, the State Government's economic development framework. However, as *Diversify WA* provides limited direction on which industry sectors each region should support, this Strategy has gone a step further by identifying 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.

It should be noted that Table 2 is not intended to be a comprehensive list, and only identifies the top two to three 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 to which a particular region may aspire.

Figure 21: Western Australian regional boundaries and key statistics[72]

Estimated Resident Population at 30 June 2020
Gross Regional Product 2019-20

Note: As at 27 May 2021, the Shire of Wiluna falls within the Goldfields-Esperance region.



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

Region	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 interstate and international tourism, and the Ningaloo Coast (including Exmouth) as a world-class tourism precinct. • Support renewable energy and hydrogen industry. • Support and advance Aboriginal enterprise, and improve the liveability of remote Aboriginal communities and town-based reserves.
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, tourism, resources and tertiary institutions. • Liveability, and largest regional population, workforce, and business sector. • Natural environment, State forests and water resources.	• 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 Fast 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.
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.

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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. This has provided a consistent and evidence-based method of identifying comparative strengths to inform the portfolio 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

Digital connectivity infrastructure is a critical asset, however 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, however the market is not adequately meeting all regional needs. Infrastructure will be required to improve digital connectivity and support mainstream adoption of digital technology. Key recommendations include:

- Develop a state-wide plan to accelerate digital transformation and improve connectivity in the regions to enhance social and economic benefits, and reduce disadvantage.
- Provide State Government funding and leverage Federal Government co-investment opportunities to improve connectivity.

Improving Aboriginal outcomes

In 2016, approximately 61 per cent WA's Aboriginal and Torres Strait Islander people lived outside of the Perth metropolitan area.[73] 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. Key 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.
- Adopt Aboriginal employment targets and strengthen procurement targets.
- Take action to build the capacity and capability of Aboriginal businesses.
- Review approaches to the delivery of Aboriginal-led housing design and management.

In relation to remote Aboriginal communities and town-based reserves:

- Improve the way infrastructure is planned and delivered.
- Establish a sustainable funding model and investment framework to guide infrastructure investment.

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- Provision of water, wastewater and power should be transitioned to Water Corporation and Horizon Power, supported by tiered regulated service standards.
- Clarify the roles and responsibilities for provision of municipal services such as roads, waste management and recreation facilities.

Mitigating and adapting to climate change

The impacts of climate change will be felt strongly in regional areas – this is already happening to some extent. Government and industry need to respond to global action to reduce carbon emissions. Industry and investors are increasingly avoiding jurisdictions 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. Key recommendations include:

- Develop up-to-date climate change information and modelling that covers all of the State's regions (not just priority regions).
- Embed the net zero emissions by 2050 aspiration as a de facto target for all State agencies' and Government Trading Enterprises', infrastructure-related assets, activities and infrastructure to achieve net zero carbon emissions.
- Accelerate preparation of sectoral emissions reduction strategies.
- Develop climate change adaptation plans to effectively manage risks to existing infrastructure.



- Subject projects and programs with a capital cost of $100 million or more, to more rigorous sustainability assessments.
- 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 central department or governance mechanisms that encourage a consistent, integrated approach across all sectors and regions.

Securing reliable and affordable energy

The energy sector is going through a period of rapid transformation that is affecting regional WA in many ways. 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. Key recommendations include:

- Update the *Whole of System Plan* to address a range of additional factors, including carbon emissions reduction targets.
- Prepare a North West Interconnected System Energy Futures Report to provide a long-term view on energy generation, demand and network infrastructure requirements.
- Realise the potential of energy storage and standalone power systems, particularly for geographically-isolated communities currently on the edge of the grid, or reliant on expensive diesel standalone systems.
- Plan for enabling infrastructure to grow and support the hydrogen industry.

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Securing reliable and affordable water

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 the State 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. 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. Key recommendations include:

- Modernise legislative, regulatory and planning frameworks for water resources and water services.
- Develop a state-wide, 20-year+ State water strategy, as well as regional water plans aligned to the State water strategy.
- Review and reform self-supply arrangements for strategic groundwater resources.
- Develop an investment prioritisation framework to support investment in water infrastructure projects for the agricultural industry.



Waste

Regions have the potential to improve the way waste is managed and recycled. Further work is needed to achieve targets outlined in the *Waste Avoidance and Resource Recovery Strategy 2030*. Key recommendations include:

- Undertake state-wide 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 its rate and application state-wide.

Strengthening regional transport and supply chain connectivity

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

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Key recommendations include:

- Enable direct shipping into northern WA to improve market access and reduce costs.
- Undertake targeted investment in the freight network across the Wheatbelt, Great Southern, Goldfields–Esperance and Mid West regions, to maintain global competitiveness of agriculture exports.
- 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.
- Update transport and freight route strategic planning to address long-term State and regional needs, including development of:
  - a 20-year regional transport plan focussed on enhancing freight supply chains for existing and emerging industries; and
  - a 20-year Perth and Peel transport plan.
- Investigate the long-term feasibility of Bunbury Fast Rail.

Addressing gaps in regional services

Social services and infrastructure, including health, education and training, and justice and public safety, are critical to the liveability of regional communities, their capacity to attract and retain people, and build a future-ready workforce. Infrastructure is required to enable gaps in services to be addressed and the provision of integrated, accessible and efficient services tailored to local needs.

– Social and affordable housing

- Prepare 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.
- Review regional officer housing assets across the public sector, including the Government Regional Officers' Housing program as staff housing needs are often not being 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 to deliver virtual services to regional areas, such as telehealth and remote monitoring.

– Education and training

- Improve school infrastructure planning for areas of growth by reviewing data formats and assumptions, and implementing new modelling technologies.
- Ensure individual school planning and delivery methods plan for and use transportable buildings as a temporary solution only, and not where 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 regional areas.
- Plan for future skills and training and fund relevant TAFE training equipment and software, and expand industry co-contributions where relevant.

– Justice and public safety

- Implement policies and programs that support early intervention and prevent reoffending to reduce unsustainable growth rates of imprisonment and recidivism for all groups, and Aboriginal people in particular, given their over representation in the justice system.
- Invest in shared facilities and precincts to increase the provision of complementary and preventative services and community development initiatives.
- Progress business cases for the replacement of Broome Prison and the future phases of the Government Radio Network.

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Regional hubs

Regional cities and towns accommodate most of regional WA's population. Government should review the strategic roles of regional cities and towns in the settlement hierarchy, and prioritise those required to support the strongest economic and population growth opportunities.

The *State Planning Strategy 2050* sets out WA's settlement hierarchy (based on size) which includes four tiers of centre – capital city (Perth), regional centre (11 centres), sub-regional centre (16 centres) and other centre (13 centres). These 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.

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 attract and retain skilled migration.

However, regions 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 been experiencing population declines due to structural change. Close attention will need to be paid to regional growth drivers so that WA can take a proactive approach to regional centre growth, and respond promptly to growth pressures, such as those experienced in the Pilbara during the last resources boom.

The settlement hierarchy was last updated in 2012 at the height of the last resources boom, but given the changing economic outlook it potentially does not reflect the strategic roles 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 that support the strongest economic and workforce growth. IWA will align its advice on infrastructure investment with the strategic importance of a regional centre to support strong industry and employment growth.



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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 the Gascoyne present opportunities to realise the Federal Government's Northern Australia agenda.

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 up new supplies of iron ore over the next ten 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 to attract and retain a workforce to support growing industries. Karratha is the largest regional centre, with the momentum to become the main innovation hub in the north-west.

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Recommendations

Timeframe for completion: 2022-2027 2027-2032 2032-2042

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 development of a regional development plan as a first step towards the development of a strategic framework connecting the whole of government regional development approach. Its development in line with this Strategy's recommendations is encouraged.

To be able to align infrastructure with regional development priorities, a range of national, State, regional and local policies, strategies and plans such as 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 and 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 state-wide implications.

The Productivity Commission's *Transitioning Regional Economies Study Report* (2017) and the *Special Inquiry into Government Programs and Projects* (2018) both noted that the effectiveness of the Royalties for Regions (RfR) program was hampered by a lack of a strategic framework setting out regional priorities and outcomes to guide investment decisions. 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'.

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'. 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 the RfR program.

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, RfR being just one of those. 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 to 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

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

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development and implementation of a regional development strategic framework. The framework would signal 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, but 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.*

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. 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 (refer to the Planning and coordination chapter) and is robust, consistent, and evidenced based;
- a regularly updated implementation plan setting out activities where stakeholders need to work 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;
- a portfolio management approach that links the strategic document, proposals and funding sources, and embeds a formalised proposal development, evaluation, prioritisation and approvals process and framework, that includes principles to guide how proposals are evaluated and prioritised under the framework;
- 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;
- a governance structure to drive development and implementation of the regional strategic development framework, with oversight including government representatives from outside the Regional Development Portfolio, such as the Departments of Treasury and Jobs, Tourism, Science and Innovation; and
- 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 growth;
- managing the long-term development and growth of regional centres; and
- promoting regional migration and population attraction and retention.

Given anticipated long-term change, it is recommended that regional economic scenario modelling be completed and 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.

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Recommendation 17

Develop and implement a regional development strategic framework that identifies State and regional priorities to guide effective whole of government action and investment. The framework should:

a. align to other government strategic documents, such as this Strategy and *Diversify WA*, and be developed in collaboration with government, business and regional stakeholders;
b. be reflected in State agency and Government Trading Enterprise Strategic Asset Plans and business cases, as a requirement of updated Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines;
c. prioritise regional centres based on their strategic importance to the State's economic and population growth. Prioritisation should take into account drivers of the State's economic growth and the settlement hierarchy should be updated accordingly; and
d. align to integrated regional land use plans, informed by the regional development strategic framework. These should include a baseline assessment of each region's infrastructure, and identify infrastructure and staging required to support the region's development and growth underpinned by a credible evidence base.

Recommendation 18

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

Integrated regional service models

IWA's regional analysis has highlighted the impact that social, economic and technological change will have on regional WA. Looking ahead, regional centres supporting growing economies will require social services to keep pace with demand and support population attraction and retention. However, factors such as climate change or disruptive technologies impacting on jobs may result in some regional areas experiencing population decline. As previously noted, some towns in regional areas have already been experiencing population decline due to structural change. Current services and infrastructure in many smaller regional centres and communities in these areas may become unsustainable and will need to adapt to changing circumstances.

New regional service models are required that offer service providers shared platforms to organise, plan and adapt, and co-design services to suit the varying needs of regional communities and deliver services as efficiently as possible over large regional areas. With the increasing focus on providing more integrated, customer-centric and community-based services to improve accessibility and outcomes, place-based planning and delivery models that facilitate collaboration between health, education, justice, housing and emergency services, should be investigated. This would include considering case studies from other jurisdictions, and piloting models to determine their efficacy in different regional settings, including in a remote Aboriginal community, small town and regional centre. Digital technology must play a key enabling role, facilitating communication, integration, and provision of customer services. Given the role of local governments, they may be well positioned to facilitate and support place-based integrated service models.

WA should also investigate applying a 'hub and spoke' model to provide a logical and transparent way of coordinating and collocating services and infrastructure across regional WA. The WA Country Health Service already applies this approach in the way it delivers services across vast regional areas, which could potentially be applied to other services. A hub and spoke approach that builds on WA's settlement network would provide multiple social service providers with a common geographic frame of reference upon which to plan and deliver services.

From a health perspective, stronger service integration has the potential to improve health outcomes and reduce demand for larger hospitals, which will be challenging to maintain in areas experiencing population decline.

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A social services and infrastructure needs assessment is required to support the design and implementation of integrated regional service models. The assessment should consider community needs and how they may change over the next 20 years, whether services are meeting those needs or could be provided in more effective ways, and identify any service gaps that need to be addressed.

Recommendation 19

Develop and implement a regional service and infrastructure framework to support more integrated, localised and efficient services and infrastructure across WA's diverse regional centres, including:

a. state-level settings to facilitate cross-sectoral planning and coordination of services and infrastructure aligned to WA's settlement network and hierarchy (for example, based on a hub and spoke network model, if appropriate), including health, education, justice, policing, housing and emergency services;

b. regional centre-level settings to facilitate place-based approaches, and co-design and collocation of services and infrastructure (for example, using a hub and spoke model), including health, education, justice, policing, housing and emergency services. Local government should play a role in facilitating collaboration in their regional centre, and potential models should be piloted in a remote Aboriginal community, small town and regional centre; and

c. a social services and infrastructure needs assessment to understand how long-term social and economic change will affect needs, and identify gaps in or between services provided in regional centres, that should be addressed.

Working Together: One Public Sector Delivering for WA (Service Priority Review)

The State 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'. 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. This Strategy supports and aligns with these recommendations.

New South Wales hub and spoke model

New South Wales (NSW) is moving to a hub and spoke model that focusses major investment in regional centres that can support the communities that surround them[74]. The model is defined as a 'service delivery model that provides connections (spokes) to and from key centres (hubs). The spokes link to different hubs across an area, rather than focussing on one key hub'.

The hub and spoke model recognises the importance of regional strategic 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 NSW's network of regional centres, providing a geographic basis for 'optimal and productive land use, economic and infrastructure planning'. Strategic regional centres and cities form the hubs, and surrounding towns and communities form the spokes.

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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.

Planning and coordinating infrastructure, for populations and economies that will grow and change, is a universal challenge. For WA, the task at hand is to build on the existing program of incremental reform. This is best 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 agencies, 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 agencies 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 will be unclear; there will be duplicated or inconsistent governance and approvals; and a lack of early and effective stakeholder collaboration.

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Many and varied reform initiatives have been advanced by State governments 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 COVID-19 recovery have amplified this reform program and pace of change for government, demonstrating how collaboratively agencies can work to respond to significant change. Yet there is still much more that can be done.

Many of the issues and considerations covered within this chapter are perennial and familiar issues for governments, often without clear ownership by a State agency 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.

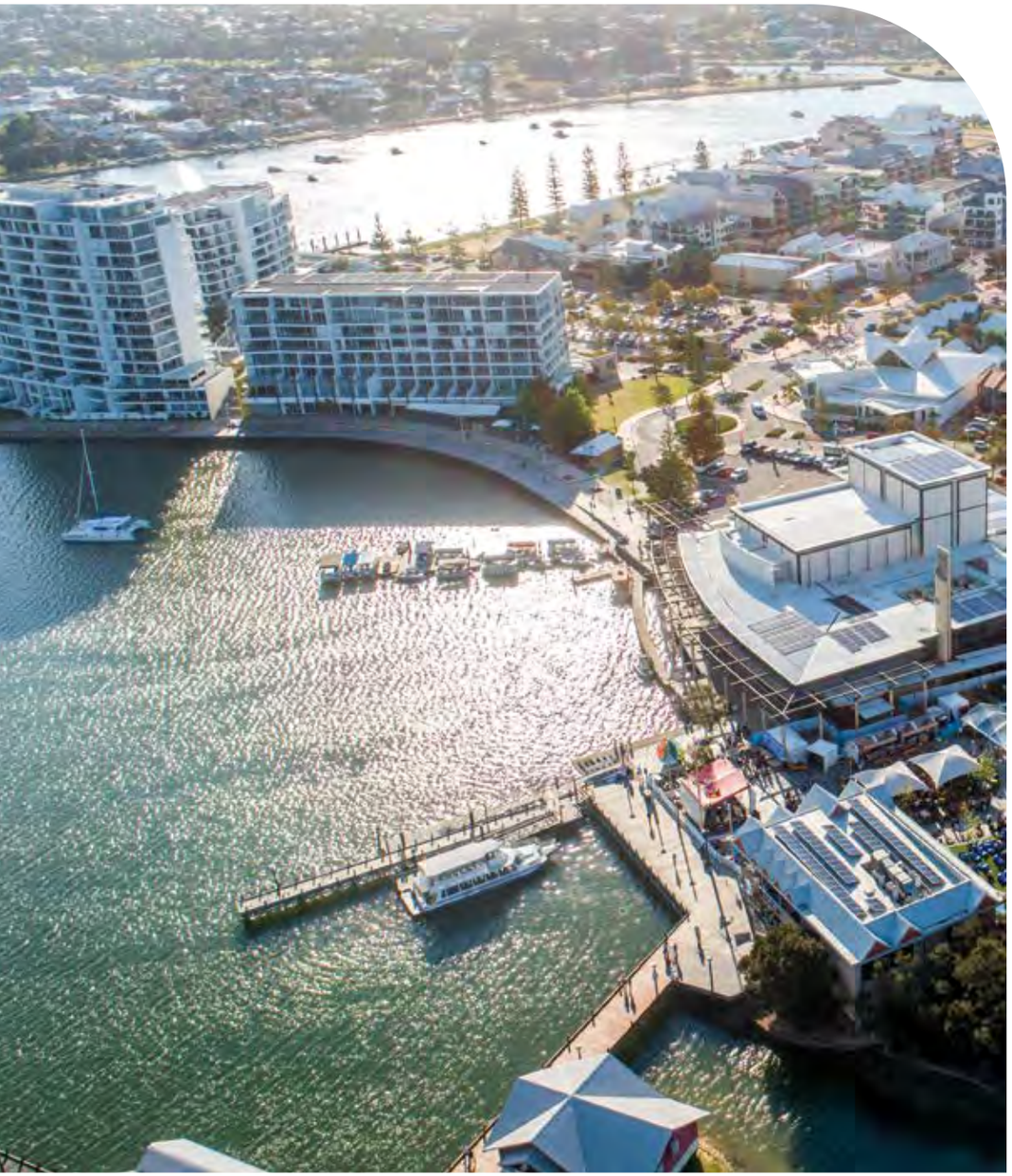
Both smaller-scale interventions and major reform initiatives can collectively enhance coordination of government operations and improve positive interactions with business and the wider community. Collectively, these initiatives work towards making WA a global location of choice – both for business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

There are several core areas of focus for government, and recommendations in this chapter identify further reform needed to effect meaningful change:

- **Culture:** striving to achieve better infrastructure outcomes through collaboration and stewardship, with industry and community, across the public sector.
- **Investment decision–making frameworks:** supporting sound, timely and informed infrastructure investment decisions (right project, right place, right time) made on a level playing field.
- **A contemporary and outcomes-focussed legislative and policy environment:** facilitating streamlined approvals and delivery processes for infrastructure, whilst 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 land sites:** 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 agencies 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.



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Governance

Integrated planning and cross-government coordination are the responsibility of all State agencies and GTEs. The recommendations in this chapter, however, are largely confined to 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 agencies play a lead role in this regard with some of their key functions provided below:

- Department of Treasury is the principal economic and financial advisor to the State Government, including coordination and oversight of the annual State Budget, economic policy and responsibility for the Strategic Asset Management Framework (SAMF).
- The Western Australian Planning Commission (WA Planning Commission) is an independent statutory body, established under the *Planning and Development Act 2005*, responsible for land use planning policy; determination of structure plans, subdivision and state-significant development applications; administration of region schemes; as well as making recommendations to the Minister for Planning.
- Department of Planning, Lands and Heritage provides resourcing support to 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 defence, international education, science and innovation sectors.

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Recommendations

Timeframe for completion:
● 2022-2027 ● 2027-2032 ● 2032-2042

Stewardship of infrastructure and investment proposals

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 customer 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 according to different activities, together with the information required to support applications, and the expected timeframes for decisions.

The creation of a one-stop shop, intuitive, online 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 would improve customer 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, and early engagement with relevant agencies to identify matters such as outcomes, interdependencies and risks.

Recommendation 20

Develop a single digital government approvals system by:

a. providing a single access platform, offering standardised, consistent and transparent information covering all State Government approvals processes, timeframes, roles and responsibilities and supporting information required from the proponent; and ●

b. developing and delivering staged updates to the platform, creating a single lodgement portal for all State Government approval applications, that allows users to track progress through the portal, enables transparent reporting and facilitates sharing of consistent information across agencies. ●

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

- **Lead agency framework:** guidance that clarifies the lead State agency responsible for coordinating certain types of proposals and major projects.
- ***Market-led Proposals Policy:*** a process for State Government to consider or seek private sector proposals to harness opportunities;
- **Approvals WA:** 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); and
- **Environment Online:** a new portal launched by the Department of Water and Environmental Regulation providing a digital one-stop shop for environmental assessments, approvals and compliance, with the aim of reducing approval timeframes by six to 12 months. It establishes a platform to share environmental data across agencies and consolidate information (part of Streamline WA).

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



Contemporary and outcomes-focussed legislation

A number of outdated legislative provisions are impeding outcomes, or leading to unnecessarily protracted approvals, for infrastructure proposals. To address this issue, targeted cross-government legislative 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, with consistent practice to update related policies concurrently, make consequential amendments or rescind where 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. An example of legislation that should be reviewed is the *Public Works Act 1902*. This Act is well over 100 years old and is in need of modernising. It contains outdated provisions that should be removed, such as requiring an Act of Parliament for the construction of a public railway.

Recommendation 21

Modernise infrastructure-related legislation through targeted amendments by:

a. reviewing relevant legislation, at least every five years, and progressing targeted amendments to streamline project approvals processes and reduce regulatory and reporting burdens; and ●

b. undertaking an evaluation of the success of the COVID-19 temporary measures and identify if these changes in project approvals are suitable for adoption on a permanent basis (for example, Part 17 of the *Planning and Development Act 2005*). ●

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Integrated planning to support growth

Aligning infrastructure planning and delivery to accommodate growth is a prevailing theme across this Strategy. Such practice requires cross-sector coordination, and a common understanding of the long-term objectives for places and regions, to optimise infrastructure and community outcomes. Step-change improvement in infrastructure coordination is required to support growth, together with more explicit direction from government about where and how growth should be accommodated.

Policy and government involvement to support greater urban consolidation in the Perth and Peel regions

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. Successive State governments have adopted an infill housing target of 47 per cent, in *Perth and Peel@3.5 million* and the preceding *Directions 2031 and Beyond*. This infill target is low compared to those set for some other Australian cities – 85 per cent in Adelaide by 2045 and an aspiration of 70 per cent in Melbourne by 2050.[75] However, even the current target for Perth is not 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 and employment. While figures vary across sources and jurisdictions, the cost of providing infrastructure to greenfield lots is two to four times more than infill development, depending on the capacity of existing infrastructure to support additional people.[76]

Some current policy settings are out of step or, in some cases, in direct conflict with the State 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 Medium Density Code 4 to be in effect, to ensure well designed and appropriately located infill development.[77]

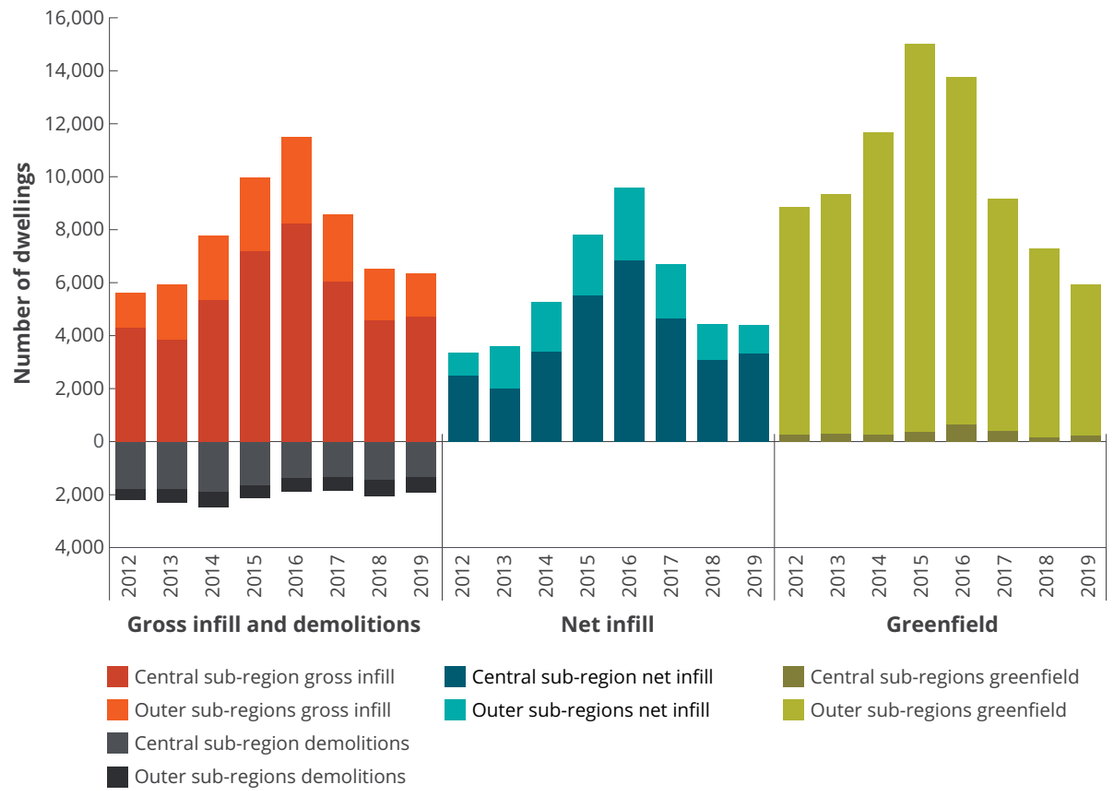
Significantly increased support, effort and accountability is required to ensure the infill target is met and exceeded.

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:** through Design WA, (a suite of State Planning policies and associated initiatives), design quality for precincts, apartments and medium density development, have received significant focus and will result in improved housing, urban design and community outcomes. However, a number 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. Policy settings will require amendments and adjustments to better respond.
- **Incentivise infill development:** the State 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.

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Figure 22: Dynamics of dwelling development 2012 to 2019[78]



Progress against the 47 per cent infill targets for Perth and Peel is variable year-on-year, however, net infill development is far from comparable to greenfield development on a sustained basis. In 2019, **net infill was approximately 43 per cent, up from 38 per cent in 2018**. Figure 22 presents key measures of dwelling dynamics relating to monitoring infill from 2012 - 2019.[79]

Recommendation 22

Prepare and implement an urban consolidation action plan which identifies the significant barriers to increasing urban consolidation and sets out a clear roadmap to address them, including intended outcomes, responsibilities and timing. This should include:

a. reviewing and adjusting policy settings to support liveability and amenity improvements in infill locations. Particular focus should be given to refining development contribution settings for public open space, public realm improvements, schools and utilities; ●

b. planning incentives to further support infill development, such as development bonuses that encourage land assembly in precinct planning to create a stronger pipeline of development sites, and funding and operational support for precinct planning in infill locations; and ●

c. purchaser incentives to support infill development, such as extension of the *Off the Plan Duty Rebate Scheme* for apartments, or place-based approaches to building bonus grants and Keystart lending requirements. ●

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Apply infrastructure appraisal principles to planning decisions

Land use planning in WA has traditionally focussed on the development of greenfield sites on urban fringes, to meet housing and employment needs. Rezoning of large tracts of land, with poor prioritisation over many years, has resulted in a growing infrastructure need across a large number of 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 the servicing agencies and GTEs, and may not be captured at all by some authorities. By understanding the full capital and ongoing operational costs of infrastructure, 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.

The Greater Sydney Commission's Place-based Infrastructure Compacts provide a useful frame of reference for more holistic assessment of development infrastructure requirements. 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.[80]



Recommendation 23

Embed rigorous infrastructure appraisal in the planning decision-making framework, to ensure the infrastructure servicing and operational burden placed on the State informs decisions by:

a. underpinning future reviews of *Perth and Peel@3.5million* 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. This includes understanding the cumulative impact of demand which may stimulate major new investment. This information should be used to inform the staging of 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. where proponents seek to depart from staging plans, or are outside land identified for future development in the frameworks, infrastructure servicing plans should be prepared to provide decision makers with an understanding of the real costs (capital and operational) to government. This will allow implications to be considered in planning decision-making; and

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

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City opportunity plan

A range of recommendations within the Strategy will significantly influence the dynamics of Perth's CBD and immediate surrounds, including:

- 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;
- determining a future roadmap for planning and development of Royal Perth Hospital and Sir Charles Gairdner Hospital;



- progressing light rail and/or bus rapid transit for CBD and inner-middle ring suburbs; and
- unlocking barriers through an urban consolidation action plan.

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 – providing 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. Pending timing, it may be possible for this process to be complementary to the Vision Statement required to support the Perth City Deal.

Recommendation 24

Prepare a city opportunity plan that sets an agreed strategic framework for transformation of the Perth CBD and immediate surrounds (including locations adjacent to Perth Water such as Burswood and South Perth). The plan should include:

a. a clear and compelling long-term vision for the city; and ●

b. identification of major precincts, other significant redevelopments and infrastructure that will contribute to city growth and activation, including desired outcomes for initiatives and the synergies between them; interface opportunities and issues; staging; and implementation requirements and responsibilities. ●

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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 will need to 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 for 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 alike.



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Urban tree coverage

Research proves that a higher level of tree coverage in urban settings delivers significant social, environmental and economic benefits. Quantified benefits include property value uplift – in the order of $17,000 per house for broad leafed street trees in Perth, adding between $3 and $13 for every dollar spent maintaining them, and with each tree contributing a $117,000 wellness benefit over its life span.[81] Greater tree coverage reduces air pollution, provides oxygen, and reduces the urban heat island effect by an average of six degrees.[82] Furthermore, the health benefits of trees in urban environments are significant – promoting mental wellness, reducing stress, heart rate, blood pressure and the incidence of obesity, asthma and diabetes.[83] More urban tree coverage brings an increase in the use of public spaces, together with improved social cohesion, physical activity and active transport usage. Urban forests also link to urban bushland and support biodiversity.



Over time, development patterns have resulted in a decline in urban tree canopy cover in both greenfield and infill settings. Although recent policies specifically require and encourage the retention of trees on private property and verges, it is difficult to address historical development patterns. Increasing the urban tree canopy has significant social, environmental and economic benefits, and a State-led approach can ensure more strategic and equitable outcomes.

Recommendation 25

Develop an overarching urban forest strategy for the Perth and Peel regions. This should include:

a. assigning a lead State agency;
b. expanding the existing Urban Canopy Grant Program to increase the urban tree canopy across the Perth and Peel regions;
c. partnering with local governments, community groups and other land managers in the rollout; and
d. further reviewing existing planning policy settings with regards to the treatment of trees in new greenfield and infill developments.

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, there is great variability in currency, geography, timeframes for planning, infrastructure needs, and the evidence base to support intended outcomes. Integrated regional plans, based on the

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Perth and Peel@3.5million model, would provide a consistent, long-term approach to addressing population change, land use planning and servicing requirements. This would lead to greater predictability of infrastructure needs, timing and funding. Importantly, integrated regional plans should be underpinned by region-wide economic strategies (refer to the Regional development chapter) and rolled out on a prioritised basis. Queensland's model of developing a regional plan for each of its seven regions provides a template that WA should consider.

Recommendation 26

Progressively prepare integrated regional plans to establish the long-term land use, infrastructure and environmental needs of each region. Developed in order of greatest need, integrated regional plans should be modelled on *Perth and Peel@3.5million* and supported by a robust regional development framework (refer to 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 ten years.

Introduction of State priority areas

There are several mechanisms within WA's planning framework which denote a hierarchy of places, such as strategic industrial areas, activity centres and redevelopment areas. However, clarity is required on where the State 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.



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.

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Introducing State priority areas into the state-wide 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 State land use planning intervention may apply (for example, Redevelopment Schemes and Improvement Schemes);
- mobilise State agencies and GTEs to prioritise and coordinate deconstraining activities, including investment in enabling infrastructure; and
- be supported by cross-agency governance structures (including local government) with clearly established roles and accountabilities.

Recommendation 27

Introduce and implement State priority areas to identify locations of state-level significance for greater Government infrastructure coordination and investment, tailored governance models and land use planning intervention, including:

a. developing a prioritisation framework to support the identification of State priority areas to ensure consistency of approach and application to areas of greatest strategic need or opportunity; and ●

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. ●

Facilitate investment in industrial and technological precincts

A rise in international demand for resources, coupled with business confidence associated with COVID-19-related stimulus packages, are expected to have positive flow-on effects for WA's economy and result in increased demand for industrial land across the State.[84] A more coordinated approach to infrastructure provision and approvals for the State's key 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 State Government has an important role to play in identifying and assembling land for enabling infrastructure, such as suitable port, road or rail access, water, wastewater, power and telecommunications. Where appropriate and equitable, Government investment in enabling infrastructure, that encourages industry development and economic activity, can reduce upfront costs for investors to unlock substantial private investment. Government provision of enabling infrastructure can be critical in supporting large investments in new and emerging industries including hydrogen, future batteries and minerals processing. It can allow for scalable, common use infrastructure which might otherwise have been single user, if developed entirely by a private sector proponent. To this end, the cross-agency Industrial Lands Steering Committee has developed a ten-year Industrial Lands Strategy. It highlights the need to progress land assembly and develop a funding model for strategic and general industrial areas, that can attract foundation proponents and fund common use infrastructure through appropriate processes.

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.

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This support includes streamlining and enabling government coordination and approvals for industry proponents, which can be a major hurdle. Prompt connection to the regional road (and in some cases rail) network can also be an acute issue for industrial areas. In addition, digital infrastructure, information management and connectivity in industrial precinct design are important considerations to optimise efficiency of precinct developments.

Recommendation 28

Facilitate and coordinate investment in industrial and technological precincts by:

a. prioritising the finalisation of land assembly, approvals and other preparatory works, as recommended in the proposed Industrial Lands Strategy;
b. applying existing State 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. extending the redevelopment provisions of the *Metropolitan Redevelopment Authority Act 2011's* functions and powers to non-metropolitan areas (at the point of consolidating legislation to reflect recent Machinery of Government changes);
d. establishing an assessment process for the funding of strategic enabling infrastructure (as identified in the proposed Industrial Lands Strategy) that facilitates private investment; and
e. planning for the long-term need for additional industrial and technology land 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.



Of the **7,510 hectares of land** zoned as industrial in the Perth and Peel regions, **approximately 6,650 hectares** (88 per cent) **is categorised as developed**. The majority of the 1,359 hectares of undeveloped land is in the Kwinana, Perth Airport and Jandakot Airport industrial centres.[85]

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Shared policy framework for multi-user facilities and corridors

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

Creation of a consistent policy framework for multi-user facilities and corridors is required to address the barriers to shared use, identify suitable complementary uses, 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. At a minimum, the framework should take into consideration:

- corridor reservations where a single State agency or GTE is responsible for easements or reservations and require them to make them 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; and
- shared use of public infrastructure, such as school facilities and education campuses, that are underused at certain times of the day or year.

Recommendation 29

Develop and implement a shared use policy framework and practical guidelines for multi-user infrastructure corridors and facilities. The framework should encompass planning, assembly, access, safety and operational requirements, governance, conflict resolution, staging and funding alignment, as well as apportionment of risk and liability.

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Identification and security of 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. In Perth, the Metropolitan Region Scheme is linked to a land acquisition fund – 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 undertaken 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, leading 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 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 State Government has significant landholdings that are surplus to current requirements, or not used effectively in line with their highest and best use. State Government land should be considered as 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. By centrally coordinating the identification of land for strategic infrastructure, WA can optimise the use of its government land, with appropriate consideration of compensation, including land swaps.

The State Government is responsible for vast proportions of land across WA, with **approximately 92 per cent held as Crown land,** with tenure under reserves, management orders and leases, or freehold land owned directly by State agencies and GTEs.[86]



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Green infrastructure

Infrastructure planning should always seek first to avoid environmental impacts, however, there are often unavoidable instances where mitigation, management or offsets are required. 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 most often secured on an isolated, case by case basis, sometimes resulting in poorer environmental outcomes and greater project risks associated with approval delays and access to a diminishing resource of available offsets.

The State Government has the opportunity to apply a more coordinated approach to protect larger, better networked areas of high environmental value for a cumulative package of major State infrastructure projects. Coordinated regional strategies, which identify priority areas for species or habitat protection, other offsets initiatives and a direct funding mechanism, would contribute to more sustainable, holistic outcomes. Without these, it is likely that future governments will find it increasingly difficult to deliver infrastructure projects in a timely and cost-effective manner, as the availability of suitable offsets becomes scarcer. To be most effective, this should be accompanied by Federal Government engagement to simultaneously address Matters of National Environmental Significance under the *Environment Protection and Biodiversity Act 1999*.

Recommendation 30

Identify and secure strategic sites, by:

a. establishing a dedicated and recurrent fund for regional land acquisition for strategic infrastructure;
b. centrally coordinating strategic infrastructure site identification, matching State agency needs with government landholdings and enabling better use of the existing land asset base; and
c. preparing and implementing long-term regional environmental offset plans, which establish priority environmental conservation areas for protection, acquisition and management; and regenerative projects and/or scientific research agendas, where State agencies and Government Trading Enterprises can direct funds to meet environmental offset requirements for major projects. Implementation and administration of funds should be centrally coordinated.

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 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, economic, 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 through the use of agreed population projections and

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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 and make readily 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; and
- investigate and resolve matters (where possible) relating to geographies, planning horizons, refresh rate and availability in spatial format.

Recommendation 31

Develop and implement a single, agreed set of common planning assumptions by:

a. determining data sets for inclusion and providing guidance on adoption across State agencies and Government Trading Enterprises. The common planning assumptions should include population, housing, economy and employment, transport, land use and climate as a minimum; and ●

b. updating the Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines to require application of the agreed common planning assumptions, with State agencies and Government Trading Enterprises required to provide a clear rationale if the common planning assumptions have not been applied. ●

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.[87] 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; and
- co-investment and collaboration opportunities exist.

Infrastructure and related attributes that may be captured by the Statements of Opportunity may 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 two-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 ten-year State Infrastructure Program, will better inform the private sector on the pipeline of public investment.

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In turn, 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 in the Pilbara, and this is the most likely region where similar issues could re-emerge.

Recommendation 32

Improve two-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, for collaboration with industry to harness opportunities or address barriers; and ●

b. undertaking place-based assessments of future infrastructure intentions, with an initial focus on the Pilbara, based on two-way information sharing between public and private sectors including all utility providers. These will include a focus on the cumulative impacts of one or more large-scale investments on related demand for services and infrastructure. ●

Investment decision-making frameworks

The SAMF is the primary tool to guide State agency and GTE infrastructure planning and decision-making. It includes requirements for ten-year Strategic Asset Plans (SAPs), business cases, and project definition plans. Its application varies widely across State agencies and GTEs, impacting the robustness and quality of SAPs and project or program business cases, which guide public investment decision-making. This is due to a range of factors, including:

- reliance on State agency and GTE participation in the annual State Budget process to identify infrastructure needs;
- SAMF being viewed by some State agencies or GTEs as a compliance exercise rather than a framework for better outcomes, practices and decisions;
- State agency capability and resourcing;
- poor feedback loops to agencies to enable continuous improvement; and
- a narrow focus on traditional, new build infrastructure solutions that cater only to the requirements of the lead State agency or GTE.

Strengthening the application of SAMF requirements, by State agencies and GTEs, will help ensure infrastructure planning and delivery is appropriately informed and associated benefits are maximised. This requires State agencies and GTEs to demonstrate analysis of the full range of required SAP 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 appropriate processes of the Expenditure Review Committee of State Cabinet.

Agencies can be supported in responding to these requirements through the continuation of the business case development fund. The current $15m fund was primarily established to assist agencies in preparing business cases for COVID-19 recovery projects and has been highly subscribed. 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 two key aspects of the SAMF – the SAP and Business Case guidelines – has been advanced by the Department of Treasury, with updated exposure drafts circulated to agencies for application and feedback. IWA supports this review and acknowledges that a primary objective has been to streamline the guidance material to assist agencies in navigating the process. However, as captured at various points in this Strategy, there are additional refinements that can further address the breadth of issues considered in infrastructure planning and decision-making. These changes can be phased to reduce initial impost on agencies. Some recommended changes are also focussed on project and program business cases at or above $100 million, which generally have greater complexity, risk and potential impacts, and will be subject to IWA's assessment of major infrastructure proposals.

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Realising benefits of investment decisions

As part of the SAMF, WA's investment decision-making process centres on 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. Improving cross-agency coordination and outcomes of investment proposals can be achieved by amending the SAMF to:

- **Embed benefits realisation monitoring before and after funding decisions are made**

As a project moves from funding into delivery, project benefits identified as part of its business case are often not realised or monitored, leading to investment that may not always deliver the public value on which funding decisions were based. This is due, in part, to the lack of a framework or process to monitor benefits across the project delivery cycle, as well as project and value management pressures. The requirement for ongoing evaluation of design evolution and delivery decisions against project benefits through the SAMF will assist, together with a post-completion review to assess the realised versus forecast benefits identified in the business case. Business cases should make funding provision for ongoing project evaluation. The data capture required and the tools to analyse this data will vary depending on the benefits being measured and the type of project but may include, for example, use of Building Information Modelling. Benefits realisation reviews should also be undertaken once projects are operating.

- **Capture wider impacts of investment decisions**

Business cases typically focus on high-level concepts to address problems or capitalise on opportunities, with limited focus on comprehensively developing plausible options. Generally led by a single State agency, business cases sometimes do not involve the required level of cross-agency consultation to ensure that impacts on enabling infrastructure are considered across government. Recent revisions to the Business Case guidelines seek stakeholder mapping, identification of potential opportunities for collaboration, and consideration of key interdependencies 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.



Embedding benefits realisation as an explicit requirement across the project cycle, together with the implementation of benefits realisation plans, will achieve better alignment between a project's investment decision benefits statement and practical realisation.

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

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Recommendation 33

Support improved infrastructure planning and decision-making, by:

a. ensuring that all relevant 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.

b. 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;

c. continuing centralised funding support for business case development, with an increased emphasis on building public sector capacity in agencies and centralised expert units;

d. updating the Strategic Asset Management Framework 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. updating the Strategic Asset Management Framework Business Case guidelines (and any other relevant guidelines) to embed benefits realisation monitoring for projects and programs with a capital cost of $100 million or more, as an explicit requirement through the asset lifecycle at:
   i. pre-operating phases, by preparing a benefits realisation plan, seeking budget for undertaking this activity as part of funding requests, and testing the impact of changes to project scope on estimated benefits during the business case, project definition, procurement and delivery phases; and
   ii. operating phase, through conducting a benefits realisation assessment for completed projects.

f. updating the Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines to strengthen requirements for State agencies and Government Trading Enterprises to demonstrate analysis 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, involving:
   i. Systematic analysis of all Strategic Asset Plans on an individual and amalgamated basis by Department of Treasury and Infrastructure WA;
   ii. Content and analysis to inform preparation of the annual ten-year State Infrastructure Program; and
   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.

h. updating the Strategic Asset Management Framework and associated guidelines to include guidance material and requirements in Table 3, in line with the broader recommendations of this Strategy.

Table 3 provides a summary of the recommendations across the Strategy that propose additional SAMF requirements to support SAPs and business cases. Further detail on the individual recommendations is available in the relevant sector or cross-cutting theme chapter.

It is noted that several recommendations relate to business cases for projects and programs which have a capital cost of $100 million or more. For projects and programs of a lesser value, agencies should still be encouraged to explore these additional considerations but IWA is not recommending that it be mandated at this stage.

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Table 3: Summary of recommended changes to the Strategic Asset Management Framework

	Summary of recommendations	Major project / program business case (≥$100 million)	Strategic Asset Management Framework	
			Business Case guidelines	Strategic Asset Plan guidelines
2a	Developing and adopting a digital-first lifecycle process over a phased rollout.	✓	✓	✓
3b	Require infrastructure strategies, plans and business cases to appropriately address cybersecurity risks.	✓	✓	✓
5d	Prepare and publish an Aboriginal engagement strategy for projects and programs.	✓	✓	
8	Require the proponent or lead agency to establish Aboriginal employment targets, and for targets to be embedded in contracts and be publicly reported on.	✓	✓	
15a	Incorporate sustainability into the Strategic Asset Management Framework by requiring Strategic Asset Plans to include a hierarchy of strategic responses, and identified projects and actions, through updates to the Strategic Asset Plan guidelines.			✓
15b	Incorporate sustainability into the Strategic Asset Management Framework by requiring business cases to clearly identify economic, social and environmental impacts (positive and negative), quantify Scope 1, 2 and 3 emissions; align to emission reduction goals and pathways; and demonstrate potential climate change impacts and adaptation actions.	✓	✓	
15c	Require projects and programs to complete and publish sustainability tool certification.	✓	✓	
17b	The regional development strategic framework to be reflected in State agency and Government Trading Enterprise Strategic Asset Plans and business cases.		✓	✓
31b	Require application of the agreed common planning assumptions in business cases and Strategic Asset Plans.		✓	✓
33d	Require consideration of interrelated infrastructure needs beyond the primary investment with other State agencies and Government Trading Enterprises in project and program business cases.		✓	
33e	Embed benefits realisation monitoring for projects and programs in the Strategic Asset Management Framework at the business case, project definition, procurement, delivery and operating stages.	✓	✓	
33f	Strengthen requirements for State agencies and Government Trading Enterprises to demonstrate analysis of this Strategy and relevant strategic planning documents.		✓	✓
33h	Include guidance material and requirements in the Strategic Asset Management Framework consistent with recommendations of this Strategy.		✓	✓
38b	Analysing all large public infrastructure project proposals for the potential for private funding.	✓	✓	✓
77b	Require public health assessments to be completed for significant strategic planning, infrastructure, land use and development proposals.	✓	✓	✓
81	Require projects and programs to consider the availability of, and/or need for, skills and training, while ensuring that State agencies and Government Trading Enterprises appropriately engage with the Department of Training and Workforce Development.	✓	✓	✓

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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.

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 project assurance, 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. It is anticipated that these targeted measures will be complemented by Infrastructure Australia's 2021 Australian Infrastructure Plan (scheduled

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for release mid-2021), which will further assess these, along with recommendations that may benefit from coordinated consideration by the State Government.

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 with identifying and addressing 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. Private sector investment is also high due to favourable iron ore and other commodity prices. This level of activity has benefits but is also putting pressure on private and public infrastructure delivery capacity, and skills shortages are being experienced in key areas such as traditional trades, experienced technicians, supervisors, and maintenance crews, particularly in regional areas.[88] While WA has previously experienced 'boom and bust' cycles in the mining and resources sector, a key difference is the current restriction on migration of skilled international labour due to required COVID-19 border controls, that are in place for valid health and safety reasons.

Public sector infrastructure skills vary considerably across the many State agencies and GTEs with direct infrastructure responsibilities. While most agencies 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.[89] 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 recent formation of the Infrastructure Delivery Unit. There is an opportunity to accelerate and raise the profile of the critical role of skills development, especially for 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, with an annual turnover of more than $5 million, fell by 15 per cent between 2016 and 2018.[90]

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

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 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 23 and Figure 24).

Various state-wide procurement systems and policies are in place to drive value for money procurement outcomes, while State agencies and GTEs also use bespoke 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.

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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 to the same extent, 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**.

Figure 23: Capital investment in Western Australia[91]

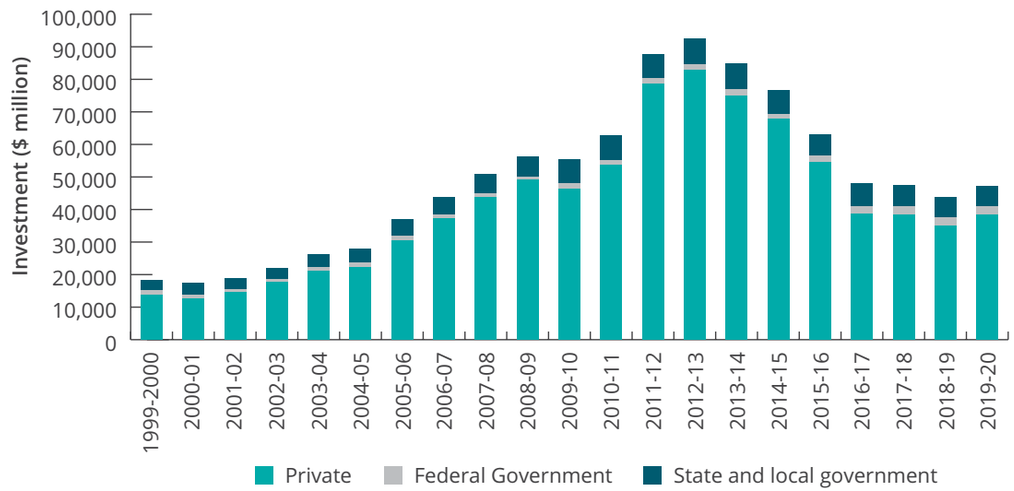
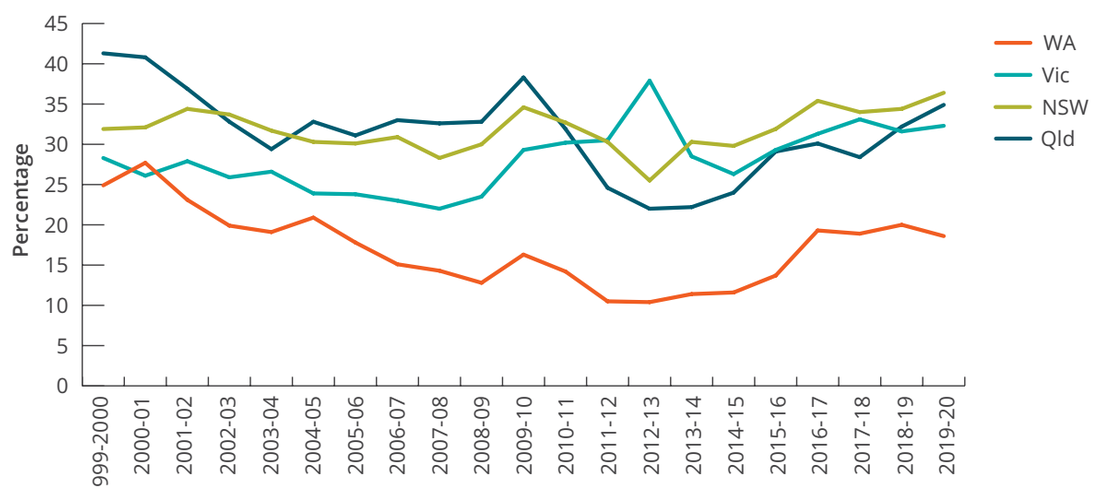


Figure 24: Public investment as a percentage of total (selected jurisdictions)[92]



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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

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 the health and viability throughout the life 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. The individual gateway stages for external project reviews are not compulsory, meaning agencies can opt out of undertaking reviews at key gateways, such as business case, procurement or delivery stages. Additionally, the process is not tiered according to the underlying levels of project risk. Some agencies view the process as not adding value or recognising internal project management processes. Recent reforms, requiring 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 (NSW) and South Australia, have introduced independent project assurance practices. These involve independent assessments of a project's health based on 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.

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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 Council is complemented by the Infrastructure Delivery Steering Committee which is focussed on strategic oversight of the Asset Investment Program. The Department of Finance has a key central role to assist and coordinate in these areas, and has established the Infrastructure Delivery Unit to provide oversight and support to agencies. These groups and reforms are supported and should continue to be implemented with an additional focus on project assurance.

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.[93]

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 position's other responsibilities.

Agencies have greater incentive to identify internal infrastructure-related skills, and areas where capability could be strengthened, if there are more and improved pathways available to them. The State should continue to develop support for small agencies, those less experienced in infrastructure procurement and delivery, and 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 agencies, and for high-value or high-risk projects and programs.

Project management standards for major projects should be adopted by agencies to improve efficiency, standardisation and enable data to be captured and analysed, so it can be used to inform central analysis across the public sector. A feedback process should be implemented to ensure continuous improvement.

Recommendation 34

Strengthen 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. building State agencies and Government Trading Enterprises' skills and capacity to deliver major projects and address weaknesses identified in previous reviews, by further enhancing the capacity of the Department of Finance to provide expert teams within less experienced infrastructure agencies to advise, upskill staff and build capacity; and
d. developing and rolling out project management standards for adoption by State agencies and Government Trading Enterprises.

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Case Study

The Bunbury Outer Ring Road

The Bunbury Outer Ring Road (BORR) project involves building a 27 kilometre free-flowing highway bypass around Bunbury, linking Forrest Highway to Bussell Highway. 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 key 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 key principles including:
  - a 'no-blame' culture focussed on achieving project outcomes;
  - a peer relationship where all participants have an equal say in decisions;
  - risks and rewards are shared equitably;
  - a culture that promotes and drives collaboration, innovation and outstanding performance; and
  - open book transactions.

  The alliance model is not unique to the BORR project – its use has increased in the last five 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 Two and Tier Three 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 per cent 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:** maximising reuse of local waste products during construction.

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

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Private sector skills

Alignment between the capability and capacity of the private sector and delivery of the State Government's infrastructure pipeline is critical to support value for money, on-time project completion and a sustainable market for future work. Optimal private sector engagement also supports policy objectives, such as jobs growth and social outcomes. Many aspects of private sector engagement are legislated under the *Western Australian Jobs Act 2017* which promotes the diversification and growth of the WA economy, with significant opportunities for local content.

A major mechanism to develop the long-term skills of the private infrastructure sector is to stimulate and provide incentives for apprenticeships and traineeships in trades and office-based roles. Government's primary policy is *Priority Start*, which aims to assist WA to develop a sustainable construction trades workforce by setting benchmarks for the number of apprentices and trainees to be employed by companies working on State Government construction and maintenance contracts. Although the obligation is on head contractors to comply with the policy, it is the various tiers of subcontractors that more often employ 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, engaged to deliver projects. GTOs carry out many of the trainee management functions required in Training Contracts, thereby 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.[94] GTOs are partially funded by the State Government, under the Western Australian Group Training Program, if they employ apprentices or trainees in specific areas, such as Aboriginal people, people with a disability, or women in certain trades. Despite the opportunity for GTOs to reduce the risk of future employment, and numerous incentives in place, they currently represent less than ten per cent of the apprenticeship and trainee market.

Delivering **high-value, high-risk projects**, for example major health infrastructure, requires enhanced skills and capability.

Recommendation 35

Further encourage apprenticeships and traineeships on public infrastructure projects by expanding the use of Group Training Organisations, including through adjusting existing incentives and promoting the use of Group Training Organisations through marketing to raise awareness amongst State agencies, Government Trading Enterprises and contractors. ●

Procurement

WA should continue to develop procurement models that encourage proactive risk management and a culture of collaboration across State agencies. WA can learn from models being implemented in New South Wales, Victoria and internationally, such as Project 13.

Longer-term partnerships between project delivery agencies and industry provide incentives for contractors to build assets that perform well, while also being 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.

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. 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

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Project 13 is an industry-led initiative to develop a new project delivery model. 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. 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 long-term better value.[95]



to achieve once contracts are awarded and 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 bigger share of what the State Government spends on goods, services and works each year. The WA *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. 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 State 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 agencies 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, off-site 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.

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Technology has an important role to play in enabling off-site and modular construction techniques, as well as broader uses in the digital planning, engineering and construction of new assets.

At present, many agencies 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 36

Implement incremental reforms to project procurement policies and practices, by:

a. developing and implementing contemporary procurement models for major projects to encourage a culture of collaboration, appropriately apportion and mitigate risk across the life of the asset, and address industry sustainability as part of procurement plans; ●

b. developing a policy under which Government would contribute to all or part of the bid costs of unsuccessful tenderers for major projects; ●

c. further reviewing and refining the *Market-led Proposals Policy* and ongoing monitoring of outcomes to ensure it is meeting its intended purpose and that private proposals are promptly considered and fairly progressed while also protecting broader public interests; ●

d. establishing panel contracts for programs of similar small to medium sized projects across one or more State agencies and Government Trading Enterprises; ●

e. considering the use of off-site and modular construction techniques where benefits can be achieved; and ●

f. establishing a cross-agency infrastructure procurement coordination mechanism for projects in the planning phase, or during business case development, to identify staging opportunities. ●

Funding

The way in which 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 that project funding arrangements are administered.

Regular updates to the management of the State's infrastructure program can ensure efficient use of funding. Opportunities include setting realistic project schedules and cashflows and centralised management of project contingencies.

Accurate forecasts for the length of time 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 timeframes 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.

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 State projects by the Federal Government under the *National Partnership Agreement on Land Transport Infrastructure Projects*.

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Budget year underspends and project contingency funds could alternatively be used to advance or de-risk other projects, or for urgent works. This includes planning, business case development and activities able to be activated quickly, such as land assembly and reducing maintenance backlogs.

Recommendation 37

Implement incremental reforms to project cost management, by:

a. establishing clear standards for setting project delivery timeframes and cash-flows at a program level, that account for public and private sector capability and capacity; and ●

b. replacing the current individual project-based management of contingency by individual State agencies and Government Trading Enterprises with a whole of government, or whole of agency or Government Trading Enterprise based approach. ●

Given limited public funds, the State 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.

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 towards 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.

Government is regularly approached with proposals to support private sector economic development. Greater consistency and transparency in how agencies 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 in Recommendation 16 of the Climate change and sustainability chapter, developing a Sustainability Bond Framework can help to ensure the State's future borrowings are better aligned with the increasing focus of global financial markets on improving environmental, social and governance outcomes.

Recommendation 38

Review the potential for private sector funding for the delivery of infrastructure, by:

a. investigating asset recycling through divesting suitable assets, such as underused buildings and land, with proceeds used to fund new infrastructure; ●

b. analysing all public infrastructure projects and programs with a capital cost of $100 million or more, for the potential for private funding, through updates to the Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines; and ●

c. developing whole of government principles for prioritisation of State funding contributions that facilitate strategic private sector investment. ●

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Asset management

Around two-thirds of the total cost of an asset generally occurs after it is built or acquired.[97] Effective management of the State's $159.2 billion infrastructure asset base is therefore essential to maximise the value and longevity of these public assets.[98] Yet good asset management practice has been a historical challenge for much of government, 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, including roads, utilities, hospitals, schools, land and equipment (Figure 25). Asset management has been identified, in various public sector reviews, as requiring significant improvement, including in the 2017 Service Priority Review.

The State's Asset Investment Program is **estimated at $7.6 billion in 2020-21** and a **total of $28.9 billion** over the four years to 2023-24.[96]

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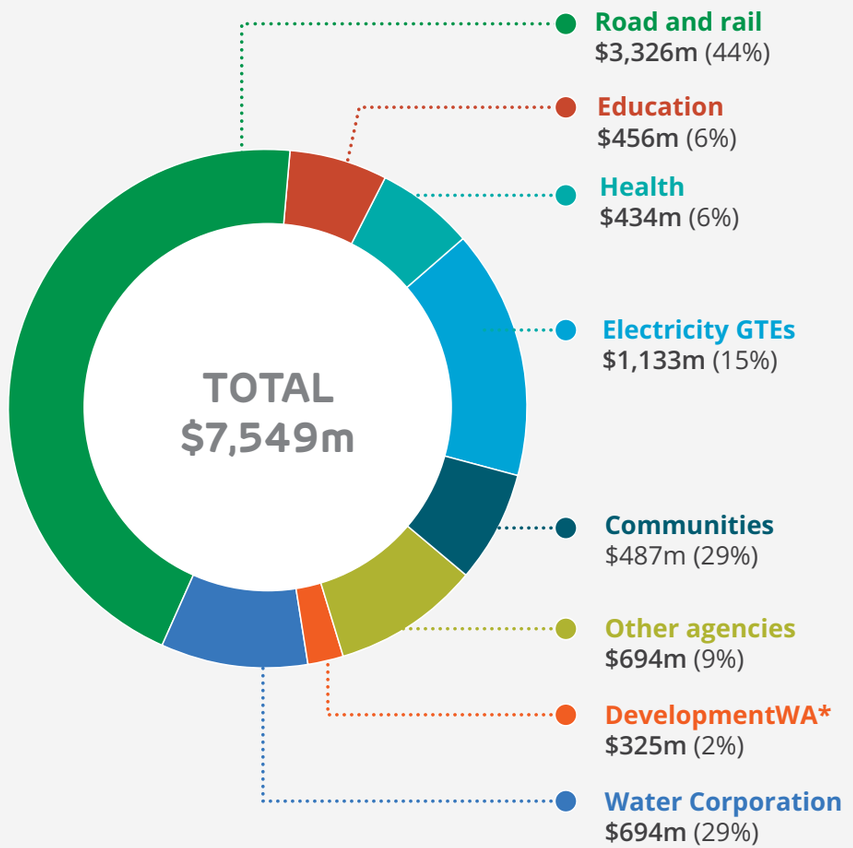
This is not unique to WA. In the 2019 Australian Infrastructure Audit, Infrastructure Australia identified a number of nationwide asset management issues across multiple sectors, including historical underspend on preventative maintenance, short budgetary and funding cycles, a lack of data and incentives, and limited mechanisms to link funding to need and maintenance backlogs.[99]

While the significant backlog in maintenance is widely recognised, it is more difficult to quantify, as asset management practice varies considerably across agencies. 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, 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 two 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. Reported expenditure is also highly variable over time, suggesting reactive or breakdown maintenance is a larger component compared to routine and preventative maintenance.

Typically, State agencies and GTEs that are responsible for major asset networks have invested more in asset management systems and internal capability. Higher standards of rigour can generally be found in State agencies and GTEs that have prioritised investment in asset management practices, such as in the Transport Portfolio. Other 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 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 State Government, in both metropolitan and regional areas, brings additional asset management challenges and responsibilities.

Figure 25: Asset Investment Program 2020-21[100]



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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 megalitres 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.[101] The system involves coordinated and systematic asset management processes, practices and decision rules, to align asset use with functional objectives and stakeholder expectations.

A whole of asset, 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 per cent through improved monitoring and management;
- a reliability improvement of 41 per cent over 36 months;
- a 40 per cent reduction in reactive maintenance and repairs;
- reduction in power consumption of 22 per cent over the last four years; and
- improved risk management and reliability and increased focus on continuous improvement activities, enabling even more benefits to be realised.[102]

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.[103] A proposed expansion could provide recycled water for gardening, flushing toilets and car washing, for up to 5,000 Melbourne households.[104]

For further information, refer to www.mcg.org.au

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Asset management maturity

Central leadership and support are needed to guide consistent asset management practice across agencies. The Strategic Asset Management Framework (SAMF) defines asset management principles for State agencies and GTEs and is in line with the International Organisation for Standardisation's (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. The framework is still in its infancy and is being jointly piloted by the Departments of Finance and Education. This work, and its central agency role, means the Department of Finance is ideally placed to lead and support asset management practice across the public sector into the future.

Given the value of the State's infrastructure and importance in enabling public services, it is essential that all agencies have sound asset management systems spanning the asset lifecycle, as shown in Figure 26. Well-functioning asset management systems assist agencies in achieving 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.



Management of the State's road network gives an indication of the scale of investment required for maintenance and estimated backlogs. For example, in 2018-19, Main Roads WA spent over **$408 million maintaining the road** network within its control, but **an estimated $605 million maintenance backlog** remained.[105]

The Department of Biodiversity, Conservation and Attractions receives a **total annual maintenance budget of around $6.1 million**, or just 0.3 per cent of the estimated total replacement value, for its circa **34,000-kilometre state-wide road and bridge network**.[106]

Local governments are responsible for almost **127,000 kilometres of roads** or 87.2 per cent of the State's public road network. In 2019-20 local governments spent **$607.1 million on road preservation**, with an estimated shortfall of $193.7 million of the **$800.8 million required to maintain roads** at their current condition.[107]

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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.[108]

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 agency's asset base; and
- 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.

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 agencies to relinquish assets, or to plan to maintain older assets with recurrent funding needs, in lieu of applying for capital funding for new assets. Funding available to build capacity, or for innovation in asset management, is also limited. The *Service Priority Review* recommended incentives for agencies to manage assets and finances to maximise their value to the State, however, this has not occurred in the four years since this recommendation was made.[109]

Asset information

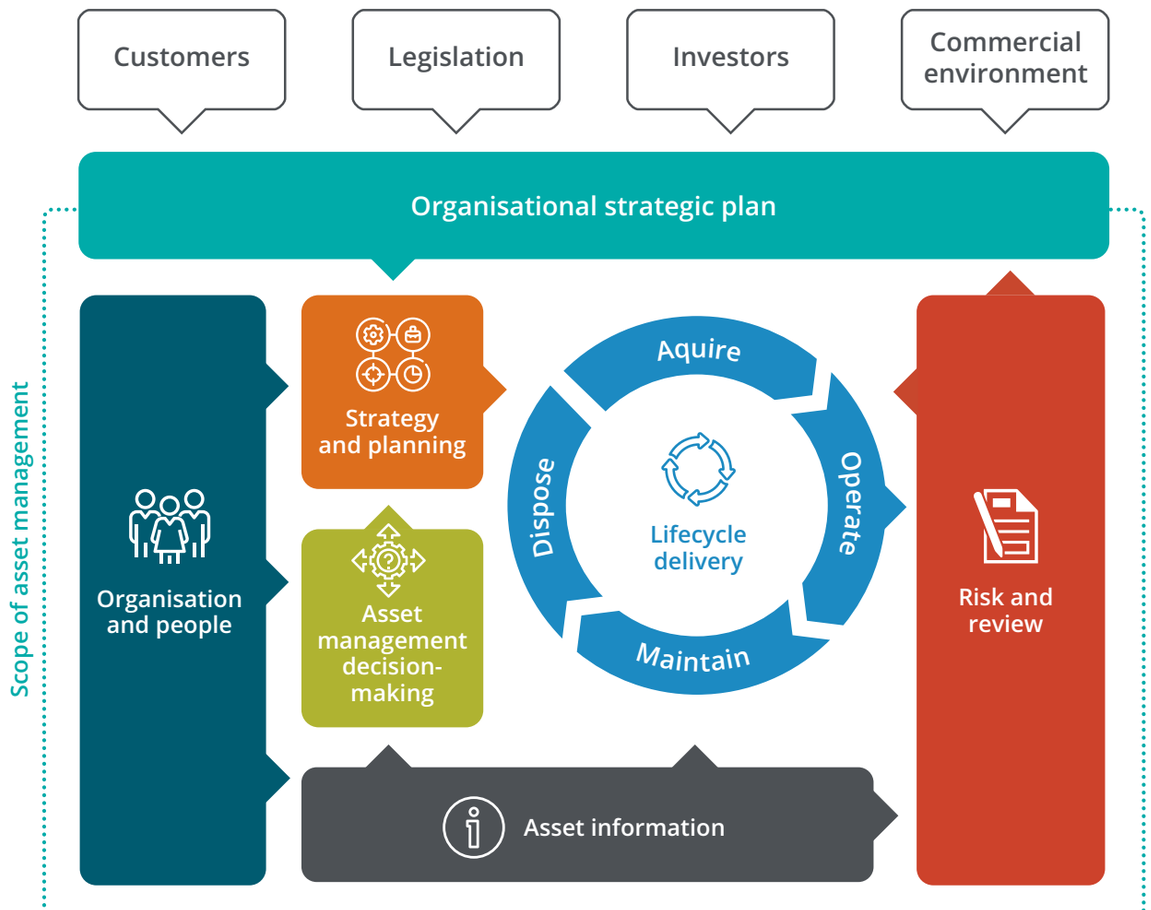
Asset information is a key enabler of asset management maturity. A wide range of information should be captured to support asset decision-making, including, but not limited to asset location, type, materials, age, condition and lifecycle cost. A lack of reliable and accurate information currently makes it difficult for many agencies to understand asset needs and to develop fit for purpose, risk-based asset management plans. This makes it challenging for agencies with lower levels of asset maturity to prioritise and plan maintenance pipelines.

More sophisticated asset information, including capture, analysis and data 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, in turn, enable a high-level view of funding requirements across the public sector.

Improvements to the way in which asset information is captured, stored and used are recommended in the Digital connectivity and technology chapter.

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Figure 26: Conceptual asset management model [110]



Benefits of mature asset management include:

- informed asset investment decisions;
- managed risk, improved services and demonstrated compliance;
- improved use of existing assets; and
- delayed or reduced need for capital investment in new assets.

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Recommendations

Asset management maturity

The Department of Finance should provide increased support and assistance to help agencies determine and improve their current asset management maturity (through Department of Finance-led assessments, applied to all types of infrastructure assets), as well as identifying any agency 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; and
- direction to agencies and GTEs 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 Department of Finance should be adequately resourced to provide leadership, assistance and advice to State agencies and GTEs where it is needed.

Recommendation 39

Improve maturity in asset management across the public sector by:

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; and expanding its Strategic Asset Management pilot initiative to 'operationalise' the Strategic Asset Management Framework for all government assets; and ●

b. all State agencies and Government Trading Enterprises developing fit for purpose asset management systems, in line with the Department of Finance's central guidance. ●

Incentive funding

Noting that 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 increases their competitiveness for future incentive programs.

In the medium term, 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 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, with 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; and
- increase use of existing assets.

The intent of the fund is to incentivise asset management maturity, information management, good practice and higher quality assets. A key intended outcome is to incentivise behavioural change and to foster a culture that considers the lifecycle of infrastructure assets.

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Recommendation 40

Incentivise improvements in asset management across the public sector by creating and implementing:

a. a new budget allocation for State agencies and Government Trading Enterprises to implement fit for purpose asset management planning, capability building and systems; and ●

b. an asset lifecycle investment fund, or similar incentive mechanism, to effectively reward maturity in asset management practice and funding submissions that demonstrate strong alignment with service delivery outcomes and optimised use of existing assets. ●

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 – this should be informed by and aligned with the Department of Finance's central guidance; and
- 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 the way in which information and data (including asset information) is captured, stored and used.



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Demand management and preventative investment

In developing the Strategy, strong links became readily 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 following chapters. The following section explores this link and interactions.

Within expanding economies, 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, behavioural change programs can influence demand, typically at a fraction of the investment cost required to expand networks and often resulting in better outcomes.[111]

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 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.

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; and
- 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 which could be redirected towards refurbishment and enhancement, rather than replacement.

In some cases, demand can be prevented via substantial investments elsewhere.

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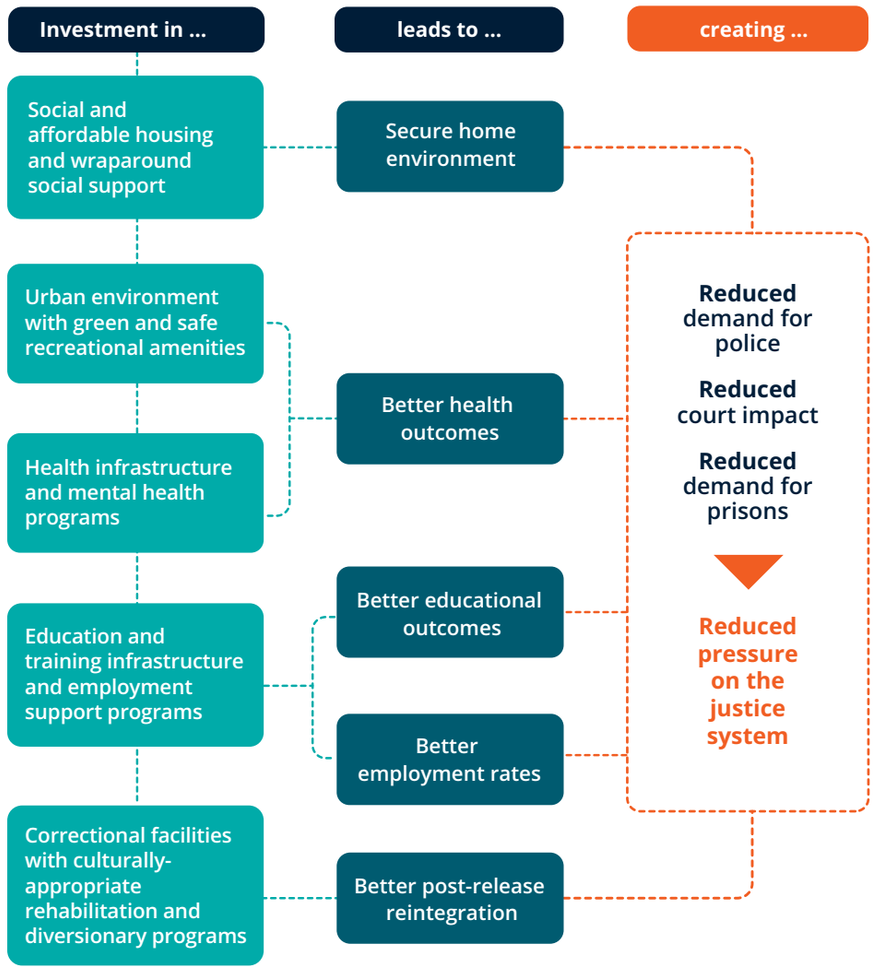
Interdependencies between infrastructure sectors offer both complexity and opportunity in project selection. Projects that offer diverse and far-ranging benefits are likely to make the most significant contributions to the wellbeing of the State's residents. It can be challenging however, to holistically 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, thereby providing a 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. 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.[112]

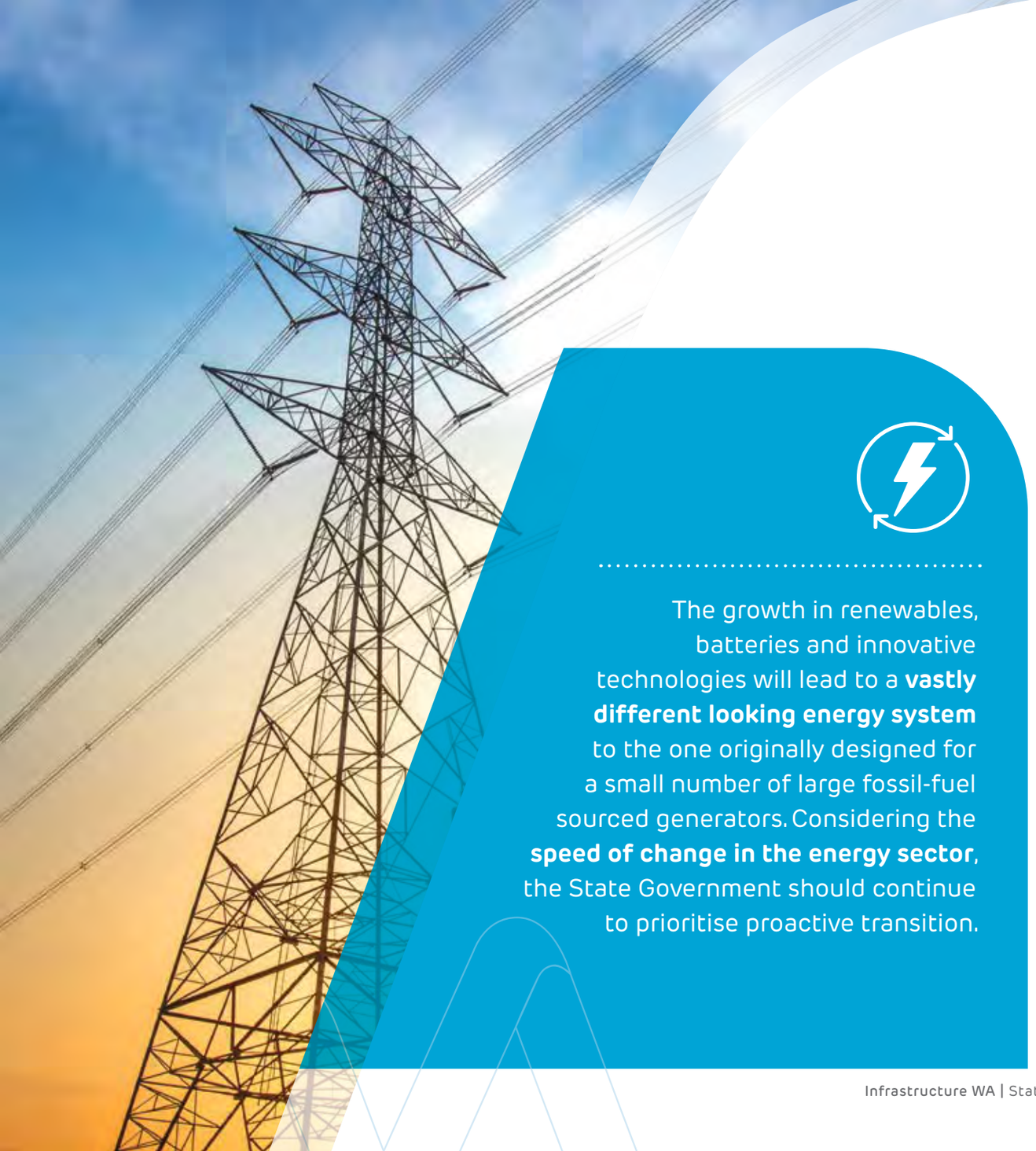
Robust, resilient and secure digital connectivity and technology infrastructure can also have wide-ranging benefits. Overcoming distance and location barriers, digital connectivity enables access to services reducing reliance on physical infrastructure and creating pathways for economic development and innovation. Similarly, addressing the high level of digital inequality experienced – particularly by older, regionally-based people on lower incomes – can stem demand for the suite of needs connected to social disadvantage.[113]

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 are reliant upon the ability to demonstrate continued value and impact over time.

Figure 27: A systemic approach to managing demand for the justice system



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Energy

The energy sector is in a period of rapid transformation. Renewable energy technologies are advancing and becoming more cost competitive, enabling WA to move towards net zero carbon emissions by 2050. The flow-on effect to the energy network and market regulation is significant.

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 State Government should continue to prioritise proactive transition.

More than one in four households in WA have solar power systems on their roofs.[114] In 2020 alone, more than 300 megawatts of residential solar power were added in WA, which is almost equivalent to the State's largest coal-fired power station.[113] As more renewable energy resources are added to the network, it will increasingly transform from a traditional linear system, to become further decentralised (Figure 28).

While advancing renewables is enabling the transition to net zero carbon emissions (refer to the Climate change and sustainability chapter), it comes at some cost to existing large-scale infrastructure which was developed in a different era. Coal-fired power sources are becoming more challenging to operate – needing 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 traditional coal-fired energy generation to renewable source generation.

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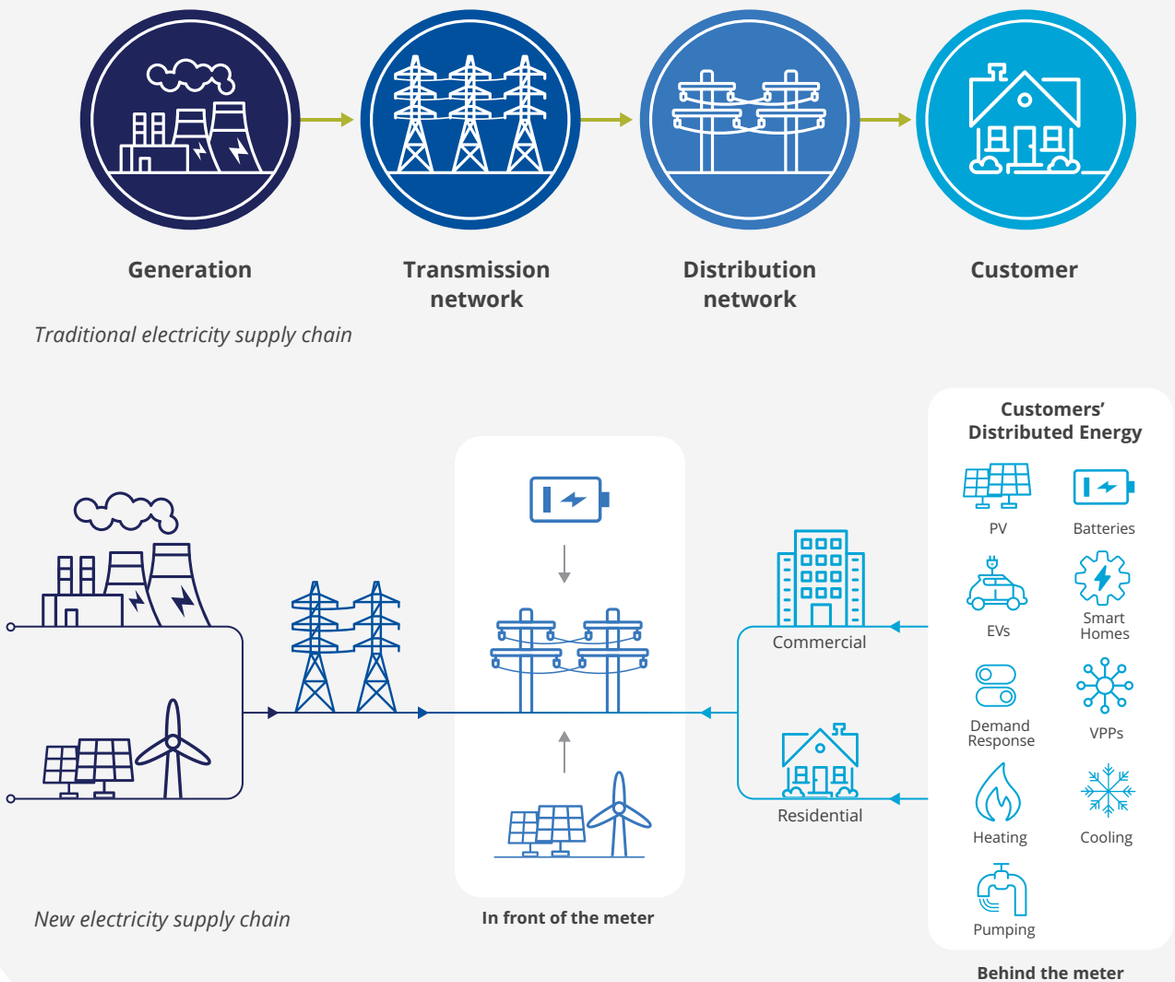
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Two of the four operating units at Synergy's Muja Power Station are programmed for retirement from October 2022.

Generating energy from zero emission sources will reduce dependency on fossil fuels and assist the State's transition to zero net 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 a major international supplier of energy sources, there will also be increasing pressure on WA to transition to cleaner energy 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.

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 issues with intermittent generation, system reliability and security. 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.

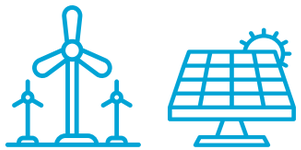
Figure 28: Transformation of the electricity supply chain[116]



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In 2020, two action plans were released including the *Economic Development Action Plan for the Collie and Bunbury Regions* and the *Just Transition Plan* for Collie to **strengthen the transformation of the local economy, acknowledging the diminishing role that coal will play**.[117] Depending on the uptake of renewable energy, additional 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.

Energy storage will increasingly be a key requirement to 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 problematic. Until further advances are made to enable lower prices for battery storage, or until alternative storage solutions and supply sources such as green hydrogen develop, energy systems including the South West Interconnected System (SWIS) will need to rely on gas-based energy sources to maintain sufficient system supply.

Renewable hydrogen is emerging as a key opportunity to decarbonise local industries, create a new export and accelerate the green-energy economy to enable the vision for WA. 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. The State has demonstrated capability in mass production through its LNG projects. It also has superior collocated solar and wind renewable energy resources, and available land to support large-scale hydrogen precincts and aligned industrial uses. Both State and Federal Governments are ready to invest to attract market participants. Ensuring appropriate infrastructure is in place will help to unlock future strategic industries for the State.

Overall, a 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 State Government should continue to prioritise proactive transition to renewable energy solutions.

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.

South West Interconnected System

WA has two main energy systems – the SWIS and the North West Interconnected System (NWIS) (Figure 29), in addition to many more isolated energy systems throughout the State. The SWIS is an interconnected electricity system in the south-western part of the State.

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Figure 29: Location of the North West Interconnected System and South West Interconnected System



Western Power is the GTE responsible for the electricity network that connects electricity generators to customers in the SWIS, while Synergy has carriage of electricity generation and retail. A significant proportion of power generation in the SWIS is privately owned and operated.

North West Interconnected System

The NWIS is located in the Pilbara region and comprises a number of interconnected electricity networks with different owners. The three 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 State Government is currently implementing the Pilbara electricity reforms for the NWIS to improve the efficiency and effectiveness of electricity services in the Pilbara. The two key components of the Pilbara electricity reforms are:

- light-handed regulation to facilitate third-party access to designated electricity network assets in the Pilbara. This will apply to Horizon Power's and Alinta Energy's interconnected networks; and
- an independent system operator (ISO), which will apply to the interconnected network in the NWIS.

The Pilbara independent system operator functions will be performed by Pilbara ISOCo. Pilbara ISOCo is an incorporated not-for-profit company limited by guarantee under the *Corporations Act 2001*. The founding members of Pilbara ISOCo are the three 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 two 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 per cent of exports available for WA consumers.

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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 energy sector GTEs and other energy sector 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:

- *Distributed Energy Resources Roadmap:* which outlines key actions to ensure small-scale renewable energy and storage resources are sustainable, cost-effective and support a reliable energy system;
- *Whole of System Plan* (WOSP): which includes a set of energy system modelling scenarios that detail future energy generation and network needs in the SWIS;
- updates to the *Wholesale Energy Market Rules (1 February 2021)* to modernise measures relating to supply and trade of wholesale electricity between retailers and generators;
- revisions to the *Electricity Networks Access Code* to improve access arrangements to Western Power's distribution and transmission network, including facilitating contemporary technologies. Changes to the Code include amendments to the New Facilities Investment Test; and
- trialling energy price signals to encourage households and businesses to consume renewable energy during the day rather than exporting energy during periods of oversupply.

Economic Regulation Authority

The Economic Regulation Authority's role is to regulate and licence the gas and electricity industries and services. The Economic Regulation Authority seeks to ensure the delivery of utilities is in the long-term interest of WA consumers by maintaining a competitive, efficient and fair commercial environment. It also has the capacity to conduct inquiries into economic matters referred to it by the Treasurer.

Wholesale energy market objectives and coordination

The Wholesale Electricity Market (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 Australian Energy Market Operator is responsible for operating the WEM in accordance with the WEM Rules and the related WEM Market Procedures. The WEM aims to facilitate competition and private investment and allow generators and wholesale purchasers of electricity (such as retailers) greater flexibility as to how they sell or buy electricity, and with whom they transact.

Under the State's *Electricity Industry Act 2004*, the 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; and
- encourage measures to manage the amount of electricity used and when it is used.

The *Electricity Networks Access Code* plays a role in ensuring the SWIS remains efficient and meets customer needs. Energy Policy WA is proposing changes to the Code which seek to increase opportunities for new technologies, including renewable energy and storage. Changes to the Code include amendments to the New Facilities Investment Test, which is used by the Economic Regulation Authority to determine the extent to which the cost of new energy facilities provide a benefit to consumers and can be financed and recovered through energy tariffs.

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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Evolve the *Whole of System Plan* and ensure implementation actions are transparent

Using data provided by industry, the WOSP models four scenarios of how changes in demand, technology and the economy may shape the way electricity is used and supplied. A key 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 region where existing transmission lines exist. Despite the name, the WOSP does not present as a plan with clearly defined implementation actions.

As noted in the WOSP, it is expected that both the Plan and the modelling behind it will be updated periodically. It is understood that the next update of the WOSP is intended to consider the matters that IWA is proposing in Recommendation 41a. 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, opportunities for renewable energy growth in alternate locations outside of the Collie/Bunbury area and industry growth oriented around that renewable energy supply. This applies to the Mid West region in particular (at the northern end of the SWIS), where there is substantial capability for increased renewable energy generation, capitalising on the region's high wind speeds and strong solar resources. Along with other considerations, these conditions are contributing to areas such as the Mid West becoming a potential location for large-scale renewable energy and green hydrogen supply in WA.

Similarly, the WA Climate Policy was not released at the point of original WOSP modelling. For that reason, while the model has the capability to assess the emissions profile of each scenario, it did not test the lowest cost pathway to reach the zero net emissions by 2050 aspiration.



An additional opportunity for the next WOSP is to refine the model's approach to the curtailment of renewable energy generation. 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, the next WOSP 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), including an increased role for battery storage in the near term and the aggregation of residential rooftop photovoltaic systems in the medium term. The next WOSP should also address practicality and community acceptance of any curtailment assumptions.

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Recommendation 41

Evolve the *Whole of System Plan* and ensure implementation actions are transparent by:

a. updating the *Whole of System Plan* modelling to incorporate the following inputs and assumptions in relevant scenarios: ●
   i. achieving Government's net zero carbon emissions by 2050 aspiration through the lowest cost mix of generation, storage and network transmission and distribution;
   ii. the impacts of potential renewable energy growth locations, such as the Mid West, on energy network infrastructure requirements;
   iii. electricity offtake through the development of new industries in line with Government industry development objectives;
   iv. considering the impacts on system cost and reliability of using technologies such as energy storage to reduce the curtailment of renewable energy generation, including the practicality and community acceptance of any curtailment assumptions;
   v. testing the accelerated delivery of energy storage and other Distributed Energy Resources technologies to determine the effects on the overall investment program; and
   vi. the impacts over time from increased uptake of electric vehicles on the energy network, including increased demand for energy and energy storage opportunities from electric vehicle batteries.
b. accompanying the *Whole of System Plan* scenario modelling exercise with a detailed implementation plan for the most likely scenario. The implementation plan should be published, updated periodically, and identify: ●
   i. current and planned investment;
   ii. network constraints; and
   iii. 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 energy futures report

There are unique challenges in the NWIS, including large distances and high associated costs of energy network connections. Despite what the name would suggest, 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.

Similar to 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 two years. It is expected that these reports will focus on the core interconnected elements of the NWIS, but have the potential over time to expand beyond this.

However, a strategic plan that sets out the long-term interplay between emerging industry and energy opportunities with infrastructure requirements in the NWIS does not exist. It is therefore challenging 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; and
- what level of investment is required to facilitate industry growth and who should pay, while ensuring not to over-invest in a network that will likely change in the future.

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WA's mid and north-west coasts have some of the **most significant solar radiance resources in the world**. Wind speeds across the coast and inland areas are well above thresholds required for commercial-scale renewable developments. WA also has a key advantage in our vast available land.



Recommendation 42

Prepare a North West Interconnected System energy futures report to provide a long-term view on energy generation, demand and network infrastructure requirements. The report should:

a. test and resolve to what extent interconnection should occur in the North West Interconnected System and the infrastructure needs to support this, along with any adjustments to access arrangements;
b. define the role of State agencies, Government Trading Enterprises and the private sector in the North West Interconnected System;
c. support the identification of suitable sites for large-scale renewable energy generation and storage in proximity to industrial land and high energy users in the North West Interconnected System;
d. inform the evaluation of key project proposals, including the Burrup Common User Transmission Line and East Pilbara Link; and
e. provide recommendations to align regulatory regimes to the outcomes of the report.

Unlocking opportunities through 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. Key infrastructure solutions which 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 and addressing fluctuating energy supply and demand. Distributed battery storage is in its relative infancy in WA and elsewhere. The State Government has recently undertaken market sounding for the SWIS's first big battery, with the 100 megawatt facility to be delivered at Synergy's decommissioned Kwinana Power Station. At a domestic level, batteries have had significantly lower levels of uptake compared to rooftop photovoltaic.

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As at April 2021, there were fewer than 3,000 customers with behind-the-meter battery installations, with price the primary barrier.[118] However, the cost of batteries is declining over time and substantially greater distribution across the network – through a mix of large-scale, community and domestic batteries – has the opportunity to support system stability.

Energy storage, microgrids, standalone power systems and virtual power plants are being considered in a number of 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.

Recommendation 43

Accelerate and coordinate a dedicated program of energy storage, microgrids, virtual power plants and standalone power systems which increase energy system security, reliability, reduced emissions and cost-effectiveness. This includes feasible locations in the South West Interconnected System, North West Interconnected System and remote Western Australia. Future energy storage options, including hydrogen, pumped hydro, batteries and other energy storage technologies, should also be investigated in the medium term.

Ensure the application of energy legislation and regulation considers broader public policy outcomes

Energy legislation and regulation details how the energy system is coordinated. It is applied by a number of 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.

Previous versions of energy legislation and regulation objectives were narrowly focussed and had the potential to limit energy transformation and long-term value to the end consumer. Limiting objectives and investment tests that focus on financial and economic aspects can constrain the market's ability to respond to broader government policy settings, including the net zero by 2050 emissions aspiration and industry development opportunities such as renewable hydrogen. Narrow objectives can also limit technology choices and innovation and create uncertainty for market participants, as well as result in higher prices for consumers in the long term.

In recent times, legislation and regulation has been revised by Energy Policy WA to include triple bottom line considerations 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

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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'.[119] The broadening of objectives in the Code is a significant step forward in achieving more balanced decisions in accessing and augmenting the SWIS network.

To ensure more balanced decision-making by the Economic Regulation Authority, it may be necessary to translate similar objectives into other sections of legislation and regulation.

Guidance from the Economic Regulation Authority is also required to ensure that market participants are aware of how the Economic Regulation Authority applies legislation, regulation and associated objectives, as well as the expected levels of information and analysis required from proponents.

The application of energy regulation and legislation should, where it does not already, also ensure greater distribution of infrastructure costs over multiple participants to address first and last-mover disadvantage. First-mover disadvantage relates to one market participant paying for a connection into the grid, with participants who follow benefitting but bearing none, or a limited amount, of the cost. 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 required to fund the full upgrade.

Once the NWIS energy futures report (under Recommendation 42) is implemented, NWIS-related regulation should also be reviewed 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.

Recommendation 44

Review and revise energy legislation, regulations, codes and associated decision-making documents and processes (particularly relating to the New Facilities Investment Test) to adequately address:

a. wider State Government policy objectives, including the net zero emissions by 2050 aspiration and industry development objectives; and
b. greater distribution of infrastructure costs over multiple participants to address first and last-mover disadvantage.

Strategically plan for enabling infrastructure to grow and support the hydrogen industry

The objective of developing an energy system highly dependent on renewable energy opens up opportunities for the hydrogen industry which can be scaled up locally, before moving into international exports. By 2030, the State Government has set a target of WA's market share in global hydrogen exports being similar to its share in LNG today.[120] For context, in 2019 WA accounted for 12 per cent of global LNG exports.[121]

Hydrogen is currently used primarily as feedstock for industrial chemical processes. Emerging uses include transport, heat, electricity generation and energy storage (Figure 30). Green hydrogen is produced by using renewable electricity to electrolyse water, splitting it into hydrogen and oxygen (Figure 31). As a zero emission energy source, green 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 from which to generate initial growth. This is reflective of the forecasts which suggest it will take ten to 15 years for green hydrogen to achieve price parity with blue hydrogen.[122] If WA is to get an early foothold on hydrogen supply and demand, then it is important to consider blue hydrogen as an interim step towards establishing the green hydrogen industry.

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Figure 30: Uses of hydrogen[123]

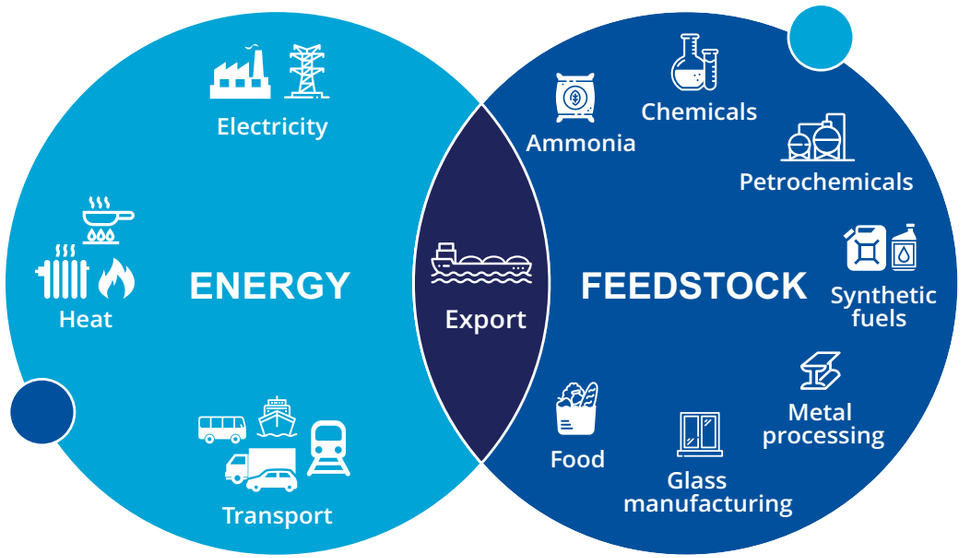
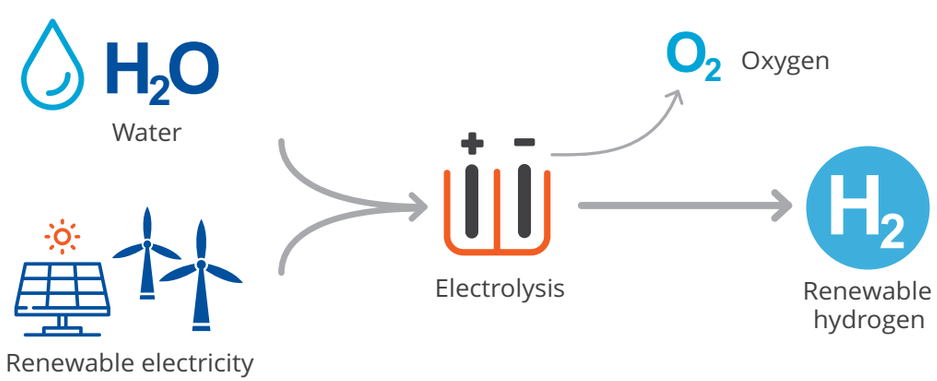


Figure 31: Production of renewable hydrogen (simplified)[124]



The State Government's *Western Australian Renewable Hydrogen Strategy* sets a vision, mission and strategic focus areas for a future hydrogen industry. Strategic focus areas include export opportunities, remote application, hydrogen blending in the natural gas network and transport. 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; expressions of interest for hydrogen development at Oakajee; and supply chain modelling to identify limitations affecting the renewable hydrogen export industry. 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.

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. A further key challenge for the production of green hydrogen is the management of power supply variability.[125] Initial studies have shown that WA collocated wind and solar farms, which can be used to power renewable hydrogen, are more financially attractive than collocated renewable energy generation located in other jurisdictions.[126] 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.

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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. Potentially connecting 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 for the SWIS and as a potential energy source for the SWIS. Preliminary investigations into enabling infrastructure for the hydrogen industry has indicated that significant planning and investment is required to expand port capacity to cater for future exports. Any studies should consider:

- the most suitable zones/hubs for hydrogen production and export;
- potential volumes of supply;
- enabling infrastructure requirements and supply chain needs;
- forecast costs and benefits for renewable hydrogen in these respective locations; and
- 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 45

Update the State's hydrogen work program to include:

a. accelerating reform of legislation, standards and policy to support the hydrogen industry; ●

b. investigating options for stimulating domestic market demand, as a precursor to establishing export industry demand; ●

c. investigating the feasibility of prospective large-scale hydrogen industry locations that may leverage renewable energy resources, electricity grid and gas networks, port facilities, road networks, a skilled workforce and market proximity; ●

d. 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[127]; ●

e. publicly reporting the *Western Australian Renewable Hydrogen Roadmap*'s actions including timing, available funding, and transition pathways such as the role of blue hydrogen; and ●

f. analysis of the potential need for augmentation of energy infrastructure associated with existing and emerging industries, such as hydrogen, in the updated *Whole of System Plan* modelling including: ●

   i. detailed projections around potential energy consumption and generation, and the degree to which augmentation of energy infrastructure such as the Mid West Transmission Line might catalyse this;

   ii. staging analysis;

   iii. energy consumption that may otherwise be curtailed; and

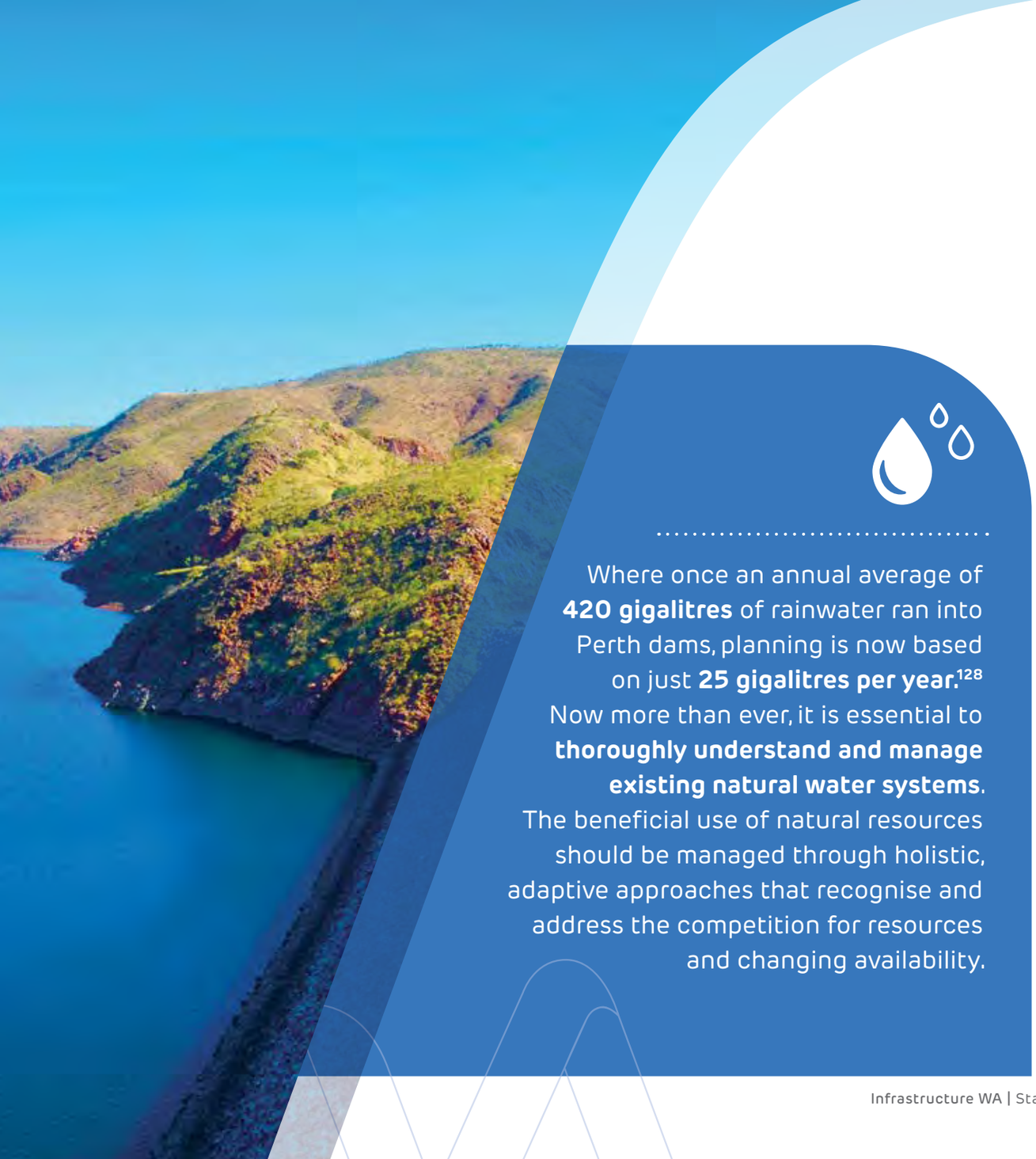
   iv. potential co-investment options from private and Federal Government sources.

Ensuring hydrogen infrastructure in priority locations through:

g. Consistent with Recommendation 38 in the Infrastructure delivery chapter, establishing a clear policy position on the private sector's role and the State's potential role in funding, financing and delivering enabling infrastructure to support the hydrogen industry (including factors such as seed funding and cost recovery); and ●

h. In addition to Recommendation 28 of the Planning and coordination chapter, developing and implementing a staged program of hydrogen industry enabling infrastructure including upgrades or new infrastructure for electricity and gas networks, water supply networks, refuelling stations, roads, rail and ports. The program should harness state, private and federal government funding. ●

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Water

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.

Where once an annual average of **420 gigalitres** of rainwater ran into Perth dams, planning is now based on just **25 gigalitres per year.**[128] 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 approaches that recognise and address the competition for resources and changing availability.

A coordinated 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, public amenity liveability purposes;
- providing integrated wastewater services (including treatment) to protect public health and the environment; and
- ensuring the efficient provision of irrigation and drainage services.

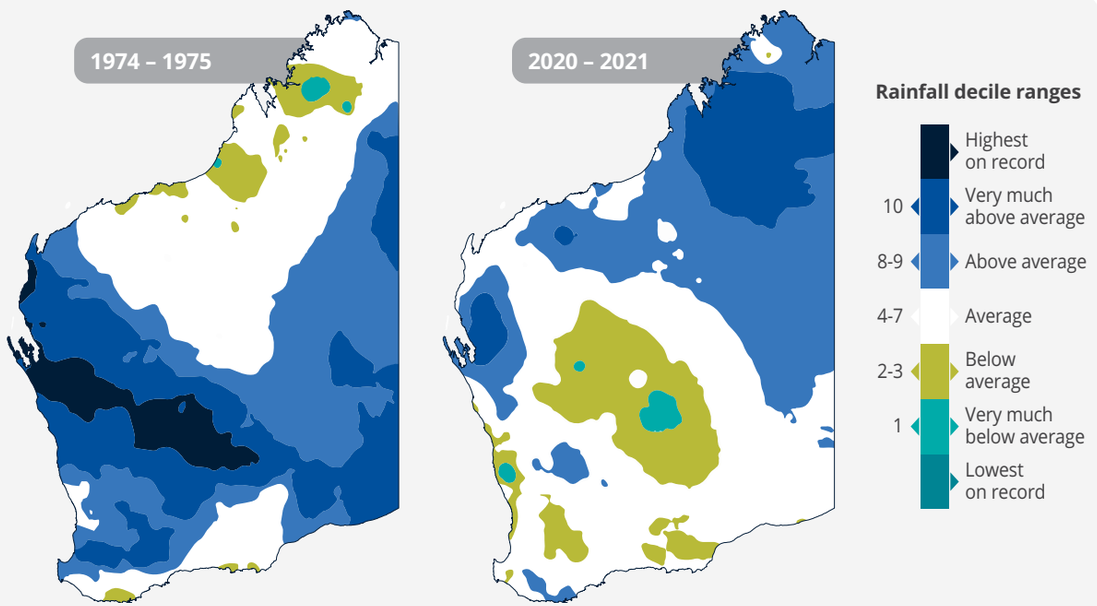
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Along with population growth, economic growth and land development, climate change is now a critical consideration for water planning. Across the south-western part of the State, a substantial reduction in rainfall over the past 30 years (Figure 32) has impacted availability of both surface and groundwater – where there was once an annual average of 420 gigalitres of water running into Perth dams, planning is now based on just 25 gigalitres per year. Groundwater levels in Perth have also significantly reduced, with a 1.8 metre drop in aquifer storage levels since 1998.[129] 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. 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.

Figure 32: Twelve monthly rainfall comparison 1974-75 to 2020-21[130]



Scheme supplied water

While 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 well over two million people in Perth, the Goldfields and surrounding agricultural regions and parts of the South West and Great Southern.[131] 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 per cent of the IWSS water supply, and an innovative groundwater replenishment scheme (whereby treated wastewater is recharged into groundwater supplies) further supplements the IWSS (Figure 33). The primary source of groundwater is the Gnangara groundwater system, supplying approximately 120 gigalitres or 37 per cent of the IWSS drinking water per year.[132] 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 the next ten years.[133]

Capital investment by the principal water service provider, the Water Corporation, across all activities, comprises more than 12 per cent of the State Government's annual Asset Investment Program, with an average annual investment of more than $750 million over the past ten years.

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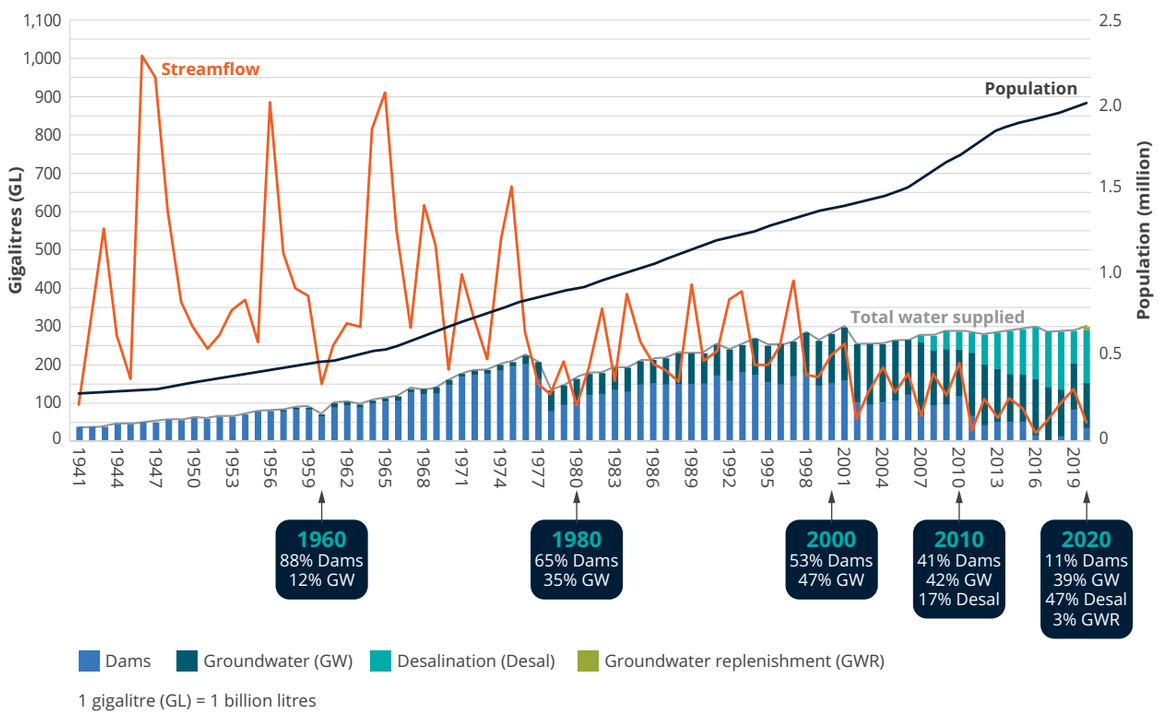
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Major water source augmentations are expensive, with a new desalination plant expected to cost well over $1 billion. In addition, commitments to water network and supply projects, which will provide greater certainty for the IWSS as it continues to be impacted by the effects of climate change, amount to approximately $570 million over the 2020-21 State Budget and forward estimates.

Desalination and groundwater recharge are 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 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.

Figure 33: Composition of drinking water supply by source in the Integrated Water Supply Scheme[135]



1 gigalitre (GL) = 1 billion litres

Self-supplied water

While much of the State's water is supplied through water supply networks (generally potable), a significant portion 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. For example, in the metropolitan area where a total of around 600 gigalitres 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. 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. Over the period 2014-2018, approximately 47 per cent of total water use in Perth and Peel was attributed to uses other than household use (Figure 34). In 2019-20 it was estimated that 650 gigalitres of irrigation water was consumed within WA each year, either through self-supply arrangements, or supplied by irrigation cooperatives.[136]

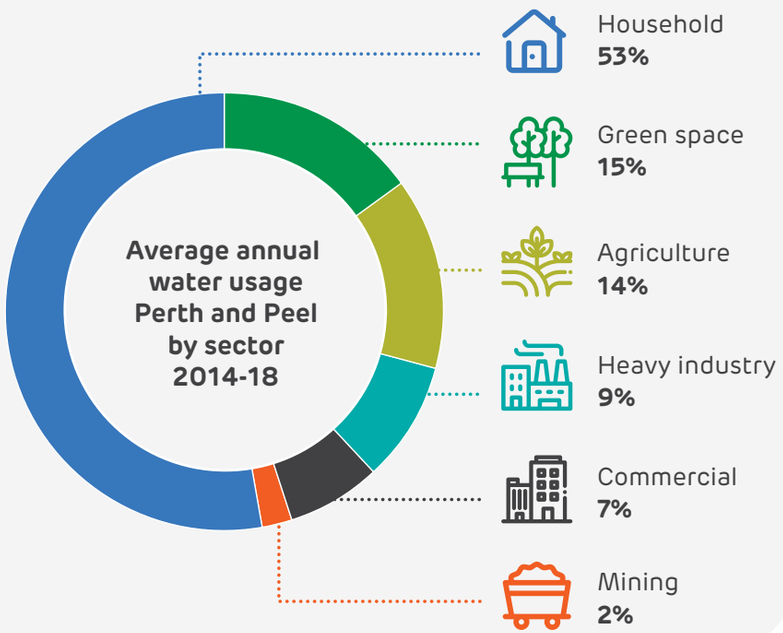
While urban water security is largely managed through schemes, water for agriculture, is often self-supplied as groundwater or surface water under licence, although there are some areas in the State (unproclaimed areas) where water can be taken without a licence. There are also instances in proclaimed areas where exemptions may apply and where licences are not required,

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Figure 34: Water used by sectors in Perth and Peel (average 2014-18)[137]



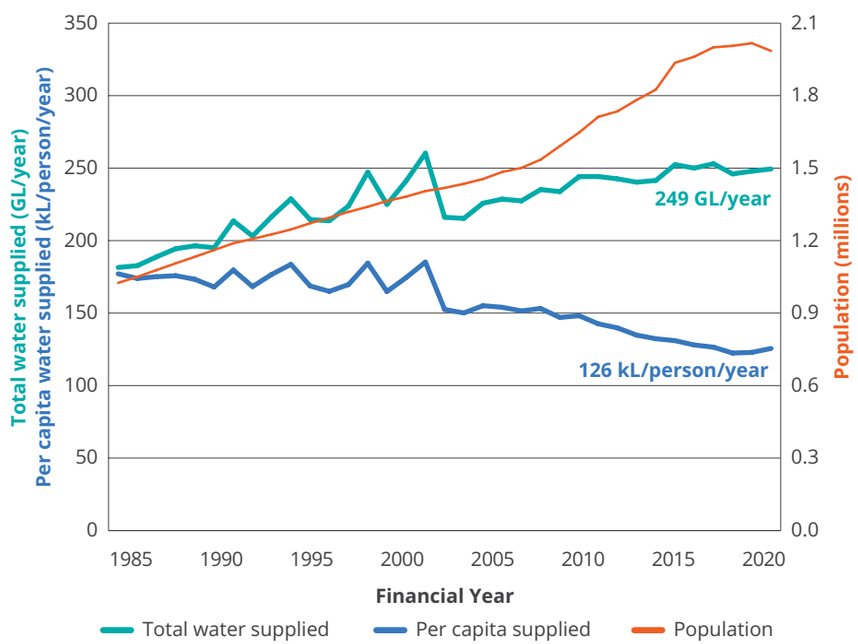
such as some domestic garden bores and where water is being taken from certain shallow aquifers. Water that is self-supplied by local governments, landowners and industries using their own water infrastructure comprises 65 per cent of water use.

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 approaches to water resource planning and allocation that recognise and address the competition for resources and changing availability.

This is currently managed 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 groundwater resources.

While demand management measures have been successful for scheme water (Figure 35), similar measures have not been broadly implemented for many self-supplied users. 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 35: Integrated Water Supply Scheme (total water supplied)[138]



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Driven by the reduced availability of groundwater and changes to environmental regulations, the Kwinana Water Reclamation Plant **recycles wastewater to supply 16.7 megalitres 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.

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. The *Waterwise Perth 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.[139] The plan aims for a target of 45 per cent of the projected gap between future water demand and supply to be met by recycled and alternative water supplies, including groundwater replenishment. 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.

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 water to the most populated areas of the State, 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 will be pronounced in low-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 to 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.



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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.

Bunbury Water Resource Recovery Scheme

As part of its Integrated Water Management Strategy, Aqwest is implementing the Bunbury Water Resource Recovery Scheme, with $11.9 million allocated from the State Government's COVID-19 *WA Recovery Plan*.

The scheme will provide 5.6 megalitres 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.

State 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, the Department of Health and the Department of 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.[134] Principles include (but are not limited to) cost recovery, two-part tariff structures, cost reflective tariffs and pricing transparency. In its assessment of jurisdictions' performance against these benchmarks, Infrastructure Australia found WA pricing to be lacking in transparency and that there was insufficient evidence to determine whether prices are set to meet full cost recovery.[135] 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.

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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. 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.



A clearly articulated state-wide 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.

While some circular economy concepts are already being adopted to some extent in WA, such as water recycling, reuse of waste by-products and conversion of waste to energy, 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.

Legislation, regulation and planning

There is currently no contemporary, long-term, state-wide direction for the water sector – the last state-level water strategy has not been refreshed for 14 years. This makes it difficult to determine whether the sector is appropriately planning for changing climatic and economic conditions and whether circular economy and sustainability principles are being adequately considered.

To enable a progressive, resilient water sector, a modern policy and legislative framework is required. Water resource legislation is complex and comprises six 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.

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 36.

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.

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Governance

The IWSS is the largest water supply scheme in WA and delivers 298 gigalitres of water per year to well over two 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 State Government water corporations, several other 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: 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 including 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 Government Trading Enterprises (GTEs):

- Water Corporation: 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: licensed water service provider servicing the Greater Bunbury region, extending from Myalup and Harvey in the north, and south to Capel.
- Busselton Water: licensed water service provider servicing the Busselton area, extending 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.

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Recommendations

Timeframe for completion: 2022-2027 2027-2032 2032-2042

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 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).

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.[142]

While it is recognised that water sector participants undertake a raft of planning activities, there are gaps in the published strategic planning framework which makes it difficult to navigate and which would benefit from a clearer long-term state-wide direction (Figure 36). A state-wide water plan was last released in 2007 and has not been refreshed since. Regional water strategies are at least six years old, do not cover the full extent of the State's regions nor adequately address the contemporary needs of regional communities, industries and agriculture. The *Waterwise Perth Action Plan* has a vision for 2030 and a two-year action plan that is strongly focussed on metropolitan water efficiency measures and proposes some welcome planning and policy review measures. However, water infrastructure provision for urban developments is often reactive and required to service developments that may have been approved without adequate consideration of source availability (particularly for watering of public open space).

Figure 36: Strategic water plans (most recent published)



***Waterwise Perth Action Plan* (DWER 2019)**
Regions: Perth and Peel
Planning horizon: two-year plan with a ten-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 and long-term resource options

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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.

What people use water for is just as important as how much 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. 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.

Recommendation 46

Modernise legislative, regulatory and planning frameworks for water resources and water services by:

a. progressing the proposed Water Resources Management Bill, to consolidate the six existing Acts into one modernised Water Resources Management Act. The reforms should aim to support contemporary, best practice and responsible water resource management, improve the definition and security of water entitlements and respond to evolving conditions such as climate change; ●

b. developing and implementing a 20-year+ State water strategy, which: ●
   i. takes into account the key drivers of population growth, existing and future industry needs (such as growing a hydrogen industry) and climate change;
   ii. plans for the transition to net zero emissions by 2050 and considers principles such as circular economy, multi-source water planning and solutions that are developed at a scale to deliver optimised outcomes (local, decentralised or large scheme);
   iii. articulates the role of government, the water services sector and the private sector in WA to support State development objectives through best practice water management approaches; and
   iv. is reviewed and refreshed on a five-year cycle.

c. developing regional water plans (including for Perth and Peel) that align with the State water strategy and with regional land use plans, outlining research, policy, water allocation, infrastructure and investment requirements. Plans should be developed through a collaborative approach with all relevant stakeholders. These plans should be reviewed and refreshed on a five-year cycle; ●

d. including provisions in planning and regulatory frameworks that enable investments in appropriately scaled, locally integrated alternative water supplies and wastewater systems where these offer more timely and locally sustainable water supply solutions than larger scale schemes, and are economically viable; and ●

e. applying Recommendation 23 in the Planning and coordination chapter, regarding rigorous infrastructure appraisal in the planning decision-making framework, water resource needs and infrastructure requirements should be clearly articulated in land use plans and infrastructure servicing plans, to ensure that: ●
   i. there is early consideration of the locational availability of water resources and servicing options to enable the determination of infrastructure servicing costs, and ensure the real capital and operational costs to government are known before making planning decisions;
   ii. opportunities to collaborate with the energy sector to plan, access and/or generate renewable energy solutions are identified; and
   iii. 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.

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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, with a range of efficiency programs and campaigns to reduce use of scheme water already 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 success of these 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'.[143]

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. Undertaking a review of these matters as they apply to the Gnangara groundwater system, in the first instance, could provide learnings and potential management approaches for other important water resources across the State.

The Gnangara groundwater system is Perth's largest and lowest-cost source of good-quality water. In 2016-17, approximately 287 gigalitres was drawn from the Gnangara system, of which 40 per cent was used by Water Corporation for potable water distribution through the IWSS. The remainder was drawn directly by self-supplied users – 13 per cent by domestic bore users and about 45 per cent on public open space, agriculture and businesses. 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. To safeguard this critical water resource, it is necessary to update and implement a revised plan that successfully rebalances water use and availability.

While Recommendation 47 is focused on strategic groundwater resources, IWA will consider broadening this recommendation to also include strategic surface water resources in the final Strategy later this year. Feedback on this issue through the consultation process would be particularly welcomed from stakeholders.

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Recommendation 47

Support the long-term sustainable use and management of the State's strategic groundwater resources by:

a. finalising, publishing and implementing the Gnangara groundwater allocation plan; and ●

b. commencing with Gnangara groundwater system, reviewing and reforming self-supply arrangements for strategic groundwater resources to: ●

   i. quantify the amount of water being used for self-supply purposes from each strategic groundwater source, such as through monitoring and metering;

   ii. understand the economic and social value of each strategic groundwater resource to the region and the State;

   iii. determine the impact of different self-supply scenarios on the timing and scale of major investment in future water supply infrastructure, such as desalination plants; and

   iv. where necessary, implement mechanisms to achieve improved water use and efficiencies for groundwater users (such as improved licensing, metering, pricing, trading and compliance measures).

Recommendation 48

Manage water demand through initiatives such as:

a. reviewing and implementing the *Waterwise Perth Action Plan* to further improve urban water efficiency, including extending the timeframe and increasing its application state-wide; ●

b. implementing and, where necessary, introducing expanded water efficiency programs, such as Water Corporation's Waterwise programs to offset the development of new water sources; and ●

c. 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 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 benefits, should be considered when undertaking feasibility and options assessments.

Recommendation 49

Ensure long-term water security through timely planning and provision of climate-independent infrastructure and protection of natural water resources, to provide fit for purpose and sustainable water services, by:

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 Government's aspiration of net zero emissions by 2050; and ●

b. further investigating groundwater replenishment schemes to recharge groundwater supplies. ●

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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 therefore 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, and to ensure viability and sustainability. 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 50

Develop a prioritisation framework to guide investment in water infrastructure projects that enable climate resilient and self-sustainable agriculture and food industries in peri-urban and regional areas. The framework should be consistent with regional water planning (refer to Recommendation 46c) and should prioritise investment in locations that are strategically aligned with agriculture and food industry opportunities (refer to the Regional development chapter).

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Jandakot groundwater protection area

The Jandakot groundwater mound in Perth's southern suburbs currently supplies approximately five per cent of the water supply for the IWSS. It is a small but strategic source for Perth, smaller than the Gnangara groundwater mound in Perth's north, which supplies approximately 34 per cent of the IWSS water supply. The Jandakot mound contains easily accessible, low-cost, good-quality water that is used for public open space, irrigated agriculture and horticulture, industry, drinking and domestic garden bores. Groundwater levels across the Jandakot mound have generally declined over the past 40 or so years, but at a slower rate than the Gnangara mound.

To protect the Jandakot mound from development and land uses that may have a detrimental impact on the groundwater resource, requirements such as the WA Planning Commission's State Planning Policy 2.3 have been in place for many years. This policy establishes a preventative, risk-based approach, with a protection area over the Jandakot mound, divided into three parts depending on existing land use and zoning. The highest priority 1 areas seek to prevent risks, while priority 2 areas seek to minimise risks, and priority 3 areas seek to manage risks. This has resulted in a mix of undeveloped areas, rural-residential developments and more intensive land uses that are managed for their risk to the groundwater mound.

While the Jandakot groundwater protection area was once on the urban fringe of Perth, much of it has since been surrounded by development and is now in close proximity to a wide range of high-quality infrastructure and services, including hospitals, freeways, train stations (existing and proposed), schools, TAFEs, universities and urban amenities. It is therefore timely to review the current policy settings to determine whether or not there would be merit in allowing more intensive development in the Jandakot groundwater protection area, with the importance of the IWSS broader water supply over the medium to long-term being a major overarching consideration.

Recommendation 51

Review the land use policies and water value of the Jandakot groundwater system to determine whether there would be merit in allowing more intensive development in the current Jandakot groundwater protection area. The review should consider:

a. all costs and benefits on a triple bottom line basis;
b. a strong up-to-date expert evidence base;
c. options to adequately mitigate risks to the Jandakot groundwater system;
d. climate change factors; and
e. the future role of the Jandakot groundwater system as part of the Integrated Water Supply Scheme's broader water supply over the medium to long-term, including potential alternative water supply options.



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Waste

Waste management is one of society's most essential services, protecting our health, environment, and the liveability of our communities.

WA is **increasingly avoiding and recycling waste**, but much more needs to be done to achieve the State's waste reduction and recovery targets.

Western Australians are increasingly recycling and avoiding waste, however, WA is falling well short of meeting targets to reduce and recover value and resources from its waste stream. Much more needs to be done to achieve the State's vision for a sustainable, low-waste circular economy.[144] The Australia-wide waste export bans, announced in 2019, highlighted the significant amount of waste WA produces and the State's lack of capacity to recycle it. WA needs to transition much faster to a circular economy and ensure the planning is done to modernise and expand waste infrastructure to meet the State's long-term needs.

Countries around the world are transforming their economies from a traditional take-make-use-dispose economic model into what is known as a circular economy (Figure 37). The circular model builds on the premise that all areas of the economy should be designing out waste, as well as 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. New technologies

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and processes for waste and resource recovery, and increasing rates of processing and value adding, will drive the need for new and additional waste infrastructure. The waste sector, communities, businesses, and government all have important roles to play in driving the transition to a circular economy.

WA is a significant generator of waste and is currently behind South Australia (85 per cent), Australian Capital Territory (79 per cent), New South Wales (68 per cent) and Victoria (68 per cent) in its rate of resource recovery (62 per cent).[145] Put simply, we must 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 products, require new skills and create new business and employment opportunities across the economy.

Figure 37: Circular economy[146]





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Waste Avoidance and Resource Recovery Strategy 2030

The State Government's WARRS 2030 vision is for WA to become a sustainable, low waste, circular economy reflecting global best practice. It has three headline targets:

- **Avoid:** Western Australians generate less waste. By 2030, reduce waste generation per capita by 20 per cent.
- **Recover:** Western Australians recover more value and resources from waste. By 2030, increase material recovery to 75 per cent.
- **Protect:** Western Australians protect the environment by managing waste responsibly. By 2030, no more than 15 per cent of waste generated in Perth and Peel is landfilled.

The State 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 towards a circular economy. WARRS 2030 is a robust strategy, reflecting international best practice, and provides 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 three key waste streams – municipal solid waste, commercial and industrial waste, and construction and demolition waste. Table 4 shows the waste targets and WA's performance in achieving them. Significant improvement has been achieved in reuse of construction and demolition waste, however not enough progress has been made in avoidance and recovery of municipal solid waste and commercial and industrial waste – and in some cases progress has even gone backwards. Much more must be done to achieve WA's waste targets.

China's announcement in 2017 that it would ban all solid waste imports from 1 January 2021 brought to attention the amount of waste WA produces and the lack of local capacity to meet projected waste management needs. 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.[142] The Federal and State governments are now working with the private sector to modernise and expand WA's waste processing capacity, with $70 million in joint funding announced in February 2021 to assist the development of new private facilities to boost recycling across WA. However, infrastructure on its own will not be enough. The suite of actions set out in WARRS 2030 must be implemented to reduce the amount of waste WA generates, while increasing markets for waste-derived products, such as recycled metals, construction materials and compost.

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Table 4: Western Australia's performance in meeting WARRS 2030 waste targets[147]

Year	Metro MSW*	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%	1,854
2016-17	32%	28%	47%	77%	52%	1,612
2017-18	37%	28%	47%	75%	51%	1,578
2018-19	34%	29%	51%	81%	57%	1,716
State targets 2020	**65%**	**50%**	**70%**	**75%**	-	-
State targets 2025	**67%**	**55%**	**75%**	**77%**	**70%**	-
State targets 2030	**70%**	**60%**	**80%**	**80%**	**75%**	-

*Municipal solid waste

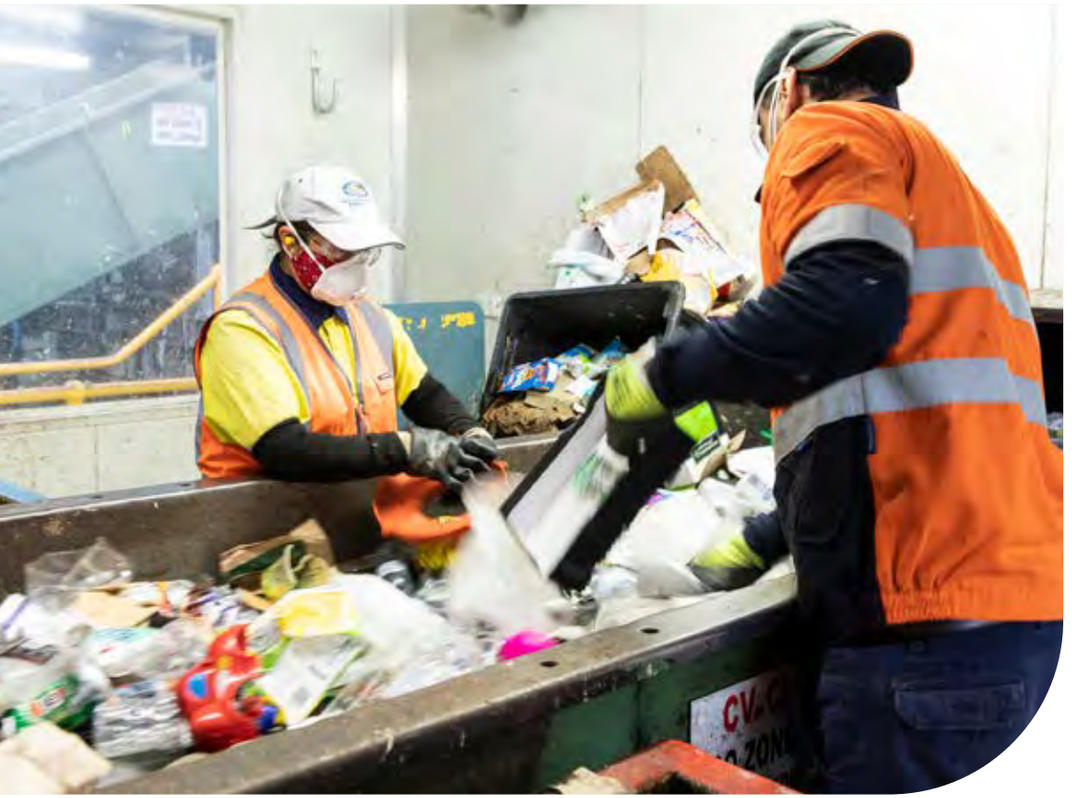
1. All figures are from the Recycling activity in Western Australia annual reports, Except MSW performance (major regional centres) which is from the annual census of Western Australian local government waste and recycling services.
2. Some historical data has been revised. The data presented here supersedes all previous versions.
3. Excludes one major regional centre due to data verification issues.

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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.



WA faces many challenges in implementing WARRS 2030. Current attitudes and behaviours toward the creation and management of waste are a significant barrier. Education and awareness-raising initiatives play a key role in changing habits and adopting approaches to reduce and reuse waste.

WA has hundreds of landfills and many are poorly managed, which impacts on the environment and the amount of waste recovered. Better practice guidelines and additional resourcing is needed to lift standards and undertake compliance. WA's geographic size, relative isolation, and distance to markets for waste derived products, add to the task of coordinating and providing services, achieving economies of scale, and reducing illegal dumping, to maximise the amount available for recovery. A key challenge will be building enough demand for waste-derived products to underpin the commercial viability of a local recycling industry and waste processing and value-adding facilities. Collective action is required to realise the benefits of waste reduction, increased economic productivity, and environmental sustainability.

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.[149] Waste management in these communities is often not adequately managed for a range of reasons, such as poorly defined roles and responsibilities for waste management, 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 of the Strategy, 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.

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Governance

All levels of government, as well as the private sector, are involved in the waste sector (Figure 38). The sector is regulated by the State Government.

The *Waste Avoidance and Resource Recovery Act 2007* is the State's principal mechanism for waste regulation and there are three State Government entities responsible for waste management:

- Waste Authority;
- Environmental Protection Authority; and
- Department of Water and Environmental Regulation.

Local governments are responsible for collecting and managing municipal solid waste, either council-by-council, or through a regional arrangement. The private sector provides waste management services and owns and operates infrastructure across WA.

Figure 38: The waste sector



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Case Study

Roads to Reuse

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.



The Waste Authority, Department of Water and Environmental Regulation and Main Roads WA, with support from the WA Department of Health and the Waste and Recycling Industry WA, successfully completed the Roads to Reuse pilot project, which demonstrated the viability of reusing used recycled construction and demolition products in road construction.[150]

Main Roads WA was identified as a key agency for the pilot project because of the volume of material the organisation uses each year, its engineering expertise and its leadership role in road construction and maintenance. The pilot project used around 62,000 tonnes of recycled construction and demolition products in road construction projects, including the Kwinana Freeway Northbound Widening and Murdoch Drive Connection projects.

Main Roads WA found recycled construction and demolition products to be strong and durable, and supports the ongoing use of products that meet Roads to Reuse specifications in future projects.[151] Importantly, the pilot project highlighted the importance of a robust assurance process to provide consumers with confidence that the products meet strict environmental specifications to manage risks of contaminants such as heavy metals and asbestos.

To ensure protection of human health and the environment, construction and demolition recyclers are required to undertake rigorous sampling and testing to demonstrate that recycled material meets the *Roads to Reuse product specification – recycled road base and recycled drainage rock*. Independent audits of recyclers' processes and products provide additional assurance to purchasers.

A number of major infrastructure projects are underway across WA, and several State agencies and Government Trading Enterprises 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.[152] Main Roads WA has also committed to using over 200,000 tonnes of crushed recycled concrete on selected projects.[153]

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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Implementation of the *Waste Avoidance and Resource Recovery Strategy 2030*

Historically, the focus of waste infrastructure planning has been on the Perth metropolitan area, however, additional regional processing infrastructure will also be required as communities, industries and their waste recovery and recycling needs grow. The WARRS 2030 proposes development of a State waste infrastructure plan to identify long-term, state-wide waste infrastructure needs. The plan would address the type and scale of waste processing infrastructure, and consider matters such as collocation and accessibility. The need to secure strategic sites with appropriate buffer zones for facilities will increase as more players enter a growing waste recovery and recycling market. It is difficult to identify waste infrastructure priorities in the absence of a State waste infrastructure plan, and IWA therefore recommends its preparation as a high priority.

WA's public sector has a significant lead role to play in avoiding waste and helping to build new markets for waste-derived products that recycling industries need for long-term sustainability. Government can use its significant purchasing power to help build domestic markets by mandating the requirement to procure recycled products. The waste sector is also highly regulated, and government has several levers it can pull, such as the Waste Levy and local government waste plans, to drive change. The Waste Levy has been highly effective in the Perth metropolitan area for increasing the material recovered from the waste stream. Reviewing its application to include the State's other regions would provide a financial incentive that may result in increased waste recovery.[150] This Strategy recommends expediting legislative and regulatory review and reforms, and that State agencies and GTEs be required to set targets to increase procurement of more environmentally sustainable and locally produced recycled products.

The **Waste Levy** has been **one of the most visible drivers introduced to reduce waste to landfill** but is currently only applied in the metropolitan area.

Recommendation 52

Accelerate implementation of the *Waste Avoidance and Resource Recovery Strategy 2030* by:

a. preparing and publishing a State waste infrastructure plan to guide long-term planning and development of waste infrastructure; ●

b. strengthening the role of the WA public sector in supporting waste avoidance, encouraging material recovery and environmental protection, and developing domestic markets for recycled materials by developing and implementing government procurement policies, which set ambitious and progressively increasing targets to: ●

   i. avoid and reduce waste generation;

   ii. increase recovery of materials; and

   iii. purchase locally produced recycled products.

c. prioritising and expediting waste legislative and regulatory reforms, by: ●

   i. reviewing the Waste Levy, the rate and application state-wide, and the use of levy funds to implement the *Waste Avoidance and Resource Recovery Strategy 2030*;

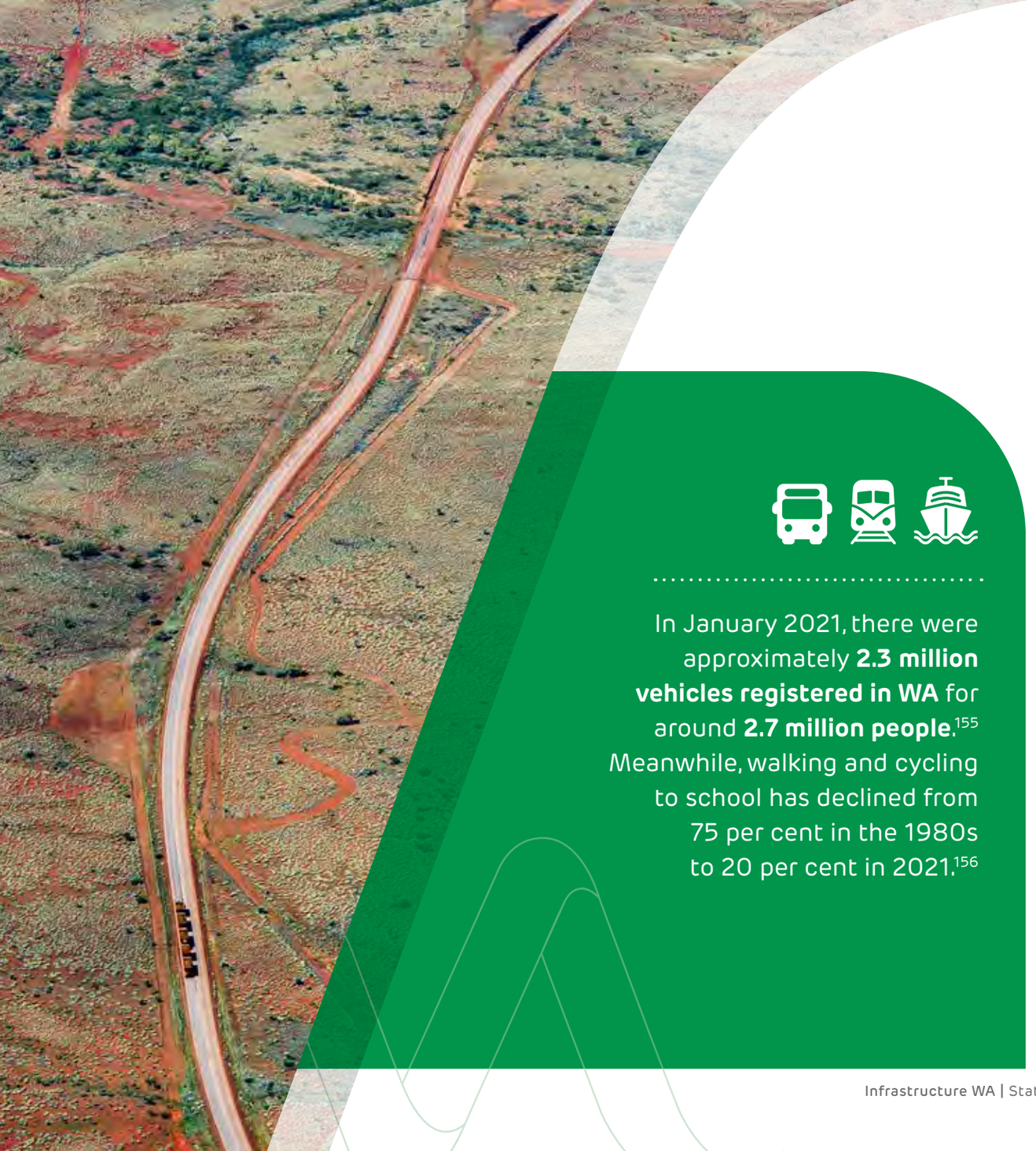
   ii. progressing reforms to encourage the recovery of materials derived from waste and provide for their safe use of recycled products; and

   iii. reducing levy avoidance and evasion practices.

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Transport

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.

In January 2021, there were approximately **2.3 million vehicles registered in WA** for around **2.7 million people**.[155] Meanwhile, walking and cycling to school has declined from 75 per cent in the 1980s to 20 per cent in 2021.[156]

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 aim requires a highly coordinated approach and alignment between WA's transport's planning, investment, delivery, operations and governance arrangements.

Transport forms a significant part of the State Government's Asset Investment Program (AIP). In the decade to 2019-20, annual average road and public transport expenditure was $1.4 billion – almost a quarter of the public sector total.[157] This increased to $3.4 billion or 44 per cent

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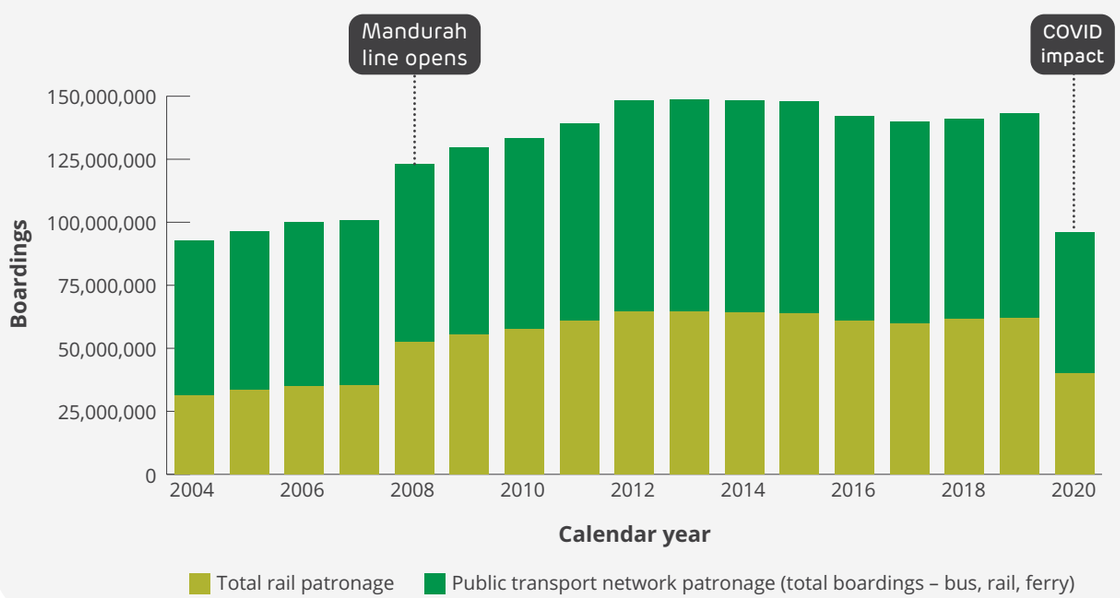
of the AIP in the *2020-21 Pre-election Financial Projection Statement*, in line with the *WA Recovery Plan* and increased investment in roads and METRONET. Transport investment will form approximately 42 per cent of the AIP from 2020-21 to 2023-24. It is critical that investment on this scale has an integrated, coordinated approach to optimise long-term public benefit.[158] WA can learn the lessons from costly build-dominated infrastructure interventions in other jurisdictions by focussing 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 timeframe 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 Perth's population and economic growth. 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.[159]

A current challenge in achieving efficient network operations is the widening gap between reductions in public transport patronage and network expenditure.[160] Patronage on the Transperth system has fallen since its peak of over 148 million trips in 2013, to 96 million in 2020, a reduction of approximately 30 per cent, with patronage relatively flat between 2012 and 2019.[161] 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 in 2020. Conversely, road use has increased to above pre-COVID-19 levels.[162] (Figure 39)

Figure 39: Transperth annual public transport patronage[163]



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WA's transport networks should move towards a **mobility as a service model**, to integrate journeys across all transport modes.[164]

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. 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' have the potential to change how people travel. While it is not possible to accurately forecast the extent to which 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.[165]

The geography of the State provides a challenge too. 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. Maintaining a safe and efficient road network of this size 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 2020-30*, should be a priority.

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 three 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 Infrastructure Delivery in 2020 demonstrated progress towards improved cross-agency transport infrastructure delivery in WA, further reform is needed.

In terms of opportunity, the State is well-positioned to take advantage of demand for its exports from the emerging global consumer class. 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

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and the potential location for a new international airport to cater for long-term growth in demand. 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. 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 five central transport themes – governance and planning, demand management, mobility, technology, and industry productivity and freight.

Governance

The State Government Transport Portfolio comprises:

- the Department of Transport;
- Main Roads WA;
- the Public Transport Authority; and
- five port authorities, which report directly to the relevant Minister – Kimberley, Pilbara, Mid West, Fremantle, and Southern.

The Department of Transport is responsible for integrating and enhancing the State's transport operations, regulatory functions and policy development across transport modes.

Accidents 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 to 70 per cent by 2030**.[166]

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 (this includes different types of infrastructure such as roads, bridges, tunnels and railway crossings) and also for funding and delivering upgrades and maintenance of local roads. It also manages traffic signals, and signage. The State-owned road network includes approximately 18,500 kilometres of road valued at $42 billion.

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 State 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.

The majority of 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 current passenger heavy rail delivery. Similarly, the Westport Office has been established to progress planning to deliver new container port facilities.

The State's five port authorities are responsible for oversight of port operations and strategic planning, with significant private sector participation and ownership of assets within port boundaries.

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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. 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.

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 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.

For further information, refer to www.transport.nsw.gov.au

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Recommendations

Timeframe for completion:

● 2022-2027 ● 2027-2032 ● 2032-2042

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. Interstate and international examples demonstrate a range of potential options to achieve this, from internal reforms to full-scale structural changes. Some initial progress has been made, through the creation of the Office of Major Transport Infrastructure Delivery and the 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.[167] 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 to Main Roads WA has prioritised motor vehicle-focussed road projects in many cases. Recently, motor vehicle licence funding has been allocated to support level crossing works associated with METRONET. More consistent and longer-term allocation of motor vehicle licence funding to other transport mode projects will 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. 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.

Recommendation 53

Ensure stronger transport system outcomes by:

a. reforming governance arrangements for the Transport Portfolio to achieve a strategic, mode-agnostic approach to transport network planning and delivery; and ●

b. reforming funding hypothecation 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 each 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. Reflecting these changes, the 2013 *Western Australian Regional Freight Transport Network Plan* should be refreshed. It should also reflect region-specific freight plans and consider cross-regional strategic issues, such as Pilbara direct shipping to and from Asia, and road upgrades for improved freight connectivity between Perth and the Pilbara region.

The key strategic transport plan for Perth is the *Perth and Peel@3.5million The Transport Network*. 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 strongly aligned to the *Perth and Peel@3.5million The Transport Network* and have not been unified to establish a single and coherent list of priorities. The 20-year Road Network Development Plan and the Public Transport Authority's Rail Growth

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Plan – Optimising the Use of Perth's Existing Railways to 2051 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 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 by 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 54

Refresh state-wide strategic transport planning by:

a. developing 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. This should build upon recent region-specific freight plans and also consider strategic cross-regional issues;
b. developing a new 20-year+ Perth and Peel transport plan across all modes. This should combine and prioritise all key mode-specific planning across transport portfolio agencies. It should also embed a diverse range of non-build, demand management and transport innovation opportunities and scenarios; and
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 portfolio.

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Demand management

Fuel excise alternatives

The fuel excise, levied by the Federal Government, is the largest single source of road charging revenue. 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.[168] This roughly covers the direct government cost 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 Federal Government in 2019-20 estimated at above $2 billion.[169] A significant decline in this revenue poses a major challenge to future road asset management and development nationally. Finding an alternative source of revenue to offset the projected decline in fuel excise is a challenge confronting all jurisdictions.[170]

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. However, these have been criticised by some stakeholders for disincentivising 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 require national coordination.

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, irrespective of time of day, day of the week, or congestion condition.

Recommendation 55

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. futureproofing any fuel excise alternative scheme and associated technology by ensuring that: ●

   i. the scheme has the potential to include vehicle mass, distance, location and time-of-day pricing elements; and

   ii. 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. ●

Demand management and public transport patronage initiatives

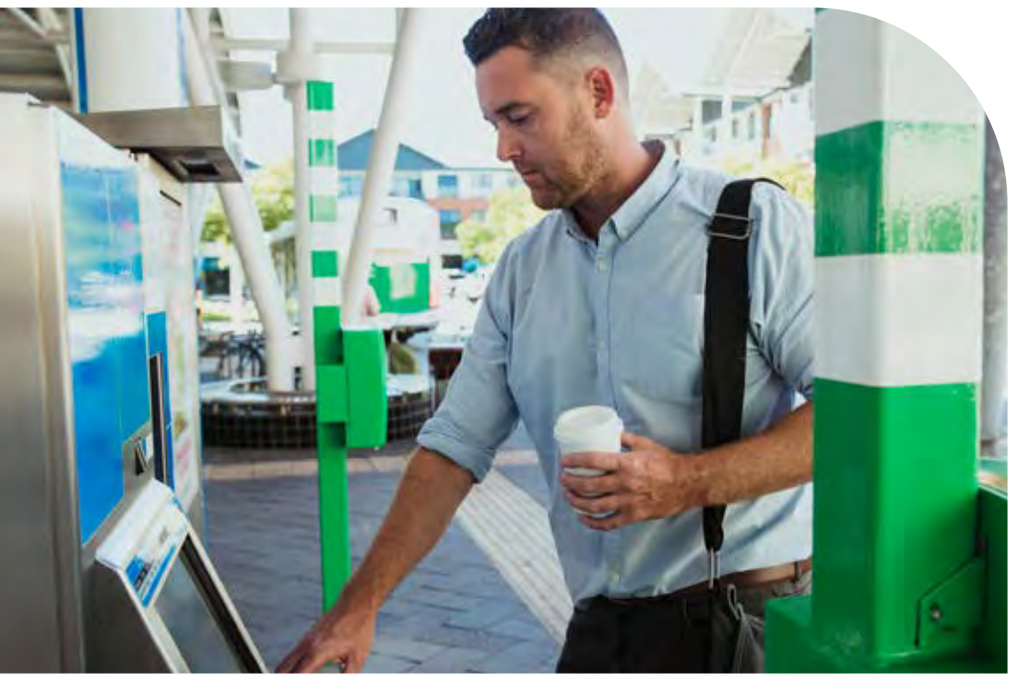
An important element of transport planning is to include demand management interventions to address congestion and counteract reductions in public transport patronage.

The high level of investment in major road and rail projects has not entirely mitigated the forecast increase in transport congestion. In order 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.

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There is a diverse range of demand management interventions which can be considered, including behaviour change campaigns, improved accessibility and new business models to link up transport mode options and 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. Regulatory reform to support the use of micro-mobility innovations such as electric scooters on the local road and path network, and allow foldable devices onto all bus, train and ferry services, has potential to reduce road demand and increase public transport patronage. Options such as promotion of carpooling and off-peak commuting, a Perth E-device scheme, and removing station parking charges could also be considered.



Digital platforms trialled in other jurisdictions have demonstrated the potential future benefits of mobility as a service, 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.

In the medium to long term, demand for public and active transport is impacted by the built environment. Adjusting state planning levers to enable greater levels of appropriate urban infill housing around all train station precincts and high frequency bus corridors would support greater public transport patronage. Developing active transport plans for all schools, universities and TAFEs can identify active transport infrastructure gaps and pursue investments that promote greater uptake of safe walking and cycling.

Recommendation 56

Develop and implement an action plan to increase public transport patronage and reduce road congestion through non-build measures, including:

a. measures within the scope of future business cases for major road and rail infrastructure;
b. embracing new innovations in digital technology and service delivery; and
c. planning for station precinct urban intensification and better connectivity to educational facilities and other activity precincts.

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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 into the future. 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 focussed 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 role of roads can also work against community expectations of public space and place making objectives, which could be better serviced by the use of movement and place principles in strategic planning for specific corridor development.

While road investment should continue, 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 57

Progress targeted expansion and improvement of the road network, including by progressing the following:

a. 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. regional maintenance and freight productivity programs to provide fit for purpose road networks; ●

c. small-scale intersection upgrades program, expanding the use of technology on arterial roads and trials for dynamic bus prioritisation; ●

d. 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. including scenarios in business cases, estimating impacts from a range of potential low and zero emissions vehicles and connected and automated vehicle rollout scenarios, for all major transport projects; and ●

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. ●

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Heavy rail

There is currently a high level of investment to expand the metropolitan heavy rail passenger network. The short 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 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, platform lengthening, level crossing removals, power systems and stabling. The Rail Growth Plan is based on meeting pre COVID-19 patronage growth forecasts. COVID-19 impacts on patronage have been significant and patronage has not yet returned to 2019 levels. The longer-term impact on patronage remains uncertain, though current METRONET projects and recent reforms to public transport fares will have a positive impact. The current investment in new rolling stock, plus the proposed investment in signalling, will provide additional system capacity. This means other proposed complementary investments can be staged over the longer term, although the cascading of older rolling stock onto the three 'heritage lines' 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 current and emerging modes, for more convenient and safer access to stations from nearby areas, can also boost public transport demand. It is important to plan station accessibility upgrades for all modes, in compliance with the *Disability Discrimination Act 1992*, 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 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 feasibility investigations, including costs, potential patronage, and consideration of 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 Fast 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 58

Plan and invest in the future development of new heavy rail infrastructure, including:

a. investing in high capacity signalling;
b. investing in improved station precinct accessibility, including compliance with the *Disability Discrimination Act 1992*;
c. staging of other investments from the Rail Growth Plan; and
d. investigating the feasibility of long-term major projects – East Wanneroo Rail Link, Bunbury Fast 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-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 in-between heavy rail and regular bus services.

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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 east–west, along a primary axis of the CBD, together with connections to nearby key activity centres. Further strategic planning is required to select the two 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.

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 (refer to Recommendation 54b). 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 59

Undertake planning of light rail and/or bus rapid transit for the next stage of major public transport priority investment in Perth, particularly in the CBD and inner-middle ring suburbs. This includes completing a full business case options assessment comparing the Knowledge Arc light rail corridor against a 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 health, avoids emissions, and decreases road congestion. The increase in cycling participation during the COVID-19 pandemic has highlighted the community's interest in cycling. This is in addition to the growth in popularity of various cycling activities.

While Perth has an excellent Principal 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 school children who walk or cycle to school has fallen from 75 per cent in the 1970s, to around 20 per cent today.[171]

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A long-term cycle network has been developed for Perth, and agreed by state and metropolitan local governments (5,570 kilometres of new links in total).[172] Over $220 million in funding has been allocated to cycling infrastructure over the next four 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.[173] Only $5 million in 50 per cent co-funding, is available annually to both metropolitan and regional local governments for local cycling infrastructure projects. These projects have delivered over 18 kilometres of local cycling infrastructure annually, on average, between 2015-16 and 2019-20.[174]

Recent investment focus has been towards 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. People often have no option but to cycle, for part of their journey, unprotected along painted lanes on busy roads. The lack of a safe 'first and last mile' discourages potential cyclists with safety concerns, as the probability of a fatal outcome increases substantially if a person is hit by a vehicle at speeds above 30 kilometres per hour.[175]



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, designed to protect vulnerable road users through lower speeds and a safer road environment. It is a key barrier to cycling becoming a major transport mode, and also reduces the benefits derived from the Principal Shared Path and rail networks.

Recommendation 60

Enhance cycling and walking infrastructure through safer designs on cross-suburban linkages, by:

a. allocating a greater portion of state funding to local government bike projects that deliver strategic, continuous cross-suburban linkages, based on Perth Long Term Cycling Network priorities and equivalent regional plans. This should include 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 bike infrastructure priority projects; and

c. requiring application of new safe bike infrastructure design guidelines for all state and local government projects, based on international best practice. This includes through relevant updates to the WA Planning Commission's Liveable Neighbourhoods policy and Main Roads WA's procedures for the review and approval of local government road works.

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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 ten to 20 years. The CSIRO predicts that electric vehicles could potentially account for around 40 per cent of Australia's vehicle fleet by 2050 under a 'central' scenario, based on current trends and assuming little or no policy intervention. 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 may become more prevalent for long haul and heavy freight vehicles.

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. Given the low uptake rate, both in WA and nationally, compared to many other nations, this Strategy recommends further steps be taken.

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 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. This opportunity is recommended to be considered in future energy market modelling.

Recommendation 61

Implement further measures to support the *State Electric Vehicle Strategy for Western Australia* to achieve a higher uptake rate of low and zero emissions vehicles, by:

a. setting a more ambitious target for the State Government light vehicle fleet uptake;
b. investigating the transition or conversion of other government vehicles to low emissions technology, including the 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; and
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.



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Connected and automated vehicles

Connected and automated vehicles have the potential to significantly disrupt the transport system.[176] 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 dovetails with the roll out of low and zero emissions vehicles and new models of shared transport.

The timeframes and exact manner of connected and automated vehicles penetration 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 resolved.

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 also 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. These could be leveraged to promote Perth as the home of a future national automated vehicle regulator.



Recommendation 62

Support the introduction of connected and automated vehicles by ensuring the anticipated future road infrastructure and related technology systems requirements of connected and automated vehicles are incorporated in 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 which will have major implications for WA, the scale of which exceeds almost any other public infrastructure project. 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 multi-year impacts for such a large-scale project, including on the State Budget and the private sector's capacity to deliver the government's infrastructure agenda. 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 State Government has commenced detailed planning to deliver a new container port terminal at the Fremantle Outer Harbour in Kwinana.

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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 which employs 11,000 people.[177]

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. While the preferred location of a new container port has been identified, a number of key related studies are still required.

While Westport planning has focussed 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 into the future. Future options may include consolidating all of 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 Inner Harbour.

The timing for 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.



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/ 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 63

Conduct further strategic planning in the following areas to complement Westport's preparations for a new container port in Kwinana, by:

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; and
d. developing a long-term Inner Harbour masterplan to support future redevelopment, including transport network capacity.

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Commercial and defence shipbuilding is worth approximately $3 billion per annum, growing at around four per cent per annum. Approximately 50 per cent of that is based at the Australian Marine Complex, which is also home to some of Australia's largest commercial and defence shipbuilders.[178]



Australian Marine Complex

The Australian Marine Complex in Henderson, is a large and strategic defence hub, and a major industrial and shipbuilding precinct in close proximity to the Royal Australian Navy. 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 two decades, and now accommodates over 150 businesses.

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 State Government's economic diversification policies. The Australian Marine Complex functions support established primary industries, in addition to opportunities within the defence sector.

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 maintenance of large hulled vessels. This facility would support a future build and sustainment program for large hull vessels from the Royal Australian Navy, allied navies and potentially large 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. State commitments should be leveraged to attract significant funding contributions from the Federal Government and private sector.

Recommendation 64

Undertake further planning and staged expansion of the Australian Marine Complex common use infrastructure consistent with the *AMC Strategic Infrastructure & Land Use Plan* and industry requirements.

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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, 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 65

Support expansion of direct shipping services to the State's north, by:

a. assessing the viability, costs and benefits of long-term direct shipping services to the State's north, 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 all relevant port facilities to have appropriate 'first port of call' infrastructure and systems (for customs and quarantine requirements); and
d. planning for fit for purpose road connections to direct shipping facilities.

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Grain is a seasonal, high-volume commodity, with the **total production varying from 14.3 to 18.2 million tonnes per annum over the last five years**. Ninety per cent of WA's grain harvest is handled by CBH and approximately 60 per cent is transported to port by rail, with the other 40 per cent by road.[179]

Freight rail and the agricultural region supply chain

Freight rail plays a central role in a number of the State'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 port, 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 under the long-term control of private leaseholder Arc Infrastructure, until 2049. This rail system complements road freight operations, connecting the Wheatbelt 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 efficiently move large volumes during peak demand periods, while also removing trucks from roads, which benefits local communities and reduces road maintenance.

A good example of a strategic approach to freight productivity is the *Revitalising Agricultural Region Freight Strategy*. It is focussed 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 State is not as well positioned when it comes to considering public funding contributions for freight rail network development proposals that emerge over time.

Proposed 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

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the network remain the responsibility of the leaseholder, although they may become less willing to invest in network expansions or major upgrades, as the end of the lease period approaches.

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 (refer to Recommendation 54a). Developing principles to guide public contributions towards private sector investment (refer to Recommendation 38c in the Infrastructure delivery chapter) will also assist in making more informed decisions when these requests are presented to Government. Current freight rail expansion proposals include the Kalgoorlie rail realignment, which has recently been allocated business case funding.

Recommendation 66

Implement a structured approach to planning, and consideration of public contributions towards proposals for expansion of the State's freight rail network over the remainder of the lease period, supporting government contributions by exception under limited circumstances. Pursue further investigations including:

a. WA Agricultural Supply Chain Improvements; and ●
b. Kalgoorlie Rail realignment. ●

Perth and Jandakot airports

Proposed investment by Perth Airport in a third runway and in the consolidation of passenger terminals should 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.

There are extensive lead times required 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 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 timeframe of this Strategy.

Recommendation 67

Work with the Federal 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 corridors. ●



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Social and affordable housing

In 2020, **one in five (200,000) households were estimated to need some form of housing assistance** from the State Government. By 2030, **45,000 additional households** are likely to need assistance.[180]

A safe, secure place to call home is a foundation for community wellbeing. However, housing security is increasingly difficult for many. WA's population and household structures are changing, living costs are increasing, and more people are requiring housing assistance due to shifts in personal circumstances.

'Social housing' refers to subsidised rental dwellings for very low to low-income households owned and managed by the State Government (public housing) and rentals owned and/or managed by the not-for-profit and local government sectors (community housing). 'Affordable housing' refers to housing that households on low to moderate incomes can afford to access while meeting other essential living costs.[181]

Social and affordable housing is a critical factor in economic and community participation and wellbeing, and can play a key role in WA being a sought-after place to live, contributing towards improved productivity and equity.

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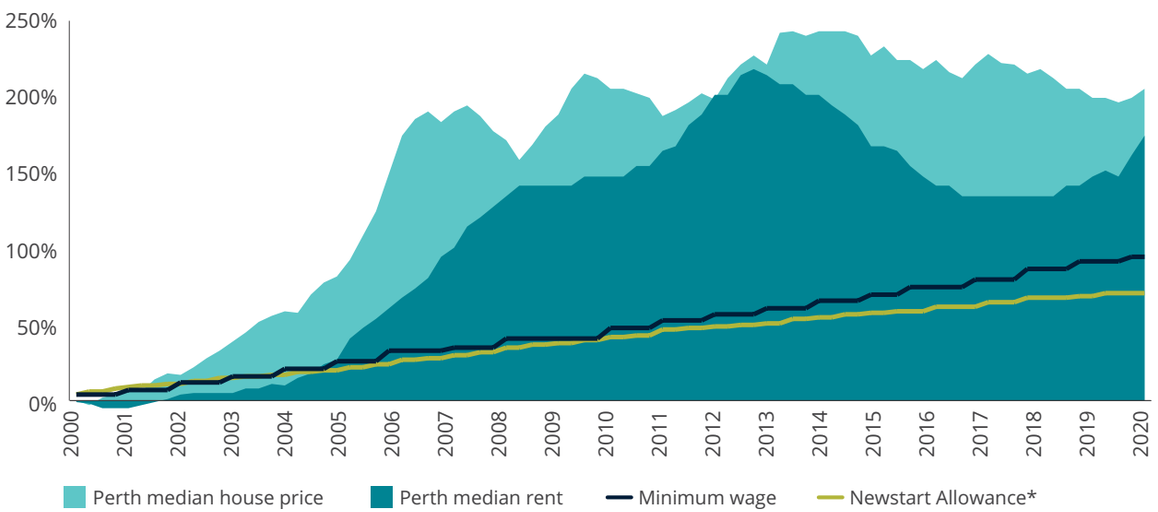
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The benefits of an effective social and affordable housing system are evidenced across health and social services as well as the justice system – providing a secure base from which people can participate in the workforce, as well as contribute in the community.[182] For example, conservative estimates released in 2016 using linked housing and health data in WA, 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.[183]

As an entrenched structural issue across Australia, housing affordability and the demand for housing support is impacted by economic and social conditions. Australia is currently facing a peak demand for housing – amplified by the COVID-19 pandemic – which is affecting those most susceptible to price increases, who can be forced out of ownership and rental markets. In WA, an increasing number of people require support to access housing. Figure 40 demonstrates decreasing housing affordability in Perth and WA.

Figure 40: Housing affordability in Perth since 2000[184]



*The Federal 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.

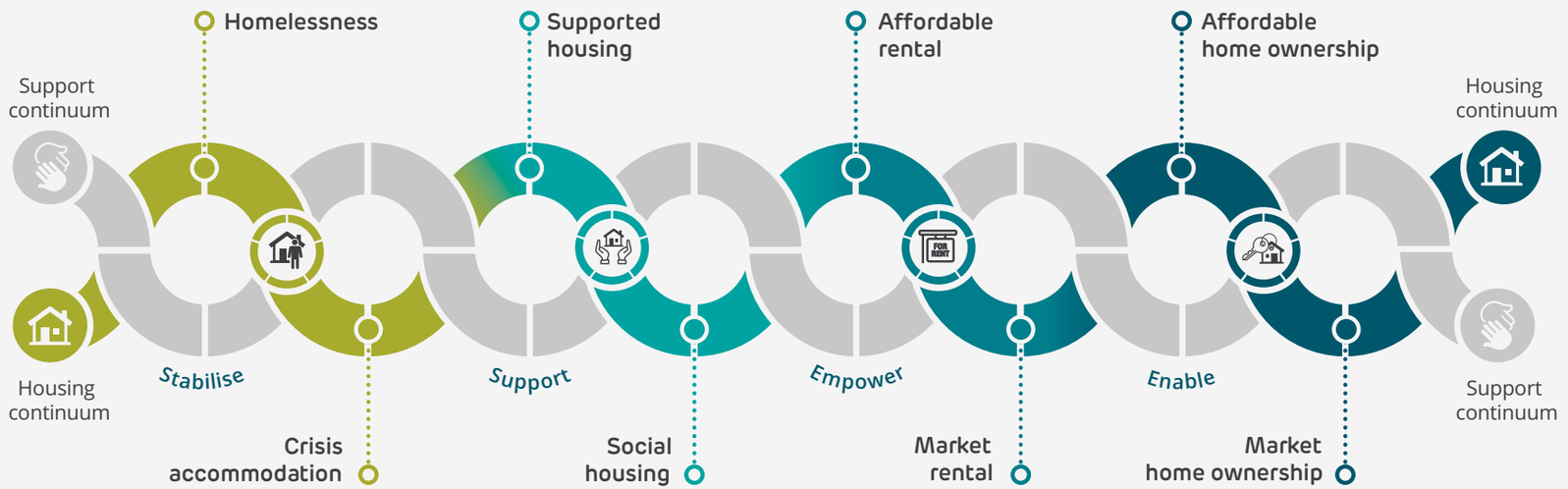


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Figure 41: The nature of assistance changes along the housing continuum[185]



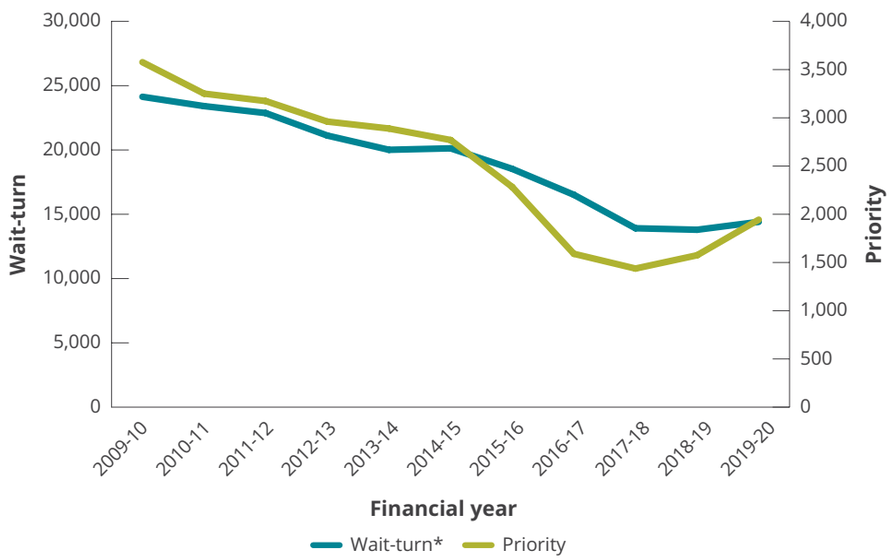
The primary focus for State housing infrastructure is to ensure adequate support for people experiencing homelessness, and to provide crisis accommodation, social and affordable housing – enabling people to move along the housing continuum when they are in a position to do so, or to access a greater level of support in times of need. The nature of assistance required changes along the housing continuum – more intensive housing and support is required for people on very low to low incomes and with greater needs (Figure 41). Fundamental shifts are required to deliver a modern housing system able to support those experiencing, or most vulnerable to, housing stress or homelessness.

There is a growing gap between the State's supported housing needs and the adequacy and availability of its infrastructure. The number of people experiencing some form of homelessness in WA on Census night in 2016 was estimated to be 9,005, including 1,083 people sleeping rough, and 3,871 living in 'severely' crowded dwellings.[186] The issue of homelessness and overcrowding is particularly acute for Aboriginal people. On Census night in 2016, Aboriginal and Torres Strait Islander people made up only 3.1 per cent of WA's total population, yet made up 29 per cent of people experiencing homelessness.[187]

For public housing, there were 16,097 waitlist applications in February 2021, including 2,769 on the priority waitlist.[188] While there has been a recent increase to waitlist numbers due to unique pressures on the housing sector as a consequence of the COVID-19 pandemic, waitlist applications are well below the levels experienced during the last resources boom, where application numbers ranged between around 23,400 in 2010-11 and 20,100 in 2014-15.[189] Priority waitlist numbers have returned to the same level as 2014-15, however, they are still below the last period of extraordinary market pressure in 2009-10, where they peaked at well over 3,500 applications (Figure 42).

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Figure 42: Public housing waitlist (wait-turn and priority)[190]



*The number of wait-turn applications inlcudes priority listed applications.

Further, WA's public housing asset base is ageing, increasingly inefficient and often misaligned with community need. A substantial proportion of the State-owned public housing stock is approaching end-of-life, with more than 20 per cent over 40 years old.[191] In addition, 45 per cent of all metropolitan and 41 per cent of all regional housing assets are between 20 and 40 years old. Without substantial ongoing investment and maintenance of current properties, 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 4.14 per cent to 3.78 per cent in the five years to 2020 (Figure 43), compared to a national figure of 4.3 per cent.[192] Of note, a portion of social housing stock remains vacant at any time for a number of reasons.



Recent State Government investment packages, including economic stimulus of $540 million through Housing and Homelessness Investment Package and Social Housing Economic Recovery Package, seek to address homelessness and improve the quantity and quality of social and affordable housing. While this funding is considerable, the challenge of an ageing portfolio and long-term under investment in maintenance, has meant that dwellings that were unsafe, too expensive to maintain and not fit for purpose, were decommissioned, including large complexes with a significant number of social homes. This exacerbated the decline in housing stock, with 1,155 dwellings lost between the 2016-17 peak and 2019-20.[193]

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Housing and Homelessness Investment Package

Among other initiatives, the investment package includes:

- $125 million for more than 300 new public housing units targeting homeless and vulnerable people on the priority waitlist;
- $6 million to refurbish 20 regional and 50 metropolitan public housing properties; and
- $19.2 million for 200 additional shared equity homes, delivered in partnership with Keystart – WA's low deposit home ownership scheme.

Social Housing Economic Recovery Package

Announced in June 2020 as part of the State Government's COVID-19 Recovery Housing Stimulus Package, the $319 million package will deliver an additional 250 new dwellings across WA and refurbish 1,500 existing dwellings, together with:

- $38 million for Aboriginal Short Stay Accommodation facilities in Geraldton and Kununurra; and
- $4 million to expand the Peel and Kwinana Family and Domestic Violence Women's Refuges.

This funding is in addition to WA's $394 million Social and Affordable Housing and Jobs Package announced in 2018 and the Housing and Homelessness Investment Package (outlined above).

By the end of 2019-20, the National Housing Finance and Investment Corporation had made **total financing decisions worth $1.4 billion**. To date, only one WA Community Housing Organisation project attracted funding from the Corporation, equating to 2.9 per cent of the value of funding available. In comparison, New South Wales providers received funding for 11 projects at 62.6 per cent of the total value of funding available financed by the Corporation.[194]

Given these trends, current targets in the *WA Housing Strategy 2020-2030* – six per cent net growth of social housing by 2030 and a minimum 20 per cent of homes in State residential projects allocated to social and affordable housing – do not adequately respond to latent and growing demand and housing stress.

Revised targets must be applied to the right households, locations and dwelling types (such as number of bedrooms). Understanding the dynamics of housing programs, and the mix of market conditions relative to the needs of the community in a location, are also essential components for ensuring housing and related support services are effectively provided by all participants in the sector.

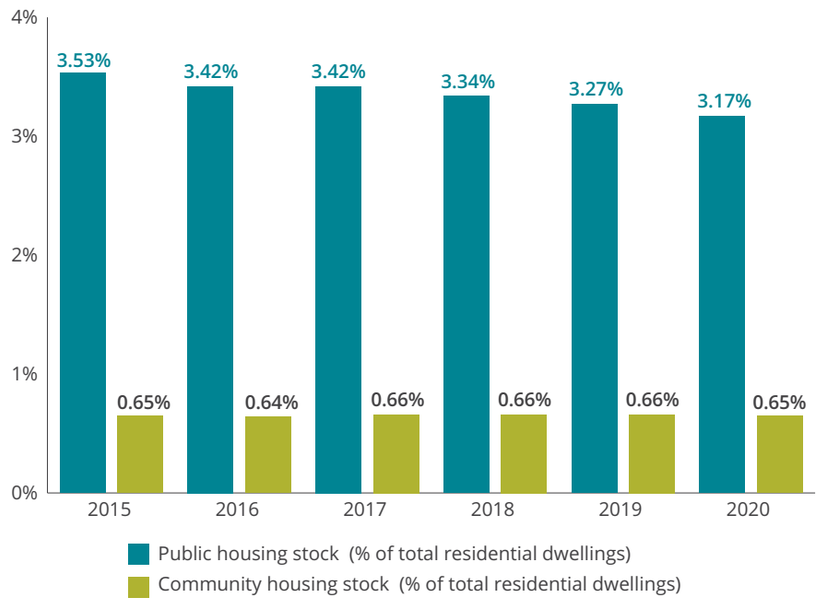
Social and affordable housing has long been recognised as an issue beyond what any State Government can address on its own.

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.

In this regard, Community Housing Organisations (CHOs) make a considerable contribution to social housing provision, with collective ownership or management of approximately 20 per cent of WA's social and supported housing stock. In WA, this has remained fairly static since 2015 (Figure 43) 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 offering a more tailored service and delivering housing choice to tenants.

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Figure 43: Public and community housing as a percentage of total residential dwellings[195]



In regional areas where populations are sometimes more transient, housing can be an important incentive to attract and retain employees, who support local economic activity and deliver government services such as health, policing and education. The State provides affordable rental housing to government officers and some non-government organisation employees through its regional officer housing programs. However, in some locations, the significant proportion of government employee housing contributes to distortions in local housing markets.

A well-functioning housing market, where private housing is more affordable and accessible to rent or purchase, is vital to reduce pressure on homelessness services, social and supported housing infrastructure.



Government policy can have significant impacts on market function, particularly for participants in the middle segment of the housing continuum (affordable rental, market rental and affordable home ownership) where initiatives can make a material difference to housing access.

WA's highly successful Keystart home loan program assists eligible applicants into home ownership through reduced upfront fees or an opportunity for shared equity. Stamp or transfer duty has been identified as a financial barrier to housing activity, with reforms to the application of this duty now being progressed in several other jurisdictions across Australia. Reforms that make it easier for people to move between houses could encourage people to occupy dwellings better aligned to their circumstance and need at a point in time. These could also attract greater investment in WA's housing market and increase supply of affordable rental accommodation.

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The WA strategic framework for homelessness, social and affordable housing

The *WA Housing Strategy 2020-2030* and *All Paths Lead To A Home – WA's 10 Year Strategy on Homelessness 2020-2030* set the strategic direction for the sector and establish priorities, outcomes and targets, including:

- more homelessness services coupled with strong, effective wraparound support;
- growth in the amount, quality and suitability of social housing supply and achieving social and affordable housing outcomes directly from Government land and development activity; and
- growth of homes located near public transport, homes built to liveable design standards, and use of non-conventional building materials.

The strategies advocate and commit to government provision of low-deposit home loans, and a more diverse rental sector.

An Action Plan supports *All Paths Lead To A Home – WA's 10 Year Strategy on Homelessness 2020-2030*, and it is understood that implementation plans will be released to provide guidance to the *WA Housing Strategy 2020-2030* in the near future.

Governance

Social and affordable housing is a multi-provider system. The State 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

- The State Government leads the provision and funding of specialist homelessness and crisis services to assist people experiencing, or at risk of, homelessness. In addition, it provides wraparound services crucial to re-establish independence, positive social connections and improve financial stability, including increased employment.[196]
- The not-for-profit sector provides vital support in operating facilities and delivering wraparound services.

Social and supported housing

- The Department of Communities has primary responsibility for providing supported housing, public housing and affordable rental and home ownership.
- State-owned infrastructure includes land and building assets – most of which are held by the Housing Authority (a statutory body operating under the oversight of the Department of Communities) and DevelopmentWA.
- In WA, there are approximately 43,200 social housing dwellings, with around 36,200 of these owned and managed by the Housing Authority. The balance is managed and/or owned by CHOs.[197]
- DevelopmentWA is responsible for the commercial and land development functions that support the delivery of social and affordable housing in State Government developments of over 20 dwellings.
- In 2020-21, the Federal Government expects to spend around $8.4 billion nationally to improve housing and homelessness outcomes. 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.[198]
- Not-for-profits (other than registered CHOs), 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 is available for Specialist Disability Accommodation where eligibility criteria are met.

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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 20 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 two agencies.



Affordable housing

- Defined as housing that households on low to moderate incomes can afford to access while meeting other essential living costs, affordable housing includes affordable rentals, shared equity home ownership and market affordable housing.[199]
- The State Government's Keystart program reduces the entry barriers to home ownership via low deposit and reduced fee home loans, as well as shared equity options. Through the Country Housing Authority, it also offers housing finance options to rural and regional business owners.
- A number of registered CHOs own and manage affordable housing portfolios.
- 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 Federal 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 is a significant contributor to WA's affordable housing exhibited in many ways including, but 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.
- In some locations across WA, particularly in the State's north, the private sector provides housing or housing subsidies as a component of employment conditions in order to attract and retain employees.

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Government Regional Officers' Housing

- The Department of Communities owns, manages and leases around 5,300 Government Regional Officers' Housing (GROH) properties for key public sector workers in over 250 regional locations across WA. Just over half of these are owned, while the other half are leased.[200] 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. Regional officer housing fulfils two functions – to attract and retain staff for service delivery in regional and remote locations, and to ensure affordable housing.

Related policy settings – land use planning

- While there are many external factors that influence housing affordability, there is a strong and direct connection with statutory and policy settings in the State's planning system. State Planning Policies, local planning schemes, local planning policies and building regulations all play a contributing role in relation to housing and land supply, density and diversity, construction cost, design quality and costs of living.

Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Prepare regional housing plans

Undertaking regional-based analysis of current housing conditions, market activity and housing programs is critical to understand and appropriately respond to the specific housing priorities of each region. Often, WA's housing strategies and programs are applied on a state-wide basis, with limited consideration of influences in regional contexts. Developing strategic regional housing plans that reflect and respond to unique community characteristics, economic conditions, land supply and other factors, will develop a strong, common understanding of each region's housing priorities. This in turn, will enable more targeted and appropriate future responses, and robust investment cases.

Establishing regional baselines, and developing plans with landholders, service providers and local stakeholders, will enable funding to be apportioned in line with prioritised demand, and ensure existing assets and regional resources are being optimised. They will also provide a sound basis to attract wider industry participation in housing development, management and service delivery.

The preparation and maintenance of individual regional housing plans will enable strategic, targeted housing outcomes for each region, and a consistent evidence base for future investment priorities. The plans should:

- respond to diverse community, housing and economic characteristics, barriers and opportunities;
- capture the range of government and non-government housing activity, providers, asset types and programs relevant to each region;
- provide a vehicle to engage with the local community, stakeholders and service provider priorities and perspectives;
- establish regional housing targets and objectives;

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- inform asset management, including type and amount of dwellings, renewal, and maintenance activities by region, which will in turn improve the quality of future Strategic Asset Plans and business cases; and
- influence future sector strategies, decisions and priorities, including the provision of wraparound services to assist those who would benefit from other social service supports.

Recommendation 68

Improve planning for social and affordable housing by:

a. preparing and publishing individual housing plans for each of WA's ten regions, including the Perth metropolitan area, to drive better housing outcomes and targeted activity across the State; and ●

b. conducting an initial regional plan pilot to resolve housing data coordination and management challenges, define requirements, establish methods of stakeholder input, and integration into decision-making structures. ●

Prioritise further investment in social and affordable housing

Expediting current investment, and prioritising future investment, is required to achieve overall growth in social housing stock - through the optimisation of WA's current public housing asset base and delivery of new supply. Assessing the effectiveness of the *WA Housing Strategy 2020-2030*'s targeted six per cent net growth in social housing is difficult when the target is not clearly connected to demand, population growth, or proportion of total housing stock. This level of growth is unlikely to adequately respond to need over the next ten years, equating to only around 260 additional dwellings per year. Attrition of stock over preceding years, current stock approaching end-of-life, coupled with latent and forecast demand, indicates that current targets and investment levels are insufficient to address the ongoing demands on the sector.

IWA acknowledges that delivery of newly built social housing stock is challenging in the short term, due to several primary constraints. The Department of Communities' capacity to deliver new stock under current investment packages is challenged, in part due to pressures on the availability of skilled workers in the housing construction sector, and also by a depleted land asset base. Additional options to increase supply should be developed, including spot purchasing of existing dwellings or those under construction, to enable faster delivery.

Social housing growth should be based on need and must be accompanied by a sustained social and affordable housing investment program that responds to diverse housing circumstances, is informed by regional housing plans, and aligned with revised targets. Consistency of future funding will also be an important element in ensuring the building acquisition program, including with partnering organisations, is achieved efficiently.

Recommendation 69

Prioritise further investment in social and affordable housing by:

a. assessing the level of investment required to accelerate the *All Paths Lead to a Home – WA's 10-year Strategy on Homelessness 2020-2030* and accompanying Action Plan, to fast-track support for people experiencing or at risk of homelessness; ●

b. undertaking a comprehensive audit of the social housing stock's asset condition, improvements needed to extend the life of existing assets and alignment of stock with housing need; ●

c. commissioning a review of the growth targets in the *WA Housing Strategy 2020-2030*, and establishing an evidence-based net growth target aligned to forecast need, including use of audit findings; and ●

d. developing a sustained social and affordable housing investment program to respond to diverse housing circumstances including the size, type and location of dwellings, informed by regional housing plans (refer to Recommendation 68a) and in line with revised targets (refer to Recommendation 69c). ●

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Enable and diversify social and affordable housing providers

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 to respond to these needs. The State Government has the opportunity to review existing policy, legislation and programs, and leverage its assets to broaden participation of providers and investment into the sector.

Building capacity of Community Housing Organisations

CHOs are a valuable contributor to housing management and provision. 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 from 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, due to their not-for-profit status; and eligibility of tenants to receive Commonwealth Rent Assistance. The fact that the National Housing Finance and Investment Corporation alone made a total of $1.4 billion in financing decisions by the end of 2019-20, demonstrates considerable opportunities for WA CHOs through increased capacity, which are not currently being fully realised.

Several areas of regulation and procedural practice are a concern for CHOs in WA. Limited progress in the transfer of additional dwellings which 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.

Innovative housing models

The Housing Authority has a history of involvement in demonstration housing projects that have the potential to contribute to affordability. These include innovation in project financing, construction methods, dwelling types and form. Alternative housing models, including build-to-rent, tiny homes, Nightingale Housing, and cooperative housing, also offer diversity and additional housing choice with minimal long-term government involvement. To date, delivery of these models has been limited in WA. The State Government can play a role through early participation or seed investment in alternative housing projects to demonstrate their viability and success. This includes unlocking some of the barriers faced by developers and proponents, such as project financing and market acceptance, as well as tax policy settings to incentivise different housing models. Using government land to deliver alternative housing projects in partnership, can also assist to build momentum and grow housing choice. Under recent Machinery of Government changes, DevelopmentWA has the opportunity to evolve in this built-form space, applying transaction structuring and innovation as demonstrated through its existing project base.

Security of rental tenure

Broadening housing options and pathways available to people on moderate incomes enables people to move beyond the social and affordable housing continuum and find homes in the market. This includes recognising the choice to rent, as well as own property. The Department of Mines, Industry Regulation and Safety is currently undertaking a review of the *Residential Tenancies Act 1987*. Consultation for the review acknowledges that the private rental landscape has changed over time, with more people across a range of demographic cohorts renting and residing in private rentals for longer periods. For these people, a rental premises is potentially a long-term home. The legislative changes outlined in the review's Discussion Paper proposes a number of reforms aimed at modernising the Act and increasing security of tenure for tenants.

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Recommendation 70

Enable and diversify choices in social and affordable housing by:

a. reforming policy to unlock the potential and facilitate growth of registered Community Housing Organisations, and review existing Community Housing Agreements to address provisions that limit, or are disincentives to, the attraction of alternative financing and funding of new projects;
b. leveraging government land assets and providing financial and yield incentives to actively broaden private sector and institutional investment in social and affordable housing projects, and the social and affordable housing sector generally; and
c. accelerating the review of the *Residential Tenancies Act 1987* to ensure provisions provide greater security of tenure for tenants, including facilitating engagement in longer-term leases.

Regional officer housing

The availability of fit for purpose, key worker housing in required locations is critical to responding to service need and positively contributes to regional economic activity and liveability. It acts as a form of affordable housing in these locations.

In some instances, State agencies have adopted individual employee accommodation programs outside of 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 State agencies' or employees' needs, yet there has been limited action in optimising and improving the program.



Recommendation 71

Optimise regional officer housing by undertaking an independent review of regional officer housing assets across the public sector, including the Department of Communities' Government Regional Officers' Housing program, all other State Government officer housing programs, and the *Government Employees' Housing Act 1964*, to assess:

a. implementation status and application of previous program reviews;
b. effectiveness, efficiency and value for money, particularly in regard to duplicate programs being operated by multiple State agencies;
c. opportunities to consolidate housing programs across State agencies;
d. ability to respond to State agency and tenant needs;
e. appropriateness of models to regional property market conditions; and
f. innovative models that could provide high-quality regional staff housing while managing the cost to government, such as the Defence Housing Australia model.

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Case Study

North West Aboriginal Housing Fund



The North West Aboriginal Fund invests in projects that increase affordable, suitable and stable housing options, increase opportunities for educational attainment and job stability, and empower Aboriginal people and communities.

It recognises the importance of developing genuine and strong partnerships with local Aboriginal organisations, service providers and other partners to ensure projects are designed to meet the needs and aspirations of local Aboriginal people. Projects supported through the Fund are community-driven, collaborative, flexible, strengths-based and based on genuine dialogue.

All construction projects provide apprenticeships and jobs for local Aboriginal people. Over four years, the Fund is expected to achieve:

- 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; and
- about $25 million in services and construction contracts for Aboriginal organisations.[201]

To date, the Fund has expanded the successful East Kimberley transitional housing program with an additional 50 homes and has launched a similar program in South Hedland.

In December 2020, a new $9.7 million investment in Jalbi Jiya was announced. Jalbi Jiya (meaning 'your home' in Yawuru language) is offered through a partnership with not-for-profit company, Nyamba Buru Yawuru, and will provide affordable rental and home ownership pathways for Aboriginal people in Broome.

The Fund received dozens of innovative ideas through a Request for Expressions of Interest process in 2019, and is now working with successful respondents to support them to develop their ideas.

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

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Aboriginal housing outcomes

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 and wait times for public housing are longer for Aboriginal people. Data from a recent Centre for Social Impact report shows that, of the tracked participants in the WA-based 50 Lives 50 Homes initiative, an Aboriginal person waited on average 308 days for housing after receiving a priority listing, while the wait time for a non-Aboriginal person in the same situation was 170 days.[202]

Access to safe, good-quality housing underpins, and is fundamental to achieving, outcomes in health, education and employment, as well as community safety, as set out in Closing the Gap. Ongoing, sustained and certain investment in Aboriginal housing will enable Aboriginal organisations to be more involved in housing provision and management.

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 (refer to 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. Targeted action is needed to bolster the capacity and capability of Aboriginal CHOs and other organisations to participate. 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 strategically plan, 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 72

Improve Aboriginal housing outcomes by:

a. ensuring Aboriginal social and affordable housing activities and targets correspond with the *National Agreement on Closing the Gap*, Target 9: to increase the proportion of Aboriginal and Torres Strait Islander people living in appropriately sized (not overcrowded) housing to 88 per cent, by 2031; ●

b. delivering sustained investments in Aboriginal housing to enable Aboriginal organisations and communities to build capacity, embed housing services into strategic organisational plans, attract and retain skilled staff, and deliver meaningful associated training opportunities; and ●

c. developing a clear, targeted social impact strategy to demonstrate housing need, to seek required funding from the Federal Government, as well as attract diverse financial participation from the private sector where possible. ●



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Health

The quality of the State's health, and its healthcare system, help position WA as a global location of choice. 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. Accelerating major health system reforms will improve the community's health, reduce demand on hospitals and deliver long-term sustainability for the health budget.

Clinical care only influences **16 per cent of a person's overall health and wellbeing**.[203] Greater action is needed to address wider determinants of health, such as socioeconomic factors, the built environment and climate change.[204]

The Sustainable Health Review (SHR) is a major ten-year plan to transform WA's health system. Following billions of dollars in investment in new major hospitals over the past ten years to 2021, the SHR drives the next phase of reform – aiming to transition to a more effective and sustainable health system.

The need for systemic change across the health sector has been building for some time. WA's population has grown and aged. Chronic disease, obesity and mental health conditions have increased and, while health spending has more than doubled in the last decade, improvements in public health and acute care outcomes have not kept pace.[205]

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Without action, the SHR notes that State Budget health spending is projected to increase from 30 per cent of the total State Budget in 2017-18 to 38 per cent by 2026-27.[206] This may limit funding available for other priority areas across government. Finding new ways to improve health services and outcomes, maximising use of existing health infrastructure, and improving health budget sustainability are key issues.

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 SHR moves away from a model centred on acute care in hospitals to one that is more person-centric, focussed on preventing illness and providing healthcare in more accessible, community-based settings. Providing more convenient and integrated health care, with earlier intervention, can assist in preventing people from going into hospitals altogether. The SHR notes that in 2017-18, 51,000 (7 per cent) of the 707,000 hospitalisations, at a cost of $368 million each year, could have been prevented if timely and appropriate healthcare and management had occurred in community-based settings.[207]

The approach to planning and delivering health services is also shifting towards collaboration and co-design of services and infrastructure with stakeholders such as health organisations, patients and local communities. Digital technology is central to system reform, providing a foundation for interoperable, accessible and person-centric health services.

Mental health is a key focus of the SHR as it is the part of the health system under the greatest pressure. There is significant unmet demand for mental health services which is impacting on the capacity of other areas of the health system. Additional community and hospital-based mental health services and facilities are required as a priority. There is also focus in the SHR on children and young people, who represent 23 per cent of the State's population. Building foundations for future health from the start of an individual's life will have 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.[208]

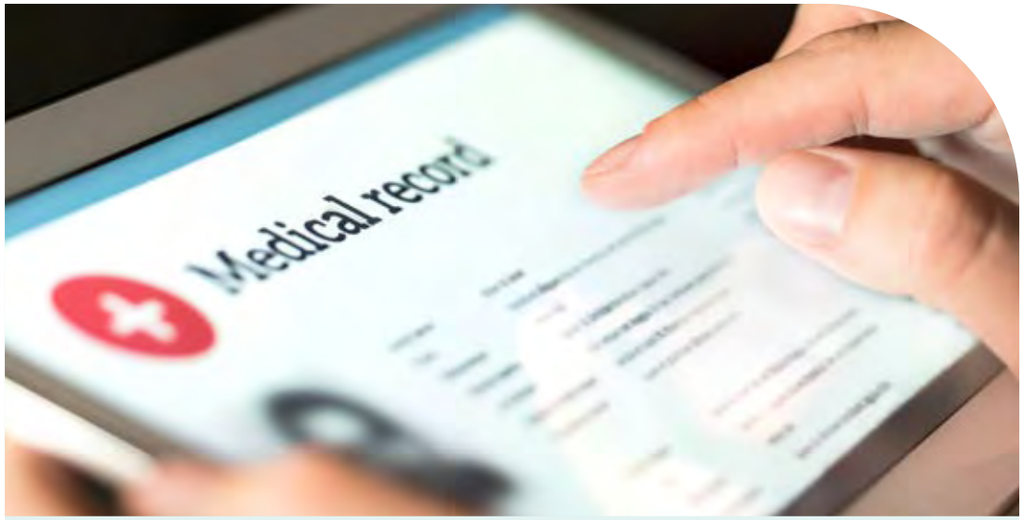


Over the past 20 years to 2021, two major reviews have shaped WA's health system. The 2004 *A Healthy Future for Western Australians: Report of the Health Reform Committee* recommended significant reorganisation of the system and **almost $7 billion investment in major health infrastructure**, including Fiona Stanley Hospital and Perth Children's Hospital. In 2017, the State Government initiated the SHR to drive the next phase of reform, adopting final recommendations in 2019.

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Digitising Western Australia's health system

Embracing digital technology is a priority to enable health system reforms, realise greater value and transform state-wide service delivery.

As recommended in the SHR, in 2019 the Department of Health released the *WA Health Digital Strategy 2020-2030* (Digital Strategy). 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 across WA is also proposed. Initiatives that enable system-wide reform such as electronic medical records should be prioritised.

It will be important for the SHR and Digital Strategy to rollout together and system-wide to support a coordinated transition toward 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.

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*'. In WA, Aboriginal people experience unequal health outcomes when compared to non-Aboriginal people. Their life expectancy is lower – by 13.4 years for men and 12 years for women – while childhood mortality rates are three times higher.[209] Health outcomes are a core component of Closing the Gap targets, however recent progress has been limited. 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 toward person-centric and community-based services focussed on prevention and early intervention. Healthcare for Aboriginal people should take a holistic approach and services delivered in a culturally safe and sensitive environment. Service planning and delivery should be community-led, delivered through partnerships where possible, for example through Aboriginal Community Controlled Health Organisations.

Reorienting the health system towards community-based care will have a significant influence on long-term health infrastructure planning and investment. Expanding the role of primary care and increasing the level of services provided in community settings will result in more services delivered in people's homes or closer to where they live, such as via General Practitioner clinics, primary and allied health hubs, child health centres, and supported mental health accommodation. This will improve convenience and accessibility and maintain people's ability to live as independently as possible. It will also help to improve the cost-effectiveness of the health system by reducing demand on hospitals, which are costly to build and operate.

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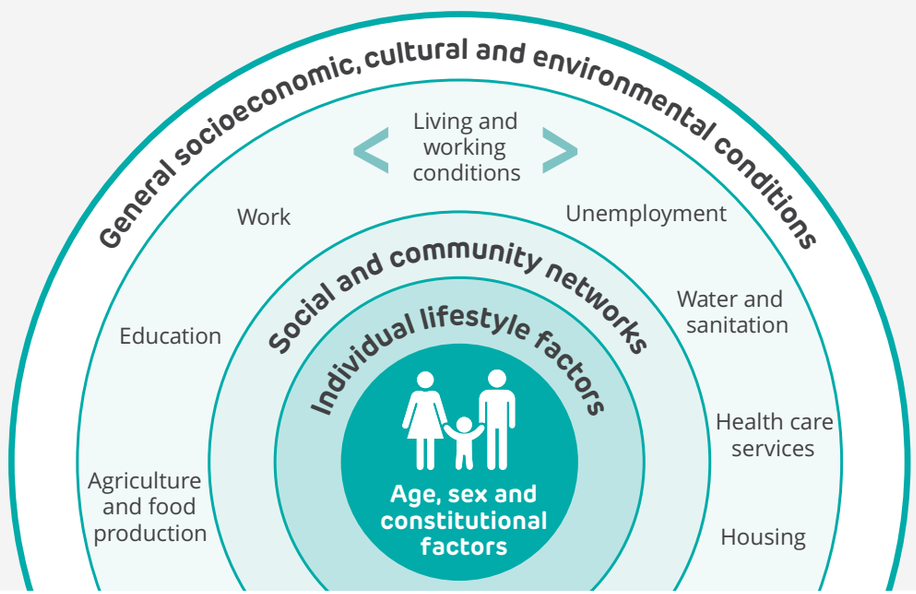
Even with a shift towards community-based care, hospitals will continue to be a vital part of the health system and will require sustained investment. Following a decade of major health infrastructure investment in new major hospitals such as Fiona Stanley Hospital (2014) and Perth Children's Hospital (2018), the SHR notes the health system will need to manage its asset base wisely. Even still, further planning and investment in hospitals is proposed.
The health system is supported by a number of 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 is needed to inform decisions on the future of these facilities. This planning should be informed by scenarios that account for long-term population growth and change, and changes in demand across the health system that are anticipated to occur as a result of implementing the SHR. The future of Royal Perth Hospital, in particular, will need to be carefully considered, and system-wide planning will be necessary to understand the most effective way of providing services in Perth's CBD and eastern metropolitan region over the long term.

While not addressed in this Strategy, it is noted that recommendation 20 of the SHR calls for short to medium-term capacity pressure points in the health system to be addressed, such as those in Armadale, Bunbury, and Peel-Murray.

Delivery of Fiona Stanley and Perth Children's Hospitals experienced a number of challenges, and the lessons learned should be applied to the delivery of major health projects in the future such as the new 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 34 of the Infrastructure delivery chapter.

The built environment, of which infrastructure is a major component, underpins community liveability and influences the wider determinants of health in many ways, as shown in Figure 44. 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. Figure 45 provides key examples of health inequality in WA. Infrastructure should therefore 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 44: A framework for determinants of health[210]



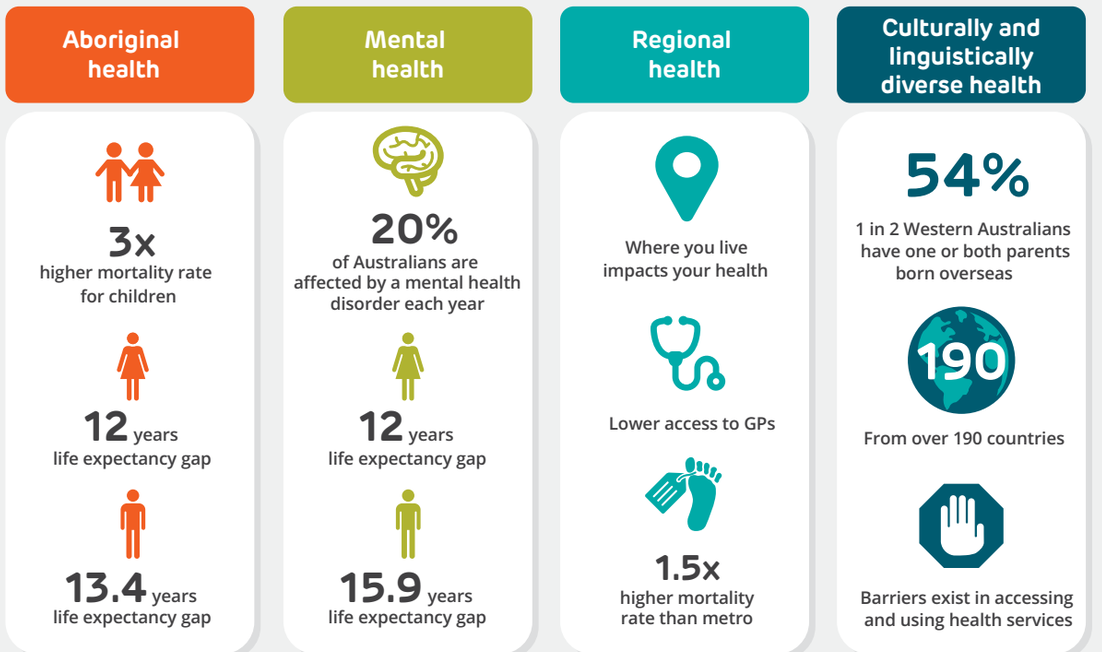
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Figure 45: Key examples of health inequality in Western Australia[211]



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 people 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 (for example, 800 metres) of community facilities and public open space, and banning advertising of junk food on public infrastructure, will promote active living and help people maintain a healthy weight, as well as helping their mental health. 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.

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. Much-needed upgrades to infrastructure and services in Aboriginal communities can support improved environmental health outcomes.[212]

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To achieve better health outcomes, the State's public health framework, including the *State Public Health Plan for Western Australia* and public health assessment, should play a more prominent role in facilitating whole of government action to protect and promote public health. Aligning of government strategic plans and programs to the *State Public Health Plan for Western Australia*, and applying public health assessment to regulatory processes and infrastructure proposals, would provide mechanisms to address health priorities and improve outcomes. All future projects and programs with a capital cost of $100 million or more, referred to IWA for assessment, should also be required to consider 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 life sciences. In addition to WA's universities, major institutes such as the Telethon Kids Institute, Harry Perkins Institute, Lions Eye Institute, Ear Sciences Institute, Perron Institute, the Australian National Phenome Centre and the Institute for Respiratory Health are undertaking globally significant medical research. WA also has a highly valuable data bank from some of the longest-running longitudinal studies in the world, such as the Busselton Health Study (established 1966), the ORIGINS Project (established 2017) and the Raine Study (established 1989).

WA's strong standing – 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 not seen their research translate into successful commercialisation ventures within WA, due partly to the State's lack of international-standard common use facilities, for the small-scale production required as a next step to commercialisation. As a consequence, the intellectual property developed from research must be exported in order 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 interrelationship between the health, aged care and disability sectors, and integrated planning and delivery of services and infrastructure should be carefully managed.

The aged care sector provides support to people over 65 in their own home, aged care or in retirement villages. The Federal Government regulates, funds and subsidises the aged care sector and residential aged care places.

The Royal Commission into Aged Care Quality and Safety presented the *Final Report: Care, Dignity and Respect* in February 2021 and its recommendations support increased ageing in place and in-home care, and therefore 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.

There is an undersupply in the number of operational residential aged care beds in WA and there are already major challenges in meeting demand in regional areas. IWA will pay close attention to funding reform recommended by the Royal Commission and how it is progressed to address this. IWA will monitor the outcome of the Federal Government's response to the Royal Commission recommendations and respond as appropriate.

The Federal Government also funds the National Disability Insurance Scheme, which provides people under 65 with support to enable them to live as independently as possible. 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.

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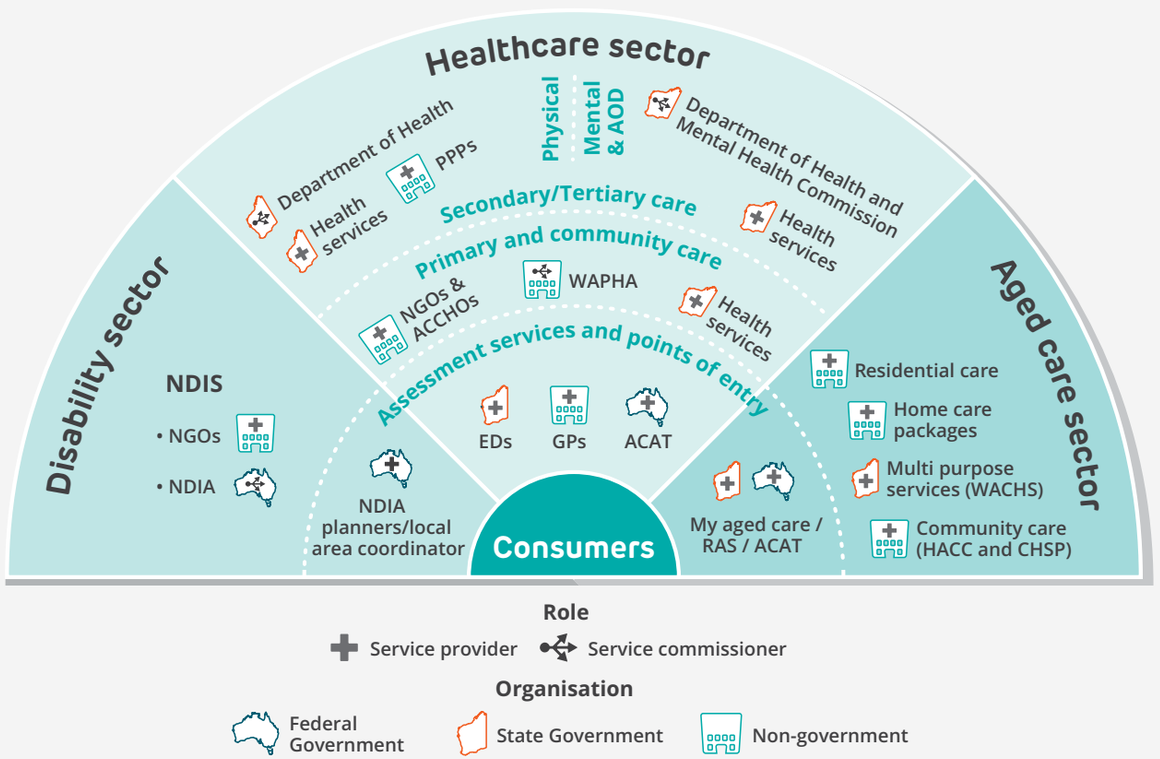
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Governance

WA's health system incorporates a mix of State and Federal Government-funded public hospitals and community services, primary care, mental health, aged care and disability services, and private and community health services (Figure 46).

Figure 46: High level mapping of the health, aged care and disability sectors in Western Australia[213]



Government plays the lead policy and regulation role, as well as lead funder, service commissioner and health services provider:

- The Federal Government regulates and funds primary care, guided by the WA Primary Health Alliance.
- WA Health (collective term for State Government health entities) is responsible for planning, commissioning and operating hospitals, health services and public health programs.
- The Department of Health provides leadership and management of the public health system as a whole. 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) which have jurisdiction over specific services or geographic areas.
- At a state-level, healthcare is delivered by a variety of public and private providers in a range of settings and includes illness prevention, health promotion, detecting and treating illness, rehabilitation and end-of-life care.

The system is highly interdependent and providing services is challenging given the State's size and diversity of required services. Its large asset base includes almost 90 hospitals ranging from large tertiary hospitals to smaller regional hospitals, including three managed under private-public partnerships.

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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Accelerate implementation of the Sustainable Health Review

IWA supports the SHR and seeks to align health infrastructure priorities with its recommendations. With almost 75 per cent of the State health budget directed at hospital services, the system is heavily weighted in favour of hospitals and acute care. The benefits from implementing the SHR's recommendations are well documented. Initiatives including redesigning the health system towards integrated, community-based care, investment in primary and mental health care and digital infrastructure are needed to transform the system. It is recognised this rebalancing will need to be carefully managed, as the system 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. 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 Government's adoption of the final recommendations. However, shortly after, the Department was required to shift focus to the COVID-19 pandemic, resulting in implementation falling behind schedule. While it is understood 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. System-wide health services and infrastructure planning are essential to demonstrate how the reformed health system will operate, and to identify the infrastructure required to support it. 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. For example, the refresh of the *WA Health Clinical Services Framework 2014-2024* must be completed as a priority to inform other strategic planning processes. Planning should also consider long-term scenarios that take into account long-term population growth and change projections and the impact of implementing the SHR, along with options for the future of Royal Perth Hospital.

Establishing a sustainable funding footprint will be important to manage the health budget, and should include recurrent and capital expenditure, and targets for rebalancing the health budget towards community-based services. Preparing a system-wide Strategic Asset Plan will also be essential to improve portfolio planning and management, as it 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. To manage infrastructure investment, decision-making should be supported by a prioritisation framework that considers risk throughout the lifecycle of health assets.

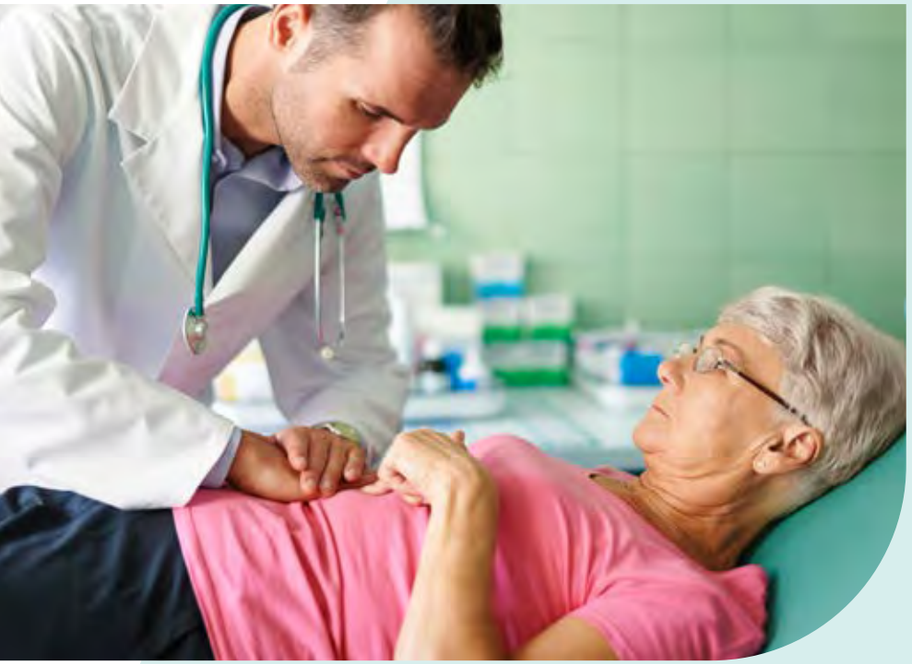
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Case Study

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 focussing on moving treatment out of hospitals and into the community.[214]

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 fell from 40 to 21, and hospital beds fell from just under four to almost three per 1,000 population. However, the quality of care did not appear to have reduced, and life expectancy continued to rise over the timeframe. In 2017, the largest category of health spending was on outpatient care (mostly including GP 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 per cent increase in outpatient treatment, which is expected to result in a 20 per cent 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

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Recommendation 73

Accelerate the transition to a person-centric, preventative and community-based public health system to improve the health of Western Australians, and the sustainability of the State Budget by fast-tracking delivery of the Sustainable Health Review and providing regular public progress reporting to improve accountability and transparency for achieving Sustainable Health Review reform outcomes. ●

Recommendation 74

Address gaps in the health system design, service and infrastructure planning framework by:

a. finalising the review of the *WA Health Clinical Services Framework 2014-2024* to provide a basis for system-wide service and infrastructure planning. ●

b. in line with recommendation 20 of the Sustainable Health Review, finalising development of the 10-year State Health Plan, including integrated clinical, infrastructure, public health, digital and workforce planning, to provide a cohesive set of health service and infrastructure priorities aligned to the Sustainable Health Review; ●

c. in line with recommendation 18 of the Sustainable Health Review, establishing an agreement for a sustainable funding footprint to support the necessary change and investment required in the health system in line with the 10-year State Health Plan, to help manage the health budget; ●

d. preparing an annually updated system-wide Strategic Asset Plan, in line with the Strategic Asset Management Framework; and ●

e. when planning for health services infrastructure, assessing options for the private health system to augment the public health system, such as public-private partnerships where appropriate and medi-hotels. ●

Rebalance investment toward community-based services to reduce demand on hospitals

Mental health services are the part of the system under most pressure and should be the priority for infrastructure investment. 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. It is important that new facilities 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 much longer than necessary. The accommodation shortfall must be addressed as a priority, as recommended in the Social and affordable 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 are in prison and in need of specialist inpatient mental health care.[215] Recommendations 75b and 75c should be informed by outcomes of the Graylands Reconfiguration and Forensic Taskforce.

Primary and community-based care must play a stronger role in improving healthcare 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 of hospitals and to 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 collocation of primary and allied healthcare to improve accessibility, should be a priority.

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Mental Health Inpatient Snapshot Survey 2019

The Mental Health Commission's *Draft Western Australian Mental Health, Alcohol and Other Drug Accommodation and Support Strategy 2018-2025* recognises that 'stable and secure housing is critical for people with mental health and/or alcohol and other drug issues'. However, '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 Draft Strategy 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/or alcohol and other drug issues'. It also asserts that 'currently, the lack of appropriate accommodation and support options leads to bed blockages in clinical settings. Many individuals remain in acute settings (including long stay hospital admissions) for far longer than needed'.

The *Mental Health Inpatient Snapshot Survey 2019* found that, of the 656 mental health inpatients occupying a bed, 178 (27.1 per cent) were deemed unable to be discharged because of a lack of suitable community-based accommodation and/or mental health support services. 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.

Approximately 25 per cent 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-enabling services such as telehealth and remote monitoring offers significant potential to improve the accessibility and effectiveness of regional health services. Quality regional housing is also important to attract and retain permanent staff, as well as accommodate 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 Officers' Housing program, and many require upgrades to bring them up to an appropriate standard.

Royal Perth Hospital and Sir Charles Gairdner Hospitals are ageing assets and improved portfolio planning is needed to determine priority and timeframes for their future. Planning for the future of the Royal Perth Hospital site should explore opportunities to consolidate health services on a portion of the site and unlock land to revitalise the East Perth precinct, upgrade McIver train station, and create a health-focussed innovation hub. Sir Charles Gairdner Hospital will require significant upgrades to complement the development and integration of the new Women and Babies Hospital.

It is essential 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 *PCH – A Long Waiting Period* and the *Special Inquiry into Government Programs and Projects*), to future projects such as development of the new Women and Babies Hospital. 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.

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Recommendation 75

Rebalance investment toward community-based services to reduce demand on hospitals, targeting investment in hospitals only when required to modernise facilities or address capacity gaps. Specifically:

In relation to mental health care, by:

a. rebalancing and accelerating investment toward community-based mental health services and facilities, such as supported accommodation, and integrating mental health services into hospitals to address inpatient capacity shortfalls;
b. 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/ies or other appropriate models of care, and to transition patients to suitable accommodation, where necessary;
c. 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; and
d. 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.

In relation to primary healthcare, working with the Federal Government in:

e. prioritising and expanding the role of primary healthcare in providing more integrated, community-based health services that leverage capacity and support early intervention; and
f. investigating and investing in innovative models of community-based primary health services and facilities, such as Urgent Care Clinics and collocated primary and allied healthcare hubs.

In relation to regional healthcare, by:

g. expanding application of digital technologies, such as telehealth and remote inpatient monitoring, to improve regional health services' quality and accessibility.

In relation to modernising and expanding hospital capacity, by:

h. subject to Recommendation 74a, 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; and
i. subject to Recommendation 74a, developing a roadmap for the planning and future investment in Sir Charles Gairdner Hospital.



Digital Strategy implementation

WA will be unable to maximise health system reforms without implementing the vision of a digitally-enabled public health system set out in the supporting *WA Health Digital Strategy 2020-2030* (Digital Strategy). The Digital Strategy sets out a technology roadmap to implement a number of critical initiatives such as telehealth/ virtual care, remote patient monitoring and electronic medical records required to deliver key 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 Record program is a key enabler and requirement for reforming the digital platform, environment and operations of the WA health system.

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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 76

Subject to business cases, prioritise and fund digital technology initiatives identified in the *WA Health Digital Strategy 2020-2030* to leverage advances in health technology and enable health system reforms. ●

Preventive health

The State's public health framework, including the *State Public Health Plan for Western Australia* and public health assessment, should play a more prominent 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. The Department of Health should establish capacity to support public health assessments.

Recommendation 77

Enable infrastructure across the built environment to play a stronger role in addressing the wider determinants of health to improve public health and chronic disease by:

a. aligning government 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; and ●

b. requiring public health assessments to be completed for significant strategic planning, infrastructure, land use and development proposals that are assessed as presenting a high public health risk. The Strategic Asset Management Framework Strategic Asset Plan and Business Case guidelines (for projects and programs with a capital cost of $100 million or more) should be updated to require application of public health assessments to be demonstrated. ●

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Aboriginal health

As with other population cohorts, it is important that healthcare models move away from acute care to person-centric and community-based services focussed on prevention and early intervention. For Aboriginal people, it is important that healthcare takes a holistic approach, and that services are delivered in a culturally-safe and sensitive environment. Planning and delivery of services should be community led and delivered where possible, for example through Aboriginal Community Controlled Health Organisations.

Recommendation 78

Increase action to reduce Aboriginal health inequity and inequality across the State by:

a. supporting and funding the development of community-based primary care and allied services hubs, that are designed and operated in partnership with Aboriginal communities, and provide well integrated culturally secure, wraparound services for Aboriginal people; and ●

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

WA's universities and research institutes undertake globally significant research in the health and medical life sciences field. As previously noted, the State should seek to better 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 the Linear Clinical Research, and a medical trials facility located on the Queen Elizabeth II Medical Centre medical campus 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, including proposals for a BioBank, personalised medicine facility, medical devices production facility, and a common database platform to enable access to the wealth of data in WA's longitudinal cohort studies. 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 opportunity and public health benefits.

Investment in projects, including in precincts, such as the Queen Elizabeth II Medical Centre, can build a critical mass to create a world-class tertiary medical teaching and innovation sector, and attract skilled global talent.

The *WA Future Health Research and Innovation Fund Strategy 2020-2022* establishes priorities for the development of programs and initiatives to support health and medical research and innovation. The strategy provides the framework for future strategic investment to support health and medical research and innovation in WA.

Recommendation 79

Subject to business cases, co-invest in common use health and medical life sciences facilities by:

a. providing an overarching strategy to guide development of the health and medical life sciences sector and provide market clarity on potential investment priorities; and ●

b. using the Future Health Research and Investment Fund – and through collaborating with the Federal Government, academia and the private sector – to co-fund feasibility studies for common use facilities and support the development of viable facilities under appropriate governance structures and operational models. ●

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Education and training

The education and training sector is a major contributor to the State's prosperity and growth and is vital in ensuring the community is well skilled and innovative.

Today's students are facing a rapidly-changing future. Over time, technological change will continue to be a driving influence. Automation will replace certain jobs that rely on routine tasks, while demand for skills that are difficult to automate will increase. A growing proportion of jobs will require individuals who are able to interact with and coordinate people, as well as solve complex problems, think creatively and use technological tools. 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 senior secondary and higher education levels. Recently, the State Government invested in significant bandwidth increases to meet the growing demand for students to access online learning materials.

Education and skills hold the key to future wellbeing and will be **critical to restoring long-term growth**, **tackling unemployment**, **promoting competitiveness**, and **nurturing more inclusive and cohesive societies**.[216]

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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.

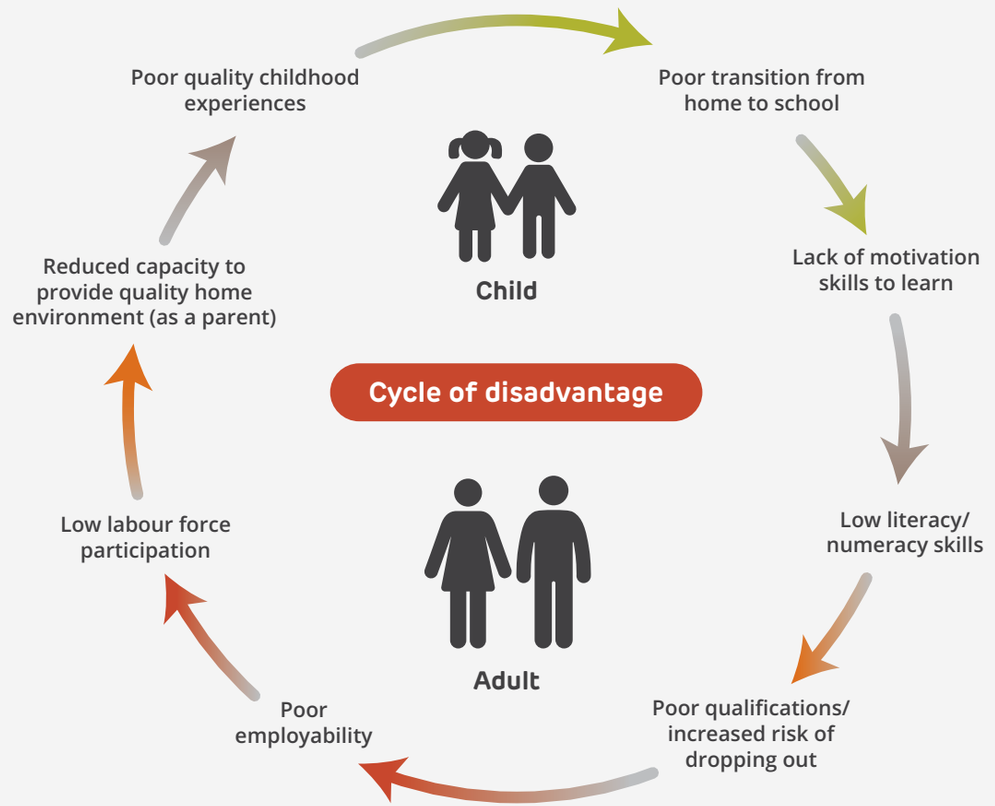
Models of teaching and learning (also known as pedagogies) have been evolving with changing needs. Contemporary teaching methods are progressively being tailored to individual learning styles. To encourage soft skills, such as creative and critical thinking, small collaborative group learning is increasingly being used in classrooms. These new methods require schools and classrooms that are designed differently. Flexible classrooms and breakout spaces support these teaching and learning approaches, while also providing spaces that match an individual's learning needs, style and pace.

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 assist in addressing entrenched intergenerational disadvantage. Challenges faced by children early in their lives can have negative consequences later in life which, in turn, hinders their own capacity as parents to give their children a better start (Figure 47).

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 into school.[217]

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.[218] Collocating health, community support services and high-quality early learning can increase access to these services and help intervene in the cycle of disadvantage. Collaborative, place-based approaches can be used in disadvantaged areas to align complex needs with infrastructure solutions, co-designed in partnership between the local community and government.

Figure 47: The cycle of disadvantage[219]



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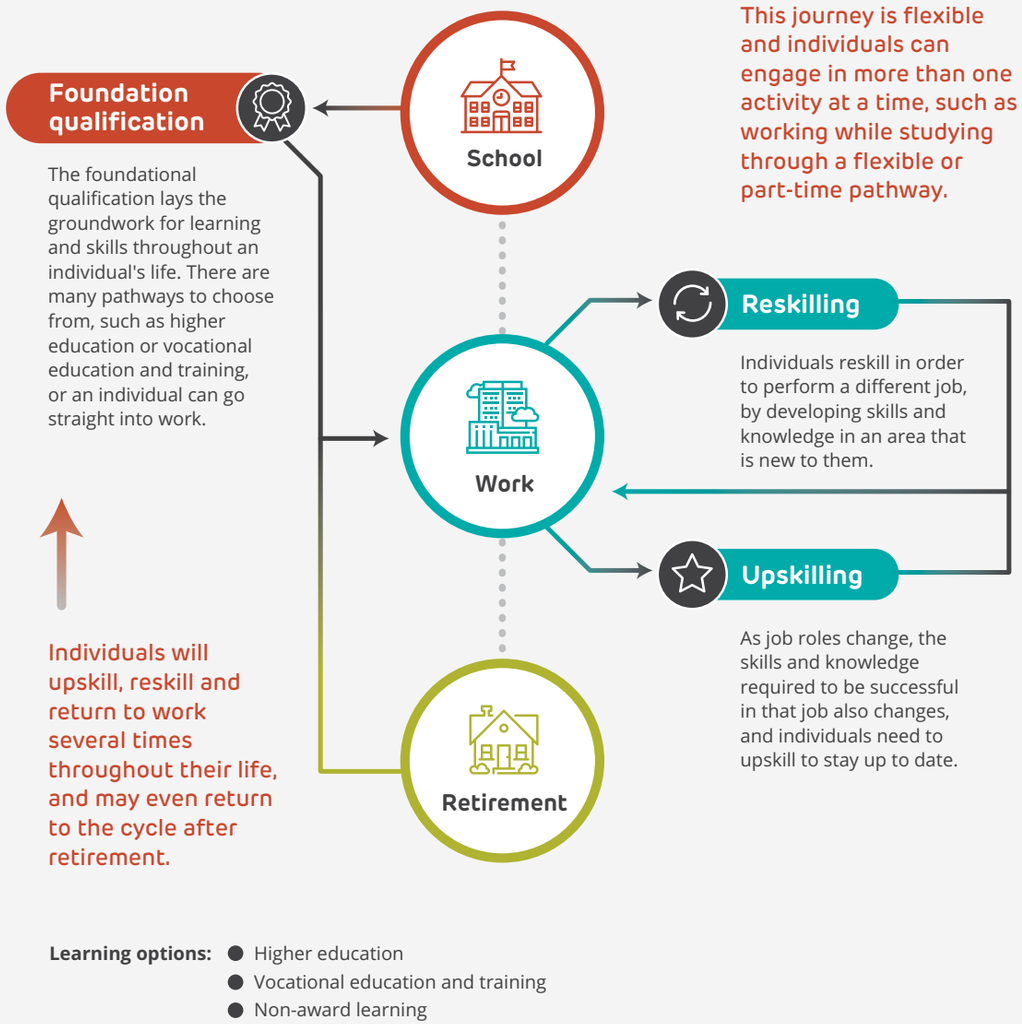
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Population change is also impacting the education and training sector. Perth's outer suburban growth areas, and inner-middle locations undergoing urban consolidation, are experiencing population growth. Many schools in these areas are at capacity or are expected to reach capacity in the near future. The methods used to predict and plan for this growth are complex, and if data and planning methods are inaccurate and do not predict growth sufficiently ahead of time, this can impact on the type and timing of infrastructure used to meet school demand. Without timely action, overcrowding and ineffective infrastructure responses are likely to impact the quality of education and training methods. To add to the complexity, many older schools require additional maintenance and are also in need of functionality upgrades.

Conversely, education and training facilities in some regional and remote locations in WA are facing reduced demand as population declines. Families and individuals often move to larger cities due to limited quality education and training in these locations. Smaller school sizes, particularly in high schools, reduces the breadth of education curriculum available. If this trend continues, it will impact on regional and remote WA's liveability, and some regional and remote students risk being further disadvantaged, compared to their city counterparts.

This matter is identified in the Regional development chapter, with Recommendation 19 seeking to implement a regional service and infrastructure framework to support more integrated, localised and efficient services and infrastructure (including education) across WA's diverse regional centres.

Figure 48: The lifelong learning cycle[220]



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International education is a key economic contributor to the State, **contributing approximately $2.1 billion in export income and 12,000 full-time jobs** – one full-time job for every five international students.[221] Pre-COVID-19, it was Australia's third largest export (after iron ore and coal).

At the vocational and tertiary education levels, lifelong learning trends are increasing the frequency and demand for training and higher education. 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 48). 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. The challenge of identifying and securing sites for this purpose is addressed 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. WA has an opportunity to serve the emerging consumer class through growth in international education once Australia's borders reopen following the COVID-19 pandemic. For this to occur, highly visible, renowned universities able to compete in a global higher education marketplace, are needed. While each of the State's universities has strengths, their rankings against other Australian jurisdictions attracting 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, the State's universities have needed to reconsider business and teaching models to remain viable. With digital-based learning likely to continue beyond the immediate pandemic impacts, 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 universities, could reduce unnecessary duplication, increase international rankings, unlock new opportunities for campus infrastructure and bring greater administration efficiencies.



Science and innovation

WA has a strong and emerging science sector, with significant public investment contributions (Federal and State) supporting infrastructure, such as the Pawsey Supercomputing Centre and the Murchison Radio-astronomy Observatory to support the planned Square Kilometre Array. Federal and State Government investment in science has given the State a comparative advantage in these research niches and have enabled private sector spin-off investment. Private investment in science has also made WA a world leader in remote, automated operations and automated vehicle technology, as well as in innovative processes for operational efficiency in harsh environments. Science excellence begins early, and government has demonstrated its commitment to this sector by investing in science, technology, engineering and mathematics education.

More effective collaboration between industry, research institutions and universities in WA can ensure the community benefits from this investment, which has the potential to increase the capability of WA's current and future workforce, strengthen tertiary-level education and research, and apply science to improve productivity and living standards for WA residents. By supporting the development of business case investigations for priority research infrastructure projects, the State Government can enable greater opportunities for WA research organisations to access National Collaborative Research Infrastructure Strategy and other co-investment funding.

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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 State Government primary and high schools. Key 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; and
- *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.

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 teaching soft skills including creativity, collaborative and critical thinking.

In conjunction with Department of Finance, the Department of Education has jointly developed the Secondary School Planning Guide and Primary School Standard Pattern Design Brief. Each secondary school is designed and guided by the Secondary School Planning Guide. This 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 and refurbished primary schools. 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 two-year delivery timelines. It is understood that the Department of Education reviews the Primary School Standard Pattern Design Brief biannually in consultation with both internal and external stakeholders to ensure that the design reflects the needs for individual schools and contemporary pedagogies.



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Vocational education and training

The Department of Training and Workforce Development is responsible for planning, designing and maintaining metropolitan and regional TAFEs and Job 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 heavily devolved vocational training to Registered Training Providers, WA's TAFE system largely remains a provider of choice.

Key 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; and
- *Strategic Plan 2019-2023* which sets out a high-level vision and priorities for the vocational education and training sector.

The WA State Training Board, 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 State's industries' training needs, including eight 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 Federal Government is responsible for university funding arrangements, the State Government provides government land and some funding to support capital investment. International education is identified in *Diversify WA* as an industry sector that presents significant growth and diversification opportunity for the State.[222]

Private sector education and training providers

There is a range of private sector and not-for-profit organisations that 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.

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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Improve school infrastructure planning and delivery to meet future needs

Planning for a network of schools across the State can be complex. Schools are local facilities that need to cater for changing demands, influenced by a variety of factors. These include population projections and changing demographics, individual family decisions on public versus private schools, and the capacity and longevity of existing schools.

In a metropolitan Perth context, planning is particularly complex. The State Government has adopted an infill housing target of 47 per cent in *Perth and Peel@3.5million* which is driving increased school demand in infill areas, particularly inner and middle suburbs. Furthermore, in these locations, many schools are ageing and are in need of upgrades to address functionality. The age of a school is also a reliable indicator of increased maintenance needs. As detailed in the Asset management chapter, Recommendation 40 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 assets.

Added to this complexity are community expectations for the design of schools. In medium to high-density locations, schools will increasingly need to adapt to a context of greater urban density. In other jurisdictions, medium to high-rise public 'vertical schools' have already been successfully used in major cities such as Sydney, Brisbane, Melbourne and Adelaide to support increased urban infill development. Further work is required to implement this model in Perth, particularly engaging with the community to enable broader acceptance.

Urban infill environments tend to have high competition for land, increasing market prices. If there is a lack of State Government land in such areas, the Department of Education will need to compete with the private sector to purchase large parcels of land to build new schools that could reduce demand on existing schools that are at capacity. As detailed in the Planning and coordination chapter, Recommendation 30 seeks to identify and secure strategic sites, by establishing a dedicated and recurrent fund for land acquisition for strategic infrastructure while also centrally coordinating strategic infrastructure site identification, matching State agency needs with government landholdings and enabling better use of the existing land asset base.

To appropriately plan for the broader network of schools, timely, evidence-based student population projections are required. At present, Perth metropolitan school infrastructure demand is predicted using key spatial inputs from *Perth and Peel@3.5million*, the *Urban Land Development Outlook*, structure plans and local plans. These are combined with population projections and age structures. However, the planning method currently used by the Department of Education is manual and reliant on disparate data sources. The timeliness of population projections is also impacting decisions on how to optimise infrastructure investments, including decisions on when and where to expand current schools or build new ones. This needs to shift to a digitised approach with automated data inputs. Simulating and visualising scenarios through data modelling will give greater insight and responsiveness to local population and demographic changes, enable timely site identification and channelling of investment in the right locations. It will also enable any impacts on the broader school network to be well-understood.

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To effectively plan for schools in growth areas, demographic and land use planning data should be accessible, accurate, timely, scalable and digitised. It should also be able to paint a picture of demand at a local, granular level, in line with how school catchments are defined.

The complexities of planning can often influence delivery timeframes. In many situations, these complexities have resulted in transportable buildings being used as infrastructure solutions by way of adding capacity. Transportable buildings were originally meant to be used for no longer than seven years but, in practice, have been used for much longer time periods in some cases.[223] A significant increase in the number at some schools can result in decreased student access to amenities and open play spaces.

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 healthcare and childcare – particularly in disadvantaged areas. Here, infrastructure needs to be planned and designed in a way that integrates with the wider community. Collocating 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.

Recommendation 80

Improve school infrastructure planning and delivery to meet future needs by:

For areas of growth, ensuring school network planning methods:

a. review data formats, sources, accessibility and assumptions to ensure they are timely and functional for planning school demand, for both greenfield and infill areas; and ●
b. implement new modelling methodologies, tools, software and systems that can be used to provide projections that are more responsive to change. Data-driven decision-making tools that use scenario modelling should be applied as an input to plan for the network of schools into the future. ●

Ensuring individual school planning and delivery methods:

c. plan for, and use, transportable buildings only as a temporary demand solution, and not where growth is expected to continue; ●
d. implement collocation and shared use with childcare, health and community support services where possible, particularly in areas of disadvantage; ●
e. enable the use of medium to high-rise public vertical schools in appropriate locations, particularly engaging with stakeholders to foster broader community acceptance of this model; and ●
f. consistent with Recommendation 40a in the Asset management chapter, allocate budget to implement fit for purpose asset management planning to enable older school assets to be upgraded to ensure they are functionally fit for purpose. ●

Plan for future skills and training and fund relevant equipment

Training and skills are important elements for growth and development in a changing world. Fostering knowledge, talent and skills is recognised as an important ingredient in the State's prosperity and resilience. Partnerships and collaboration between industry, high schools, TAFEs, universities and other training providers is key to drive innovation and training that meets workforce needs. Greater recognition of the value of early engagement is required to build talent and a cohesive and competitive sector. Cross-government and industry collaboration with WA's TAFE providers and the Department of Training and Workforce Development has been improving over time, with each increasingly involved in government strategies, plans and program development. The growing role of industry in curriculum development and delivery is a strong step in ensuring up-to-date, fit for purpose course content that helps increase training participation and completion rates.

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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 State Government in its *Western Australian Defence and Defence Industries Strategic Plan*.

The WA Defence Industry Workforce Office's work on formulating trades workforce strategies for the maritime defence industry has been supported by the **State Government's $18.34 million investment in defence industry initiatives to date.**[224]

The 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 Department of Training and Workforce Development and the Department of 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 on formulating trades workforce strategies for the maritime defence industry has been supported by the State Government's $18.34 million investment in defence industry initiatives to date.[225] 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. The planning focusses on priority projects that align with the Federal Government's *2020 Force Structure Plan* and WA's defence industry capabilities.

For further information, refer to www.southmetrotafe.wa.edu.au

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There is opportunity for this collaboration to be more widespread, and greater flexibility demonstrated in responding to industry needs.

Rapidly changing technologies and innovation is impacting facility and equipment needs of the vocational education and training sector. Equipment is becoming increasingly technical and complex, and specialist software more prevalent, 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 curriculum needed to keep pace with change. Expanding co-contributions from industry should be further explored. Crucially, this investment must respond to place-based training needs with a focus on alignment with a region's major employment industries – many of which are impacted by thin markets of skilled labour. It must also be recognised that this may come at a higher cost for infrastructure, equipment and staff in dispersed locations, but is a necessary investment to align regional training, and employment pathways.

Recommendation 81

Plan for future skills and training and fund relevant equipment, by:

a. involving the Department of Training and Workforce Development and relevant TAFEs when strategies or plans are developed for a new or existing industry sector, to ensure future skills and training requirements are considered, and future curriculum is planned in a timely manner; ●

b. updating the Strategic Asset Management Framework 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, while ensuring that State agencies and Government Trading Enterprises appropriately engage with the Department of Training and Workforce Development; and ●

c. establishing a dedicated funding program for TAFE training equipment and software and expanding industry co-contributions where relevant. ●

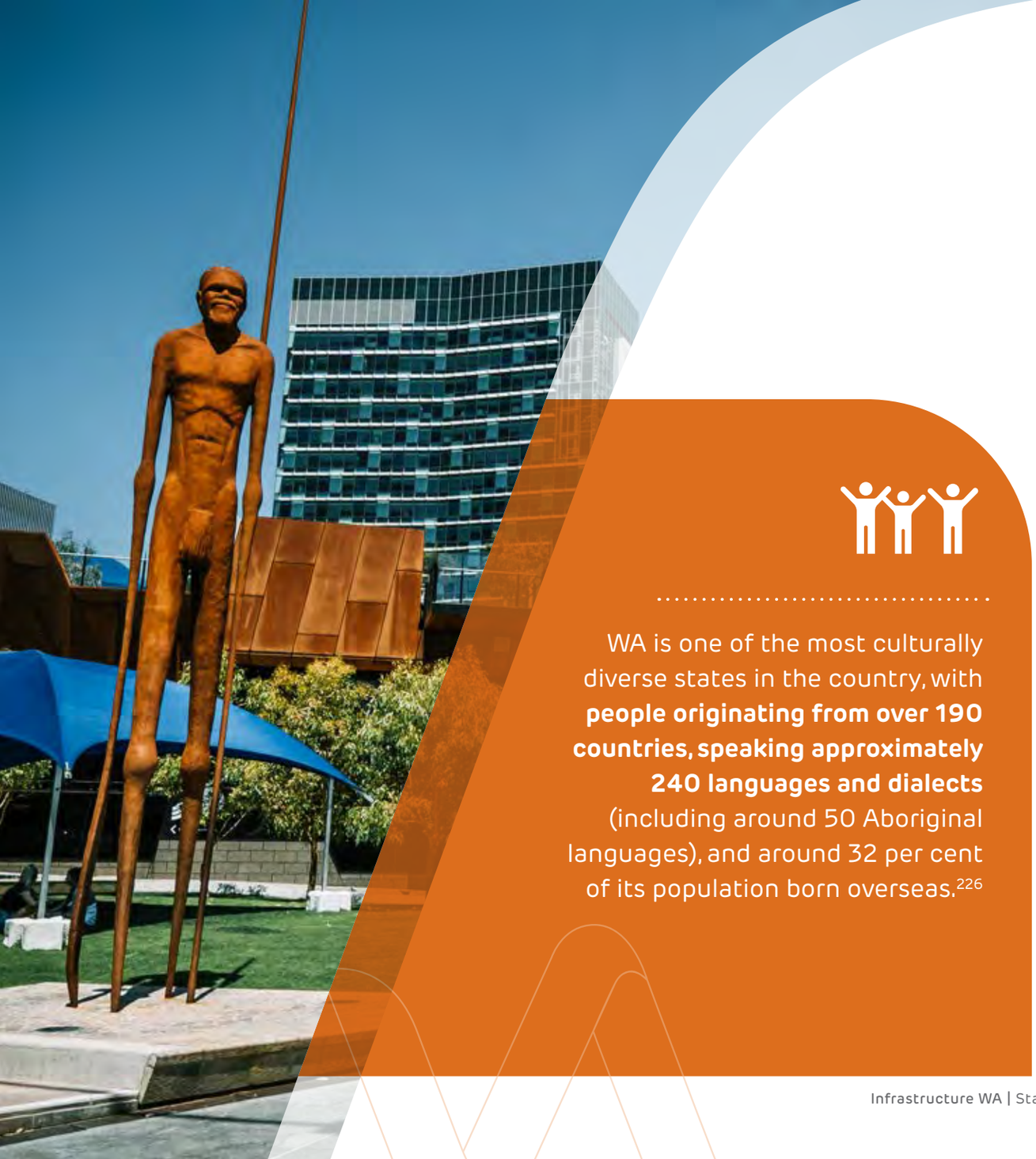
Early and ongoing alignment between future workforce demand, emerging industry needs, and required changes to training curriculums, is critical to ensure adequate lead time is allocated for changes – typically between one and four years.



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WA is one of the most culturally diverse states in the country, with **people originating from over 190 countries, speaking approximately 240 languages and dialects** (including around 50 Aboriginal languages), and around 32 per cent of its population born overseas.[226]

Arts, culture, sport and recreation

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 and quality of ACSR assets to enable participation in sporting, cultural and leisure activities positively contributes to economic diversity and growth. These assets are key to increasing the vibrancy and cultural depth of WA 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 arts, culture, sport and recreation activities. The ACSR sector makes a significant contribution to the community's quality of life, creativity, innovation and inclusiveness.

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It brings positive flow-on benefits to a range of industries including tourism, international education, creative industries, entertainment and hospitality. Each, in turn, contributes to the State's competitive positioning, brand characteristics and desirability as a global location of choice, and in serving the growing 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.[227] 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.[228]

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 sector and its relationship to infrastructure needs and delivery vary significantly.

Sport is the only ASCR 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. 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 and a plan for future infrastructure investment. 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. The associated *WA 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.

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 sector to address these challenges, such as the recent *WA Cultural Infrastructure Investment Guidelines*, the issue remains.

The COVID-19 pandemic has **greatly impacted tourism, culture and arts,** which 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**.



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The creative industries have been very effective in the **inventive and dynamic use of underused and unusual spaces**. The Perth International Arts Festival and the associated Fringe Festival have indeed made an art out of this. Yet this does not replace the need for high-quality, suitable facilities that allow people to hone and share their craft.

The most significant ACSR investment in the ten years since 2010 has been focussed towards sporting infrastructure, including the State Football (soccer) Centre (construction commenced 2021), Optus Stadium (2017), State Netball Centre (2015), State Basketball Centre (2012) and RAC (Perth) Arena (2012), which is mixed-use but routinely hosts basketball, netball and has hosted tennis tournaments. The New Museum Boola Bardip (2020), Kalbarri Skywalk (2020) and State Theatre Centre of WA (2011) are some of the most significant singular arts, cultural and recreation investments made over the past decade.

In 2020-21, the ACSR sector received a proportionately small budget of $177 million (or two per cent) of the total $7.5 billion Asset Investment Program.[229] 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 arts, culture, sport and recreation 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 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.

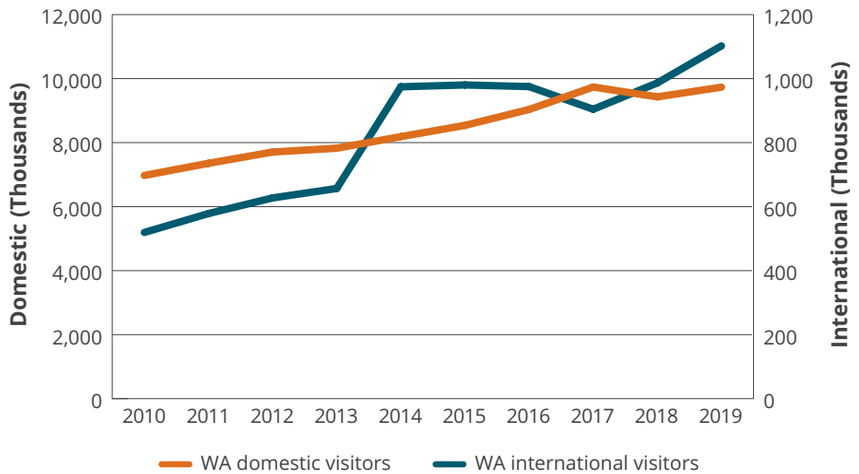
IWA recognises the important relationship between tourism and the enabling role of ASCR infrastructure. High-quality, fit for purpose infrastructure is essential to attract increased domestic and international visitation. Tourism makes a vital contribution to regional economic growth, diversification and employment. Prior to the COVID-19 pandemic, WA's share of international and domestic visitors had continued to increase since 2010 (Figure 49). 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 *Tjina: WA 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.

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Figure 49: Domestic and international visitors 2010-2019[230]



Governance

The 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 and responsibilities.

- The Department of Local Government, Sport and Cultural Industries works to strengthen the vibrancy of the WA community and economy by supporting industry and providing sporting, recreational, cultural and arts policy, programs and activities. It manages a wide range of cultural, sporting and entertainment venues, land, and five recreation camps. It also works closely with the statutory authorities within the cultural portfolio, including the Art Gallery of WA; State Library of WA; WA Museum; Perth Theatre Trust; and State Records Office. In addition, the Department of Local Government, Sport and Cultural Industries:
  - manages the maintenance of 65 buildings, 23 of which are vested with the Minister for Culture and the Arts; and
  - the Sport and Recreation division works in partnership with more than 135 local government authorities, 5,000 clubs and 90 state sporting associations.
- VenuesWest owns and manages 13 sport and entertainment venues on behalf of the State Government including the RAC (Perth) Arena and Optus Stadium. VenuesWest is governed by a Board responsible to the Minister for Sport and Recreation.
- The Department of Biodiversity, Conservation and Attractions works to conserve WA's biodiversity and wildlife; manages parks, forests and reserves including an extensive 36,000 kilometres road network; provides sustainable recreational and tourism opportunities; and protects communities and assets from bushfire. Its governance structure includes three statutory authorities (Botanic Gardens and Parks Authority, Rottnest Island Authority, Zoological Parks Authority) reporting to respective Ministers via Boards. 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.
- The State Government provides significant funding to WA's premier art and cultural organisations, such as Screenwest and major performing arts companies, including the WA Ballet, WA Symphony Orchestra and WA Opera.
- The Federal Government and local governments provide funding and support to the ACSR sector, including infrastructure provision.

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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Long-term State arts and culture strategy

A unified and compelling vision for the arts and cultural sectors is required, with a clear thread 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. The strategy must define responsibilities and the funding and resourcing for implementation required to meet the intended outcomes.

Recommendation 82

Develop and publish a ten-year+ State arts and culture strategy to guide priorities, including infrastructure and investment needs. ●

Tourism WA research shows **81 per cent of visitors to WA** are interested in **participating in an Aboriginal tourism experience**. However, less than one in five visitors (or 17 per cent) access this type of experience, demonstrating an opportunity to respond to increasing demand.[231]

Invest in existing and new arts, culture, sport and recreation infrastructure

Investment in the maintenance of existing arts, culture, sport and recreation infrastructure is a key priority to optimise its use and access 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. Pathways to improve asset management and funding options are contained in the Asset management chapter.

Aboriginal Cultural Centre

A nationally relevant and internationally recognised flagship Aboriginal Cultural Centre for WA 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 opportunities such as 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 WA Aboriginal cultural centres – and responding to unprecedented demand for cultural tourism experiences and creating tangible pathways for Aboriginal enterprise.

Culturally-appropriate, meaningful collaboration with Aboriginal communities across WA is required, starting with the Whadjuk Noongar

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people as the Traditional Owners and Custodians of the land on which the Centre would stand. This engagement should continue throughout the project and cover all facets – from concept development to site selection, design, delivery, operation and programming.

The State Government has committed $50 million of seed funding towards this project and has stated it will seek matching funding from the Federal Government as well as contributions from the private sector.

Perth's convention and exhibition facilities

Attracting convention activity is highly competitive and relies on quality delegate experiences in world-class facilities. Since opening in 2004, the Perth Convention and Exhibition Centre (PCEC) has fallen behind its national and international competitors in attendee capacity and floor space. It is one of only a few major centres in Australia 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 State 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 two times that of a regular business traveller and 3.5 times that of a leisure traveller.[232]

Table 5: Overview of Australia's convention and exhibition facilities market

Location	Initial cost / major redevelopment (years)	Exhibition space (m^2)	Number of other rooms	Maximum plenary capacity
Sydney	$1.5b (2016)	33,000	55	8,000
Melbourne	$129m – Exhibition Centre (1996) $413m – Convention Centre (2009) $305m – Expansion (2108)	39,000	60	5,564
Gold Coast	$127m (2004) $40m – Expansion (2009)	6,000	15	6,000
Brisbane	$170m (1994) $140m – Expansion (2012)	20,000	44	4,000
Adelaide	$39m (1987) $400m – Expansion (2017)	13,000	24	3,500
Perth	**$225m (2004)**	**16,632**	**23**	**2,500**
Canberra	$50m (1989) $30m – Upgrade (2007)	2,400	13	2,460
Cairns	$80m (1996) $30m – Expansion (1999)	4,560	22	5,000
Darwin	$110m (2008)	4,000	13	1,500

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For WA to improve its standing when a more stable conference and event market resumes post-COVID-19, increased capacity is needed to enable at least two major events to be hosted concurrently. Among other matters, 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 optimum value is derived from infrastructure investment, and wider economic benefits are maximised. Ongoing participation by the State 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 including the PCEC, major corporate head offices, hotels, Elizabeth Quay bus and train stations and major public car parking. It falls well short of a legible, comfortable and connected destination to support world-class convention experiences. Irrespective 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.

Perth Cultural Centre

The Perth Cultural Centre is home to a number of WA's most significant cultural assets including the Art Gallery of WA, State Theatre Centre of WA, State Library and the new WA Museum Boola Bardip. Established in the early 1980s, the Perth Cultural Centre's concentration of major cultural institutions in such close 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, 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 Elevate (the Art Gallery of WA's rooftop activation) are catalysts for further transformation of the precinct. The Perth Cultural Centre 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.

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Recommendation 83

Increase investment in existing and new arts, culture, sport and recreation infrastructure state-wide to ensure they are fit for purpose, including investment in the following projects:

a. continuing planning and developing a business case to deliver a flagship Western Australian Aboriginal Cultural Centre of national and international significance in Perth;
b. planning and developing a business case to improve the capacity and quality of convention and exhibition facilities in the Perth CBD, to ensure Perth is attractive and competitive for high capacity national and global events;
c. completing planning to redevelop the Perth Convention Precinct; and
d. continuing ongoing planning and developing a business case for the redevelopment of the Perth Cultural Centre to guide investment and improve the functionality and interface of civic infrastructure and the public domain.

Long-term State tourism strategy

Tourism WA currently works on a two-year strategic planning horizon, with its most recent *Two-Year Action Plan* concluding in 2019-20. Historically these plans have focussed on major event attraction and destination marketing. While these functions are vitally important, 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 focusses on WA's recovery in the short term, but ensures the State is ready to harness growth when more regular travel patterns resume post the COVID-19 pandemic. A ten-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 will 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.

Recommendation 84

Develop and publish a ten-year+ State tourism strategy to guide tourism precinct and infrastructure development and investment.

Over 2018-19, **tourism generated 100,900 jobs and injected $12.2 billion into the WA economy**, measured by Gross State Product. In the year ending December 2019, 24.2 million daytrips were taken within the State and 12 million overnight (domestic and international) visitors came to, or travelled within, WA. **Together, these visitors spent $11 billion in the State, $5.2 billion (48 per cent) of which was spent in regional WA.**[233]



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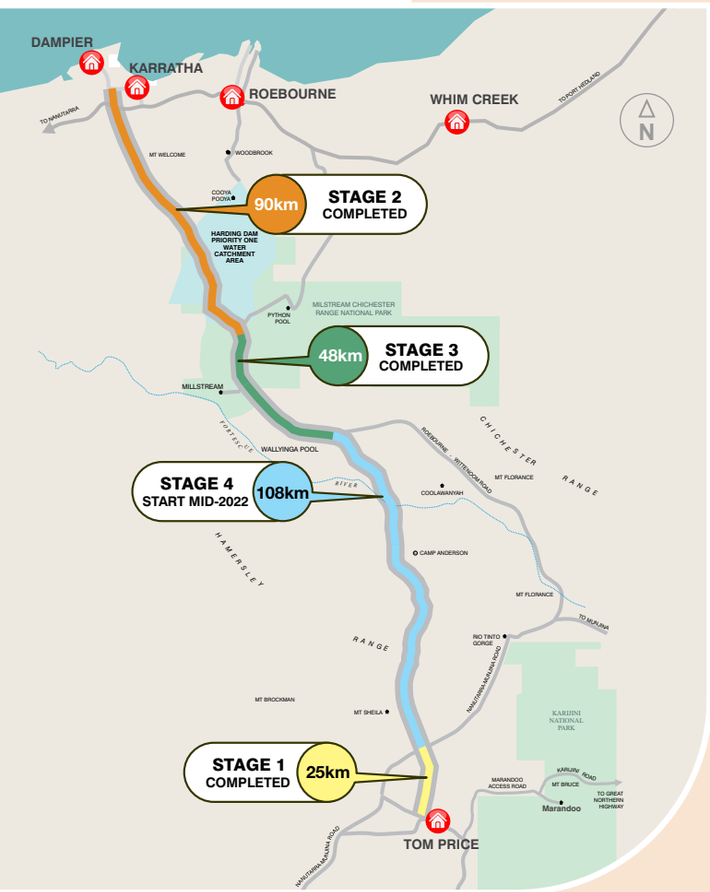
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Case Study

Manuwarra Red Dog Highway

Main Roads WA is sealing 271 kilometres of the Manuwarra Red Dog Highway between Karratha and Tom Price. Stages 1-3 are complete, with work on the final 108 kilometre Stage 4 due to commence from mid-2022 (Figure 50).

Figure 50: Stages of sealing of Manuwarra Red Dog Highway[234]



The project delivers a number of 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 two of WA's premier National Parks – Millstream Chichester and Karijini.

Karijini, with its many gorges, is a well-recognised and visited. In 2018-19 visitor numbers peaked at over 365,000 per annum.[235] The State Government recently made a $16 million investment commitment to improve access and visitor facilities. The majority of those funds will upgrade access roads, with around $2 million spent on new or upgraded visitor facilities. The Department of Biodiversity, Conservation and Attractions estimates that an additional $4-5 million is required to improve Karijini's access roads and carparks. 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.[236]

Visitors to Millstream Chichester have steadily increased, with over 49,000 reached in 2018-19.[237] Further increases are expected when sealing of the Highway is complete. The Department of Biodiversity, Conservation and Attractions has identified an estimated over $5.8 million in additional facilities needed to support an expected rise in visitor numbers.[238] However, to 2022-23, the Department of Biodiversity, Conservation and Attractions has only $600,000 in capital investment available for infrastructure improvements within the Park.

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 access and attractiveness of the destinations to visitors is sustained, but that the natural environment is protected from the impacts of increased patronage.

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

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Tourism destination infrastructure

State Government investment should be focussed primarily around WA's four established and successful 'jewels in the crown' tourism destinations, which are proven drawcards for inbound visitation (international and interstate) and have the largest potential return on investment. While other locations and regions across WA offer varying degrees of tourism opportunities, the four destinations are evidenced as the State's major tourism attractors for domestic and international visitors.[239] The four destinations identified are based on historical data, and do not necessarily capture potential future aspirations that other locations or regions may have.

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 to cement WA's position as an attractive tourism destination and improve visitor access to its many natural wonders, cultural icons and built facilities. Identifying state-wide 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 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.



Recommendation 85

Tourism infrastructure destination planning and activation should be achieved through:

a. increased investment in the four 'jewels in the crown' of WA's tourism offering to drive international and interstate inbound visitation and build on the clusters of attractions and enabling infrastructure already in place. This investment should be informed by Destination Management Plans and business cases which identify a program of new or upgraded amenities and attractions to meet longer-term supply, demand and capacity goals for the following locations: ●
   - the Perth region (including Rottnest Island);
   - the South West region;
   - the Ningaloo Coast (including Exmouth); and
   - the Kimberley region (including Broome).

Refer to Recommendation 33 within the Planning and coordination chapter for detail on capturing wider impacts of investment decisions.

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Justice and public safety

Over the past two decades, offences against the person have **more than doubled**.[240]

Demand for emergency services continues to increase, in part due to longer and overlapping bushfire seasons in the north and south of WA.

With the largest policing jurisdiction in the world, along with court and corrective services spanning the State, WA police and justice systems have a large task in maintaining law and order.[241] In times of need, police and emergency services – supported by other government agencies, ambulance services and a large network of volunteers – manage multi-agency responses to serious incidents and natural disasters. Service delivery across the sector is faced with increasing complexity.

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 readily they can access safe housing, adequate education, cultural and sporting opportunities, 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.[242]

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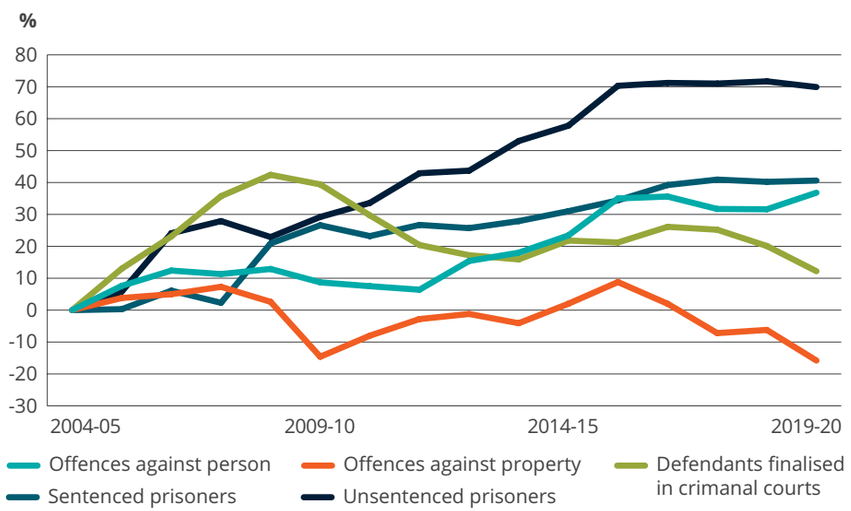
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Trends and issues facing broader society are often reflected within criminal activity and correctional facilities.[243] The nature of crime is changing – offenders are finding new ways of using technology to commit crime, offenders are, on average, older and many are struggling with mental health, drug and alcohol issues.[244] This is changing how police and justice systems provide services, and the infrastructure they use.

Over the past two decades, offences against the person have more than doubled to over 47,500 in 2019-20, while offences against property have fallen by around a quarter to 142,416.[245] 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.

Over the 15 years since 2004-05, defendants finalised in criminal courts rose from 68,553 to 78,089 in 2019-20.[246] The prison population grew at a faster rate, from 3,482 in 2004-05 to 6,770 in 2019-20.[247] During this time, the proportion of prisoners awaiting trial or sentencing rose from 15.9 per cent to 27.2 per cent reflecting the flow-on impact of high demand for court services on the prison system. In 2019-20, the median time to bring a trial for criminal matters to the Supreme Court was 45 weeks (17 weeks above target), while to the District Court it was 45 weeks (13 weeks above target), and to the Magistrates' Court, 23 weeks for criminal and civil matters (four weeks above target).[249] 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 51 displays the change in these numbers over the past 15 years, but cannot fully demonstrate the complexity of the police and justice task.

Figure 51: 15-year crime, court and prison trends in Western Australia (percentage increase/decrease)[248]

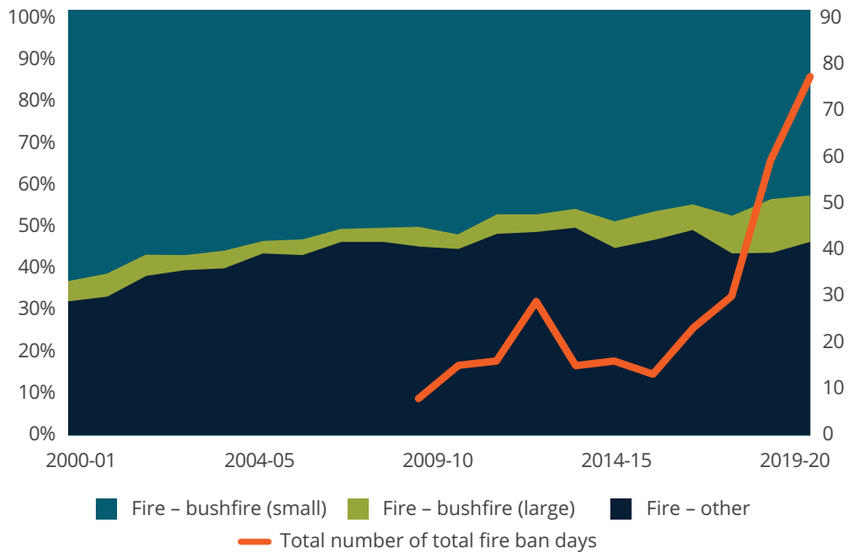


As well as policing criminal matters, WA Police Force also has responsibility, in conjunction with the Department of Fire and Emergency services, to lead the response to incidents and natural disasters. More incidents are occurring in dense and increasingly congested urban areas, along with difficult to access and remote locations. 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).[250] There is also a growing intensity of natural disasters driven by factors such as shifts in climatic conditions, which place heightened demand on emergency services and the infrastructure networks, such as telecommunications and supply chains, needed during emergency response.[251]

Over the past 20-years, the Department of Fire and Emergency Services and its predecessors have responded to a fairly stable number of incidents, although the composition of incidents has changed. For example, in 2000-01, WA experienced 881 large bushfires, 11,029 small bushfires and 5,533 other fires.[252] By 2019-20, this had shifted to 1,007 large bushfires, 3,887 small bushfires and 4,204 other fires (Figure 52). While total fire bans, community education and a shared responsibility approach has 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

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Figure 52: Comparison of fire types 2000-01 to 2019-20 and total fire ban days 2009-10 to 2019-20[253]



summer of 2019-20 closed the Eyre Highway, significantly disrupting primary industry, transport logistics suppliers and tourists. A hot and dry climate results in bushfires that are more intense, larger and longer.[254]

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 ten years. Demand for emergency services will also continue to increase, particularly due to longer and overlapping bushfire seasons in the north and south of WA, 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, which are often interrelated, include:

- Many WA Police Force premises needing 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 State Government commitments for an injection of 950 additional police officers, partly attributable to the increased demand for policing services in the COVID-19 response, will have significant flow-on infrastructure effects (for example, officer housing and police station accommodation) that have not yet been fully planned or funded, as well as downstream impacts on other sectors and services including courts and correctional facilities.[255]
- 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, with some not offering an appropriate level of rehabilitation and diversionary programs, including those that are culturally appropriate.
- 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. There is a need to improve coordination and collaboration between WA's infrastructure, land use planning and fire and emergency services to meet demographic needs, achieve alignment around location and to ensure accessibility. This is particularly important when planning for new types of infrastructure or new developments in bushfire risk areas. As both the urban environment and nature of emergency incidents changes, there is also the need to ensure capacity to upskill for specific hazard and situational responses.

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The **increase of 950 WA Police Force personnel** will bring flow-on demand implications to station, court, correctional facilities and regional housing – a key example of the need to understand and respond to planning interdependencies.[256]



Governance

The main agencies responsible for providing policing, justice and emergency services are:

- The WA Police Force, which has a broad responsibility to enforce the law in the community and on the roads, prevent crime and protect the community. They also manage and coordinate multi-agency emergency responses, which can range from search and rescue through to the State of Emergency declared in March 2020 for the WA response to the COVID-19 pandemic;
- The Department of Justice, which 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; and
- The Department of Fire and Emergency Services, which 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 is comprised of 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, in particular in relation to digital connectivity, Aboriginal wellbeing, climate change, planning and coordination and asset management.

There are a range of other government agencies and non-government organisations providing justice and public safety services, which the Strategy does not mention nor discuss in detail. This includes, for example, not-for-profit organisations, ambulance services and other government agencies that provide emergency response support.

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Case Study

Olabud Doogethu program (all of us together)



The team has seen a **58 per cent reduction of burglary offences** in the Halls Creek town site and a **28 per cent reduction in stealing offences** since the program began.[257]

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. The program aim is to reduce youth incarceration rates and improve outcomes for young people in the Shire.

The team of Youth Engagement Night Officers and daytime Aboriginal Parent Support crew has seen a 58 per cent reduction of burglary offences in the Halls Creek town site and a 28 per cent reduction in stealing offences since the program began.[258] Contributing to these results is 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.

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. They are youth workers, not police officers; and
- 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

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Recommendations

Timeframe for completion: ● 2022-2027 ● 2027-2032 ● 2032-2042

Demand management and prevention

The rates of imprisonment and recidivism across many parts of the community is high and, in the case of Aboriginal people, deeply concerning.[259] It is arguable that just building more infrastructure, such as court houses and prisons, to meet these pressures is not sustainable and 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. High rates of recidivism are of particular concern and greater efforts would seem necessary to ensure individuals, who on release 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, along with historical disempowerment, which has led to a level of distrust in law-and-order systems.

In 2019-20, the cost to keep an adult offender in custody was $323 per day. In contrast, the cost to manage an adult offender through community supervision was $35 per day.[260] The diversion of some of these funds to justice reinvestment programs and non-traditional corrective services has the potential for long-term positive change. 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 prison in Australia, at less than one per cent.[261]

Culturally-appropriate initiatives and collaboration are needed to respond to high incarceration rates of Aboriginal adults and young people (40 per cent of adult prisoners, and 69 per cent of youth detainees).[262] 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.

The **cost to house an adult offender in custody is $323 per day**. The cost to manage an adult offender through **community supervision is just $35 per day**.[263]



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Infrastructure Australia speaks to the benefits of prevention and early intervention in the 2019 Australian Infrastructure Audit, which in particular identified the justice reinvestment project in Bourke, NSW. 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'.[264] The Maranguka Justice Reinvestment Project Impact Assessment, released in November 2018, reported promising results in reducing demand on policing and justice services, along with positive economic impacts.

Through the *Our Priorities: Sharing Prosperity – A Safer Community* program, the State Government set cross-agency targets to reduce:

- the number of Aboriginal adults in prison;
- youth offenders who return to detention within two years of release; and
- the proportion of the WA population who have taken an illicit drug in the 12-months prior to measure being taken.



While this program has now been deferred, government should work to 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 forthcoming WA Implementation Plan.

Establishing agreed whole of government targets will require efficient and collaborative cross-agency governance arrangements and frameworks. Over the years there has been a large number of programs and activities undertaken in early intervention, prevention and rehabilitation, by government and the private sector. This has occurred at a state, national and international level, however a long-term, collaborative and consistently funded state approach does not currently exist. Harnessing the strengths, benefits and lessons learnt from previous work – including the tools, models and data sources – will potentially assist in building evidence for the consideration of future programs and activities.

Recommendation 86

Establish and implement cross-agency stretch targets that address the growth in demand for police, courts and corrective services, and associated infrastructure through prevention, early intervention and rehabilitation, particularly for Aboriginal people, and report progress against these targets publicly each year.

In WA, 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, amongst many others.

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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 which incorporate other government agencies and private providers. However, they also present challenges in terms of the responsibility for asset management. The Armadale Courthouse and Police Complex, currently under development, aims to improve the security and efficiency of custodial services through a shared custody area. The 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.[265] Recommendation 29 within 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 19 within the Regional development chapter recognises the need for integrated, place-based planning and delivery models that suit the varying needs and population changes of regional communities.

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 off-site and modular construction techniques where benefits can be achieved, in line with Recommendation 36e of 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 verses 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.



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Recommendation 87

Improve justice and public safety infrastructure planning, focussed on the interdependencies of police, courts and correctional facilities, through updated Strategic Asset Plans that include:

a. pursuing future collocation opportunities with other government agencies and non-government providers for potential precincts; ●

b. improving alignment and cooperation between the Department of Justice and WA Police Force in managing existing 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; and ●

d. progressing long-term infrastructure planning (equivalent to the Long Term Custodial Infrastructure Plan) for courts and police facilities. ●



Targeted investment

Replacement and relocation of Broome 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 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.[266] Planning for the new Broome Prison to date demonstrates use of network design principles, engagement with Traditional Owners and Custodians in identifying site options and providing input to concept designs, 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 to inform investment timing and the preferred option.

The current WA Emergency Management Training Centre is past its useful life, with increasing maintenance requirements and deteriorating specialised infrastructure. Legislative changes in the past three 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.[267] The ability for fire and other emergency services to respond to incidents in a contemporary and effective manner is a crucial priority. The finalisation of a business case, which assesses a range of feasible options, should be progressed as a priority to inform investment timing and the preferred option.

Further investigation of the phased rollout of the Government Radio Network to multiple agencies should continue, while seeking to avoid obsolescence from new telecommunications innovations and exploring opportunities for digitisation across the sector.

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The Government Radio Network will ensure WA meets Federal requirements and provides an opportunity to bring emergency services together onto a single platform. The finalisation of a business case should be progressed as a priority to inform investment timing and the preferred option.

Potential future medium to long-term projects, 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. Planning and business cases should align with the Strategic Asset Management Framework and also demonstrate:

- a digital-first approach;
- integration and precinct opportunities;
- prevention and intervention opportunities;
- Aboriginal stakeholder engagement and co-design;
- clear asset management governance; and
- a robust evidence base and due-diligence.

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 (refer to Recommendation 2 in the Digital connectivity and technology chapter). Pursuing digitisation opportunities and applying a digital-first approach in the sector will need to be balanced so as not to 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 with limited digital connectivity.

Recommendation 88

Pursue further investigation and planning for potential long-term projects; and invest in new justice and public safety major infrastructure, subject to business cases, for the:

a. Broome Regional Prison;

b. WA Emergency Management Training Centre; and

c. Government Radio Network.



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Summary of Strategy recommendations

Understanding the recommendations

For ease of reference, a list of all recommendations in abbreviated form is provided in the summary table on the following pages. For recommendations in full, users should refer back to the relevant chapter of the Strategy. The separate components of each recommendation are separately shown as these are the specific actions that require implementation and monitoring. These are referred to as sub-recommendations.

Also presented for each recommendation or sub-recommendation is:

- a suggested State agency and/or GTE (or sometimes multiple) responsible for leading implementation;
- the timeframe by which implementation is to be completed; and
- alignment against the ten 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 implementation of the Strategy's recommendations.

The Next steps chapter outlines the process for finalising the Strategy, including the process for Government to respond to the recommendations, and IWA's role to report annually on progress in implementing the recommendations (to the extent the recommendations are supported by Government). While the timeframe 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 and sub-recommendation, and whether it is on track for completion. IWA intends to work with relevant agencies and/or GTEs to develop an implementation plan for each recommendation that is supported by Government.

Where IWA suggests a State agency and/or GTE to lead implementation of a recommendation in the summary table below, this is a suggestion only and does not form part IWA's recommendation – this recognises that Government may wish to assign it to a different lead agency and/or GTE, which IWA would be supportive of provided the recommendation is adequately implemented on time. Many sub-recommendations will require a response and action from one or more State agencies or GTEs in addition to the suggested lead listed. In particular, a large proportion 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.

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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 Western Australia
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

Timeframe for completion:

- 2022-2027
- 2027-2032
- 2032-2042

Summary of recommendations	Timeframe for completion	Suggested lead agency	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. Assigning a lead government agency for digital technology adoption.	2022-2027	DPC	✓							✓		
b. Establishing and implementing an integrated state-wide plan for digital connectivity, supported by a prioritisation framework.	2022-2027	DPC		✓		✓	✓			✓		
c. Developing a collaboration model, adopting a coordinated State Government approach to current and future Federal programs.	2022-2027	DPC						✓		✓		
d. Providing multi-year State Government funding and leveraging Federal Government co-investment opportunities for identified digital initiatives.	2027-2032	DPC						✓		✓		
2. Take a digital-first approach to all aspects of the infrastructure lifecycle by:												
a. Developing and adopting a digital-first lifecycle process over a phased rollout, including through amendments to the Strategic Asset Management Framework SAP and Business Case guidelines for projects or programs with a capital cost of $100 million or more.	2022-2027	IWA, Treasury						✓		✓		✓
b. Establishing a smart infrastructure policy.	2027-2032	IWA								✓		✓
c. Reporting publicly on digitisation of infrastructure.	2027-2032	IWA								✓		✓
3. Set and implement cybersecurity standards for State-owned and regulated infrastructure by:												
a. Assigning a single agency in charge of cybersecurity, to develop, monitor and enforce policy and standards and clearly articulate obligations to government infrastructure owners and operators.	2022-2027	DPC								✓	✓	

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Summary of recommendations	Timeframe for completion	Suggested lead agency	Alignment with Strategy objectives									
			1	2	3	4	5	6	7	8	9	10
b. Updating the Strategic Asset Management Framework SAP and Business Case guidelines for projects or programs with a capital cost of $100 million or more, to require infrastructure strategies, plans and business cases to appropriately address cybersecurity risks.	2022-2027	Treasury, IWA								✓	✓	
4. Develop digital capabilities within government to ensure optimal operation and security of infrastructure by:												
a. Prioritising development of State privacy and information sharing legislation.	2022-2027	DPC								✓		
b. Developing government data management and asset information policies, processes, platforms and standards.	2022-2027	DPC						✓		✓		
c. Assigning a centralised lead role responsible for developing and retaining data science capabilities within government.	2022-2027	PSC						✓			✓	
Aboriginal cultural heritage, wellbeing and enterprise												
5. Develop and implement guidelines to engage with Traditional Owners and Custodians throughout the infrastructure lifecycle, including:												
a. Community-led processes and place-based infrastructure outcomes for Aboriginal communities. b. Native Title and cultural heritage guidance for infrastructure proposals. c. Alignment with the principles of the State Government's proposed Aboriginal Empowerment Strategy.	2027-2032	DPC			✓		✓	✓			✓	
d. For projects and programs with a capital cost of $100 million or more, requiring the preparation and publication of an Aboriginal engagement strategy, through updates to the Strategic Asset Management Framework Business Case guidelines.	2022-2027	Treasury, IWA	✓		✓		✓				✓	
6. Prioritise the Aboriginal Cultural Heritage Bill's passage through Parliament and implementation.	2022-2027	DPLH			✓		✓					
7. Improve and increase participation and growth of Aboriginal businesses through the WA Aboriginal Procurement Policy by:												
a. Establishing targets that are also based on contract value, rather than only the number of total contracts. b. Expanding the policy through Aboriginal employment requirements and Aboriginal business subcontracting and joint venturing provisions. c. Considering the application of region-specific and/or industry-specific targets	2022-2027	DoF		✓	✓		✓	✓			✓	
d. Strongly encouraging greater uptake of unconscious bias training for public sector officers involved in procurement decision-making.	2027-2032	DoF	✓	✓	✓						✓	
e. Implementing mechanisms to mandate application of the Policy by GTEs.	2022-2027	DoF	✓	✓	✓						✓	
f. Subject to application and outcomes of Recommendations 7a-c, set new stretch procurement targets above those outlined in the Policy over time.	2022-2027	DoF	✓	✓	✓						✓	

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Summary of recommendations	Timeframe for completion	Suggested lead agency	Alignment with Strategy objectives									
			1	2	3	4	5	6	7	8	9	10
8. For projects and programs with a capital cost of $100 million or more, require the proponent or lead agency to establish Aboriginal employment targets, including through updates to the Strategic Asset Management Framework Business Case guidelines. Targets should be embedded in contracts and be reported on.	2022-2027	DoF		✓	✓		✓				✓	
9. Develop and implement complementary and proactive measures to progressively build capacity and capability of Aboriginal businesses.	2022-2027	DoF	✓	✓	✓		✓				✓	
10. Improve the quality of infrastructure and services provided in remote Aboriginal communities and town-based reserves, by:												
a. Prioritising development of a sustainable funding model and investment framework that considers whole-of-life asset costs.	2022-2027	Treasury, DoC			✓						✓	✓
b. Establishing a mechanism for government to share information about the delivery of infrastructure and services.	2027-2032	DPC			✓			✓		✓	✓	✓
c. Investigating opportunities for the private sector to fund, deliver, operate and maintain infrastructure and services.	2027-2032	Treasury	✓		✓		✓				✓	
d. Evaluating outcomes of the Bidyadanga Land Activation Pilot Project and assess suitability for application in other Aboriginal communities.	2022-2027	DPC, DPLH			✓		✓	✓				
e. Accelerating the transition and regularisation of water and wastewater services to the Water Corporation and power services to Horizon Power.	2027-2032	DoC			✓		✓				✓	
f. Establishing and implementing a tiered regulated service standard for remote settlements.	2022-2027	DPC			✓		✓					
g. Clarifying the roles and responsibilities of relevant entities for provision of municipal infrastructure services	2022-2027	DoC			✓			✓			✓	✓
h. Determining appropriate funding arrangements for the provision of municipal infrastructure and services.	2027-2032	Treasury			✓		✓	✓	✓		✓	✓
Climate change and sustainability												
11. Implement the State Government's policy for net zero emissions by 2050 by:												
a. Embedding the net zero emissions by 2050 aspiration as a de facto target for all government infrastructure-related assets and activities.	2022-2027	All agencies and GTEs		✓		✓						
b. Preparing and implementing net zero transition plans. The plans should: i. include interim targets for Scope 1 and 2 emissions associated with facilities under the State agency or GTE's operational control; ii. identify actions that deliver a triple bottom line benefit for Scope 1 and 2 emissions reductions iii. include mechanisms for State agencies and GTEs to report progress against targets and implementation actions on an annual basis; iv. be supported by funding, resources and public sector capability training; and	2022-2027	All agencies and GTEs				✓						

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v. contribute to public annual reporting on whole of government progress of the plans.	2022-2027	DWER				✓		✓				
c. Preparing and implementing sectoral emissions reduction strategies. The strategies should: i. be prepared under the direction of the Department of Water and Environmental Regulation with authority of a Cabinet decision; ii. clearly identify government policies and processes that impact economic sector emissions and the changes required to those policy and processes consistent with the strategies; iii. include analysis of opportunities for State agencies and GTEs to influence embodied, operational and enabled emissions; iv. account for enabled emissions through infrastructure design and assessment processes and prepare infrastructure to accommodate emerging low and zero carbon technology and transitions; v. identify cost-effective emission reduction actions, along with associated requirements for funding and financing, resources and public sector capability training; and	2027-2032	All agencies and GTEs				✓		✓				
vi. be supported by an annual public report that details the State's emissions, the extent to which they have changed compared with 2005 levels, and estimated emission reductions achieved.	2027-2032	DWER				✓		✓				
12. Strengthen and expand *WA Climate Policy* programs to develop carbon farming and sequestration markets: This should include:												
a. Assigning a lead agency to coordinate the program of works, including development of a WA carbon farming strategy and carbon farming industry development plan across agencies and tenure types.	2022-2027	DPC	✓	✓		✓						
b. Exploring opportunities to expand carbon farming to government-managed land outside of the conservation estate.	2027-2032	DBCA, DPLH	✓	✓		✓		✓				
c. Supporting Aboriginal empowerment through land management and custodianship in carbon farming initiatives.	2027-2032	DPLH	✓	✓	✓	✓						
13. Implement a state-wide approach for climate change adaptation for existing infrastructure by:												
a. Expanding the Climate Science Initiative to require state-wide coverage across all regions.	2022-2027	DWER		✓		✓		✓				
b. All agencies and GTEs developing climate change adaptation plans for assets, operations and services under their control.	2022-2027	All agencies and GTEs				✓						✓
c. Developing guidance to progress the further development of sectoral adaptation actions.	2022-2027	DWER				✓		✓				✓
d. Agencies and GTEs developing sectoral adaptation plans beyond the pilot plan.	2027-2032	DWER				✓		✓				✓

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14. Implement effective methods of accountability and coordination across State agencies and GTEs to support climate change mitigation and adaptation.	2022-2027	DPC, PSC				✓		✓				
15. Incorporate sustainability into the Strategic Asset Management Framework by:												
a. Requiring SAPs to include a hierarchy of strategic responses, and identified projects and actions, through updated SAP guidelines.	2022-2027	Treasury, IWA				✓						✓
b. Through updates to Business Case guidelines, for projects and programs with a capital cost of $100 million or more, requiring business cases to more clearly identify environmental, social and economic impacts (positive and negative); quantify Scope 1, 2 and 3 emissions; align to emission reduction goals and pathways; and demonstrate potential climate change impacts and adaptation actions.	2022-2027	Treasury, IWA				✓						✓
c. Through updates to Business Case guidelines, for projects and programs with a capital cost of $100 million or more, require completion and publication of sustainability tool certification.	2022-2027	Treasury, IWA				✓	✓					✓
16. Develop a Sustainability Bond Framework.	2022-2027	WATC	✓		✓	✓	✓					
Regional development												
17. Develop and implement a regional development strategic framework that identifies state and regional priorities. The framework should:												
a. Align to other government strategic documents and be developed in collaboration with government, business and community stakeholders.	2022-2027	DPIRD	✓	✓				✓				
b. Be reflected in State agency and GTE SAPs and business cases, as a requirement of updated Strategic Asset Management Framework SAP and Business Case guidelines.	2022-2027	DPIRD		✓				✓				
c. Prioritise regional centres based on their strategic importance to the State's economic and population growth.	2022-2027	DPIRD, DPLH	✓	✓				✓	✓			
d. Align to integrated regional land use plans.	2022-2027	DPIRD, DPLH		✓				✓				
18. Improve transparency on regional investment by reporting in the State Budget on all government regional expenditure and its geographic distribution.	2022-2027	Treasury	✓	✓	✓		✓	✓			✓	
19. Develop and implement a regional service and infrastructure framework across WA's diverse regional centres, including:.												
a. State-level settings to facilitate cross-sectoral planning and coordination of services and infrastructure. b. Regional centre level settings to facilitate place-based approaches, and co-design and collocation of services and infrastructure. c. A social services and infrastructure needs assessment.	2027-2032	DPC		✓			✓	✓	✓		✓	

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Planning and coordination												
20. Develop a single digital government approvals system by:												
a. Providing a single access platform to standardised information.	2022-2027	Treasury	✓		✓			✓		✓		
b. Delivering staged platform upgrades to create a single lodgement portal.	2027-2032	Treasury	✓		✓			✓		✓		
21. Modernise infrastructure-related legislation through targeted amendments by:												
a. Reviewing relevant infrastructure legislation at least every five years, and progressing targeted amendments.	2022-2027	Treasury	✓					✓			✓	✓
b. Evaluating the success of temporary COVID-19 measures and identify if these changes in project approvals are suitable for permanent adoption.	2022-2027	Treasury, DPLH	✓					✓			✓	✓
22. Prepare and implement an urban consolidation action plan that includes:												
a. Reviewing and adjusting policy settings to support liveability and amenity improvements in infill locations.	2022-2027	WAPC, DPLH	✓		✓		✓	✓	✓			✓
b. Planning incentives to further support infill development.	2022-2027	WAPC, DPLH	✓		✓		✓	✓	✓			✓
c. Purchaser incentives to support infill development.	2022-2027	WAPC, DPLH, Treasury	✓		✓		✓	✓	✓			✓
23. Embed rigorous infrastructure appraisal in the planning decision-making framework to ensure the infrastructure servicing and operational burden placed on the State informs decisions, by:												
a. Underpinning future reviews of *Perth and Peel@3.5million* and development of integrated regional plans with analysis of infrastructure capital and operational costs and the extent this will likely be carried by the State.	2022-2027	WAPC, DPLH		✓				✓	✓		✓	✓
b. Staging and prioritising development fronts, and identifying a clear implementation strategy in land use plans.	2022-2027	WAPC, DPLH	✓					✓	✓		✓	✓
c. Preparing infrastructure servicing plans where proponents seek to depart from staging plans or are outside land identified for future development.	2022-2027	WAPC, DPLH	✓					✓	✓		✓	✓
d. Ensuring rezoning proposals for greenfield land are considered in the context of land supply and demand.	2022-2027	WAPC, DPLH	✓					✓	✓		✓	✓
24. Preparation of a city opportunity plan that sets an agreed strategic framework for the Perth Central Business District and immediate surrounds including:												
a. A clear and compelling long-term vision for the city.	2022-2027	WAPC, DPLH	✓			✓	✓	✓	✓			✓
b. Identification of major precincts, significant redevelopments and infrastructure that contribute to city growth and activation.	2022-2027	WAPC, DPLH	✓			✓	✓	✓	✓			✓

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25. Develop an overarching urban forest strategy for the Perth and Peel regions. This should include:												
a. Assigning a lead State agency;	2022-2027	WAPC, DPLH				✓	✓	✓				
b. Expanding the existing Urban Canopy Grant Program.	2022-2027	WAPC, DPLH				✓	✓					
c. Partnering with local governments, community groups and other land managers.	2022-2027	WAPC, DPLH				✓	✓	✓				
d. Review of existing planning policy settings with regards to the treatment of trees in new greenfield and infill developments.	2022-2027	WAPC, DPLH				✓	✓	✓				✓
26. Progressively prepare integrated regional plans for each region, and refresh at least every ten years.	2027-2032	WAPC, DPLH	✓	✓				✓	✓			
27. Introduce and implement State priority areas, including:												
a. Developing a prioritisation framework to identify State priority areas.	2022-2027	WAPC, DPLH	✓	✓				✓			✓	
b. Whole of government endorsement of the framework and State priority area locations.	2022-2027	WAPC, DPLH	✓	✓				✓			✓	
28. Facilitate and coordinate investment in industrial and technological precincts by:												
a. Prioritising the finalisation of land assembly, approvals and other preparatory works as recommended in the proposed Industrial Lands Strategy.	2022-2027	DWA	✓	✓				✓			✓	
b. Applying State planning system tools in a more consistent and proactive manner to industrial and technological precincts.	2022-2027	DWA	✓	✓				✓				
c. Extending the *Metropolitan Redevelopment Authority Act 2011*'s redevelopment provisions to non-metropolitan areas.	2022-2027	DWA	✓	✓				✓				
d. Establishing an assessment process for the funding of strategic enabling infrastructure that facilitates private investment.	2022-2027	DJTSI	✓	✓				✓			✓	
e. Planning for the long-term need for additional industrial and technology land, 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.	2022-2027	DWA, SWDC	✓	✓				✓		✓		
29. Develop and implement a shared use policy framework and guidelines for multi-user infrastructure corridors and facilities.	2027-2032	IWA	✓	✓				✓				✓
30. Identify and secure strategic sites, by:												
a. Establishing a dedicated and recurrent fund for regional land acquisition for strategic infrastructure.	2022-2027	Treasury						✓	✓			
b. Centrally coordinating strategic infrastructure site identification.	2022-2027	WAPC, DPLH						✓	✓			
c. Preparing and implementing long-term regional environmental offset plans.	2022-2027	DBCA				✓		✓				

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31. Develop and implement a single, agreed set of common planning assumptions by:												
a. Determining data sets for inclusion and providing guidance on adoption across agencies and GTEs.	2022-2027	Treasury	✓					✓	✓	✓		
b. Updating the Strategic Asset Management Framework guidelines for SAPs and business cases to require application of the agreed common planning assumptions.	2022-2027	Treasury, IWA						✓	✓		✓	
32. Improve two-way public and private sector information sharing about infrastructure capacity by:												
a. Developing Statements of Opportunity.	2022-2027	IWA	✓	✓				✓				✓
b. Undertaking place-based assessments of future infrastructure intentions with an initial focus on the Pilbara, based on two-way information sharing between public and private sectors including all utility providers.	2022-2027	IWA	✓	✓		✓		✓				✓
33. Support improved infrastructure planning and decision making by:												
a. Ensuring business case decision-making is considered by Cabinet's Expenditure Review Committee, and that business cases address Strategic Asset Management Framework-required content.	2022-2027	Treasury						✓			✓	✓
b. Establishing an appropriate mechanism to embed and communicate the required use of, and compliance with, the Strategic Asset Management Framework.	2022-2027	Treasury						✓			✓	✓
c. Continuing centralised funding support for business case development.	2022-2027	Treasury	✓					✓			✓	
d. Updating the Strategic Asset Management Framework Business Case guidelines to require consideration of interrelated infrastructure needs beyond the primary investment with other State agencies and GTEs.	2022-2027	Treasury, IWA	✓			✓		✓			✓	✓
e. Updating the Strategic Asset Management Framework Business Case guidelines and other relevant guidelines for projects and programs with a capital cost of $100 million or more, to embed benefits realisation at pre-operating and operating phases.	2022-2027	Treasury, IWA	✓			✓	✓	✓			✓	✓
f. Updating the Strategic Asset Management Framework SAP and Business Case guidelines to strengthen requirements for agencies and GTEs to demonstrate analysis of this Strategy and relevant strategic planning documents for the development of SAP content.	2022-2027	Treasury, IWA						✓			✓	✓
g. Ensuring SAPs are at the centre of a robust and transparent annual process involving systematic analysis of all SAPs by Treasury and IWA, informing preparation of the State Infrastructure Program, and engagement and feedback between Treasury and agencies to assist with ongoing improvement.	2022-2027	Treasury, IWA						✓			✓	✓
h. Updating the Strategic Asset Management Framework and associated guidelines to include guidance material and requirements consistent with recommendations of this Strategy.	2022-2027	Treasury, IWA	✓		✓	✓	✓	✓		✓	✓	✓

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Infrastructure delivery												
34. Strengthen 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.	2022-2027	DoF									✓	
b. Ensuring major project steering committees chairs have time to prepare for, attend and lead steering committee meetings and deliberations.	2022-2027	DPC									✓	
c. Further enhancing the capacity of the Department of Finance to provide expert teams within less experienced infrastructure agencies and GTEs.	2022-2027	DoF					✓				✓	
d. Developing and rolling out project management standards for adoption by State agencies and GTEs.	2027-2032	DoF						✓			✓	
35. Further encourage apprenticeships and traineeships on public infrastructure projects by expanding the use of Group Training Organisations.	2027-2032	DTWD	✓								✓	
36. Implement incremental reforms to project procurement policies and practices, by:												
a. Developing and implementing contemporary procurement models for major projects.	2027-2032	DoF									✓	
b. Developing a bid cost reimbursement policy for unsuccessful tenders for major projects.	2022-2027	DoF									✓	
c. Further reviewing and refining the *Market-led Proposals Policy* and ongoing monitoring of outcomes.	2022-2027	DoF	✓								✓	
d. Establishing panel contracts for programs of similar small to medium sized projects across one or more State agencies and GTEs.	2027-2032	DoF									✓	
e. Considering the use of off-site and modular construction techniques where benefits can be achieved.	2027-2032	All agencies and GTEs			✓				✓		✓	
f. Establishing a cross-agency infrastructure procurement coordination mechanism for projects in the planning phase during business case development.	2027-2032	DoF	✓					✓			✓	
37. Implement incremental reforms to project cost management, by:												
a. Establishing clear standards for setting project delivery timeframes and cashflows at a program level, that account for public and private sector capability and capacity.	2027-2032	Treasury									✓	
b. Replacing the current individual project-based management of contingency with a whole of government, or whole of agency or GTE based approach.	2022-2027	Treasury						✓			✓	
38. Review the potential for private sector funding for the delivery of infrastructure, by:												
a. Investigating asset recycling through divesting suitable assets.	2027-2032	Treasury									✓	✓
b. Analysing projects and programs with a capital cost of $100 million or more, for the potential for private funding through updates to the Strategic Asset Management Framework guidelines for SAPs and business cases.	2022-2027	Treasury	✓								✓	
c. Developing principles for prioritisation of State funding contributions that facilitate strategic private sector investment.	2022-2027	Treasury, DJTSI	✓								✓	

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Asset management												
39. Improve maturity in asset management across the public sector by:												
a. Formalising and funding the Department of Finance's role as functional lead for asset management; and expanding its Strategic Asset Management pilot initiative for all government assets.	2022-2027	DoF						✓			✓	✓
b. Developing fit for purpose asset management systems, in line with the Department of Finance's central guidance.	2022-2027	All agencies and GTEs						✓			✓	✓
40. Incentivise improvements in asset management across the public sector by creating and implementing:												
a. A new budget allocation for fit for purpose asset management planning, capability building and systems.	2022-2027	Treasury									✓	✓
b. An asset lifecycle investment fund or similar incentive mechanism.	2027-2032	Treasury									✓	✓
Energy												
41. Evolve the *Whole of System Plan* and ensure implementation actions are transparent, by:												
a. Updating the *Whole of System Plan* modelling to incorporate the following inputs and assumptions in relevant scenarios: i. achieving Government's net zero carbon emissions by 2050 aspiration through the lowest cost mix of generation, storage and network transmission and distribution; ii. impact of potential renewable energy growth locations on energy network infrastructure requirements; iii. electricity offtake through the development of new industries; iv. considering the impacts on system cost and reliability of using technologies such as energy storage to reduce the curtailment of renewable energy generation, including the practicality and community acceptance of any curtailment assumptions; v. testing the accelerated delivery of energy storage and other Distributed Energy Resources technologies to determine the effects on the overall investment program; and vi. the impacts over time from increased uptake of electric vehicles on the energy network.	2022-2027	EPWA	✓	✓		✓		✓		✓	✓	✓
b. Accompanying the *Whole of System Plan* scenario modelling exercise with a detailed implementation plan for the most likely scenario, which identifies: i. current and planned investment; ii. detail network constraints; and iii. opportunities for investment in programs and projects to deliver energy transformation.	2022-2027	EPWA	✓	✓		✓					✓	✓

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42. Prepare a North West Interconnected System Energy Futures Report. The Report should:												
a. Test and resolve to what extent interconnection should occur in the North West Interconnected System and the infrastructure needs to support this, along with any adjustment to access arrangements.	2027-2032	EPWA	✓	✓		✓		✓			✓	
b. Define the role of State agencies, GTEs and the private sector in the North West Interconnected System.	2027-2032	EPWA	✓	✓		✓		✓			✓	
c. Support the identification of suitable sites for large-scale renewable energy generation and storage in proximity to industrial land and high energy users in the North West Interconnected System.	2027-2032	EPWA	✓	✓		✓		✓			✓	
d. Inform the evaluation of key project proposals, including the Burrup Common User Transmission Line and East Pilbara Link.	2027-2032	EPWA	✓	✓		✓		✓			✓	
e. Provide recommendations to align regulatory regimes to the outcomes of the report.	2027-2032	EPWA	✓	✓		✓		✓			✓	
43. Accelerate and coordinate a dedicated program of energy storage, micro-grids, virtual power plants and standalone power systems. Future energy storage options should also be investigated in the medium term.	2022-2027	EPWA, Energy GTEs	✓	✓		✓						✓
44. Review and revise energy legislation, regulations, codes and associated decision-making documents and processes (particularly relating to the New Facilities Investment Test) to address:												
a. Wider State Government policy objectives, including the net zero emissions by 2050 aspiration and industry development objectives.	2022-2027	EPWA	✓	✓		✓						
b. Greater distribution of infrastructure costs over multiple participants to address first and last mover disadvantage.	2022-2027	EPWA	✓	✓							✓	
45. Update the State's hydrogen work program to include:												
a. Accelerating reform of legislation, standards and policy.	2027-2032	DJTSI	✓	✓		✓		✓				
b. Investigating options for stimulating domestic market demand, as a precursor to establishing export industry demand.	2022-2027	DJTSI	✓	✓		✓						
c. Investigating the feasibility of prospective large-scale hydrogen industry locations.	2027-2032	DJTSI	✓	✓		✓						
d. Investigating the feasibility of a hydrogen refuelling network on key freight routes across the State.	2022-2027	DJTSI	✓	✓		✓						
e. Publicly reporting the *Western Australian Renewable Hydrogen Roadmap*'s actions.	2022-2027	DJTSI	✓	✓		✓						

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f. Analysis of the potential need for augmentation of energy infrastructure associated with existing and emerging industries, such as hydrogen, in the updated *Whole of System Plan* modelling including: i. detailed projections around potential energy consumption and generation from existing and emerging industries, and the degree to which augmentation of energy infrastructure such as the Mid West Transmission Line might catalyse this; ii. staging analysis; iii. energy consumption that may otherwise be curtailed; and iv. potential co-investment options from private and Federal Government sources.	2022-2027	EPWA	✓	✓		✓						✓
g. Establishing a clear policy position on the private sector's role and the State's potential role in funding, financing and delivering enabling infrastructure to support the hydrogen industry.	2027-2032	DJTSI	✓	✓		✓		✓			✓	
h. Developing and implementing a staged program of hydrogen industry enabling infrastructure.	2027-2032	DJTSI	✓	✓		✓						
Water												
46. Modernise legislative, regulatory and planning frameworks for water resources and water services by:												
a. Progressing the proposed Water Resources Management Bill.	2022-2027	DWER				✓		✓				✓
b. Developing and implementing a 20-year+ State water strategy which: i. takes into account key drivers of population growth, existing and future industry needs and climate change; ii. plans for the transition to net zero emissions by 2050, and considers principles such as circular economy, multi-source water planning and solutions that are developed at a scale to deliver optimised outcomes iii. articulates the role of government, the water services sector and the private sector in WA to support State development objectives; iv. is reviewed and refreshed on a five-year cycle.	2022-2027	DWER	✓	✓	✓	✓	✓	✓	✓			
c. Developing regional water plans (including for Perth and Peel) that align with the State water strategy and with regional land use plans, and are refreshed on a five-year cycle.	2022-2027	DWER	✓	✓		✓		✓	✓		✓	
d. Including provisions in planning and regulatory frameworks that enable investments in alternative water supplies and wastewater systems.	2027-2032	DWER, WAPC, DPLH		✓		✓		✓	✓			
e. Clearly articulate water resource needs and infrastructure requirements in land use plans and infrastructure servicing plans.	2022-2027	WAPC, DPLH						✓			✓	✓
47. Support the long-term sustainable use and management of the State's strategic groundwater resources by:												
a. Finalising, publishing and implementing the Gnangara groundwater allocation plan.	2022-2027	DWER				✓			✓			

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b. Commencing with the Gnangara groundwater mound, reviewing and reforming self-supply arrangements for strategic groundwater resources to: i. quantify the amount of water being used for self-supply purposes from each strategic groundwater source; ii. understand the economic and social value of each strategic groundwater resource to the region and the State; iii. determine the impact of different self-supply scenarios on the timing and scale of major investment in future scheme water supply infrastructure; and iv. where necessary, implement mechanisms to achieve improved water use and efficiencies for groundwater users.	2022-2027	DWER	✓			✓			✓			✓
48. Manage water demand through initiatives such as:												
a. Reviewing and implementing the *Waterwise Perth Action Plan* to further improve urban water efficiency, including an extension of the timeframe and increasing its application state-wide.	2022-2027	DWER				✓	✓		✓			
b. Implementing and introducing expanded water efficiency programs, such as the Water Corporation's Waterwise programs.	2022-2027	Water GTEs				✓	✓		✓			✓
c. Reducing water consumption through education and improved consumer awareness including by increased use of smart meters, and applying digital technologies.	2022-2027	Water GTEs				✓			✓	✓		✓
49. Ensure long-term water security through timely planning and provision of climate-independent infrastructure and protection of natural water resources by:												
a. Continuing planning and business case development for an additional desalination plant.	2027-2032	Water Corp	✓	✓		✓			✓			
b. Further investigating of groundwater replenishment schemes to recharge groundwater supplies.	2027-2032	Water GTEs	✓	✓		✓			✓			✓
50. Develop a prioritisation framework to guide investment in water infrastructure projects that enable climate resilient and self- sustainable agriculture and food industries in peri-urban and regional areas.	2022-2027	DPIRD	✓	✓		✓					✓	
51. Review the land use policies and water value of the Jandakot groundwater system to determine whether there would be merit in allowing more intensive development considering:												
a. All costs and benefits on a triple bottom line basis; b. A strong up-to-date expert evidence base; c. Options to adequately mitigate risks to the Jandakot groundwater mound; d. Climate change factors; and e. The future role of the Jandakot groundwater system as part of the Integrated Water Supply Scheme's broader water supply.	2022-2027	DWER, WAPC, DPLH				✓		✓	✓			✓

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Waste												
52. Accelerate implementation of the *Waste Avoidance and Resource Recovery Strategy 2030* by:												
a. Preparing and publishing a State waste infrastructure plan.	2022-2027	Waste Authority, DWER				✓		✓	✓			✓
b. Strengthening the role of the WA public sector in supporting waste avoidance by developing and implementing government procurement policies which set ambitious and progressively increasing targets to: i. avoid and reduce waste generation; ii. increase recovery of materials; and iii. purchase locally produced recycled products.	2022-2027	Waste Authority, DWER, DoF	✓			✓			✓			✓
c. Prioritising and expediting waste legislative and regulatory reforms to: i. reviewing the Waste Levy, the rate and application state-wide, and the use of levy funds; ii. progressing reforms to encourage the recovery of materials derived from waste and provide for their safe use of recycled products; and iii. reducing levy avoidance and evasion practices.	2022-2027	Waste Authority, DWER	✓	✓		✓						
Transport												
53. Ensure stronger transport system outcomes by:												
a. Reforming governance arrangements for the Transport Portfolio.	2022-2027	Transport Portfolio	✓					✓			✓	
b. Reforming funding hypothecation arrangements for motor vehicle licence revenue.	2022-2027	Transport Portfolio	✓			✓	✓	✓		✓		✓
54. Refresh state-wide strategic transport planning by:												
a. Developing a new 20+ year regional transport plan.	2022-2027	Transport Portfolio	✓	✓		✓		✓	✓			✓
b. Developing a new 20+ year Perth and Peel transport plan.	2022-2027	Transport Portfolio	✓			✓		✓	✓			✓
c. Finalising development of the new Perth transport model.	2022-2027	Transport Portfolio	✓					✓	✓			✓
55. 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.	2027-2032	Transport Portfolio	✓			✓	✓	✓		✓		✓
b. Future proofing any fuel excise alternative scheme and associated technology by ensuring that the scheme can incorporate vehicle mass, distance, location and time of day pricing elements, and total road system revenue is maintained at a stable level as a policy reform objective.	2027-2032	Transport Portfolio	✓			✓	✓			✓		✓
c. Investigating the merit of location and time-of-day pricing signals being incorporated into a fuel excise alternative.	2027-2032	Transport Portfolio	✓			✓	✓			✓		✓

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56.	**Develop and implement an action plan to increase public transport patronage and reduce road congestion through non-build measures including:**												
a.	Measures within the scope of future business cases for major road and rail infrastructure.	2022-2027	Transport Portfolio	✓			✓	✓	✓	✓	✓	✓	✓
b.	Embracing new innovations in digital technology and service delivery; and	2027-2032	Transport Portfolio	✓		✓	✓	✓			✓		✓
c.	Planning for station precinct urban intensification and better connectivity to educational facilities and other activity precincts.	2022-2027	WAPC, DPLH, Transport Portfolio	✓		✓	✓	✓	✓	✓			✓
57.	**Progress targeted expansion and improvement of the road network, including by progressing:**												
a.	Road safety programs in line with *Driving Change: Road Safety Strategy for Western Australia 2020-2030*.	2027-2032	MRWA	✓	✓			✓	✓	✓			✓
b.	Regional maintenance and freight productivity programs to provide fit for purpose road networks.	2027-2032	MRWA	✓	✓	✓				✓			✓
c.	Small-scale intersection upgrades program, the use of technology on arterial roads and trials for dynamic bus prioritisation.	2027-2032	Transport Portfolio	✓		✓		✓		✓			✓
d.	Capacity and efficiency upgrades to freeways and major urban highways, incorporating all modes and greater use of technology as a priority option.	2027-2032	Transport Portfolio	✓				✓	✓	✓			✓
e.	Including scenarios estimating impacts from a range of potential low and zero emissions vehicles and connected and automated vehicles in all major transport project business cases.	2022-2027	Transport Portfolio	✓	✓		✓	✓	✓			✓	✓
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.	2027-2032	Transport Portfolio	✓	✓					✓			
58.	**Plan and invest in the future development of new heavy rail infrastructure, including:**												
a.	Investing in high capacity signalling.	2027-2032	PTA	✓			✓			✓	✓		✓
b.	Investing in improved station precinct accessibility, including compliance with the *Disability Discrimination Act 1992*.	2027-2032	Transport Portfolio	✓		✓	✓	✓	✓	✓			✓
c.	Staging of other investments from the Rail Growth Plan.	2027-2032	Transport Portfolio	✓			✓	✓		✓			
d.	Investigating the feasibility of long term major projects – East Wanneroo Rail Link, Bunbury Fast Rail and Perth metropolitan orbital rail route.	2027-2032	Transport Portfolio	✓	✓					✓			
59.	**Undertake planning of light rail and/or bus rapid transit for the next stage of major public transport priority investment in Perth.**	2027-2032	Transport Portfolio	✓		✓	✓	✓	✓	✓			✓

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60. Enhance cycling and walking infrastructure through safer designs on cross-suburban linkages, by:												
a. Allocating a greater portion of state funding to local government bike projects that deliver strategic, continuous cross-suburban linkages, based on Perth Long Term Cycling Network priorities and equivalent regional plans.	2027-2032	Transport Portfolio	✓			✓	✓	✓	✓			✓
b. Seeking federal funding contributions for a program of bike infrastructure priority projects.	2022-2027	Transport Portfolio	✓			✓	✓		✓			✓
c. Requiring application of new safe bike infrastructure design guidelines for all state and local government projects.	2027-2032	Transport Portfolio, WAPC, DPLH	✓			✓	✓	✓	✓			✓
61. Implement further measures to support the *State Electric Vehicle Strategy for Western Australia* by:												
a. Setting a more ambitious target for the State Government light vehicle fleet uptake.	2022-2027	DoF, DWER	✓			✓	✓	✓		✓		
b. Investigating the transition or conversion of other government vehicles to low emissions technology.	2027-2032	PTA, DFES, WAPOL, DoF, DWER	✓			✓		✓		✓		✓
c. Expanding the rollout of charging infrastructure on government land and buildings including at train station car parks.	2027-2032	DoF, Transport Portfolio	✓		✓	✓		✓		✓		✓
d. Supporting the private sector to provide charging infrastructure.	2027-2032	Transport Portfolio, WAPC, DPLH	✓			✓				✓		
62. Support the introduction of connected and automated vehicles by ensuring incorporation in future strategic planning and business cases.	2027-2032	Transport Portfolio	✓				✓	✓		✓		✓
63. Conduct further strategic planning in the following areas to complement Westport's preparations by:												
a. Refining and monitoring the estimated optimal required timing for Outer Harbour investment and operations.	2022-2027	DoT	✓					✓				✓
b. Identifying the future location of non-container trades currently based in the Fremantle Inner Harbour.	2022-2027	FPA, DoT	✓					✓				✓
c. Optimising the road and rail supply chain servicing the Inner Harbour.	2022-2027	Transport Portfolio	✓	✓				✓				✓
d. Developing a long-term Inner Harbour masterplan to support future redevelopment, including transport network capacity.	2022-2027	Transport Portfolio	✓					✓	✓			✓
64. Undertake further planning and staged expansion of Australian Marine Complex common use infrastructure.	2022-2027	DJTSI, DWA	✓	✓				✓				✓

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65. Support expansion of direct shipping services to the State's north, by:												
a. Assessing the viability, costs and benefits of long-term direct shipping services to the State's north, and associated infrastructure requirements.	2027-2032	PPA, KPA, Transport Portfolio	✓	✓				✓	✓		✓	
b. Seeking Northern Australia Infrastructure Facility and private funding for any major new port facility required for direct shipping.	2027-2032	PPA, KPA, Transport Portfolio, DJTSI	✓	✓				✓	✓			
c. Funding all relevant port facilities to have appropriate 'first port of call' infrastructure and systems (for customs and quarantine requirements); and	2027-2032	PPA, KPA, Transport Portfolio	✓	✓				✓	✓			✓
d. Planning for fit for purpose road connections to direct shipping facilities.	2027-2032	PPA, KPA, Transport Portfolio	✓	✓				✓	✓			
66. Implement a structured approach to planning, and consideration of public contributions for expansion of the State's freight rail network, including pursuing further investigations for:	2022-2027	DJTSI, Transport Portfolio	✓	✓				✓	✓			✓
a. WA Agricultural Supply Chain Improvements.	2027-2032	Transport Portfolio	✓	✓				✓	✓			✓
b. Kalgoorlie Rail realignment.	2022-2027	Transport Portfolio, DWA	✓	✓				✓	✓			✓
67. Work with the Federal 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 corridors.	2027-2032	WAPC, DPLH	✓	✓		✓	✓	✓	✓		✓	
Social and affordable housing												
68. Improve planning for social and affordable housing by:												
a. Preparing and publishing individual housing plans for each of WA's ten regions.	2022-2027	DoC		✓	✓		✓	✓	✓	✓		✓
b. Conducting an initial regional plan pilot.	2022-2027	DoC		✓	✓		✓	✓	✓	✓		✓
69. Prioritise further investment in social and affordable housing by:												
a. Assessing the level of investment required to accelerate *WA's 10-year Strategy on Homelessness 2020-2030* and accompanying Action Plan.	2022-2027	DoC			✓		✓		✓		✓	
b. Undertaking a comprehensive audit of the social housing stock's asset condition, improvements needed to extend the life of assets and alignment of stock with housing need.	2022-2027	DoC			✓		✓		✓			✓

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c. Commissioning a review of the growth targets in the *WA Housing Strategy 2020-2030* to establish an evidence-based net growth target.	2022-2027	DoC			✓		✓		✓		✓	
d. Developing a sustained social and affordable housing investment program to respond to diverse housing circumstance, informed by regional housing plans and in line with revised targets.	2027-2032	DoC			✓		✓		✓		✓	✓
70. Enable and diversify choices in social and affordable housing by:												
a. Reforming policy to unlock the potential of registered Community Housing Organisations and review existing Community Housing Agreements to address provisions that limit the attraction of alternative financing and funding of new projects.	2022-2027	DoC			✓		✓		✓			✓
b. Leveraging government land assets and providing financial and yield incentives to broaden private sector and institutional investment in social and affordable housing.	2027-2032	DoC, DWA	✓		✓		✓	✓	✓			
c. Accelerating the review of the *Residential Tenancies Act 1987* to provide greater security of tenure for tenants.	2022-2027	DMIRS			✓		✓					
71. Optimise regional officer housing by undertaking an independent review of regional officer housing assets across the public sector to assess:												
a. Implementation status and application of previous program reviews;	2022-2027	DoC		✓			✓	✓				✓
b. Effectiveness, efficiency and value for money, particularly in regard to duplicate programs being operated by multiple State agencies;	2022-2027	DoC		✓			✓	✓				✓
c. Opportunities to consolidate housing programs across State agencies;	2022-2027	DoC		✓			✓	✓				✓
d. Ability to respond to State agency and tenant needs;	2022-2027	DoC		✓			✓	✓				✓
e. Appropriateness of models to regional property market conditions; and	2022-2027	DoC		✓			✓	✓				✓
f. Investigation of innovative models to provide high-quality regional staff housing while managing the cost to government.	2022-2027	DoC		✓			✓	✓				✓
72. Improve Aboriginal housing outcomes by:												
a. Ensuring Aboriginal social and affordable housing activities and targets correspond with the *National Agreement on Closing the Gap* Target 9, to increase the proportion of Aboriginal and Torres Strait Islander people living in appropriately sized housing to 88 per cent by 2031.	2022-2027	DoC		✓	✓		✓					✓
b. Commencing delivery of sustained investments in Aboriginal housing.	2027-2032	DoC		✓	✓		✓				✓	
c. Seeking funding from the Federal Government and financial participation from the private sector by developing a clear, targeted social impact strategy to demonstrate housing need.	2022-2027	DoC		✓	✓		✓					

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Health												
73. Accelerate the transition to a person-centric, preventative and community-based public health system by fast-tracking delivery of the Sustainable Health Review and providing regular public progress reporting.	2022-2027	DoH			✓		✓		✓	✓	✓	✓
74. Address gaps in the health system design, service and infrastructure planning framework by:												
a. Finalising the review of the *WA Health Clinical Services Framework 2014-2024*.	2022-2027	DoH			✓		✓		✓		✓	✓
b. Finalising development of the 10-year State Health Plan.	2022-2027	DoH			✓		✓		✓		✓	✓
c. Establishing an agreement for a sustainable funding footprint to support change and investment in the health system in line with the 10-Year State Health Plan.	2022-2027	DoH, Treasury			✓		✓		✓		✓	✓
d. Preparing an annually updated system-wide Strategic Asset Plan, in line with the Strategic Asset Management Framework.	2022-2027	DoH			✓		✓		✓		✓	✓
e. When planning for health services infrastructure, assessing options for the private health system to augment the public health system.	2022-2027	DoH			✓		✓		✓		✓	✓
75. Rebalance investment toward community-based services to reduce demand on hospitals, targeting investment in hospitals only when required to modernise facilities or address capacity gaps, specifically:												
a. Rebalancing and accelerating investment toward community-based mental health services and facilities.	2022-2027	MHC, DoH,			✓		✓		✓			✓
b. Informed by outcomes of the Graylands Reconfiguration and Forensic Taskforce, prioritising investment to continue the services provided at Graylands Hospital and Selby Lodge.	2027-2032	MHC, DoH			✓		✓		✓			✓
c. Informed by outcomes of the Graylands Reconfiguration and Forensic Taskforce, prioritising investment in forensic mental health services.	2027-2032	MHC, DoJ, DoH			✓		✓		✓			✓
d. Completing a full review of the *Western Australian Mental Health, Alcohol and Other Drug Services Plan 2015-2025*.	2022-2027	MHC			✓		✓		✓			✓
e. Working with the Federal Government in prioritising expanding the role of primary health care in providing more integrated, community-based health services.	2022-2027	DoH			✓		✓		✓			✓
f. Working with the Federal Government in investigating and investing in innovative models of community-based primary health services and facilities.	2022-2027	DoH			✓		✓		✓			✓
g. Expanding application of digital technologies such as telehealth and remote inpatient monitoring.	2027-2032	DoH		✓	✓		✓		✓	✓		✓

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h. Subject to Recommendation 74a, developing a roadmap for the planning and redevelopment of Royal Perth Hospital.	2022-2027	DoH			✓		✓		✓			✓
i. Subject to Recommendation 74a, developing a roadmap for the planning and investment in Sir Charles Gairdner Hospital	2027-2032	DoH			✓		✓		✓			✓
76. Subject to business cases, prioritise and fund digital technology initiatives identified in the *WA Health Digital Strategy 2020-2030* to leverage advances in technology.	2027-2032	DoH		✓	✓		✓		✓	✓	✓	✓
77. Enable infrastructure across the built environment to play a stronger role in addressing the wider determinants of health by:												
a. Aligning government strategic planning and infrastructure proposals to the *State Public Health Plan for Western Australia* and reporting on progress against objectives.	2027-2032	DoH, DPLH, Treasury			✓		✓	✓	✓		✓	✓
b. Requiring public health assessments to be completed for significant strategic planning, infrastructure, land use planning and development proposals that are assessed as presenting a high public health risk, through updates to the Strategic Asset Management Framework SAP and Business Case guidelines (for projects and programs with a capital cost of $100 million or more).	2027-2032	DoH, DPLH, Treasury, EPA, DLGC			✓		✓	✓	✓		✓	✓
78. Increase action to reduce Aboriginal health inequity and inequality across the State by:												
a. Supporting and funding the development of community-based primary care and allied services hubs.	2027-2032	DoH		✓	✓		✓					
b. Providing health facilities in Aboriginal communities that are fit for purpose and have access to high-quality connectivity.	2027-2032	DoH		✓	✓		✓					
79. Subject to business cases, co-invest in common use health and medical life sciences facilities by:												
a. Providing a overarching strategy to guide development of the health and medical life sciences sector and provide market clarity on potential investment priorities.	2022-2027	DJTSI	✓				✓	✓				✓
b. Using the Future Health Research and Investment Fund - and through collaboration with the Federal Government, academia and the private sector - to co-fund feasibility studies for common use facilities and support the development of viable facilities, under appropriate governance structures and operational models.	2027-2032	DJTSI, DoH	✓				✓	✓				

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			1	2	3	4	5	6	7	8	9	10
Education and training												
80. Improve school infrastructure planning and delivery to meet future needs by:												
a. Reviewing data formats, sources, accessibility and assumptions to ensure they are timely and functional for planning for school demand.	2022-2027	DoE, WAPC, DPLH			✓		✓		✓		✓	✓
b. Implementing new modelling methodologies, tools, software and systems that can be used to provide projections that are more responsive to change.	2022-2027	DoE			✓		✓		✓	✓	✓	✓
c. Planning for and using transportable buildings only as a temporary demand solution, and not where growth is expected to continue.	2027-2032	DoE			✓		✓		✓			✓
d. Implementing collocation and shared-use with child care, health and community support services where possible, particularly in areas of disadvantage.	2027-2032	DoE		✓	✓		✓	✓			✓	✓
e. Enabling the use of medium to high-rise public vertical schools in appropriate locations.	2022-2027	DoE			✓		✓		✓			✓
f. Consistent with Recommendation 40a, allocating budget to undertake asset management planning to enable older school assets to be upgraded to ensure they are functionally fit for purpose.	2027-2032	DoE			✓		✓	✓				✓
81. Plan for future skills and training and fund relevant equipment, by:												
a. Including the Department of Training and Workforce Development and relevant TAFEs, when strategies or plans are developed for a new or existing industry sector.	2022-2027	DTWD	✓		✓			✓			✓	
b. Updating the Strategic Asset Management Framework SAP and Business Case guidelines to require projects and programs with a capital cost of $100 million or more, to consider the need for, and/or availability of, skills and training, while ensuring State agencies and GTEs appropriately engage with the Department of Training and Workforce Development.	2022-2027	Treasury, IWA	✓		✓			✓			✓	
c. Establishing a dedicated funding program for TAFE training equipment and software, and expanding industry co-contributions where relevant.	2027-2032	Treasury	✓		✓				✓	✓	✓	
Arts, culture, sport and recreation												
82. Develop and publish a ten-year+ State culture and arts strategy.	2022-2027	DLGSCI	✓	✓	✓		✓	✓	✓			
83. Increase investment in existing and new arts, culture, sport and recreation infrastructure state-wide to ensure they are fit for purpose, including investment in the following projects:												
a. Continuing planning and developing a business case to deliver a flagship Western Australian Aboriginal Cultural Centre in Perth.	2027-2032	DPC	✓	✓	✓		✓					

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b. Planning and developing a business case to improve the capacity and quality of convention and exhibition facilities in the Perth CBD.	2027-2032	DPLH	✓				✓	✓				
c. Completing planning to redevelop the Perth Convention Precinct.	2027-2032	DPLH	✓				✓	✓				✓
d. Continuing ongoing planning and developing a business case for the redevelopment of the Perth Cultural Centre.	2027-2032	DLGSCI	✓				✓	✓				✓
84. Develop and publish a ten-year+ State tourism strategy.	2022-2027	DJTSI (Tourism WA)	✓	✓	✓		✓	✓				
85. Tourism infrastructure destination planning and activation should be achieved through increased investment in the four 'jewels in the crown' of WA's tourism offering, and be informed by Destination Management Plans and business cases.	2027-2032	DJTSI (Tourism WA)	✓	✓		✓	✓	✓				✓
Justice and public safety												
86. Establish and implement cross-agency stretch targets that address growth in demand for police, courts, corrective services, and associated infrastructure through prevention, early intervention and rehabilitation, and report progress against these targets publicly each year.	2022-2027	DPC, DoJ, WAPOL			✓			✓	✓			
87. Improve infrastructure planning focussed on the interdependencies of police, courts and correctional facilities, through updated Strategic Asset Plans that include:												
a. Pursuing future collocation opportunities with other government agencies and non-government providers for potential precincts.	2022-2027	DoJ, WAPOL			✓			✓	✓			✓
b. Improving alignment and cooperation between the Department of Justice and WA Police Force in managing existing shared assets.	2022-2027	DoJ, WAPOL		✓	✓			✓	✓			✓
c. Updating and maintaining the Long Term Custodial Infrastructure Plan.	2022-2027	DoJ						✓	✓			✓
d. Progressing long-term infrastructure planning for courts and police facilities.	2022-2027	DoJ, WAPOL						✓	✓			✓
88. Pursue further investigation and planning for potential long-term projects; and invest in new justice and public safety major infrastructure, subject to business cases, for the:	2027-2032	DoJ, WAPOL			✓			✓	✓			✓
a. Broome Regional Prison.	2022-2027	DoJ			✓		✓		✓			
b. WA Emergency Management Training Centre.	2027-2032	DFES				✓		✓	✓			
c. Government Radio Network.	2027-2032	WAPOL					✓	✓	✓	✓		

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Glossary and acronyms

Term	Definition
Aboriginal Aboriginal and Torres Strait Islander	Within Western Australia, the term Aboriginal is used in preference to Aboriginal and Torres Strait Islander, in recognition that Aboriginal people are the original inhabitants of Western Australia. Aboriginal and Torres Strait Islander may be referred to 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 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.
Automation	The use or introduction of automatic equipment in a manufacturing or other process or facility.
Artificial intelligence	Technology that can perform tasks defined by humans without needing explicit guidance.
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 when natural gas is split into hydrogen and CO_2 either by steam methane reforming or auto thermal reforming, but the CO_2 is captured and then 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.
Build-to-rent (alternative housing model)	Developers finance and construct housing, usually apartments, and rather than selling off individual units, they are retained and rented 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-operative housing (alternative housing model)	Property is owned by an organisation or corporation, which is often, but not always a not for profit, and then sold as shares to members of the co-operative. The costs of housing amenities are shared. This model is often used as a part of an intentional community initiative.
Curtailment	A reduction in the output of an energy generator from what it could otherwise produce given available resources.
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.
Desalination	The process of removing salt and impurities from seawater to produce fresh water.

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Term	Definition
Digital connectivity	Access to fast and reliable internet connection (fixed or mobile) which enables users to benefit from smart and digital services.
Digital divide	The gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies and to their use of the internet for a wide variety of activities.
Digital-first	A philosophy that approaches any new opportunity, or problem, with the assumption that delivery should focus on a digital solution over a conventional method or approach.
Green hydrogen	Hydrogen 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 which 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.
Indigenous	Only used if referencing other bodies of work that use the term 'Indigenous'. Refer 'Aboriginal' and 'Aboriginal and Torres Strait Islander' glossary terms for further detail.
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.
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 towards further social and criminal justice improvements.
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.
Net zero emissions	Achieving a neutral balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere.
Nightingale Housing (alternative housing model)	Development of environmentally, socially and financially sustainable strata titled apartments, with pre-registered households who wish to purchase and occupy the dwellings (they are not sold to investors). Housing is provided at cost, and caveats on titles are used to ensure savings are passed on to future owners.
Peri-urban	An area that surrounds a metropolitan area or city that is neither urban nor rural in the conventional sense.
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.

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Term	Definition
Public private partnership	A collaboration between government and a private-sector company that can be used to finance common infrastructure projects such as public transportation networks, parks, and convention centres.
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.
Scenario planning	A strategic planning method for envisaging and testing what the future might hold for an organisation, industrial sector, society, economy or the State and attempts to identify the major drivers that are likely to shape our future and gauge the impact these will have.
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 government agencies' 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 entities' activities. For example, in the case of the transport infrastructure 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 Road WA roads.
Smart infrastructure	Infrastructure that uses technology and data to optimise performance, increase capacity and achieve a greater return on investment.
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 for the purpose of providing telemedicine, medical education, and health education, often but not limited to, the provision of these services over distances or into remote areas.
Urban consolidation	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, contributed by human and energy activity, also through reduced tree canopy cover.
Waitlist – Priority	The list of public housing applicants eligible for priority housing assistance (ahead of the wait-turn waitlist) due to urgent need, such as family domestic violence, to reunite a child with a family, or homelessness.
Waitlist – Wait-turn	The general waitlist for public housing, where applicants wait their turn to be offered accommodation.

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Acronyms

ACSR	Arts, culture, sport and recreation (IWA infrastructure sector)
AIP	Asset investment program
CBD	Central business district
CHO	Community Housing Organisation
ESG	Environmental, Sustainable and Governance
GROH	Government Regional Officer Housing
GTE	Government Trading Enterprise
GTO	Group Training Organisation
ICT	Information and communications technology
IWA	Infrastructure WA
LNG	Liquefied natural gas
NSW	New South Wales
NWIS	North West Interconnected System
RfR	Royalties for Regions
SAMF	Strategic Asset Management Framework
SAP	Strategic Asset Plan
SIP	State Infrastructure Program
SHR	Sustainable Health Review
SWIS	South West Interconnected System
TAFE	Technical and Further Education
WA	Western Australia
WEM	Wholesale Electricity Market
WOSP	Whole of System Plan

Acronyms and abbreviations for WA State Government entities

DBCA	Department of Biodiversity, Conservation and Attractions
DoC	Department of Communities
DoE	Department of Education
DoF	Department of Finance
DFES	Department of Fire and Emergency Services
DoH	Department of Health
DJTSI	Department of Jobs, Tourism, Science and Innovation
DoJ	Department of Justice
DLGSCI	Department of Local Government, Sport and Cultural Industries
DMIRS	Department of Mines, Industry Regulation and Safety
DPLH	Department of Planning, Lands and Heritage
DPIRD	Department of Primary Industries and Regional Development
DPC	Department of the Premier and Cabinet
DTWD	Department of Training and Workforce Development
DoT	Department of Transport
DWER	Department of Water and Environmental Regulation
DWA	Development WA
Energy GTEs	Comprises Horizon Power, Synergy and Western Power
EPWA	Energy Policy WA
FPA	Fremantle Port Authority
KPA	Kimberley Ports Authority
MHC	Mental Health Commission
MRWA	Main Roads Western Australia
PPA	Pilbara Ports Authority
PSC	Public Sector Commission
PTA	Public Transport Authority
SWDC	South West Development Commission
Transport Portfolio	Comprises the Department of Transport, Main Roads Western Australia and the Public Transport Authority
Treasury	Department of Treasury
Water Corp	Water Corporation
WAPC	Western Australian Planning Commission
WAPOL	Western Australia Police Force
WATC	Western Australian Treasury Corporation
Water GTEs	Comprises Aqwest, Busselton Water and the Water Corporation

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139	Traffic controller	Shutterstock
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144	Matagarup Bridge, Perth	Main Roads WA
148	Power lines	Stock image
153	Albany Wind Farm	Shutterstock
155	Solar panel farm	Shutterstock
156	Ellenbrook Powerbank	Western Power
160	Lake Argyle	Shutterstock
164	Perth Seawater Desalination Plant	Water Corporation
167	Alkimos Wastewater Treatment Plant	Water Corporation
170	Student drinking from water fountain	Water Corporation
172	Wheat drought	Stock image
173	Students and guide at Groundwater Replenishment Visitor Centre	Water Corporation
174	Regional Resource Recovery Centre	Southern Metropolitan Regional Council
175	Waste on beach	Waste Authority
176	Southern Metropolitan Regional Council Materials Recovery Facility	Southern Metropolitan Regional Council
178	Waste sorting	Southern Metropolitan Regional Council
180	Roads to Reuse	Waste Authority
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195	Electric vehicle charging station	Shutterstock
196	Iron ore train	Shutterstock
197	Fremantle Port	Fremantle Port Authority
198	Australian Marine Complex	Department of Jobs, Tourism, Science and Innovation
199	Port Hedland	Shutterstock
200	Grain storage facility	Shutterstock
201	Perth Airport	Shutterstock
202	Suburban homes in Perth	Shutterstock
203	Family with dog outside house	Shutterstock
205	Microlots Ellenbrook	Department of Communities
207	Adara, Success	Department of Communities
209	Residential street	Department of Planning, Lands and Heritage
210	Aerial view of Broome	Shutterstock
213	Family outside house	Shutterstock
214	Child with a bicycle on a bridge	Shutterstock
215	Aboriginal short stay housing	Department of Communities
216	Karratha Health Campus	WA Country Health Service
217	Paediatrician	Department of Health
218	Electronic medical record	Shutterstock
220	Aboriginal worker	Department of Health
223	Fiona Stanley Hospital	South Metropolitan Health Service
224	Doctor with patient	Stock image
226	Geraldton Step Up Step Down facility	Mental Health Commission

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227	Telehealth consultation	Shutterstock
228	Child medical consultation	Shutterstock
230	University of Western Australia	Jarrad Seng
233	Student working with microscope at university	Shutterstock
234	School	Department of Education
235	Winthrop Hall, University of Western Australia	Shutterstock
236	Classroom	Department of Education
239	Apprentice with drill	Shutterstock
240	Yagan Square	Shutterstock
241	Quokka and tourist, Rottnest Island	Shutterstock
242	Optus Stadium	Shutterstock
244	WA Museum Boola Bardip	Shutterstock
246	Perth Cultural Centre	Development WA
247	Cape Naturaliste	Shutterstock
249	Busselton Jetty	Shutterstock
250	Supreme Court of WA	Shutterstock
253	Melaleuca staff swearing in	Department of Justice
255	Unit at Greenough Prison	Department of Justice
256	Banksia Hill Detention Centre	Department of Justice
257	Bandyup Women's Prison	Department of Justice
258	Greenhouse at Pardelup Prison Farm	Department of Justice
259	Firefighters	Department of Fire and Emergency Services
260	Perth city skyline	Adobe Stock image
297	Stirling Gardens, Perth	City of Perth
299	Coastal café, Prevelly	Shutterstock
300	Hot-air balloons, Esperance	Shutterstock
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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.

The following pages provide further detail on the global megatrends and six opportunity areas identified by IWA, that underpin the Strategy vision.

Global megatrends – disruption and the impetus for change

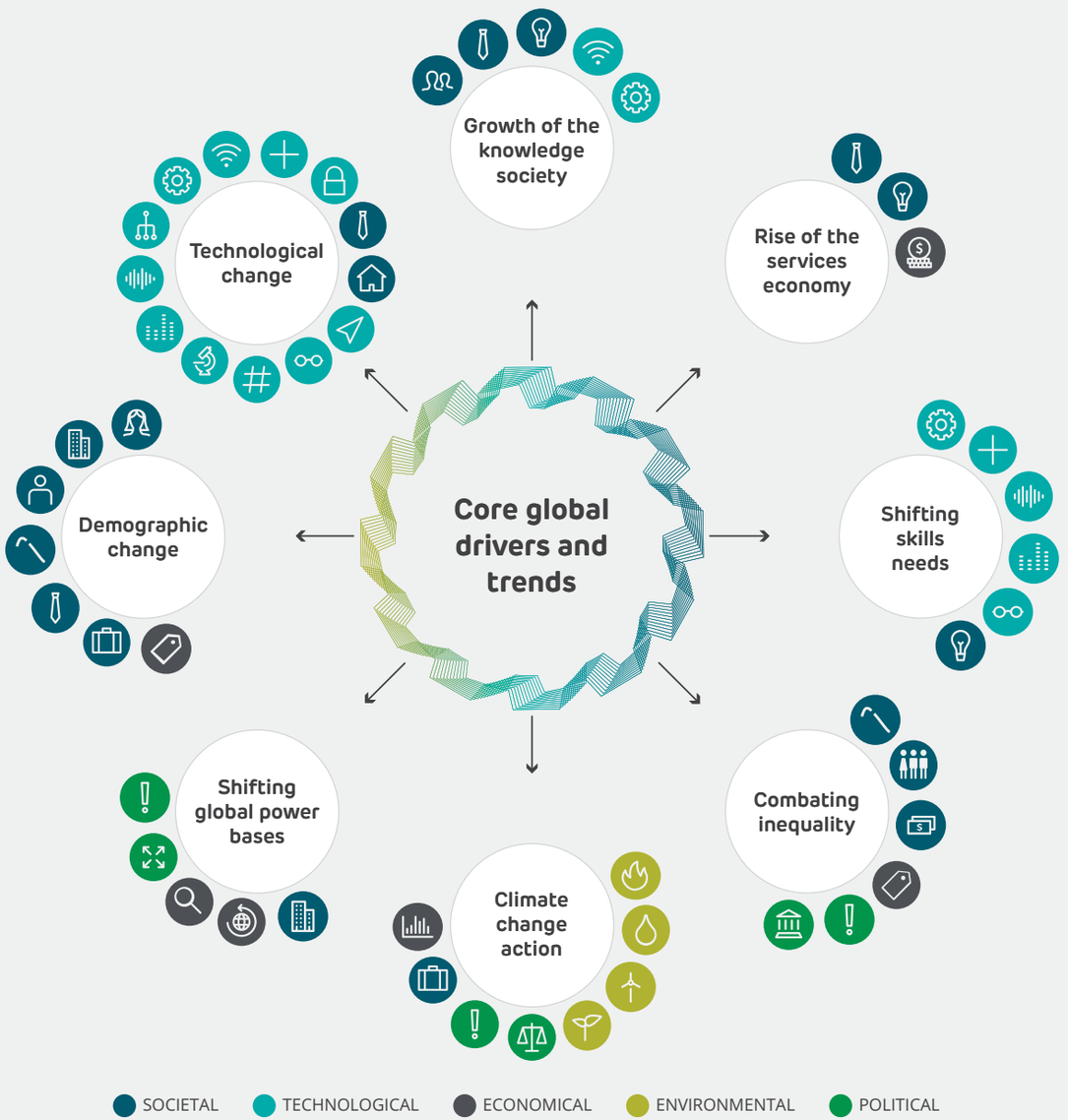
WA's society, economy and environment are part of an interconnected national and global economy. Thirty-nine identified trends have been summarised into eight overarching global megatrends that will shape infrastructure demand and the vision for WA (Figure 1). These megatrends are:

- **Demographic change:** By 2040, the United Nations predicts that almost 20 per cent of the world's population will be older than 60. The world is also getting richer, with nine out of ten of the next billion new middle-class consumers expected to reside in Asia.[1] Developing economies are driving the rise in global middle classes and demand for higher quality goods and services such as clean food and tourism.[2]
- **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.



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Figure 1: Global megatrends and drivers of change





Source: Deloitte

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- **Growth of the knowledge society:** Intellectual property and human capital is highly prized, more so than land, labour or financial assets, bringing with it significant implications for the way we create and capture value. An estimated 86 per cent of jobs created in Australia in the next decade are likely to be knowledge worker jobs.[3]
- **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 both cognitive and interpersonal skills, with a premium on fields including technology, cybersecurity and artificial intelligence. The workforce will need to reskill with increasing value on digital literacy, and interpersonal and cognitive skills becoming 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. 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 a geopolitical competition has the potential to increase volatility.



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 which will see greater economic diversification will be important in shaping how WA performs economically in the next two decades. Against this backdrop, IWA has identified six 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.

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A global location of choice

WA can take advantage of its liveability, stable governance, and strong economic outlook to position it 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.[4] With the global shift toward 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-focussed 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 in close proximity 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 clean foods and tourism. Over the last ten years, WA has significantly grown the value of non-mining merchandise to Association of Southeast Asian Nations countries and China, and has built a brand as a provider of clean and premium food exports.[5]

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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 State's infrastructure that brings produce to emerging markets and that supports efficient supply chains is seen as a priority.

International and domestic tourism

Perth as the metropolitan centre of the State and the entry hub for tourists has been identified as one of four 'jewels in the crown' of WA tourism. The other three 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 access, signage and information.

Agriculture and food

Areas with availability of 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 availability of agricultural land and water to expand agricultural and processing activities. WA also has growing trade surpluses in crustaceans 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 per cent of the market. To grow this market, WA will need to develop its tertiary education sector to be able to offer safe study environments delivering 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 inhabitants and custodians of WA, and the State bears evidence of Aboriginal occupation dating back to at least 50,000 years.[6] Around 39 per cent of Aboriginal people live in the Perth metropolitan region[7], while the remainder are dispersed throughout the State. The 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, 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 with 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 which 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.

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Regional WA has strong 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 and Petroleum Engineering and Technical Services, 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 start-up 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 investment 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 has 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 their export footprint through increasing productivity in high-value products. And emerging advancements in lithium battery technology align well to the opportunity to process more of WA's raw materials in future and consider their applications in industry. Areas supporting supply chains for mineral and agricultural commodities, that can provide access to cheap and reliable power, industrial land, and export infrastructure, will be in a position to take advantage of these opportunities.

End notes

1 Brookings Institute (Sep 2018) *A global tipping point: Half the world is now middle class or wealthier*

2 Deloitte Access Economics (2020) State Infrastructure Strategy Scenario Planning

3 Deloitte Touche Tohmatsu (2019) Building the Lucky Country #7, *The path to prosperity: Why the future of work is human*

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6 Veth P, Ditchfield K, Bateman M, Ouzman S, Benoit M, Motta AP, Lewis D, Harper S, Balanggarra Aboriginal Corporation (May 2019) *Minjiwarra: archaeological evidence of human occupation of Australia's northern Kimberley by 50,000 BP*

7 Australian Bureau of Statistics (May 2019) 2071.0 - Census of Population and Housing: Reflecting Australia - Stories from the Census, 2016, Aboriginal and Torres Strait Islander Population – Western Australia

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