
Design the investment program to endure

11

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Strategic directions

- ▶ Reconsider megaprojects and invest in existing infrastructure through augmentation, digitisation and maintenance
 - ▶ Diversify funding sources to deliver future investments
 - ▶ Ensure the construction market has the capacity, capability and productivity to meet increasing demands
 - ▶ Consolidate a robust process for investment prioritisation, project sequencing and investment appraisal
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Future demands on the NSW Government budget will continue to be significant. Many important new projects remain to be funded and investment in the maintenance of existing assets is set to increase. To build an enduring infrastructure investment program, the 2022 SIS recommends tipping the balance of spending towards technology upgrades, augmentation of existing assets and networks, and structured maintenance as the NSW asset base matures.

Many investments have been enabled by funding from asset recycling during the past 10 years.³⁶¹ Investments in critical assets such as transport, schools and hospitals have delivered better services for communities across the State. However, apart from the most recent sale of WestConnex, the proceeds from past asset recycling have now largely been allocated. The NSW Government should continue to pursue opportunities for recycling mature State-owned assets to fund new infrastructure investment.

However, new funding sources will be needed to both service future investment and maintain the growing asset base in NSW.

Over the long term, investment in infrastructure is projected to return to a steadier growth trajectory. The NSW Treasury Intergenerational Report (IGR) projected that General Government capital expenditure as a share of Gross State Product (GSP) will fall gradually from 2.6% in 2018-19 to 1.8% by 2060-61,³⁶² bringing it more in line with other OECD countries.

The IGR also found that, unless corrective measures are taken, the NSW Government faces a rising fiscal gap in coming decades.³⁶³ This is partly due to the projected increase in maintenance costs, reflecting the marked growth in the NSW asset base and ageing of the existing asset base.

Accordingly, future infrastructure investments should be planned with consideration to:

- ▶ boosting economic productivity leading to an expanded tax base
- ▶ getting the greatest value for citizens from public investment through effective management and use of existing assets
- ▶ avoiding the concurrent delivery of large numbers of megaprojects that stretch capacity to deliver
- ▶ making sound investment decisions that deliver the best service outcomes
- ▶ finding new long-term funding sources, through taxation reform, user and beneficiary contributions, better arrangements with the Australian Government, and generating additional commercial revenues from government assets
- ▶ enabling private sector investment in assets and services, where the sector is well positioned to do so.

11.1 The forward investment program should be carefully planned

The NSW infrastructure program is large by any modern standard. It includes several projects that are themselves rightly described as ‘megaprojects’ and a large number of mid-sized projects and programs.

Delivering an ambitious and complex infrastructure program presented many challenges

The acceleration of the NSW Government’s infrastructure program over the past decade, combined with the unprecedented size and complexity of projects, has presented significant delivery challenges. The largest infrastructure projects in the 2000s, such as the \$1.1 billion Lane Cove Tunnel, now appear small relative to current projects. There are several \$10 billion or more projects underway in NSW, such as Sydney Metro City & Southwest, Sydney Metro West and WestConnex.

The 2018 SIS flagged concerns about the capacity and capability of both the public and private sectors to continue to deliver these investments. Similar concerns were also raised by Infrastructure Australia in its 2019 Audit. Lack of capacity has been exacerbated by declining productivity and low innovation in the construction sector, which are affecting cost, quality and profitability in the sector. These concerns have already led to

significant variations in budgets and delivery timelines on several major projects.

The recent experience with some NSW projects is like that in other jurisdictions. There is much evidence assembled by industry and academic experts of significant delays and cost variances on megaprojects, indicating that this is the norm, rather than the exception. Lessons have been learned from the many successfully delivered projects, as well as those projects that have experienced time delays and cost overruns.

Significant reforms to drive more effective and efficient project delivery and better asset management

The NSW Government has implemented reforms to drive faster project delivery and better value for money. For example, reforms in NSW planning processes for major projects have led to a significant reduction in average processing times: from 298 days in 2014 to 163 days in 2016-17 to 130 days in 2020-21. Processing time is a key concern for industry and a driver of cost.

Since the publication of the 2018 SIS, several important initiatives have been progressed:

- ▶ **Ten Point Commitment to the Construction Industry:** now well established and subject to periodic reports on its implementation, as recommended by the 2018 SIS
- ▶ **The NSW Government Major Infrastructure Projects Pipeline:** routinely updated

- ▶ **Bid Cost Contributions Policy:** published, implemented and regularly updated as required
- ▶ **The Oversight Framework:** a framework to ensure effective management of High Priority High Risk Projects
- ▶ **Timely Information on Infrastructure Projects:** addresses one of the common problems of projects that experience stress: premature determination and announcement of program and budget
- ▶ **The Infrastructure Skills Legacy Program (ISLP):** the program aims to boost the number of skilled construction workers and create pathways to employment across the State
- ▶ **Female and Youth Workforce Participation:** actions for a more inclusive culture across the construction sector and to encourage greater participation by women and young people
- ▶ **Procurement for Large, Complex Infrastructure Projects:** procurement practices to support the successful delivery of megaprojects
- ▶ **Commercial Principles for Construction:** during the construction shutdown in July 2021 arising from the outbreak of COVID-19, commercial principles were developed and released to minimise long-term impact on projects and the industry. They have been developed further since then to address barriers to competition and participation

▶ **Asset Management Policy and Assurance**

Framework: aims to realise value from the State's asset portfolio and better identify investments that meet the needs of NSW communities.

Although some reforms are relatively recent, others are already improving project delivery outcomes, with further positive impacts expected. The test of the reforms will come with projects that are yet to be procured, and more reforms are required.

Delivery of megaprojects should be sequenced to match industry capability

Megaprojects are bespoke in design and complexity. They are often brownfield projects that disrupt communities, require extensive property acquisition, are often overlaid on centuries (if not millennia) of settlement and intersect with existing critical operating assets. In some cases, they can only be delivered by a limited pool of contractors and place especially high demand on limited skilled engineering and project management resources. These projects can be transformational for cities and regions, but they are also higher in risk.

NSW has successfully delivered many such projects over the past decade and there are more nearing completion. Others are only now commencing. The NSW forward pipeline includes some complex megaprojects that have not yet reached the stages of final business case, investment decision or main-works procurement.

It is good practice for the NSW Government to regularly consider the rate and sequence at which these projects should proceed – even where timeframes have already been announced or projects are proceeding with investigation and 'no-regrets' early works, business case development and even planning consents.

Some megaprojects in the NSW pipeline are likely to face significant delivery challenges in the near to medium term as they proceed alongside other megaprojects already in delivery or procurement. This was already the case prior to the impact of COVID-19 outbreaks in 2021. The situation has now been exacerbated by shortages in specialised technical, design and project management professionals, as well as supply chain backlogs and unpredictable interruptions. The projects most vulnerable to those impacts have common features:

- ▶ large scale and complex in delivery
- ▶ a limited field of contractors with technical and financial capability/appetite
- ▶ higher than average demand on specialist engineering investigation and design
- ▶ highly reliant on large or bespoke orders from international supply chains.

Several projects in the pre-procurement stage exhibit these features – Beaches Link, the M6 Motorway Stage 2, Parramatta Light Rail Stage 2, the central tunnel for the Great Western Highway-Katoomba to Lithgow upgrade, further stages of the Sydney Metro or rail projects (Sydney CBD to

Zetland, Western Sydney International Airport to Leppington or Campbelltown) and regional major dam projects (New Dungowan, Wyangala). The NSW Government should reconsider the urgency of these projects. Projects that proceed should be sequenced and commence procurement only when other existing megaprojects are stable and in mature delivery.

That rate at which these (and other) projects can proceed in the future will depend upon the effective delivery of existing projects, as well as the successful implementation of practices that enable large, complex projects to de-risk, reduce the costs of participation and increase the State's ability to draw on the resources of tier 2 and tier 3 contractors, as well as new entrants to the contractor market.

In general, the questions that should be asked of these megaprojects are:

- ▶ Is the project ready to proceed to the next stage or would it benefit from further time in planning and development?
- ▶ In the overall portfolio of upcoming investments, is the project the most valuable to the public?
- ▶ Do other projects already in delivery or procurement create resourcing pressures that mean deferral of the project is warranted to minimise risks and achieve value for money?

In this 2022 SIS, Infrastructure NSW has recommended that Warragamba Dam Wall Raising should proceed (see Chapter 5 for more). This is a megaproject but it has been the subject of extensive options analysis and business case development, has undergone early contractor engagement to develop design solutions and cost estimates, is part-way through the planning determination process and, most importantly, addresses a pressing and severe flood risk in the Hawkesbury Nepean Valley. For other megaprojects, Infrastructure NSW recommends that their timing and priority be reconsidered but that long-term options planning and corridor preservation continue.

Many valuable projects and programs can be delivered with current State and industry capability

All parts of the Australian economy are experiencing supply constraints. Even without these constraints, industry and public sector capability is greatest for projects that are less complex, incremental in nature and of a scale capable of being delivered by many players in the market. Within the construction sector, this can mean different tiers of the market (including smaller local firms), while technology projects often draw from a completely different pool of firms and resources. Fortunately, these projects often have high payoffs to the community, as they can address longstanding bottlenecks and points

of failure, modernise ageing and outdated assets or make phased additions to existing groups of assets to respond to gradual growth in demand.

This is the ‘bread and butter’ of most infrastructure agencies. Individually, these projects are less transformative than megaprojects, but they are almost always required to create optimal value from major new assets in a network. For example, major motorways require network integration works on feeder roads, and the Sydney Metro City and Southwest project is supported by the More Trains More Services program. These projects often go hand-in-hand with sound asset management approaches.

11.2 High service standards require investment in existing assets

Meeting the expectations of citizens and NSW businesses requires a sharper focus on the reliability, safety and functionality of public assets.

To reverse historic underinvestment, the past decade saw a step change in the scale of the State’s infrastructure asset base. This work is not complete, with several major projects in procurement or development. With a large and growing asset base, value from public expenditure is more likely to be found by rebalancing from new greenfield assets to asset augmentations.

Augmentation of existing assets includes measures such as technology upgrades, additions to existing networks and adaptations to improve reliability, safety, functionality, capacity and resilience. To help shift the focus to value-adding investment in existing assets, the NSW Government introduced the Asset Management Policy for the NSW Public Sector in 2019 (see Box 11.1).

Box 11.1

NSW Government Asset Management Policy

The NSW Asset Management Policy supports high-quality service provision to NSW communities through:

- ▶ increasing asset management capability
- ▶ improving asset use and resilience
- ▶ strengthening financial sustainability
- ▶ targeting effective investments in existing assets.

NSW Government agencies are working to increase their capacity to achieve these outcomes. This will optimise the benefits from existing and new assets through better use of technology and data, driving asset adaptability and the adoption of predictive whole-of-life cycle approaches to maintenance.

The need to shift the focus of investment to asset augmentation and management has been experienced by other jurisdictions following significant new infrastructure investments. In 2021, infrastructure maintenance was included among the G20's top priorities. The G20 Policy Agenda on Infrastructure Maintenance says a shift in perspective in asset management is critical to achieving long-term economic and community benefits.³⁶⁴

Well-maintained infrastructure is key to reliable service and asset resilience

Effective asset management is critical to ensure that services continue to be delivered during disruptive events and, when interrupted, promptly restored. This requires infrastructure to be built, adapted and maintained to be resilient to shocks and stresses.

Resilience in asset management requires awareness of demand patterns, interdependencies between systems, potential exposure to hazards, an understanding of the condition of existing assets and the standards necessary for effective adaptation.

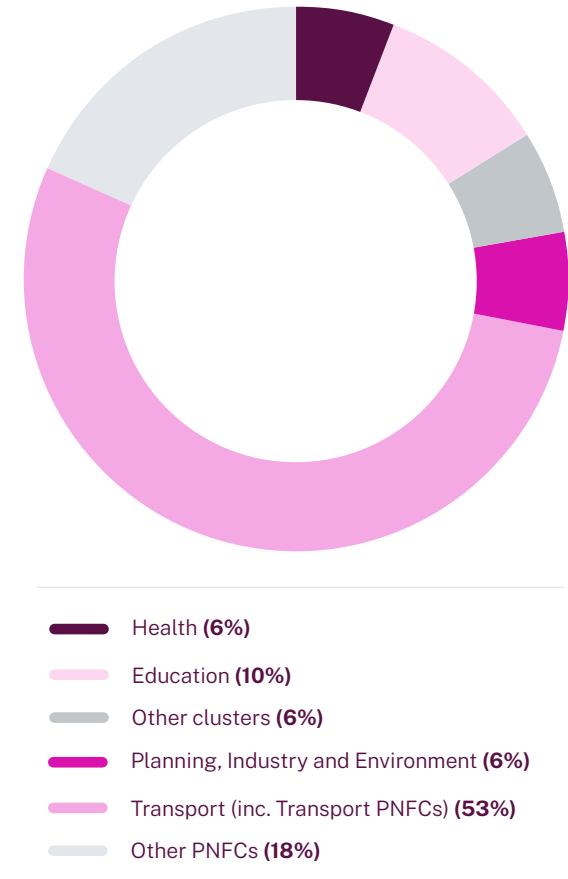
The NSW Asset Management Policy requires that agencies undertake an assessment of resilience and vulnerability to climate change, natural disasters and human-related threats and develop proposed mitigations. Such assessments should be incorporated in the Asset Management Policy's assurance process, as outlined in Chapter 5.

Optimising expenditure on maintenance and renewals

Making the most of existing assets means knowing how to maximise their useful life. This can be achieved through maintenance activities designed to preserve an asset's utility and value, or through more extensive interventions that adapt the asset to changing service needs.

Government agencies use a variety of methods to assess maintenance priorities and renewal opportunities. This creates challenges in directing expenditure for maximum impact. Best value for money will be achieved by applying a consistent approach to prioritising maintenance and investment in existing assets. This will enable the Government to evaluate competing demand on funds and provide a better understanding of the proportional investment needed across sectors, which varies greatly in terms of asset portfolio value, as shown in Figure 11.1.

Figure 11.1 - Asset portfolio value by cluster (as at 30 June 2021)



Source: NSW Treasury, based on revised 2020-21 data as per the 2021-22 Budget

Digital technology can enhance asset management capability

Digital technology offers opportunities to inject smarter, predictive approaches to asset maintenance that can improve efficiency, utilisation, reliability and safety.

Digital technology applications for infrastructure can generate real-time data to inform asset management decisions. Remote site monitoring using cameras and sensors is already possible using existing technology, and widely deployed in some areas. The rich data collection and analysis can inform operators about asset condition in ways that were previously not possible. Maintenance and renewals can be better planned to minimise costly service disruptions to customers and reduce safety incidents.

The private sector should be leveraged in addressing infrastructure maintenance needs

The combined maintenance needs from the existing asset base and from new infrastructure will have a significant impact on current and future State Budgets. To ensure value for money, the NSW Government should consider:

- ▶ **leveraging the benefits of private sector innovation** to maintain State assets, such as capitalising on systems that are already available for real-time, remote monitoring of asset condition (see Box 11.2 for examples)

- ▶ **achieving efficiencies** through longer-term, outcomes-focused asset maintenance contracts that adopt whole-of-life preventative and predictive maintenance approaches
- ▶ **improving the visibility of major maintenance and asset renewal programs** on a forward infrastructure pipeline to increase contestability and competitiveness. For example, New Zealand's Infrastructure Commission includes projects for major upgrades on its infrastructure pipeline,³⁶⁵ and the UK publishes 5-year investment and maintenance plans for rail and roads.

Alongside a transparent and visible pipeline of major maintenance and asset renewal plans, innovative contracting approaches will also give the private sector confidence to invest in people, processes and technologies.

Box 11.2

Examples of successfully leveraging private sector experience in maintenance contracts

Newcastle Transport

Newcastle Transport is an integrated transport provider running buses, ferries, light rail and the multi-modal Newcastle Interchange. It is operated by a service provider (Keolis Downer) through a 10-year contract with the NSW Government. The contract includes minimum service standards and Key Performance Indicators (KPIs), including financial incentives to grow patronage, giving Keolis Downer a strong incentive to improve customer service and deliver transport services locals want.

Achieving these results involves Keolis Downer making improvements to the long-term management of assets to ensure safety and reliability, and driving down maintenance costs while achieving zero or negligible maintenance backlogs.

The New Schools Privately Financed Project

The NSW Department of Education and Training established two major Public Private Partnerships (PPP) contracts to provide schools in new urban release areas. The contracts required the private sector to finance, design and construct the schools and provide cleaning, maintenance, security, safety, utility, furniture, equipment and grounds maintenance and other services until the end of the contract when these school buildings will be handed over to the NSW Government.

A performance audit of the New Schools Privately Financed Project found that the contracts were established and let in a way that greatly assisted their potential for delivering value for money.³⁶⁶ Schools were delivered earlier, and maintenance services were provided to a level higher than specified.

Department of Communities and Justice Infrastructure Support Services Contract

DCJ's Infrastructure Support Services Contract is an innovative and collaborative contract that specifies minimum outcomes to be achieved by the service provider for a broad range of services. The contract aligns with the Asset Management Policy as it requires the development of whole-of-lifecycle asset planning systems that achieve environmental and financial sustainability, and the development of data-driven, evidence-based maintenance programs.

The contract is also aligned to the department's objectives to reduce recidivism, increase participation of Aboriginal people, use Disability Enterprises and engage with regional and small-medium enterprises within a 125km radius of assets.

11.3 Infrastructure funding approaches need to broaden

Most public infrastructure is funded through general NSW Government taxation revenue, including GST transfers. Regardless of the efficiency gains from better asset management, achieving better customer outcomes means that additional funding will be needed for new assets, asset augmentation and maintenance. Pressures on future NSW Budgets will remain high.

More sustained co-funding arrangements with the Australian Government are required

A significant funding source for State projects is direct contributions from the Australian Government. This means that building an enduring future investment program will require the NSW Government to continue to work effectively with the Australian Government.

It is common for project budgets, funding commitments and completion dates to be announced very early in the lifecycle of a project. These estimates are often premature, particularly for large, complex engineering projects. While the NSW Government has taken steps to alleviate this issue,³⁶⁷ Australian Government practice has not kept pace. This increases risk to NSW projects and can compromise investment programs.

NSW is changing its procurement of large, complex projects to include more recognition that some risks cannot be reliably quantified prior to commencement of construction. As part of this approach, steps are taken to de-risk projects, to the extent possible, prior to main works and to identify risks that may require risk sharing mechanisms. This approach is supported by the Australian Government and co-funding arrangements should reflect the fact that final outturn costs (the actual total costs of construction) are less certain. Greater sharing of cost risk between the NSW Government and the Australian Government may also imply greater involvement from the Australian Government across the project development stages and in associated decision making.

User and beneficiary contributions should become broader and more dynamic

Apart from NSW and the Australian Government directly funding projects, user contributions have been a common feature in infrastructure. The telecommunications and utilities sectors, for example, are mostly funded by users. However, this has been more challenging for other sectors, particularly transport and social infrastructure, which largely rely on public subsidies, with some partial contributions from landowners and developers in greenfield areas.

Infrastructure NSW advocated for pricing reform in the transport sector in the 2018 SIS. This acknowledged the inequity in current approaches to fixed use pricing (such as registration and stamp duty), as well as the important role pricing reform can play in improving accessibility and reducing congestion, carbon emissions, and air and noise pollution. In addition, pricing reform is a pathway to a more fiscally sustainable approach to the provision and maintenance of infrastructure and services.

More recently, the NSW Government has introduced reforms to its road charging strategy, which included providing stamp duty subsidies and introduction of an alternative distance-based Road User Charge (RUC) from mid-2027 or when EVs make up 30% of all new car sales.³⁶⁸ This alternative form of revenue will contribute funding for the ongoing operation and maintenance of the road network.

This reform is a welcome development but should be considered as the first stage of a longer term and more holistic reform for the transport sector, as recommended in the 2018 SIS. Building on the existing EV road user charging reform, the NSW Government should consider the best approach to gradually replace the fixed RUCs with variable user charges.

In the longer term, pricing reform should also consider changes in public transport fares. Currently, there are no explicit links between the benefits to users from investment in the public transport network (such as increased capacity,

improved journey times and overall customer experience) and the cost of this investment.

While Transport for NSW continually pursues alternative approaches to contribute funds to the provision of infrastructure and services, transport farebox recovery is typically around 20% to 30% of the cost of services. This means the cost and burden of investment is shared across taxpayers, regardless of whether they use the infrastructure and services.

The immediate challenge is the safe return of passengers to the public transport network, post COVID-19. Reforms to public transport fares may not be an immediate priority but should be a consideration for the future, once demand returns to pre-COVID levels.

Public transport pricing reform should aim to better reflect the real cost of trips on the network, integrate with pricing reform in the road system and reflect the investments government is making to the network and the overall benefits users and society receive from the accessibility the public transport network provides.

In other sectors, there are often groups that benefit financially from new infrastructure, and opportunities for those groups to contribute over time should be explored. This is the case when new major public transport is delivered, as well as when land becomes more valuable through infrastructure that mitigates the impact of natural events.

Contributions from indirect beneficiaries of public infrastructure investment should also be considered. The NSW Government is currently implementing reforms to the infrastructure contributions system to address some of these challenges (see Box 11.3).

Box 11.3

Productivity Commissioner's Review of Infrastructure Contributions in NSW

The NSW Government recently accepted all 29 recommendations from the NSW Productivity Commissioner's Review of Infrastructure Contributions in NSW.³⁶⁹ The reforms are intended to provide a more simple, efficient and sustainable approach for infrastructure funding. The review recommended:

- ▶ introducing a broad, simple and relatively modest Regional Infrastructure Contributions (RICs) system in the Greater Sydney, Central Coast, Hunter and Illawarra-Shoalhaven regions. The RIC will support NSW Government priorities and commitments related to housing, jobs, investment and infrastructure delivery outlined in the strategic plans for each region
- ▶ adopting a direct land contribution that requires landowners who benefit from rising land values following a rezoning to contribute towards the provision of land for local infrastructure. This can improve the efficiency and certainty of funding for land acquisition
- ▶ amending the local government rate peg to reflect population growth to allow councils to maintain per capita rates revenue as their communities grow. The additional rates revenue raised will cover the increasing maintenance and operational costs of councils' expanding asset bases to service their growing communities.

The outcomes of the Productivity Commissioner's Review will support capital funding for State and local governments and ensure councils have enough recurrent funding to meet service needs. DPE have been tasked with implementing these reforms, along with NSW Treasury.

Where opportunities arise for specific contributions for projects with a discrete group of beneficiaries, these should be considered on a case-by-case basis.

Further opportunities to unlock commercial value from State-owned assets should be pursued

The NSW Government should explore further opportunities to unlock value from physical and digital assets. This can be through generating commercial revenues or further asset recycling where assets are commercially viable and there is no policy or strategic imperative to retain these assets in government ownership.

Several agencies have demonstrated success in unlocking commercial revenues (see Box 11.4). It should become a standard requirement for agencies to explore the optimal use of physical and digital assets for revenue generation and/or recycling, including land, buildings, natural assets, linear assets (such as rail and roads), fleet and data.

Box 11.4

Commercial revenue generation through the Western Sydney Parklands Trust³⁷⁰

The Western Sydney Parklands is the largest urban park in Australia and one of the largest in the world. The Western Sydney Parklands Trust is a NSW Government statutory authority that is tasked with expanding public access to the Parklands and securing a strong funding base for ongoing operations, maintenance and improvements.

The Parklands' Plan of Management includes a strategy to use 2% of the estate for business hubs to create a long-term income stream to manage the remainder of the Parklands.

11.4 Concerted effort and focused policies are required to harness private sector investment

The increased role of the private sector in infrastructure over recent decades demonstrates that there are many opportunities for private sector investors to deliver new infrastructure. Much private investment originated in purchasing already operational public assets, such as airports, seaports, motorways, telecommunications and energy. Those assets typically already had built facilities and established revenue streams.

There has been less appetite for greenfield investment. However, this may be changing as institutional investors compete to invest in scarce, long-lived infrastructure assets. WestConnex was sold as a project in development and is being completed by the new asset owners. Also, privately owned operators have increasingly taken development risk on new expansions and extensions of assets, confident in a stable and supportive regulatory environment and the potential for commercial returns.

The demand for infrastructure investment remains strong. The challenge typically lies in establishing the right balance between risk allocation and value for money. While this is an increasing area of focus for the NSW Government, a concerted effort is required to develop and embed policies that leverage increased private capital deployed to major infrastructure assets.

Defining the future role of government in infrastructure markets would provide increased private sector certainty

To attract private sector investment, clarity and consistency on the regulatory and operating environment is required. Some aspects of the role of government in infrastructure markets are well-established, such as the regulation of natural monopolies or the delivery of essential services. However, direct participation by government in previously privatised sectors, like energy and telecommunications, has increased uncertainty about its role in markets and the stability of the policy environment.

Sectors in transition, such as energy, sometimes require support to maintain ongoing investment. The same can be true in emerging industries where there is a clear public need but a limited commercial track record. There is a question of whether and to what extent the NSW Government should de-risk private sector investment where this aligns with its priorities. Where investment has been de-risked, a question also arises on the extent to which the NSW Government should share in returns earned by private operators invested in the market.

Defining the future role of government in infrastructure markets will be important to provide investors with certainty to participate in the delivery and operation of infrastructure assets and services.

Further partnership opportunities with the private sector need to be explored

The NSW Government should actively explore opportunities to partner with the private sector and to develop commercial models to fund infrastructure to deliver on its agenda. Some key approaches that could be explored include:

- ▶ **lease or sale of brownfields assets** with commercial revenues to traditional infrastructure investors, such as superannuation funds, that have shown a capacity to meet community expectations in long-term management of assets

- ▶ **complementary development of assets** that improve services and public benefit and offset the costs of public infrastructure. This includes co-development of private and social housing, development over train stations and the development of precincts, such as Barangaroo
- ▶ **development of infrastructure where there is a direct operating cost benefit to operators** and commensurate commercial opportunities, such as rail, ports and intermodal facilities that support the freight industry
- ▶ **consideration of packages of private investment to upgrade, augment and maintain public assets**, such as improving technology penetration and resilience hardening. This will require further development of commercial models underpinned by, for example, sharing in cost savings to taxpayers and/or improving services
- ▶ **active development of infrastructure assets in a manner suitable for PPP procurement** to facilitate increased engagement and innovation from the private sector and attract private financing. This should also consider more collaborative arrangements in PPPs, such as alliance models
- ▶ **increasing use of technology, digitisation of infrastructure and emerging data assets** to enable greater private sector participation and new commercial delivery models.

All approaches will require mature commercial models, the creation of structured opportunities for investors, and strong and clear arrangements for cyber security where digital assets are involved.

11.5 Evolving priorities need to be reflected in investment appraisal

The NSW Government's business case guidance and investment appraisal frameworks have been at the heart of disciplined infrastructure decision making. After strategic planning, developing a business case is a fundamental step in informed decision making that leads to efficient resource allocation outcomes. This includes the selection of effective intervention options (investment in physical infrastructure or otherwise) and the successful realisation of anticipated benefits through early planning of program delivery.

NSW Treasury has also pioneered outcome-based budgeting which has been driving infrastructure decision making. The use of robust business cases and economic appraisal of identified government intervention options should continue to be central to the NSW Government's approach to making prudent funding decisions, as this maximises the value for taxpayers' dollars spent and contributes towards achieving outcomes that benefit the people of NSW.

There are opportunities to improve guidelines and practices across government to drive better funding decisions and outcomes where infrastructure planning or delivery is involved. This includes reflecting the following realities:

- ▶ **NSW Government strategic objectives:** infrastructure investments do not proceed in a vacuum. They operate in the context of broader strategies: economic, social and environmental. Various government strategies also target economic diversification which challenges traditional investment appraisal frameworks. The Government's strategic objectives should be built into investment decision making even if these objectives are not typically included in the usual cost-benefit assessment frameworks
- ▶ **investment logic mapping** promotes robust upfront discussion and analysis, resulting in sound problem definition and options identification on build and non-build intervention options. Greater emphasis on front-end planning means subsequent resources for detailed feasibility analysis and planning will be allocated to options that are genuinely expected to deliver intended benefits and outcomes. Any proposed investment needs to be tested and confirmed for its evidence-base against a well-defined problem or opportunity
- ▶ **risk and scenario planning:** future uncertainties, shocks and stressors will require a better approach to scenario planning and considerations of low frequency but high-risk events in investment decision making. The Department of Premier and Cabinet's Shaping

Futures team has undertaken significant work to develop an evidence-based Trends Atlas and scenario planning framework to embed in investment decisions. Quantitative methods such as Real Options Analysis (see Box 11.5) can also provide tools to decision makers³⁷¹

- ▶ **commerciality and deliverability analysis** should be fundamental considerations as part of the options identification and development process. Insufficient consideration and planning for construction procurement and delivery at early stages of the business case process could result in projects that are unable to be delivered within the original funding allocation
- ▶ **discount rates:** the current social discount rate used in economic appraisal has remained at 7% (in real terms) for over three decades, despite market interest rates having declined to historic lows.³⁷² An artificially high discount rate underestimates the merits of projects with long-term benefits, such as environmental and social housing investments. The discount rate and the methodology used for estimating it should be reviewed

- ▶ **post-program evaluations:** evaluation of government-funded programs can be useful to inform future decision making, improve existing programs and share learnings. Developing program evaluation plans as part of the business case process can also enable adaptive decision making that responds to changing circumstances and conditions over the course of an investment. This is particularly important where proposed investments are large in scale, involve long timeframes to implement or where the program benefits are yet to be clearly understood (for example through pilot investments and programs).

NSW Treasury is updating its business case and investment appraisal guidelines during the next two years. The review may benefit from an independent expert advisory panel to provide oversight and advice. This would be in line with international best practice and would strengthen credibility, innovation and independence in the investment appraisal guidelines used by the NSW Government.

Box 11.5

Using Real Options Analysis to respond to uncertainty

Real Options Analysis (ROA) is an investment evaluation and decision-making framework that specifically recognises the value of flexibility in project design and delivery, and supports embedding flexible approaches into an investment strategy to better structure and manage projects that are significantly impacted by uncertainty. ROA can support government development of infrastructure investment strategies that are adaptable and able to meet evolving community needs.

ROA uses a broad range of methodologies and tools to consider and address uncertainty through all stages of an investment's lifecycle. Essentially, it involves a series of actions that start with identifying the key sources of future uncertainty and possible responses to this uncertainty, and move progressively towards developing a strategy that maximises the expected value of the project by dealing with uncertainty effectively.³⁷³

More information about the performance of current infrastructure in NSW will assist future investment decisions. The Gate 6 Review process, under the Infrastructure Investor Assurance Framework (IIAF) already requires delivery and operating agencies to review projects and ensure mechanisms have been set up to collect information on project benefits. NSW Treasury's Evaluation Framework also supports collecting more systematic information on how projects have performed relative to business case forecasts.

As more projects become operational, these review processes will provide a rich source of data to inform the development of future projects and overall decision-making frameworks.

As outlined in Chapter 8, there is growing demand for sustainable financing and associated climate- and sustainability-related disclosures. These market trends are driving the need for accelerating environmental, social and governance (ESG) outcomes across government in a coordinated manner. In this context, the NSW Government should consider establishing an overarching framework that defines the roles and priorities of government in supporting sustainable finance outcomes, to provide greater clarity for infrastructure delivery agencies and the private sector.

11.6 Delivery can be improved by greater innovation and capability development in the construction industry

Delivery of an investment program requires a thriving construction industry. The Global Infrastructure Hub's InfraCompass tool ranks Australia 9th out of 76 countries for infrastructure procurement.³⁷⁴ However, the scale of the current investment program in NSW and the size and complexity of individual projects are leading to concerns about the capacity and capability of both public and private sectors to continue delivering these infrastructure investments.

The 2018 SIS highlighted that quality skills shortages and low levels of innovation in the construction industry contribute to sluggish productivity growth. These trends continue. Recent ABS data show that the construction industry ranks poorly when it comes to R&D expenditure.³⁷⁵ This influences the industry's profitability and performance. There is an opportunity to build on the successful use of innovative construction methods (see Box 11.6) to uplift innovation in the construction sector. Innovation is an important priority of the NSW Government, with the new R&D NSW established within the Department of Enterprise, Investment and Trade in response to the 2021 *Accelerating R&D in NSW Action Plan*.³⁷⁶ R&D NSW has been tasked with driving and overseeing delivery of the R&D Action Plan to position NSW as Australia's R&D leader.

Box 11.6

Innovative construction methods in NSW public school delivery³⁷⁷

Jordan Springs Public School, completed in July 2020, became the first NSW public school delivered using the Design for Manufacture and Assembly (DfMA) construction method.

DfMA is a design and construction process that combines the manufacture of building components, such as wall systems and facades, in a safe, clean and efficient factory environment, with on-site construction assembly. Its benefits include:

- ▶ time savings, with potential to reduce on-site construction assembly time by up to 30%
- ▶ minimising impact on schools, including less noise, traffic and pollution compared to traditional construction methods
- ▶ upskilling the workforce, with demand created for new jobs in manufacturing, including production line management, logistics management, digital systems and quality assurance
- ▶ improved sustainability, with the opportunity to reduce carbon emissions, water and material waste by more than 30%
- ▶ opportunity to reduce costs over time, as the industry becomes more familiar with DfMA.

In addition to on-the-ground skills for project delivery, successful execution of large and complex projects requires careful decision making and oversight throughout inception, business case, scoping and design, and then delivery. This oversight and accountability cannot be handed off and generally sits with a small group of people within the NSW Government and industry. There is a limit to the number of projects that can be supervised at one time. In short, funding is not the only constraint to a successful infrastructure program.

To further address market capacity constraints, NSW would benefit from more international construction firms entering the domestic market, particularly those from neighbours in the Asia-Pacific region, such as Japan and South Korea.³⁷⁸ This will require both overt work to attract the interest of these firms and a willingness to value the capabilities and experiences of international players.

Many of these firms are already active internationally and are industry leaders in sustainability and the deployment of cutting-edge technology, such as artificial intelligence (AI) and robotics. Greater participation of these firms could further catalyse industry productivity and support digital transformation in the construction industry in NSW. The recent *Premier's Memorandum on Procurement for Large, Complex Infrastructure Projects* introduced a provision aimed at

recognising the international experience of international contractors and key personnel. Tracking and monitoring the implementation of this provision will be an important way to further foster competition and innovation in the market.

Targeted initiatives can lift industry capability and opportunity

A busy delivery program provides much opportunity for construction industry professionals and workers, but leaves little scope for capability development. More recently, government and industry capacity has been absorbed with managing the increased task load of the current pipeline and dealing with the impacts of COVID-19 on infrastructure projects. This has left limited time and resources to focus on implementing new policies and practices, and amending traditional ways of working that will increase efficiencies.

With comparatively small and targeted funding and resourcing of key initiatives, the NSW Government can better realise the social and economic benefits of the current pipeline, as well as increase the speed of pipeline delivery, create extra capacity, improve project performance and significantly reduce delivery risk.

There is an opportunity to increase capacity in the labour market, while supporting local and regional economies. Capacity and capability challenges within regional NSW are of particular concern to the NSW Government. There is also a need to invest in local council capacity and capability to better operate and maintain critical public assets and infrastructure (see Box 11.7 for an example); in particular, to uplift capability in the following areas:

- ▶ business case development and strategic planning activities for critical economic and service infrastructure
- ▶ project management / project assurance / procurement for infrastructure delivery
- ▶ effective asset management planning to support the operation and maintenance of government investments.

Box 11.7

Case study: Town Water Risk Reduction Program

Through the Town Water Risk Reduction Program, the NSW Government is partnering with local water utilities (LWUs) in regional areas and the wider water sector to develop and implement a new approach of working together. This new approach will enable LWUs to manage risks and priorities in town water systems more strategically and effectively and, as a result, reduce water risks in regional NSW communities over time.

The overarching goal for this program is to work collaboratively with LWUs and other partners to build a town water sector where:

- ▶ stakeholders, including the Department of Planning and Environment, work together in partnership, sharing data and knowledge, consulting and collaborating with one another, and supporting each other where applicable
- ▶ LWUs are supported to manage safe, secure and sustainable water supply and sewerage services in an efficient and customer-focused manner
- ▶ the regulation of LWUs is focused on outcomes, based on risk and the maturity of each LWU, and is fair and transparent. Regulators are accountable and well-coordinated.

The program is working with Training Services NSW, alongside the training and water sectors, to increase the skills of existing water operators, attract more operators into the sector and increase employment in regional NSW. The program aims to provide access to training for up to 200 water operators in regional NSW seeking accredited training each year.

Based on this work, the NSW Government has released an action plan investing \$1.175 million for 200 new trainee places each year in NSW to tackle critical skills shortages in the water operations sector. The plan will establish a sustainable training market, develop high-quality resources for training providers and boost funding for remote and regional student training places.

Training Services NSW (TSNSW) has a range of programs to uplift skills as part of the NSW Government's infrastructure investment spending.³⁷⁹ These programs provide pathways to traineeships, apprenticeships and permanent employment opportunities. The Infrastructure Skills Legacy Program (ISLP) is mandated on all major government infrastructure projects, requiring projects to meet skills, training and diversity targets. Strong performance has been demonstrated against ISLP targets and consideration should be given to applying the ISLP to smaller projects.

The NSW Government's Aboriginal Procurement Policy (APP) seeks to build capacity and increase the Aboriginal community's economic participation,³⁸⁰ consistent with Closing the Gap commitments.³⁸¹ There is opportunity to lift agencies' capacity and capability to improve data collection on the application of the APP. Approaches to achieve this include knowledge sharing through the Procurement Leadership Group, the Construction Leadership Group and the APP Community of Practice. In addition, where relevant and of interest to communities, agencies should be transparent and share data and information with Aboriginal communities to support business partnerships.

Agencies have implemented strategies to achieve these outcomes.^{382,383} These strategies, co-designed with the Aboriginal community, training organisations and businesses, outline actions to build capability, capacity and increase Aboriginal business participation in partnership with industry and government. For example, Transport for NSW's Regional Rail Project, which will replace the ageing regional train fleet at the new Mindyarra Maintenance Centre in Dubbo, includes an Aboriginal Working Group in its governance structure. This will ensure ongoing participation of local Aboriginal businesses, stakeholders and the community throughout the life of the project.

Water Infrastructure NSW is piloting several initiatives that that could be adopted more broadly, particularly in regional areas.³⁸⁴ These include:

- ▶ a project with TAFE NSW and Aboriginal-led training organisations to ready Aboriginal students for the training certifications needed for upcoming projects
- ▶ breaking down large projects into smaller components that allow Aboriginal businesses, which are often smaller in scale, to meaningfully participate
- ▶ publishing local project pipelines to provide transparency about future skills demand to support planning by individuals and businesses.

As Water Infrastructure NSW explores these initiatives, there will be an opportunity to leverage the lessons and consider how they might be applied beyond the construction phase into operations and maintenance to provide longer-term benefits. To be successful, initiatives to build capability and increase capacity must include engagement with local communities.

11.7 Recommendations

No	Recommendations	Implementation timeframe	Lead agency
48	<p>Reconsider the timing and sequence of future megaprojects to diversify the State's investment program and mitigate delivery risks</p> <ul style="list-style-type: none"> a. Reconsider the urgency, need and timing of megaprojects in the State's forward pipeline and focus on those with the greatest benefits and need. b. In the foreseeable future, sequence megaprojects to ensure their best chance of success, ideally once existing projects are in stable delivery. c. In the sequencing exercise, reconsider the timing and need for Beaches Link, the M6 Stage 2, Parramatta Light Rail Stage 2, the central tunnel for the Great Western Highway - Katoomba to Lithgow upgrade, further stages of the Sydney Metro or rail projects (Sydney CBD to Zetland, Western Sydney International Airport to Leppington or Campbelltown) and regional major dam projects (New Dungowan, Wyangala). d. Refocus the investment program by bringing forward programs of smaller to mid-sized projects identified by portfolio agencies. e. Resolutely apply procurement practices for large complex projects that de-risk projects, reduce the costs of participation for bidders and increase participation by tier 2 and tier 3 contractors and new entrants. 	Immediate Priority	Infrastructure NSW & Treasury
49	<p>Make asset maintenance and augmentation a high priority for the future infrastructure program</p> <ul style="list-style-type: none"> a. Implement a whole-of-government approach to asset maintenance and renewals. b. Foster the adoption of technology-driven, predictive maintenance methods. 	Immediate Priority	Infrastructure NSW & Treasury
50	<p>Adopt data-enabled asset management and investment decision making across the NSW Government, including:</p> <ul style="list-style-type: none"> a. Continued focus on delivering cross-government asset data structures and asset information platforms. b. Centralised collection of essential asset data into a register, including performance, location, and condition. c. Uplift of data capabilities to drive technology solutions for smarter, effective asset management. 	Immediate Priority	Customer Service, Infrastructure NSW & Treasury
51	<p>Publish a pipeline of major asset maintenance, upgrade and renewal opportunities as part of the NSW Major Projects Pipeline, and promote the use of innovative, outcome-based asset management service contracts</p>	Immediate Priority	Infrastructure NSW
52	<p>Partner with the Australian Government to achieve sustainable co-funding arrangements</p> <ul style="list-style-type: none"> a. Request Australian Government compliance with <i>Timely Information on Infrastructure Projects</i> on co-funded infrastructure projects. b. Support procurement practices that suit large, complex projects, including early engagement on risks, scope and design solutions, and open book approaches. 	Immediate Priority	Treasury & Infrastructure NSW

No	Recommendations	Implementation timeframe	Lead agency
53	Develop a roadmap for long-term reform of user contributions across the road and public transport networks	Extended Program	Treasury & Transport
54	Utilise all viable commercial models and approaches to enable additional opportunities for private sector investment in infrastructure, including: <ol style="list-style-type: none"> a. Leases or sales of commercial brownfield assets to traditional infrastructure investors. b. Complementary development of assets that deliver additional services and benefit to offset the public infrastructure costs. c. Development of infrastructure with direct operating cost benefits to operators. d. Packages of private investment for public asset augmentation and maintenance. e. Development of infrastructure assets in a manner suitable for PPP procurement. f. Use of emerging data assets from the increasing digitisation of infrastructure to underpin new commercial delivery models. 	Immediate Priority	Treasury & Infrastructure NSW
55	Update investment planning and decision-making frameworks to improve options identification, scenario analysis and test deliverability of projects In the next round of the refresh of business case guidelines, the following should be considered: <ol style="list-style-type: none"> a. Formally incorporate scenario planning into investment decision making that extends beyond the standard sensitivity analysis currently used in business case development. b. Explore the use of Real Options Analysis (ROA) to support greater flexibility to deal with uncertainty, such as high impact and low frequency events. c. Strengthen upfront thinking, sound problem definition and benefits realisation testing to ensure a range of compelling investment options that lead to intended benefits. d. Require early engagement with industry on commercial viability and program deliverability (including market sounding) to inform options. e. Ensure alignment of investment proposals with government strategies and outcomes in a measurable and evidence-based manner. f. Review the methodology for estimating the appropriate discount rate to reflect current conditions. g. Periodically review assumptions underpinning infrastructure planning and delivery, including accounting for uncertainties and disruptive events. 	Immediate Priority	Treasury & Infrastructure NSW

No	Recommendations	Implementation timeframe	Lead agency
56	<p>Support innovation in construction through productivity initiatives jointly sponsored with industry</p> <ul style="list-style-type: none"> a. Develop agreed methods to encourage innovation in project procurement and delivery. b. Provide seed and pilot funding to drive forward infrastructure-related digital transformation. c. Partner with industry and academia to pilot new technologies, such as through Cooperative Research Centres (CRCs). 	Immediate Priority	Infrastructure NSW
57	<p>Develop new skills and capabilities required for infrastructure projects, and widen opportunities for communities to participate through targeted actions in training and employment initiatives</p> <ul style="list-style-type: none"> a. Enhance training and development for infrastructure delivery agencies, particularly in the areas of commercial skills for large projects (bidding, pricing, contract administration, procurement, evaluation) and Project, Program and Portfolio leadership. b. Deliver joint government and industry certification and training for staff engaged in large, complex project development and delivery. c. Work with the construction industry to co-design training for projects, from entry level to project management. d. Improve regional NSW local council capability in business case development, strategic planning, project management and assurance and asset management. e. Where possible, provide information on the pipeline of infrastructure work for the regions so that local communities and businesses can better prepare for employment and business opportunities. f. Work with local Aboriginal communities and businesses to support employment opportunities and business growth by: <ul style="list-style-type: none"> – forming partnerships between Aboriginal-led training organisations, TAFE NSW, infrastructure delivery agencies, businesses and local communities – improving agencies’ data collection with regard to the application of the Aboriginal Procurement Policy, including through cross-agency knowledge sharing. 	Extended Program	Infrastructure NSW