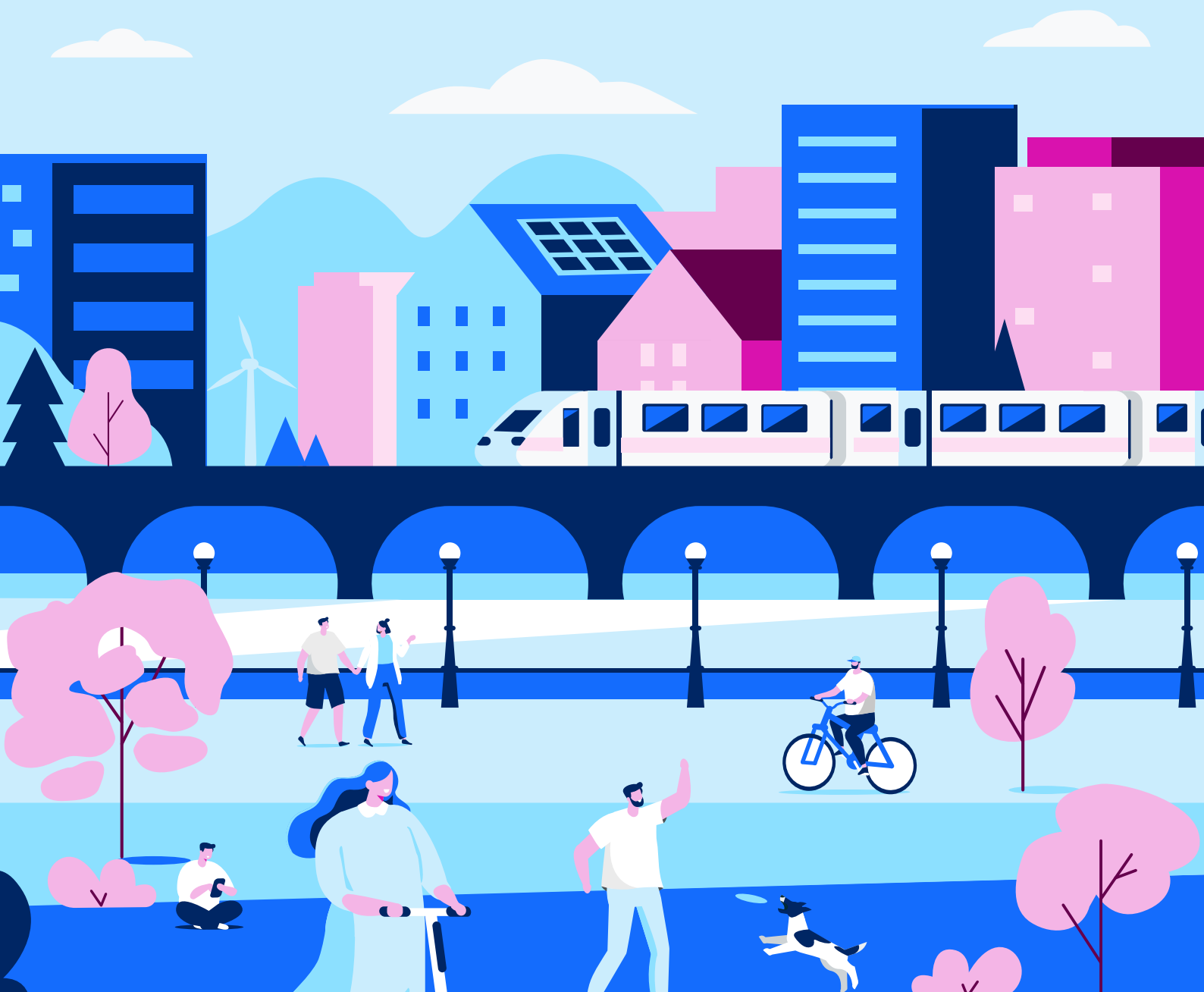

Infrastructure
NSW

Trends and Insights 2021





Acknowledgement of Country

Infrastructure NSW acknowledges the Traditional Custodians of the lands where we walk, work and live, and pays respect to their Elders past and present.

We acknowledge and respect their continuing connection to land, seas and waterways of NSW, and the continuation of their cultural, spiritual and educational practices.

In preparing the Trends and Insights Report, we acknowledge the importance of Aboriginal and Torres Strait Islander people's unique history of land and water management, and of art, culture and society that began over 65,000 years ago.

This report analyses the performance of the State Infrastructure Program of capital projects and programs in financial year 2020–2021 (FY21) and assesses the progress made in addressing key drivers of risk previously identified.

It identifies opportunities to further increase the confidence in the successful delivery of a sustainable infrastructure legacy.



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Introduction

Purpose

The *Infrastructure NSW Trends and Insights 2021 Report* (report) assesses the key risks impacting the successful development, procurement, and delivery of capital infrastructure projects in NSW. It identifies:

- State Infrastructure Program-wide trends impacting the performance of projects
- progress made towards mitigating drivers of risk
- opportunities to further improve the delivery of the State Infrastructure Program.

The report relies on Infrastructure NSW's Assurance activities during FY21 to produce an evidence-based analysis of the State Infrastructure Program's performance.

As a result of this analysis, Infrastructure NSW is, ongoingly and proactively, pursuing responses to improve future infrastructure investment outcomes by capitalising on opportunities as they present. Our current focus is on initiatives which will further:

- ensure we invest in the right project, at the right place and at the right time
- reduce the State Infrastructure Program risks
- maximise benefits for today and tomorrow
- increase capacity to deliver.

Context

The budgeted infrastructure program of capital projects in NSW reached a record \$110.4 billion over the forward estimates,¹ despite increasing challenges including the:

- impact of the COVID-19 pandemic on the State's fiscal position, the safe and timely delivery of projects, and the future demand for increased services enabled through infrastructure.
- increasing delivery capacity pressures in specialised segments of the construction market.

Significant progress was made in some areas while, in other areas, risks identified in previous years remain. There are new opportunities to further improve infrastructure investments outcomes, value for money and benefits, building on the work undertaken by agencies and Infrastructure NSW to date.

Infrastructure NSW is in the process of preparing the next *State Infrastructure Strategy* (SIS) and some of the Trends and Insights identified in prior years are addressed through recommendations in the SIS. This is highlighted through the report, where relevant.

¹ NSW Government, The NSW Budget 2021–22, Half-Yearly Review

Background

Each year, Infrastructure NSW analyses the information collected through its Assurance function to produce the *Infrastructure NSW's Trends and Insights Report*.

Planning and delivery of the infrastructure program has matured since 2011, and many agencies are successfully leading the delivery of multibillion-dollar projects and programs.

The principles of Infrastructure NSW's Assurance function are established by the *NSW Gateway Policy*.² It mandates confidential and independent peer reviews at critical decision points throughout the lifecycle of capital projects. The scope of Infrastructure NSW's Assurance function is further defined by the *Infrastructure Investor Assurance Framework (IIAF)*³ which applies to all infrastructure projects with a value of \$10 million and above, being developed, procured or delivered by NSW Government agencies and businesses.

The process is confidential to each project, and the resulting advice is provided to the NSW Government, as the investor, through regular reporting. The insights from the Assurance process presents a unique opportunity to learn from long-term systemic issues and trends, track progress and define further improvement opportunities to increase confidence in the future delivery of a sustainable infrastructure legacy in NSW.

Approach

This year the report focuses on 3 key trends identified over the last 3 years. The report tracks progress, considers impacts of recent policy changes and identifies opportunities for further improvement.

The report includes case studies⁴ which provide perspectives on the qualitative observations reported and examples of good practice across the State Infrastructure Program.

In preparing this report, Infrastructure NSW considered:

- the findings of 152 reviews completed on 112 projects, which resulted in over 1400 Critical and Essential recommendations. These recommendations are categorised by risk topics that are defined in the IIAF.⁵ The topics are further detailed in the Review workbooks.⁶
- information collected through reporting on 547 projects and programs, which include risk ratings and mitigations.
- long-term trends identified in previous years and the associated strategic initiatives and policy reforms initiated by Infrastructure NSW.^{7 8 9 10}

2 NSW Government, TPP 17-01 NSW Gateway Policy

3 Infrastructure NSW, Infrastructure Investor Assurance Framework, updated March 2021

4 Case Studies prepared and approved by Sydney Metro, Health Infrastructure, Sydney Water & Department of Planning, Industry & Environment

5 Infrastructure NSW, Infrastructure Investor Assurance Framework, updated March 2021

6 <https://www.infrastructure.nsw.gov.au/project/resources/nsw-gateway-reviews/>

7 Infrastructure NSW, Oversight Framework, updated May 2021

8 Infrastructure NSW, A Guide to the Oversight Framework

9 NSW Government, M22021-10 Procurement Memorandum for Large, Complex Infrastructure Projects

10 Infrastructure NSW, Information on Infrastructure Projects Guide

Report structure

This report makes general observations on the performance of the NSW Infrastructure Program of capital infrastructure projects and provides an update on long-term trends previously identified in the industry.¹¹ Each trend is discussed in a dedicated section which includes:

- **Strategic context** — an outline of the current strategic context, as it relates to the relevant trend.
- **Trends and insights** — an overview of the key evidence, findings, trends, and root causes of risk.
- **Progress and opportunities** — a summary of the progress made against previous recommendations and new opportunities to further improve the delivery of the State Infrastructure Program.
- **Case studies** — Examples of good practice and application of new policy initiatives.

Trends

This report identified the following 3 long-term key trends:



Trend 1 — The size and sequencing of the megaprojects¹² pipeline increases risks to the State Infrastructure Program.

The nature and timing of the pipeline of megaprojects continues to magnify risk and put pressure on resources. Government's focus on optimising procurement approaches is mitigating risk.



Trend 2 — Insufficient identification of alternative investment options in the development phase curtails long-term value creation.

Consideration of broader options and benefits, to future-proof the delivery of services and ensure Government invests in the right infrastructure for generations to come, continues to decline.



Trend 3 — Establishing effective oversight and risk management, at project and portfolio level, requires continued effort by executives.

Project and program oversight and risk management requires prioritisation by executives, especially considering the increasing complexity and interdependency of projects.

¹¹ Infrastructure NSW, Trends and Insights Report 2020

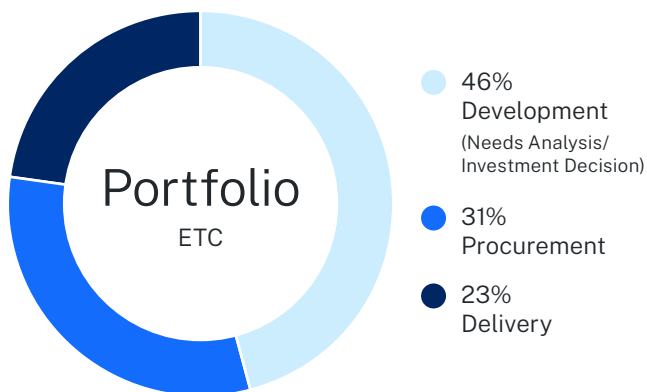
¹² Megaprojects defined as having an estimated total cost (ETC) of \$1 billion or more

State Infrastructure Program observations and general considerations

State Infrastructure Program composition and performance¹³

The current composition of the State Infrastructure Program is shown in Figure 1.1 & 1.2.

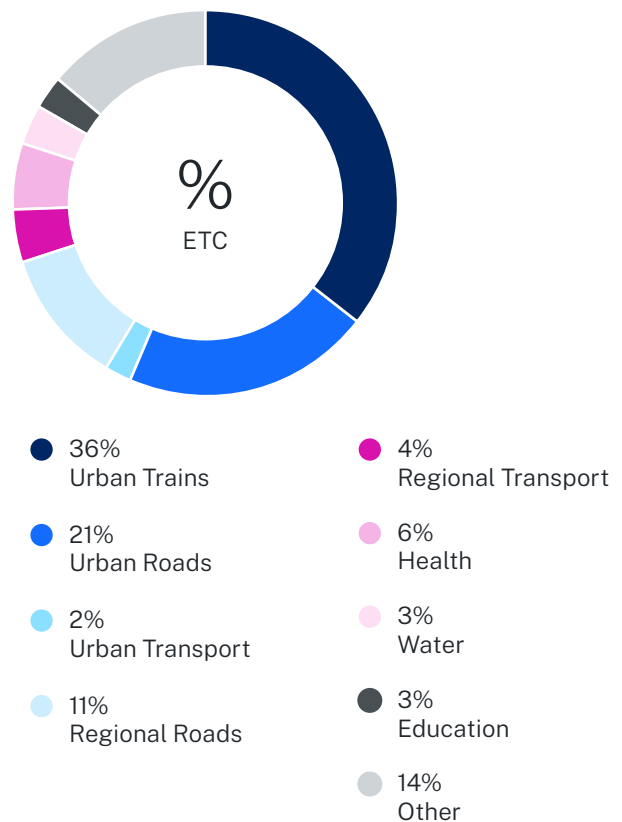
Figure 1.1 – Portfolio value by phase (percent) – Tier 1–3 Projects



Compared to FY20, the State Infrastructure Program grew by 15% in the value of projects in the development and procurement phases and before contract award.¹⁴ Pre-delivery projects by value account for 77% of the portfolio. This highlights the significant additional resources required by Government and industry to deliver the growing pipeline of infrastructure projects.

The Transport Cluster accounts for 74% of the total State Infrastructure Program value. In FY 2021 23% of the State Infrastructure Program was in delivery, and 31% was in procurement compared to 26% in FY20.

Figure 1.2 – Portfolio percentage value (%) by type



¹³ Analysis performed on the composition and performance of the Infrastructure Program throughout this report applies to assured Tier 1–3 projects above \$10 million, which are subject to assurance in FY21. Assurance reviews and periodic reporting is not mandatory for Tier 4 under the IIAF.

¹⁴ Infrastructure NSW, Trends and Insights Report 2020

COVID-19 pandemic considerations

The FY21 NSW Public Health Orders, aimed at containing the COVID-19 pandemic, enabled construction sites to continue work under social distancing arrangements until mid-2021. More restrictive orders, including a 2-week pause of all construction projects, for the Greater Sydney area took effect in July 2021; the impact of these orders fall outside of the reporting period for this paper.

These subsequent restrictions impacted many projects in delivery in a range of ways. Impacts included schedule delays, staffing shortages and supply chain bottlenecks, notably in the procurement of transportation systems and special engineering machinery. It also led to the rise in cost of some materials like timber and steel. It is expected these impacts will progressively translate into cost overrun in the future.

Service consumption patterns and reduced traffic during the pandemic allowed, in some cases, for project acceleration through extended working hours. Finally, the COVID-19 pandemic response impacted the State's fiscal position and as a result it is expected to drive increased focus on future investment decisions.

Market capacity considerations

*The Infrastructure Australia 2021 Market Capacity Report*¹⁵ highlights that resources, and skills will continue to be strained through the current period (2021-2025) of infrastructure investment growth. This is impacting industry's confidence to deliver projects on time and budget. In terms of large and complex engineering projects, there are very few contractors in Australia with the experience to successfully deliver such projects and accept their associated risk-reward ratios. This resulted in the release of the *Procurement Memorandum for Large, Complex Projects*¹⁶ in 2021 which contains procurement practices that are expected to increase industry participation and lead to a sustainable industry.

¹⁵ Infrastructure Australia 2021 Infrastructure Market Capacity Report

¹⁶ NSW Government, M22021-10 Procurement Memorandum for Large, Complex Infrastructure Projects



Trend 1 – The size and sequencing of the megaproject pipeline increases risks to the State Infrastructure Program

Year-on-year change – stable

The nature and timing of the pipeline of megaprojects continues to magnify risk and strain resources. Government's focus on optimising procurement approaches is mitigating risk and supporting the sustainability of industry.

Context

The value of megaprojects continues to increase year-on-year to now account for 69% of the State Infrastructure Program value, as compared to 64% in FY20.

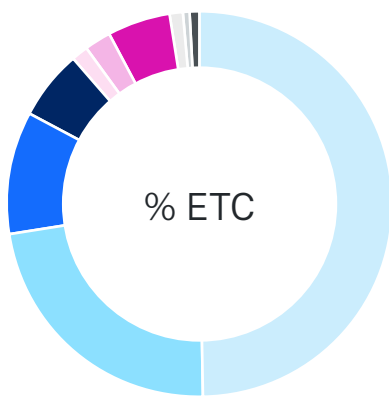
By value of the megaprojects, 18% are in the delivery phase and 82% are in pre-delivery. Megaprojects in procurement remain dominated by urban rail, urban road and regional road projects. In these sectors the megaproject market is dominated by two contractors.

Figure 2.3 – Percentage of megaproject portfolio value (prior to or in delivery)



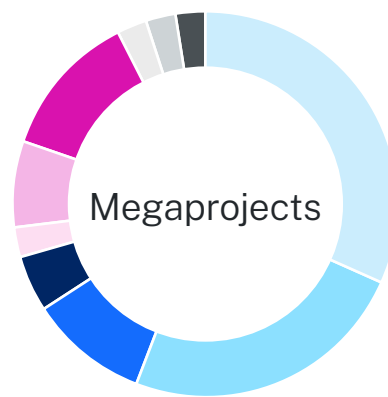
This year showed a diversification of megaproject types — see Figure 2.5. New dams, pipelines, precincts and hospitals are examples of that trend and make up 11% of megaprojects. Non-transport projects now account for 27% of megaprojects by number compared to 19% in FY20. Transport megaproject types combined, account for 90% of all megaprojects by value as shown in Figure 2.4, and 60% by value of the State Infrastructure Program. Importantly these transport projects present long-term staging, contract packaging, and sequencing potential.

Figure 2.4 – Megaprojects portfolio, percentage ETC by type



- 50% Urban Trains
- 23% Urban Roads
- 10% Regional Roads
- 6% Regional Transport
- 1% Urban Transport
- 2% Water
- 5% Other
- 1% Justice
- 1% Health
- 1% Education

Figure 2.5 – Percentage of Megaprojects by type



- 32% Urban Trains
- 24% Urban Roads
- 10% Regional Roads
- 5% Regional Transport
- 2% Urban Transport
- 7% Water
- 14% Other
- 2% Justice
- 2% Health
- 2% Education

Trends and insights

Megaprojects magnify risks

Assurance activities show that megaprojects¹⁷ are more likely to be at risk compared to projects with value less than \$1 billion. Figure 2.6 shows 23% of megaprojects have a high delivery confidence.¹⁸ In comparison, this ratio is 33% for smaller projects (Figure 2.7). Despite minor year-on-year improvements in delivery confidence ratings,¹⁸ megaprojects continue to magnify risks. These megaprojects are often built in developed areas with pre-existing infrastructure which require extensive early investigations to mitigate risks. This is further exacerbated by the need for continued service delivery.

Figure 2.6 – Delivery confidence rating for megaprojects by year

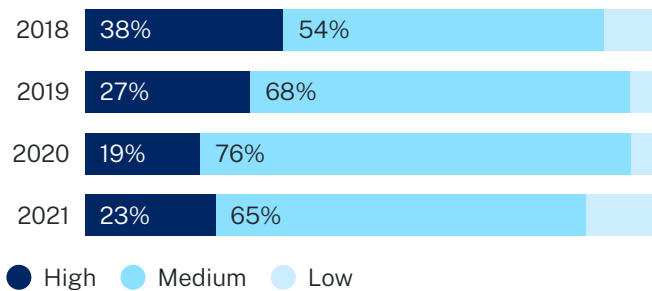
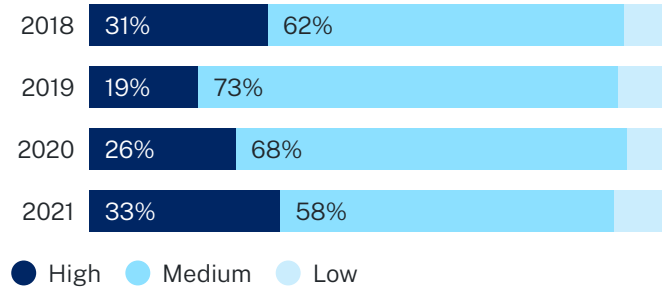


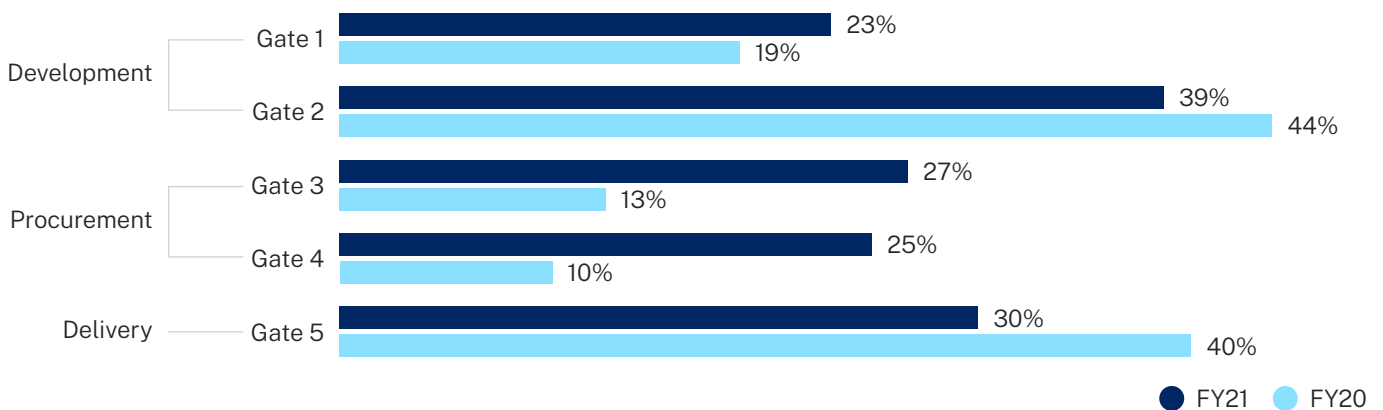
Figure 2.7 – Delivery confidence rating for non-megaprojects by year



Effective procurement strategies are mitigating risk

Figure 2.8 shows the number of Assurance reviews providing a high delivery rating in procurement (i.e., Gate 3 and 4) approximately doubled year-on-year.

Figure 2.8 – Ratio of high delivery confidence ratings by review gate and phase¹⁹



¹⁷ Megaprojects defined as having an estimated total cost (ETC) of \$1 billion or more

¹⁸ Infrastructure NSW, Infrastructure Investor Assurance Framework, updated March 2021

¹⁹ Figure 2.8 – Health checks in development are allocated to Gate 1, health checks in procurement are allocated to Gate 3, and health checks in delivery are allocated to Gate 5.

Our reviews highlight that the procurement theme overall improved by 2 ranks, from the 4th to the 6th as demonstrated in Figure 2.9. This is based on the number of critical recommendations made in Assurance reviews overall. This improvement is however not consistent for megaprojects, where the procurement theme is ranked 2nd by number of critical recommendations.

Figure 2.9 – Overall rankings of theme, by critical recommendations made in assurance reviews

Ranking	Ranking FY20	Ranking FY21	Megaprojects FY21
1	Risk management	Quality of business case	Risk management
2	Governance	Risk management	Procurement
3	Project management and planning	Governance	Program/project management
4	Procurement	Program/project management	Governance
5	Quality of business case	Project resourcing	Project resourcing
6	Options analysis	Procurement (+2)	Quality of business case

Progress and opportunities

Progress

Underlying challenges associated with the delivery of large, complex projects remain, including the adequacy of:

1. Procurement strategies, and contract packaging methodologies.
2. The alignment of scope, pre-tender estimates, budget, risks and mitigations, and cost contingencies.
3. Project oversight providing clear accountabilities and business continuity between the tender process and the subsequent delivery phase. This applies to both the contractor and Government teams.

The *Procurement Memorandum for Large, Complex Infrastructure Projects*²⁰ contains practices designed to address these challenges and include the need to involve contractors earlier, increase focus on packaging and contracting strategies, and align delivery strategies

with industry feedback and capacity. The procurement memorandum supports a sustainable industry by increasing participation through the following:

1. Promote alternative contracting strategies to deliver projects in smaller packages and target smaller contractors within the market.
2. Normalise early industry engagement to identify and define risk earlier.
3. Commence procurement with a clearly informed risk allocation model.

Examples of progress include:

1. **Sydney Metro Western Sydney Airport** which is implementing practices like an open book or targeted cost mechanism in contract packages. This allows risk to be more effectively shared during the delivery phase as a result of increased engagement through the Expression of Interest (EOI) phase – see Case Study 1.

²⁰ NSW Government, M22021-10 Procurement Memorandum for Large, Complex Infrastructure Projects

Opportunities

Although this trend suggests Government's focus on improving the procurement of megaprojects is starting to realise benefits, opportunities to further improve confidence in the delivery of megaprojects remain. Assurance Reviews show the importance to further focus on the following:

1. Sequence megaprojects to manage demand and ensure industry can deliver the growing pipeline efficiently while prioritising capital maintenance works. This thinking is central to the *State Infrastructure Strategy* and the operationalisation of such principles is key to Infrastructure NSW's role.
2. Strengthen monitoring the impact of increased investment and procurement on the State Infrastructure Program; notably to assess industry delivery capacity risks and value for money. Infrastructure NSW in partnership with the broader Government, has and will continue to apply greater focus on this through the ongoing update of the annual State Infrastructure Plan.
3. Build on the national effort to promote inclusive work environments, drive participation of underrepresented groups, and retention of staff in the construction industry. Many public and private partners have and continue to do great work in this space and change is taking place, but more should be done to further accelerate the transition.
4. Work with the Federal Government to facilitate and accelerate skilled migration where a shortage is forecast. Infrastructure NSW will engage with infrastructure bodies, Federal Government, and industry associations to support their skills building roadmaps and initiatives.
5. Standard designs, modular solutions, automation and other technology solutions contribute to lifting productivity and alleviating delivery capacity challenges on specific project types. These solutions should be systematically included as options, where relevant. Significant progress was made by the Department of Education notably and opportunities to leverage lessons learnt more broadly should be prioritised. Infrastructure NSW will consult with Industry, the Department of Enterprise, Trade and Investment and Schools Infrastructure NSW to support investment in advanced manufacturing in NSW.
6. Embed the adoption of the relevant principles within the *Premier's Memorandum on the Procurement of Large and Complex Infrastructure Projects*²¹ to the broader State Infrastructure Program. To support the above, Infrastructure NSW will assess the performance of the Memorandum through deep dive Assurance reviews, select the principles that derived most value and formalise them into enduring policies and guidance. For example, this includes the application of a new commercial guidelines informing the allocation of liability and risk currently underway.

21 NSW Government, M22021-10 Procurement Memorandum for Large, Complex Infrastructure Projects

Sydney Metro Western Sydney Airport



Description

Sydney Metro Western Sydney Airport consists of 23km of new railway (tunnels and civils structures) between St Marys and the Western Sydney Aerotropolis, 6 new vibrant metro stations and precincts including 2 at the new Western Sydney Airport and the provision and operation of fully automated driverless trains. Trains will run between St Marys to the Western Sydney Aerotropolis with a 'turn up and go' system and maintenance, stabling facilities, and operations control centre.

The Stations, Systems, Trains, Operations and Maintenance (SSTOM) contract package includes the design, construction, supply and financing of stations, rail systems, trains and maintenance facility, and operations and maintenance. The SSTOM package is being procured as a Public Private Partnership (PPP) contract.

Key objectives:

- Supporting the long-term success of the Western Sydney Airport and the Western Parkland City by optimising development, transport and green infrastructure.
- Connect Western Sydney communities with an integrated transport network to maximise the 30-minute city catchment of the Western Parkland City.

Station, Systems, Trains, Operation and Maintenance Project

- Industry capability and capacity is providing sufficient competitive tension to drive innovation and value-for-money outcomes.
- Encouraging on-time delivery to support passenger movements to the Western Sydney Airport.
- Acceptable risk allocation to ensure interfaces between contractors can be managed to enable safe, timely, and effective delivery.
- Whole-of-life performance outcomes and optimisation.

Best practice

Early and extensive market engagement throughout the procurement process

Sydney Metro conducted market sounding throughout 2020 to identify the most effective delivery, packaging, and procurement strategy which resulted in strong interest for the SSTOM package. In response to changing market conditions and decreased appetite from civils and line wide delivery contractors in early 2021, Sydney Metro conducted further one to one market engagements. Sydney Metro revised the procurement strategy and commercial approach incorporating key market feedback into the Request for Proposal documentation as a result.

Standardisation and consistency of contract and commercial models

To ensure consistency Sydney Metro evolved SSTOM project and commercial documents from precedent PPP projects from Sydney Metro Northwest (SMNW) and Sydney Metro City and Southwest (SMCSW) and improved alignment with NSW Treasury PPP Toolbox risk allocation model.

Contracting for high-risk project elements utilising open book and or target cost mechanisms

Sydney Metro conducted a highly interactive Expression of Interest phase for SSTOM engaging with applicants on potential improvements to the Risk Allocation and associated commercial principles.

Sydney Metro adapted targeted elements of risk allocation in response to this engagement to include risk-sharing arrangements in the delivery phase.

Outcome

Sydney Metro received a very positive response from industry to the call for Registrations of Interest (ROI).

Four fully formed Consortia progressed to Expression of Interest (EOI) stage including suitable civils and line wide delivery contractors. The approach also facilitated the potential for new international entrants, supported by local Tier 2 contractors. Sydney Metro has adopted a consistent standardised approach across its PPPs, enabling lessons learnt from previous Sydney Metro contracts to be adopted.

Sydney Metro included Cost Risk Sharing (CRS) (i.e., Incentivised Target Cost) mechanism within the Request for Proposal (RFP) for SSTOM discrete works to minimise risk pricing and allow improved architectural and finish outcomes.

SSTOM proponents have been offered the potential to bid back alternate scope under CRS where better value may be achieved.

Sydney Metro is providing risk sharing allocation arrangements in relation to contamination, unknown utility services, and unanticipated unexploded ordnance.





Trend 2 – Insufficient identification of alternative investment options in the development phase curtails long-term value creation

Year-on-year change – down 

Consideration of broader options and benefits to ensure Government invests in the right infrastructure for future generations, continues to decline in assurance reviews.

Context

Infrastructure investments represent 30% of the State's budget²² and attract significant political and community interest.

Comprehensive options analysis is core to providing confidence to the community and broader public that the selected option will most improve service outcomes through investment. Premature preferred option identification can be counterproductive for project teams and communities. Delivery of public commitments and the need to keep communities as informed as possible on progress in improving service delivery, need balancing to avoid early anchoring of solutions, options, scope, cost and schedule which is a key risk driver of this trend.

The digitally connected world provides an opportunity for transparent investment decision-making to maintain trust with the community. Community needs and expectations are quickly evolving, and technology disruption enables citizens to be more involved in the selection of service options. People expect problems to be solved faster and more innovatively, with greater transparency on performance and outcomes.

Infrastructure planning, development and delivery must be informed by community insights and future trends, rather than by historical patterns, to ensure value and benefits are realised in the long-term for future generations.

Major environmental and health crises have the potential to accelerate this trend and challenge planning and benefit realisation assumptions upon which investment priorities are based. In these fast-changing times, thoroughly considering community needs, long-term benefit categories and impacted stakeholders early is key to realising the full benefits of investment. Furthermore, it requires the ability to execute ongoing and rapid adjustments to support the recovery from from major crisis such as the COVID-19 Pandemic and the natural disasters that occurred from 2019 onwards.

²² NSW Government, The NSW Budget 2021–22, Half-Yearly Review

Trends and insights

Assurance reviews assess the project performance against best practice requirements (which are grouped by key themes) to derive a delivery confidence rating.²³ In FY21, the lowest performing theme consistently relates to either option analysis, or benefits identification, quantification, management and realisation. This means that options identification and associated benefits realisation undertaken in the development phases are insufficient. Figure 3.1 shows 8 significant low performing requirements driving this trend.

Figure 3.1 – Underperforming best practice requirements for ‘low’ and ‘medium’ delivery confidence ratings in Assurance reviews

- The whole-of-life benefits are understood and articulated within the cost-benefit analysis for each option and captured through delivery strategy, tender documentation and evaluation processes.
- Project interdependencies and whole-of-life benefits are being incorporated into the options analysis, procurement strategy and early market engagement approach.
- Non-economic benefits are included, and broader community outcomes are considered in the scope development.
- Scope of each option has considered social and economic equity, environmental impacts, technological change and climate resilience in the context of its location and integration with its wider asset network.
- Scope of each option is articulated, clearly connected to the service need and a rigorous process of option identification against objectives has been undertaken.
- Client and contractor obligations and expectations regarding stakeholder management and engagement have been clearly articulated and documented.
- Potential risks resulting from the acceptability of options to key stakeholders and the engagement process with those stakeholders have been identified and captured.
- Stakeholders, with a focus on end users, have been informed of project benefits.

Furthermore, Assurance reviews²³ focusing on defining the needs and options (Gate 1) account for the largest portion of ‘low’ delivery confidence rating with 28%. Figure 4.2 (on page 21) shows the service need focus area, which also relates to the clear definition of needs, benefits, and outcomes, deteriorated 1 place compared to FY20 to list 4th as a primary cause for ‘low’ and ‘medium’ project delivery confidence ratings.

Figure 4.2 also highlights that the reduced project delivery confidence correlates in 85% of cases with an inferior performance in the value for money and affordability area which is now the primary cause for ‘low’ and ‘medium’ Assurance review confidence.²³ This highlights an important opportunity to further improve how options and benefits are identified and quantified to ensure value is maximised.

²³ Infrastructure NSW, Infrastructure Investor Assurance Framework, updated March 2021

Examples of these risks and issues supporting this trend include:

1. The early commitment to scope of projects and program milestones, during the needs identification phase, committing government to deliver a particular solution before the options analysis is finalised.
2. Not assessing future-focused infrastructure and non-infrastructure options and, if considered, the challenge for these options to compete with more traditional infrastructure options through dated benefit assessment frameworks.
3. Balancing competing priorities of mitigating impacts of life threatening environmental disasters against potential significant environmental and heritage impacts.
4. The commissioning of innovative technologies and systems and their impact on key stakeholders and staff.

This highlights the importance of consulting early with all stakeholders to align project objectives, outcomes, and benefits while genuinely considering all options. Especially in times where community priorities are shifting towards more sustainable solutions and where changing demand patterns are creating a unique opportunity to meet emerging community expectations.

Progress and opportunities

Progress

Many of the underlying challenges associated with linking investments to community outcomes remain, including the need for Government agencies to reinforce the:

1. Rigor of options identification and evaluation frameworks, cost estimates and whole of life planning approaches.
2. Focus and resources dedicated to the planning and development phase of projects to broaden investments alternatives being considered and the community consultation.
3. Avoid solving problems with prematurely identified solutions.

Some reforms were initiated to address the above including the commitment to build the NSW Digital Twin and Live.NSW. The program will link the customer to infrastructure outcomes through technology. It forms a complete, virtual customer-centric view of places and projects providing the customer with a clearer understanding of the potential project options and their impacts and it enables people to influence investments in their community.

Furthermore, Infrastructure NSW released the *Information on Infrastructure Projects Guide*²⁴ which provides information that can be reliably announced to the community at each stage of the project life cycle. It recognises that certainty increases as a project progresses through its life cycle and avoids early anchoring of scope, cost and milestones.

24 Infrastructure NSW, Information on Infrastructure Projects Guide

Example of progress includes:

- **Wianamatta South Creek** – The project uses spatial analytics to test community outcomes in new ways, notably through the visualisation of infrastructure, integrated land-use and water cycle planning options to maximise benefits. See Case Study 2.
- **John Hunter Hospital** – The first Health Infrastructure development to have established an Aboriginal Design Group to ensure inclusive community engagement and inform the design of the precinct. Over 1000 community responses were received providing direct design input. See Case Study 3.

Opportunities

The analysis reveals that this trend is deteriorating fast across the State Infrastructure Program and significant opportunities exist to further improve Government performance. These include:

1. Provide evidence to the community that highlights the benefits of the infrastructure investments made. This can be achieved through the public release of summary information of the benefits realised after construction completion.
2. Broaden the awareness of the *Information on Infrastructure Projects* across government to avoid early anchoring of cost and program. This can be achieved through targeted briefings and by ongoingly reinforcing key messages in Cabinet and Ministerial forums.
3. Create awareness within Government of the risks associated with premature determination of preferred option identification for communities and project teams. This can be achieved through a portfolio deep dive Assurance review and benchmarking activity to assess the relationship between the quality of business cases, the overall delivery cost, the schedule, the reputational implications for government and ultimately the value realised.
4. Make provision to reconsider point in time positions through regular updates of the infrastructure Program enabling reflection on progress, if priorities are shifting. The 2022 State Infrastructure Strategy and 5-year State Infrastructure Plan, which will be updated annually, will contribute to achieving this.
5. Adapt Government policies to make digital the norm as part of the assessment of projects and the delivery of services. The foundations are being built to support this through the Live. NSW program, but a clear mandate for agencies to adopt and contribute to the program is required to accelerate benefits realisation.
6. Reform the evaluation and benefit assessment frameworks to improve the competitiveness of a broader range of alternative options. This is to support long-term strategic objectives including:
 - alternative energies investments
 - Government net zero commitment
 - regional developments
 - societal wellbeing
 - open spaces and natural assets
 - non-infrastructure options
 - resilience and adaptability.

The above is supported by the findings of the *2022 State Infrastructure Strategy*.

Wianamatta South Creek



Description

Wianamatta South Creek is the longest freshwater creek in Greater Sydney. Its catchment covers around 63,000 hectares of land and the creek corridor runs 80km from Narellan in the south to the Hawkesbury River at Windsor in the north. Government has made a commitment to protecting and restoring Wianamatta as the 'cool, green spine' of the Western Parkland City. This project focuses on a portion of the creek corridor within the Aerotropolis planning area, identified as the Wianamatta-South Creek precinct, covering approximately 1300 hectares. The project evaluates the potential to deliver living infrastructure in this precinct (including biodiversity protection, a healthy waterway, open space, active transport and stormwater wetlands). A strategic business case has been developed to assess options for land acquisition to achieve this.

Best practice

This project represents best practice in 'landscape-led' infrastructure planning and identifying value for living infrastructure.

Detailed spatial analysis was conducted at the catchment and precinct levels to identify existing environmental attributes, opportunities to improve environmental health and suitability for new infrastructure investment. This analysis informed options development for the strategic business case and can be adapted for future land use planning and infrastructure uses.

Best practice evaluation methodologies and parameters were adopted to support the cost-benefit analysis for the strategic business case. These help to monetise the value of living infrastructure to Aerotropolis communities, including the cooling benefits of tree canopy and passive open space value of stormwater infrastructure designed as wetlands.

The strategic business case is guided by an outcomes framework that links the vision for Wianamatta South Creek as the 'cool, green spine' to NSW Budget Outcomes and indicators, catchment specific outcomes, and monetised benefits evaluated in the CBA.

Outcome

The project has tested a new way of evaluating how to deliver 'living' outcomes for communities that would otherwise be lost under traditional economic analysis approaches, including integration between land use and water cycle planning. It also supports planning underway for the Aerotropolis, helping to provide a richer evidence base for Government decisions regarding current and future communities.



Trend 3 – Establishing effective oversight and risk management at project and portfolio level requires continued effort by executives

Year-on-year change – down 

Project and program oversight and risk management requires prioritisation by executives, especially in context of increasing complexity and interdependency of projects.

Context

Agencies are required to deliver more, larger and more complex projects. Oversight and integrated risk management systems and practices are not keeping pace with the increase in volume and complexity of projects. This is worsened by a global shortage in skills. Addressing resource constraints through migration was inhibited by COVID-19 as many migrants relocated back to home countries and border closures limited migration into Australia, resulting in increased competition for local talent.

The current capacity and capability challenge is heightened by the State's investment pipeline that is characterised by more complex megaprojects being delivered simultaneously and within greater proximity.²⁵

The interconnected program of infrastructure projects across agencies and sectors requires a transparent and coordinated whole-of-government approach to manage delivery and mitigate portfolio risk. As risks eventuate, it erodes value for money and, potentially, challenge the foundational assumptions supporting investment decisions. Multiple project interfaces and complex portfolio interdependencies push the limits of what

project teams can adequately plan for. This requires systematic risk identification, assessment, isolation, and management to enable effective allocation and mitigation. It requires Government to adopt a strategic portfolio lens to the development and delivery of projects. This reinforces the need for effective decision-making bodies, sharing of quality information to support decision-making and agile structures that support practices to constantly assess, identify and manage interdependencies, mitigate risks and take advantage of opportunities.

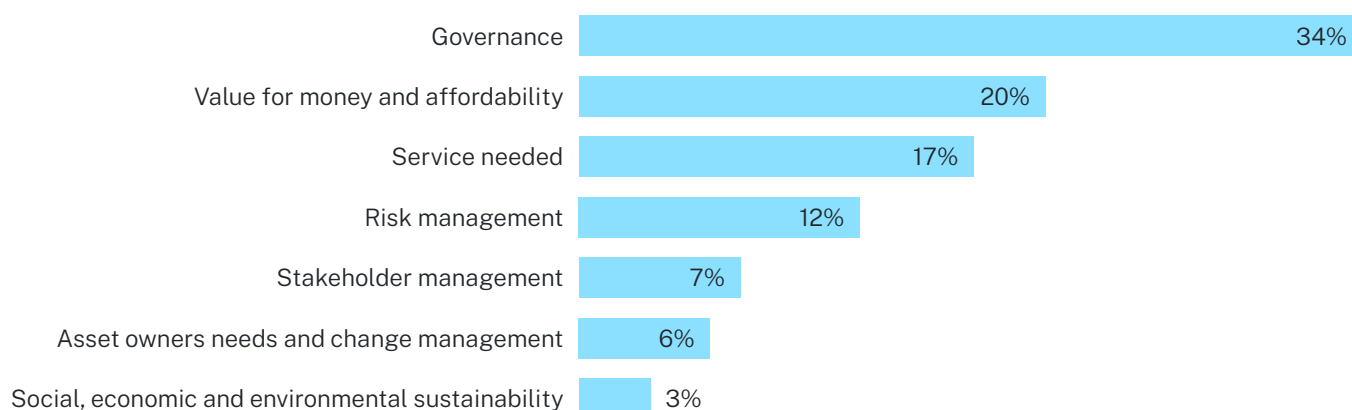
²⁵ Infrastructure Australia 2021 Infrastructure Market Capacity Report

Trends and insights

Program oversight underpins all trends discussed in this report and is assessed in assurance reviews through the ‘Governance’ theme at both the project and program level. Effective governance influences adequate assessment of options and benefits and determines the scale and timing of projects and packages procured. It promotes

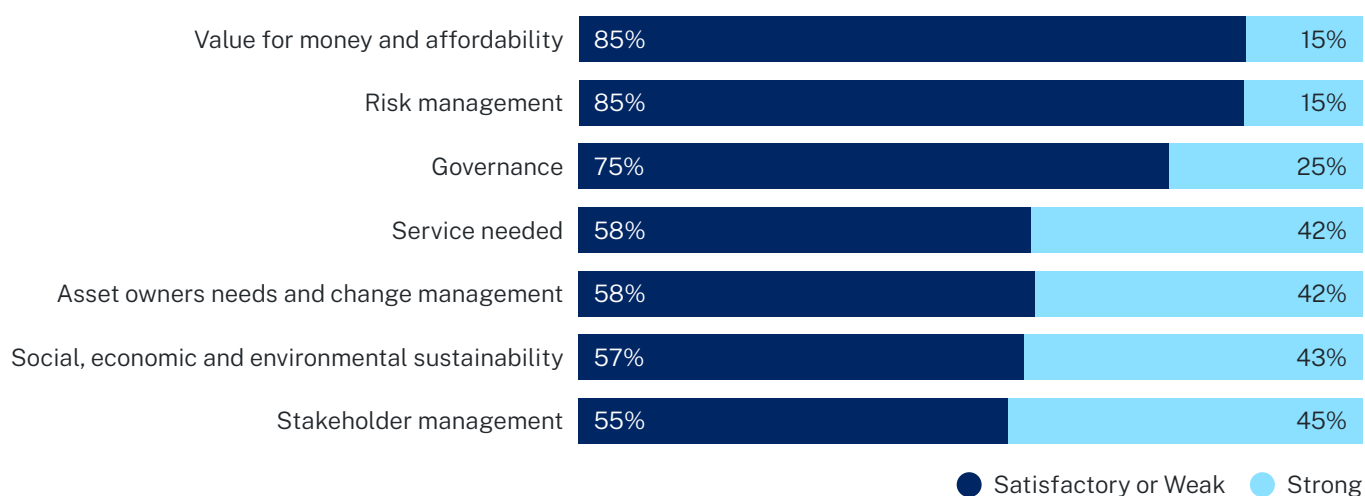
effective risk management and is essential to the success of delivery strategies. In FY21, one third of all assurance review recommendations across all phases related to the Governance key focus area (compared with 18% FY20). See Figure 4.1.

Figure 4.1 – Ratio of critical recommendations by key focus area from Assurance reviews



The performance of risk management remained relatively stable during FY21, improving one place to be the second most significant cause for projects receiving a ‘low’ or ‘medium’ delivery confidence²⁶ rating. See Figure 4.2.

Figure 4.2 – KFA (Key Focus Area) rating for Low and medium project delivery confidence from Assurance reviews



26 Infrastructure NSW, Infrastructure Investor Assurance Framework, updated March 2021

Assurance reviews highlight that the methods of risk analysis differ among agencies and projects. This translates into variability in project risk allowances and the application of mitigation measures. As the volume of projects in development remains high and complexity continues to grow, the capacity constraints impact opportunities to proactively reform how risk is managed. Evidence-based risk allocation is a key theme in containing downstream litigations and claims. This requires Government to manage more risks and interfaces in-house and have robust governance and risk management systems in place across their portfolios.

Progress and opportunities

Progress

The underlying challenges associated with the governance and risk management themes remain, including the:

1. Appropriateness of team structures and availability of critical resources.
2. Effectiveness of governance frameworks and clarity of roles and responsibilities.
3. Capabilities to effectively identify and quantify key project and portfolio risks and the availability of critical information in a federated or integrated system with individual agencies.
4. Risk management practices to protect benefits realisation through the lifecycle.

Significant reforms were initiated to further improve the State Infrastructure Program performance in these areas including:

1. The implementation of the Oversight Framework²⁷ – The framework focuses on improving accountability and transparency in project oversight and decision-making; fostering a culture of collaboration and continuous improvement; establishing effective practices to monitor and evaluate financial reporting and performance; staff performance and decision-making effectiveness.
2. The design of new capital portfolio Assurance reviews – The new Assurance review focuses on assessing an agency’s capability and capacity to successfully deliver their portfolios. It is currently being piloted.

Example of progress includes:

1. **John Hunter Hospital expansion** – NSW Health and Transport for NSW inter-agency governance model to manage the interdependencies between the Newcastle Intercity Bypass and the John Hunter Hospital expansion. See Case Study 3.

27 Infrastructure NSW, Oversight Framework, updated May 2021

Opportunities

Despite the progress made to-date, the below opportunities remain to reinforce governance and risk management practices across Government:

1. Coordinate a cross-agency investment in a whole-of-government portfolio and project management system to homogenise how projects, programs and portfolios are managed in NSW. Most agencies identified this need individually and embarked on siloed procurements but a whole-of-government approach will realise significant cost avoidance. Most importantly, it will provide a unique opportunity to build capabilities through embedded common approaches, processes and policies. This will uplift the overall likelihood of project success while providing greater visibility across the system.
2. Develop guidance to link risk assessment methodologies with procurement and commercial strategies. Develop a consistent approach to the assessment and treatment of risks. This will facilitate the evidence-based risk allocation to inform procurement and contract-terms. Infrastructure NSW, in partnership with Treasury and industry, is working on the above.
3. Adopting the new cost control framework which encourages early identification of risk and associated mitigations. It promotes transparent reporting on the management of potential unknown impacts to improve risk management disciplines.
4. Further Infrastructure NSW's focus, through the gateway review and Cabinet reporting process, on reviewing and establishing major projects' and programs' governance structures. This is in accordance with the new terms of reference of the relevant Cabinet Committees.

John Hunter Health and Innovation Precinct



Description

The \$835 million expansion to the John Hunter and John Hunter Children's Hospitals in Newcastle will transform health care for the region, with a new Acute Services Building that will see a 60% increase in Intensive Care Unit capacity and almost 50% more theatres, interventional suites and procedural spaces. It will become the centrepiece of the John Hunter Health and Innovation Precinct (JHHIP) and be a key driver of economic growth in the region.

The project has been granted planning approval with appointment of a main works contractor on track for early 2022.

Alongside the JHHIP project, Transport for NSW recently called tenders to deliver a \$450 million extension of the Newcastle Inner City Bypass (the Bypass) to almost halve the number of vehicles each day from Lookout Road, Croudace Street and Newcastle Road – returning local roads to local residents and critically unlocking the potential of the JHHIP.

On completion it is forecast that 60% of traffic accessing the JHHIP will be serviced by the Bypass.

Key aspects of John Hunter Health and Innovation Precinct were identified as best practice examples including inter-agency governance, staff and community engagement and robust decision making. Key success factors include:

Inter-agency governance

NSW Health and Transport for NSW identified early that collaboration was critical to achieve the best outcomes for both projects. The project teams established joint governance arrangements which have enabled efficient management of interactions between their respective projects. Extensive consultation provided visibility between the projects across design, program, potential disruption, and community engagement. Both the hospital and the bypass are interdependent projects but not aligned programmatically. The inter-agency governance arrangements enabled mitigation of risks to ensure effective and coordinated delivery of the combined \$1.285 billion investment.

Staff engagement

Through the development of the JHHIP design, the project team has engaged with over 1500 staff members across a range of disciplines face-to-face and almost 14,000 electronically. This engagement has driven the successful development of designs for clinical, administrative, support and public areas as well as detailed engineering systems. It also ensures that the design meets users' requirements and that the transition to the new spaces will be effective and efficient.

Community engagement

Consultation and engagement have been central to the project from the outset.

It is the first Health Infrastructure development to have established an Aboriginal Design Group to ensure the design of the Precinct follows Designing with Country principles.

The team also commissioned the Hunter Research Foundation Centre at the University of Newcastle to undertake an independent Social Impact Assessment to understand the development's potential impact on natural, financial, human, social and manufactured capital in Newcastle and the Hunter region.

Over 1000 community responses were received providing direct input into the design, for example realignment of the road network to minimise potential vegetation clearing.

Robust decision making

The JHHIP project has implemented a comprehensive governance framework aligning with NSW Health Infrastructure's standard governance approach. Key stakeholders and decision makers from the John Hunter Hospital, John Hunter Children's Hospital and Hunter New England Local Health District representatives are broadly represented across all consultation groups and project governance.

Outcome

Benefits derived from inter-agency governance have enabled interdependent projects to now be aligned programmatically, inclusive of investment decision, procurement and delivery milestones. The JHHIP and Bypass projects are well placed to successfully deliver coordinated critical infrastructure for the Newcastle, Hunter and New England regions.



Glossary

Trends and Insights 2021 Report Glossary

Term	Definition
Assurance review	Refers to gateway, health checks and deep dive reviews.
At risk	Project with a red RAG status in either cost or time.
Cluster agency	The lead Government agency tasked with developing and/or delivering a project applicable under this framework and the NSW Gateway Policy.
Delivery confidence	The assessment of the project performance against 7 key focus areas during reviews. Delivery confidence is rated as either high, medium or low.
ETC	Estimated total cost.
Health checks	Independent reviews carried out by a team of experienced practitioners seeking to identify issues in a project/program which may arise between gateway reviews.
HPHR	High profile high risk.
HPHR projects	High profile high risk projects. These are also classified as Tier 1 projects.
IIAF	Infrastructure Investor Assurance Framework.
Key themes	Key topics highlighted during assurance reviews. Key themes are categorised when review recommendations are made.
KFA	Key focus area.
KFA requirements	189 requirement statements assessed by expert reviewers during Reviews across the Key Focus Areas. The requirements are assessed as either Yes, No or Partial assessment in meeting the requirements.
Megaprojects	Projects with an Estimated Total Completion (ETC) of \$1 billion or more.
Mitigation measures	Feasible measures, actions, or features that are to be incorporated into the project in order to avoid or substantially reduce the project's significant risk impacts.
NSW Gateway Policy	The NSW Gateway Policy sets out the key points along the project lifecycle important for providing confidence to the NSW Government that projects are being delivered to time, cost and in-line with government objectives.
Periodic reporting	Monthly reports submitting by agencies to Infrastructure NSW providing project updates. Periodic reporting is completed monthly for Tier 1 projects and quarterly for Tier 2 and Tier 3 projects.
Phase	The phase of a project in its lifecycle. Project phases include needs confirmation, needs analysis, investment decision, procure, deliver and initial operations, and benefits realisation.
Portfolio	The totality of an organisation's capital investment program.

Term	Definition
Project tiers	Tier-based classification of project profile and risk potential based on the project's estimated total cost and qualitative risk profile criteria (level of government priority, interface complexity, procurement complexity, agency capability and whether it is deemed as an essential service). The project tier classification is comprised of 4 project tiers, where Tier 1 encompasses projects deemed as being the highest risk and profile (Tier 1 – high profile/high risk projects), and Tier 4 with the lowest risk profile.
RAG status	A traffic light system of red/amber/green highlighting the risk status of projects being on-track, at risk or not on track.
Reviews/gateway reviews	A review of a project/program by an independent team of experienced practitioners at a specific key decision point (Gate) in the project/program's lifecycle. A gateway review is a short, focused, independent expert appraisal of the project that highlights risks and issues, which if not addressed may threaten successful delivery. It provides a view of the current progress of a project and assurance.
Root cause	The primary causes of risk on projects as identified through assurance reviews and periodic reporting.
State	State of New South Wales.
State Infrastructure Program	The total NSW state capital infrastructure investment across all government agencies.

