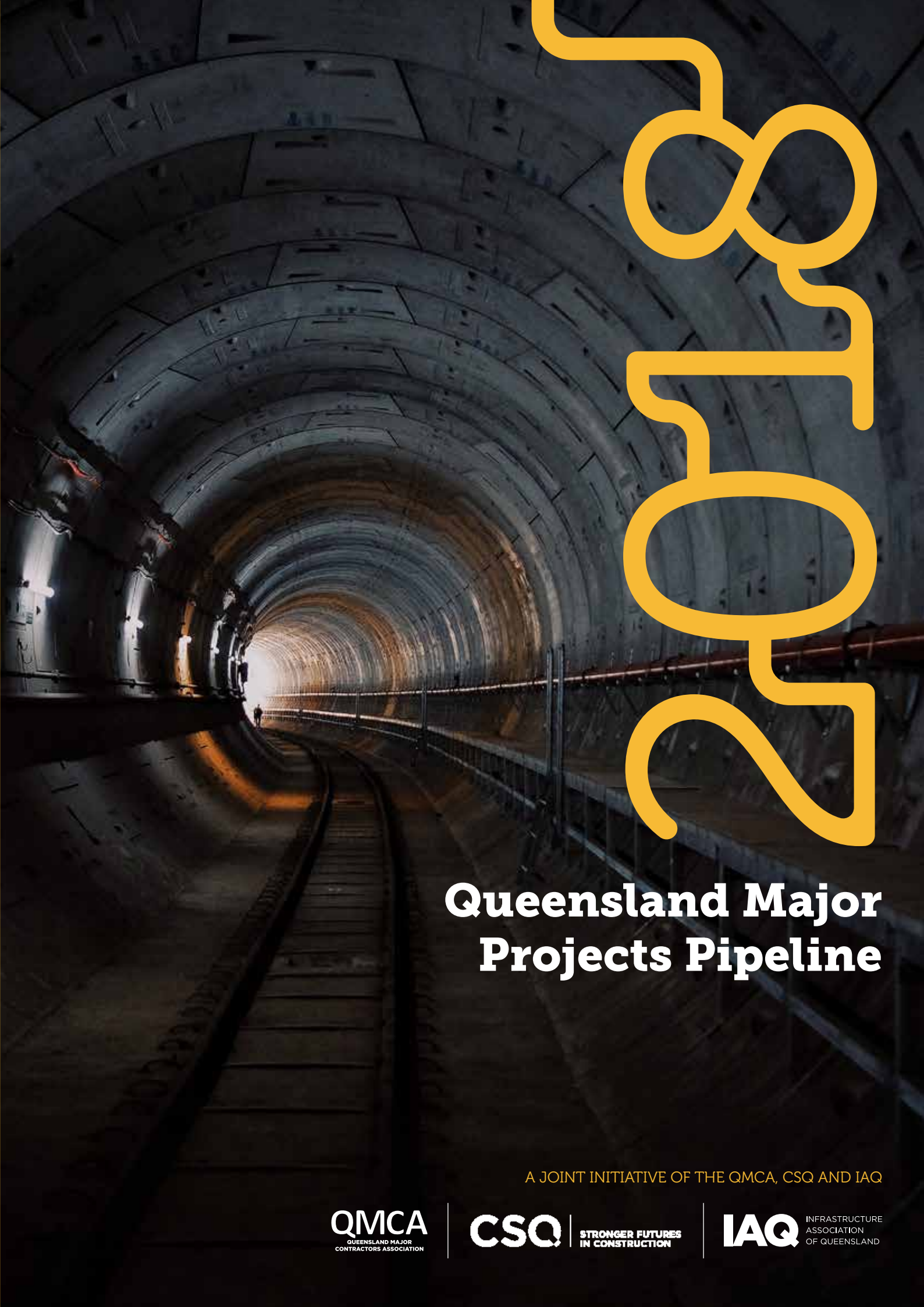


2018

Queensland Major Projects Pipeline

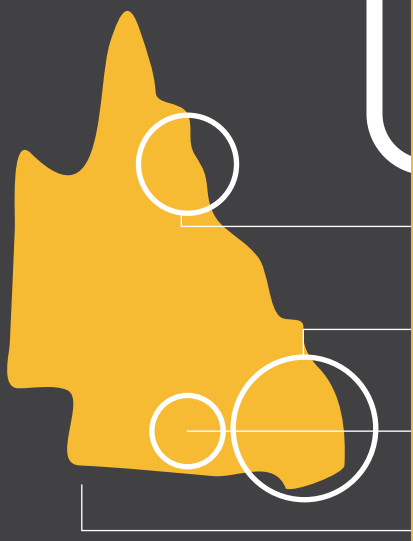
A JOINT INITIATIVE OF THE QMCA, CSQ AND IAQ

QMCA QUEENSLAND MAJOR CONTRACTORS ASSOCIATION | CSQ STRONGER FUTURES IN CONSTRUCTION | IAQ INFRASTRUCTURE ASSOCIATION OF QUEENSLAND

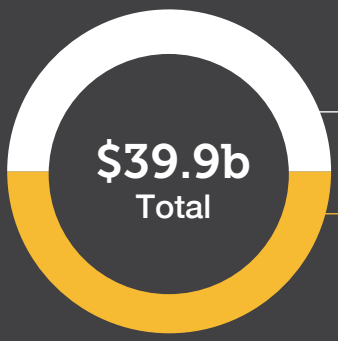
AT A GLANCE

Total Pipeline Value
$39.9b

Major project activity



Funding split



$20.2b
Public Projects

$19.7b
Private Projects

Major Projects Pipeline – Breakdown

$39.9 billion total (over 5 years)

Unlikely
33
projects valued at
$6.9b

Prospective
43
projects valued at
$5.1b

Credibly proposed
22
projects valued at
$4.1b

Unfunded $16.1 billion

QMCA | CSQ | IAQ

Scale of Recurring Expenditure

$7.9b per year

$21m per day

$2.1m per working hour

$152m per week

Major Projects Jobs

The funded pipeline will support
12,700 workers
each year on average

Fully-funding the pipeline will support an extra
4,700 workers
each year on average

- **$8.2b** North Queensland
- **$13.6b** South East Queensland
- **$3.8b** Surat Basin
- **14.3b** Various

Announced
22
projects valued at
$5.3b

Under procurement
12
projects valued at
$4.1b

Under construction
58
projects valued at
$14.4b

Funded $23.8 billion

CONTENTS

FOREWORD

We are proud to introduce the 2018 Queensland Major Projects Pipeline Report to you – an initiative of the Queensland Major Contractors Association (QMCA), Construction Skills Queensland (CSQ) and the Infrastructure Association of Queensland (IAQ).

Nowhere else in Australia do industry peak bodies consult so closely with governments, government-owned corporations and private sector proponents to accurately chart the status of all major projects in their home state. The fruit of this approach is an authoritative report which describes the scale, timing and location of all major engineering projects being considered or developed in Queensland.

Sincere thanks to our partner BIS-Oxford Economics for their expert guidance, compilation of the project listings and the detailed independent analysis that underpins the report. This year, we have increased our investment in the report format to enhance reading experience and improve access to key report data through a dedicated website. The new design and look of this report is a statement of confidence in the future of our partnership and the continued relevance of our report to industry for years to come.

For infrastructure designers, contractors and other project participants, this report is an indispensable business planning tool, capable of guiding well-informed decisions to participate in chosen market sectors and geographic regions.

For governments, the consolidated picture of state wide major project activity in the next four years can help guide policy formation, unlock the potential for private sector partnerships and leverage capital works investment.

The greatest threats to a sustainable pipeline of projects are the identification of investable projects, availability of funds and timely investment decisions. This year's report highlights much lower levels of private sector investment than previous years, with $9.4 billion of projects classified as only prospective or considered unlikely to receive funding. Until positive business cases and investment decisions are made, mining and industrial projects such as those in the undeveloped Galilee Basin remain at risk. The value of public sector projects which have positive funding announcements or are currently under procurement outstrips the private sector. The report also forecasts a significant 72% reduction in private sector mining and heavy industry projects in the next five years compared to the last. The ability of governments to identify and deliver on their planned infrastructure has therefore assumed even greater importance to the continued short-term sustainability of the major projects contracting sector.

Queensland is a decentralised and vast Australian state which requires continued investment in infrastructure by both public and private sectors to meet demands of a growing population and increase our global competitiveness. Experience from successful countries and jurisdictions around the world show that when public and private sectors face infrastructure challenges together, the public and economy are the big winners. Perhaps the real worth of our report is that it sends a strong signal to potential infrastructure investors that a highly motivated engineering sector exists, with contractors and service providers eminently capable of preparing for and delivering world class major projects.

As industry peak bodies we are committed to promoting Queensland as a world leading destination for economic development and new infrastructure investment. We look forward to working with all our stakeholders in 2018 to grow the pipeline of major projects in our great State.

Peter Anusas
President
Queensland Major Contractors Association

Brett Schimming
Chief Executive Officer
Construction Skills Queensland

Steve Abson
Chief Executive Officer
Infrastructure Association of Queensland

EXECUTIVE SUMMARY

Welcome to the second Queensland Major Projects Pipeline Report (the Report) developed by the Queensland Major Contractors Association (QMCA), Construction Skills Queensland (CSQ) and the Infrastructure Association of Queensland (IAQ). During this period, Queensland experienced a substantial boom and bust cycle in construction activity and major project work.

The key finding of this Report is that major project work has risen by 58% in 2017/2018 to $6.9 billion after two successive years of low activity. Subject to level of funding commitments for 22 credibly proposed projects, activity in 2018/2019 is forecast to be retained at a similar level. However, recovery in activity may be short-lived and decline again in 2019/2020 due to an identified lack of viable replacement projects.

Maintaining recent momentum is therefore the core challenge facing the state, requiring a range of initiatives to improve levels of funding for infrastructure, ensure capability and capacity to manage a growing pipeline and, fundamentally, provide positive conditions and frameworks that support the economy's growth engines: public and private investment. Given rising major project activity in other states, and the need to provide infrastructure to meet growing demand in Queensland, governments need to consider how they can raise additional funding for infrastructure projects, accelerate existing projects or stimulate private investment. Maintaining a stable and mildly growing pipeline of major project work from here will not only support economic growth and the sustainability of the major projects industry, but importantly will likely cost the government much less than if the projects were undertaken later in the cycle or in a more heated environment.

Industry can feel more confident about investing in new equipment, productivity enhancing initiatives and skills development if they are given reasonable lead times to prepare in the form of a clear, long-term major projects pipeline – and if governments and procuring agencies implement supportive policies.

This year's Report provides a comprehensive list of major project work, together with analysis on the corresponding level of construction activity this entails and the subsequent demand for skilled construction labour. This analysis is based on both the completion of existing projects and the likelihood of potential projects proceeding. A complete list of major projects considered for this analysis, and the explicit assumptions for each project regarding work done and construction workforces employed each year, are provided in the Appendix at the end of this report.

As well as presenting the pipeline, the Report discusses the key economic settings where major project activity is taking place, for Queensland and Australia, together with global trends.

Given rising major project activity in other states and the need to meet growing demand in Queensland, governments need to consider how they can raise additional funding for infrastructure projects, accelerate existing projects or stimulate private investment

KEY FINDINGS

- **The total value of 190 projects identified in the 2018 pipeline is $39.9 billion** (Engineering Value), compared to 166 projects valued at $39.1 billion in the 2017 pipeline. However, the value of funded work in the pipeline is only $23.8 billion, with 98 public and private projects still awaiting funding commitments.

- **New public and private investment** – including projects in the Major Projects Pipeline – is having a broader, stimulatory effect on the Queensland economy.

- **Public and private sector investment** – focused in roads, rail, telecoms and electricity – is driving the current recovery in major project work.

- **While major project activity has risen from the 2016-2017 trough** – the main challenge will be keeping activity at sustainable levels into the future given the weak outlook for currently funded work (Figure 1).

- **The value of public sector projects that have funds committed** or are currently under procurement now outstrip the private sector by a factor of 6 to 1. The ability of governments to identify and deliver on their planned infrastructure has therefore assumed even greater importance to the continued short-term sustainability of the major projects contracting sector.

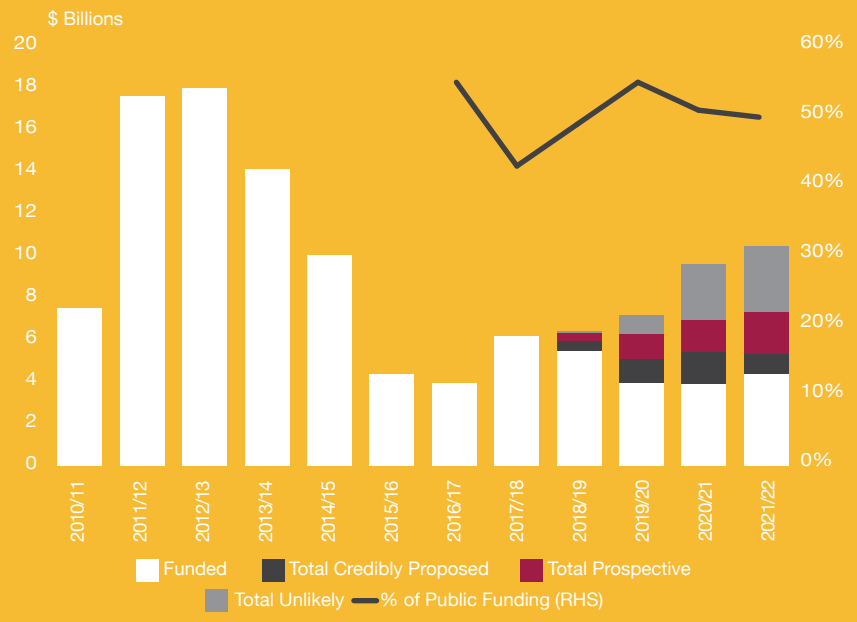
- **Northern Queensland has the strongest growth** prospects in the pipeline for all regions (including funded and unfunded work) compared to the past five years, but South East Queensland still commands the largest share of major projects activity (Figure 3).

- **Queensland still lags New South Wales and Victoria** in terms of funding and delivering infrastructure. As New South Wales and Victoria further ramp up infrastructure investment over the remainder of this decade, challenges may re-emerge in procuring construction services in Queensland. This is a challenge that will be compounded not only by digital disruption but by Queensland's and Australia's changing demographics – and in particular the ageing of the workforce, as identified in the workforce implications section of the Report.

17%
of the overall project pipeline ($6.9B) is **unlikely to proceed**

Figure 1

Major Projects Work Done: All Segments



The total value of 190 projects identified in the 2018 pipeline is **$39.9b**

Figure 2 – Outlook by Sector

Total Pipeline of Work Over the Next Five Years

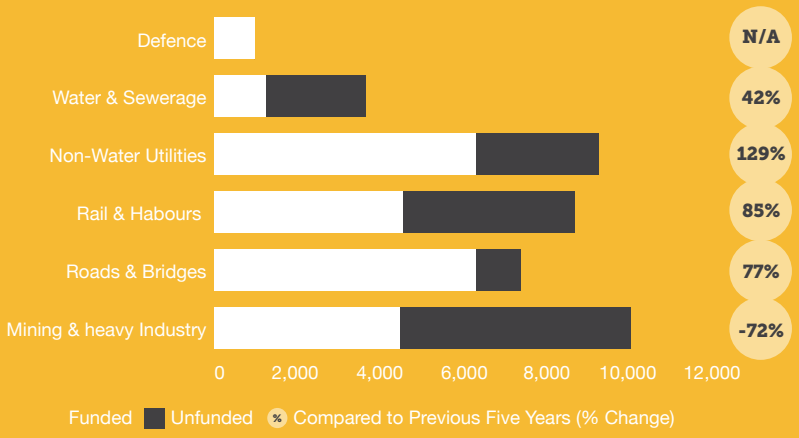


Figure 3

Outlook by Region Over the Next Five Years

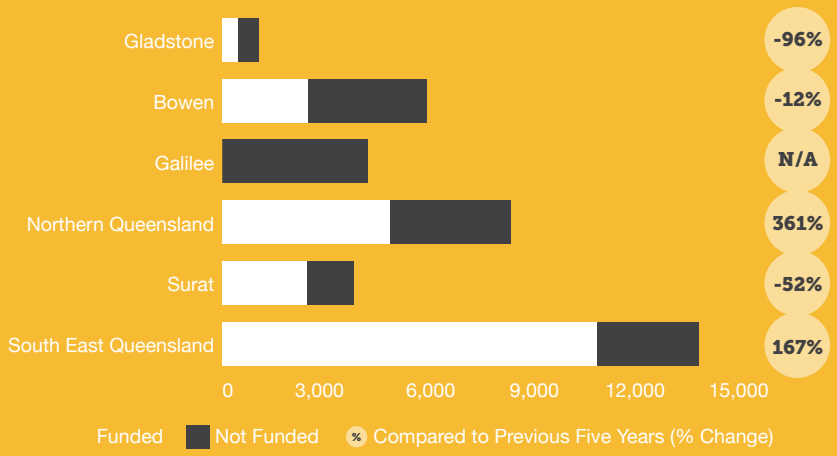
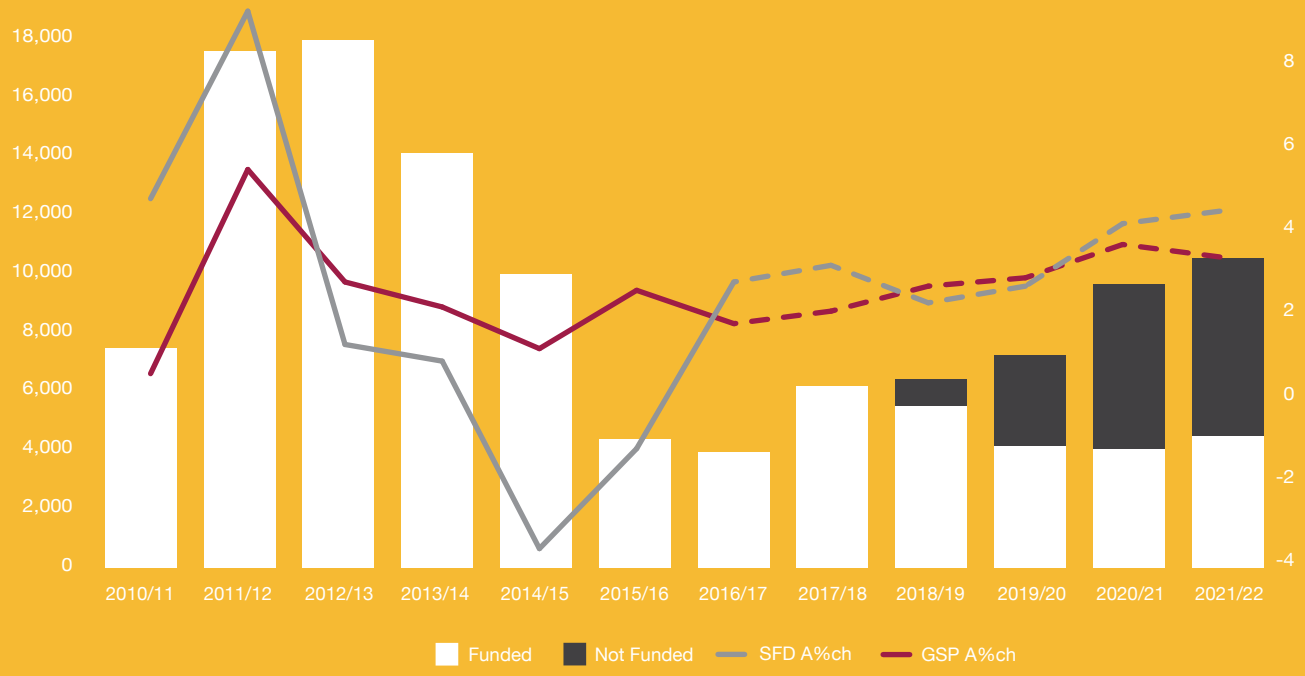


Figure 4

Major Project Work Done and Queensland State Economic Performance



LONG-TERM CHALLENGES AND RECOMMENDATIONS

While investment in major engineering projects has improved in Queensland, the general outlook for growth in investment, employment and the broader economy is not exactly spectacular. Rather than the high growth rates experienced during much of the 1990s and 2000s, economic growth (as captured by Gross State Product or GSP) is expected to average around 2.8% per annum through the next five years, with Queensland State Final Demand (SFD) growth averaging a slightly better 3.3% per annum. Historically, Queensland has significantly outperformed the Australian economy, however the next five years only sees very marginal outperformance overall.

It's unsurprising that there is a correlation between major project work done and Queensland's economic performance – with the latter represented by growth in SFD and GSP. Major project work has strong multiplier impacts on the economy, particularly when it uses local labour and resources. Essentially, additional major project work requires other industries to boost their outputs also – both directly to service the initial increase in construction output, and then indirectly to satisfy the subsequent expansion in the other industries. The overall gross multiplier (or total direct requirement) for heavy and civil engineering construction is over two, suggesting that every dollar increase in major project work "requires" an overall boost of over two dollars across the broader economy.

Apart from the short-term impacts, investment in critical infrastructure major projects can also boost long-run economic growth by improving productivity (e.g. reducing transport times and costs). This boosts the economy's "speed limit" before it runs back into capacity constraints.

Overall, sustaining growth in the Queensland economy requires putting into place plans and policies that will encourage and sustain both public and private investment in the state over the long-term. This means addressing funding issues highlighted in the 2017 Major Projects Pipeline Report, continuing to develop new productive infrastructure projects, and providing a supportive environment for privately funded projects to proceed.

Port Drive upgrade

There has been a 64% reduction in credibly proposed projects from $11.5 billion identified in our 2017 Report to just $4.1billion in this year's Report, which indicates challenges to sustaining major project work at 2017/2018 levels over the next two years. In the short-term, funding for $4.1 billion of credibly proposed projects is required and detailed business cases are needed to further support $5 billion of prospective project investment decisions.

Over half of the private sector projects identified in the Pipeline are either Prospective or unlikely to receive funding approval in the medium term. This is leading to a distinct lack of replacement projects for those currently under construction and is skewing the investable project ratio towards public sector projects. The challenge is to understand the barriers that are preventing greater private investment in existing or new private infrastructure – be that regulation, approvals, risk on financial return, perception of sovereign risk or confidence in the long-term outlook for the region.

Meeting the infrastructure challenge requires all levels of government to develop policies that align their infrastructure priorities and streamline approval of their project funding co-contributions. This is particularly important in Queensland as the split in policy between Commonwealth and State on long-term asset leasing and capital recycling means using this option to raise infrastructure funding is not possible in the medium term, unlike the high-growth states of New South Wales and Victoria. Policies are also required that encourage private sector proponents to invest in their existing infrastructure while attracting new investment to Queensland.

Encourage the adoption of new technologies that increase the productivity of the construction industry

There are initiatives that governments can undertake to boost their funding capability and deliver the infrastructure Queensland requires, including:

— Continue to mature the development of independently prepared business cases and ensure that public infrastructure projects are selected through transparent cost benefit analysis (CBA). To ensure continued regional investment, regional projects in existing areas or networks with low populations or relatively low initial demand may require more careful consideration of business case benefit-cost-ratios of less than 1, taking a longer term and wider view of the project benefits.

— Improve identification of specific markets, networks or regions where privately-led infrastructure proposals can provide critical infrastructure. For different reasons, the State-sponsored Market-led Proposal initiative and the Commonwealth-sponsored Northern Australia Infrastructure Facility initiative have yet to stimulate substantial increased economic investment and major project activity. Rather than await proposals, the formulation of specific prospectus by government that invite interest in developing desirable infrastructure may assist both international and domestic private investors to actively participate.

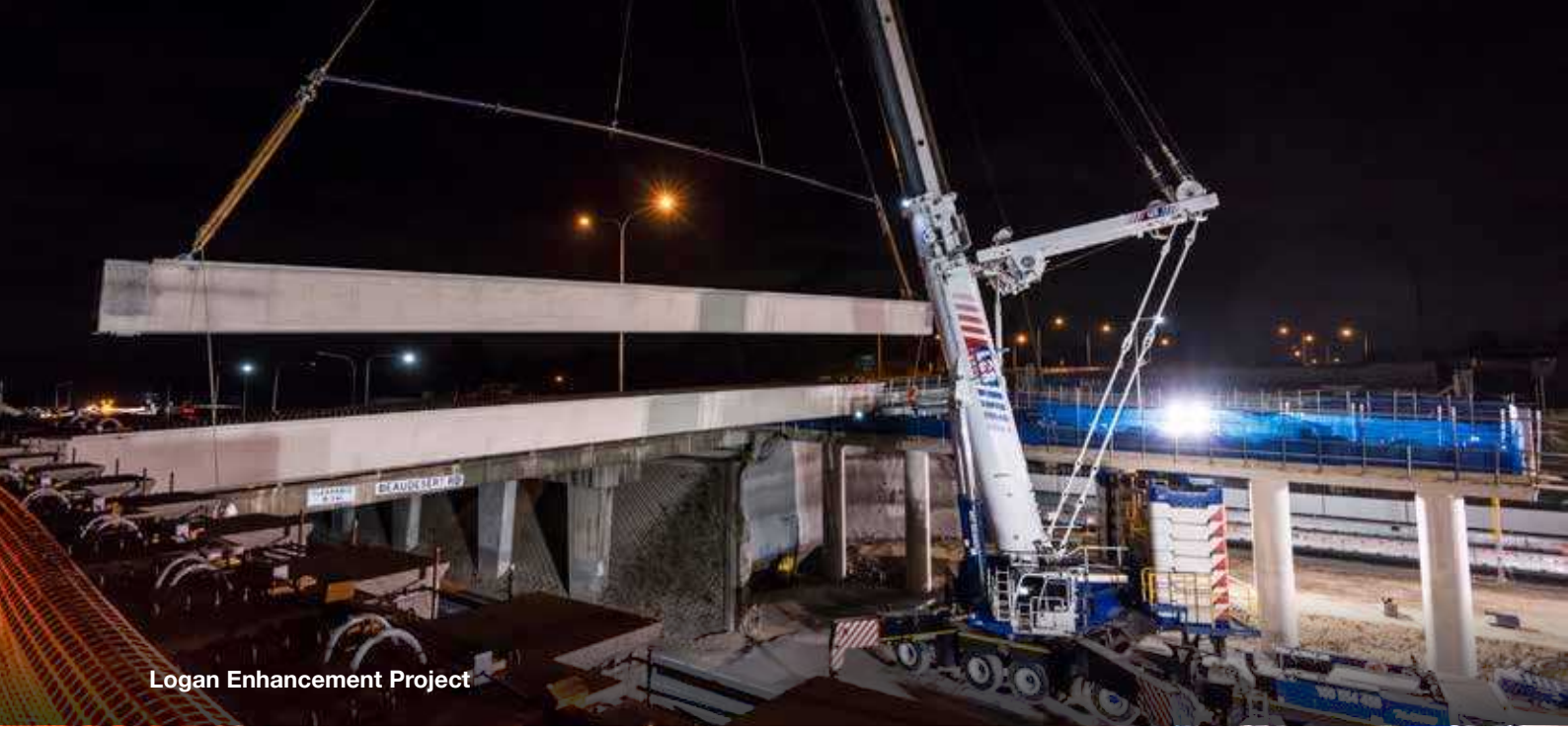
— Provide increased certainty of long-term Commonwealth funding streams through expanding the number of City Deals. The Townsville City Deal struck in December 2016 was the first in Australia and an important start. A South East Queensland (SEQ) Regional City Deal has the potential to be the foremost City Deal in the nation involving eleven separate Councils. This second generation City Deal can provide a structured, coordinated plan for the long-term funding of SEQ infrastructure by all tiers of government.

— Research, identify and work to remove barriers to private sector infrastructure investment. The current value of funded private sector projects announced or being procured is less than 20% than those funded by the public sector. This indicates a significant skew from the historical average of 50-50 public-private investment in major engineering projects.

— Do not rule out infrastructure debt for capital investment. In the right circumstance where productive economic infrastructure is identified through an independent business case, increased debt funding can have a powerful impact on economic growth.

— Provide increased certainty of Commonwealth and State contributions to funding of transport projects on the National Land Transport Network. Since last year's Report, there have been further public disagreements by the respective governments on major contributions towards funding major projects on the M1 motorway and Cross River Rail. This decreases confidence and leads to uncertainty of the transport projects in the Pipeline.

— Maintain strong oversight and monitoring of government capital works expenditure and breaking the underspend pattern on planned infrastructure investment. As highlighted in the previous Report, there continues to be sharp differences in planned public investment (measured as 'purchases of non-financial assets' in various Budgets) and actual spending outcomes. The 2016/17 State Budget, for example, planned for $8.3 billion in such investment, which the recent 2017 Mid-Year Fiscal and Economic Review (MYFER) confirmed to be $7.3 billion – around a $1 billion shortfall.



Logan Enhancement Project

The existence of a highly skilled and efficient engineering and contracting market in Queensland can help to stretch tax-payer funds and attract private sector proponents looking to develop low-cost infrastructure and exploit global markets. For these reasons governments, private sector proponents and major project participants could collectively explore how to drive out waste, improve productivity and improve project risk allocation through the following:

— Utilise accurate capital planning, state infrastructure plans and long-term project pipelines such as in this Report to give industry the best possible chance of participating in major projects.

— Increase collaboration between infrastructure developers and the construction industry, through the use of contract forms that seek to maximise value through reduction in waste, reward innovation, lead to genuine improvements in productivity and best allocate risk.

— Increase efficiency in procurement of infrastructure projects through use of more selective and collaborative tender processes that recognise the significant cost involved in bidding for large infrastructure projects (costs that ultimately need to be recovered either through direct reimbursement or mark-up).

— Strengthen the focus on workforce planning and skills development initiatives so that demand for key onsite skills can meet the infrastructure activity.

— Develop and maintain a plan for construction materials so that the demand and supply balance for scarce products can be quantified, mapped and emerging gaps identified early in the process. Similarly, attention needs to be focused on the development and maintenance of a construction transport and logistics plan to avoid bottlenecks, delays and rising costs for construction materials as a result of congested road transport networks.

— Encourage the adoption of new technologies that increase the productivity of the construction industry. These can include offsite modular construction, automation, digitisation, use of Building Information Modelling (BIM) to enhance supply chain collaboration and investigate better forms of knowledge transfer.

— Encourage the development of formal dispute avoidance strategies that include the use of effective collaboration to develop construction price certainty and allocate project risk using best practice.

ECONOMIC OUTLOOK

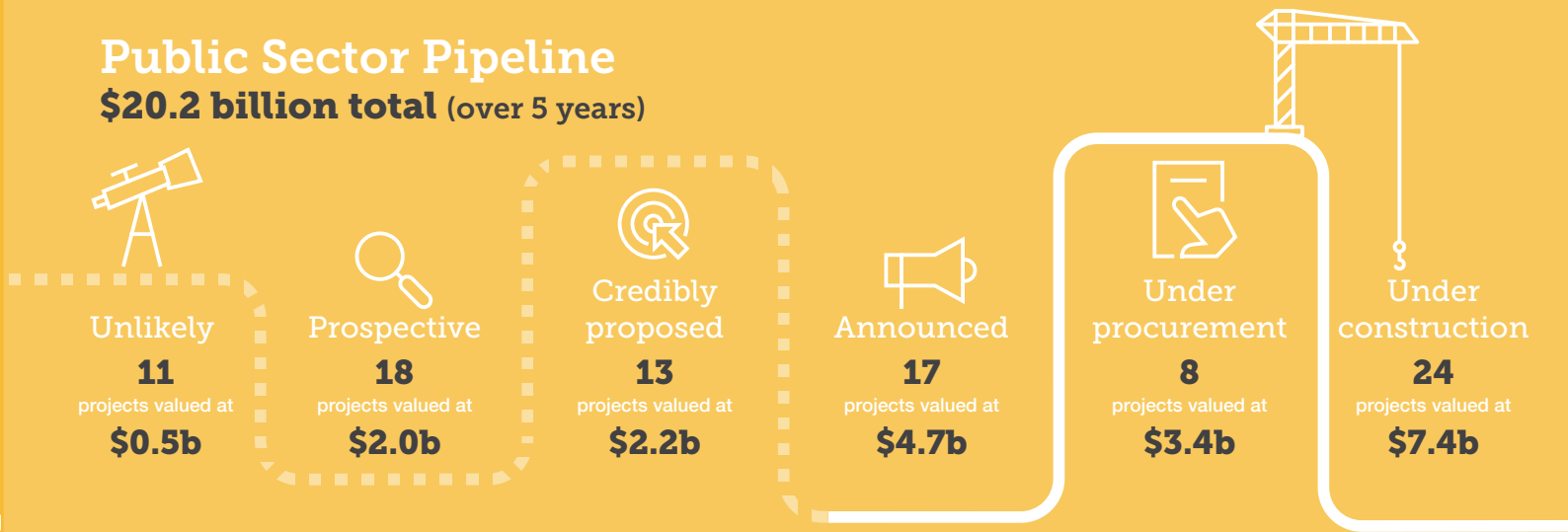
Population growth is among the highest of the developed economies, which has helped underpin household consumption and demand for dwelling and infrastructure construction

Differences in the timing and magnitude of investment cycles by region are creating large differences in economic performance (and construction activity) by state

Further declines in bulk commodity prices are anticipated, before a longer term recovery, affecting Queensland royalty revenues

Public Sector Pipeline

$20.2 billion total (over 5 years)

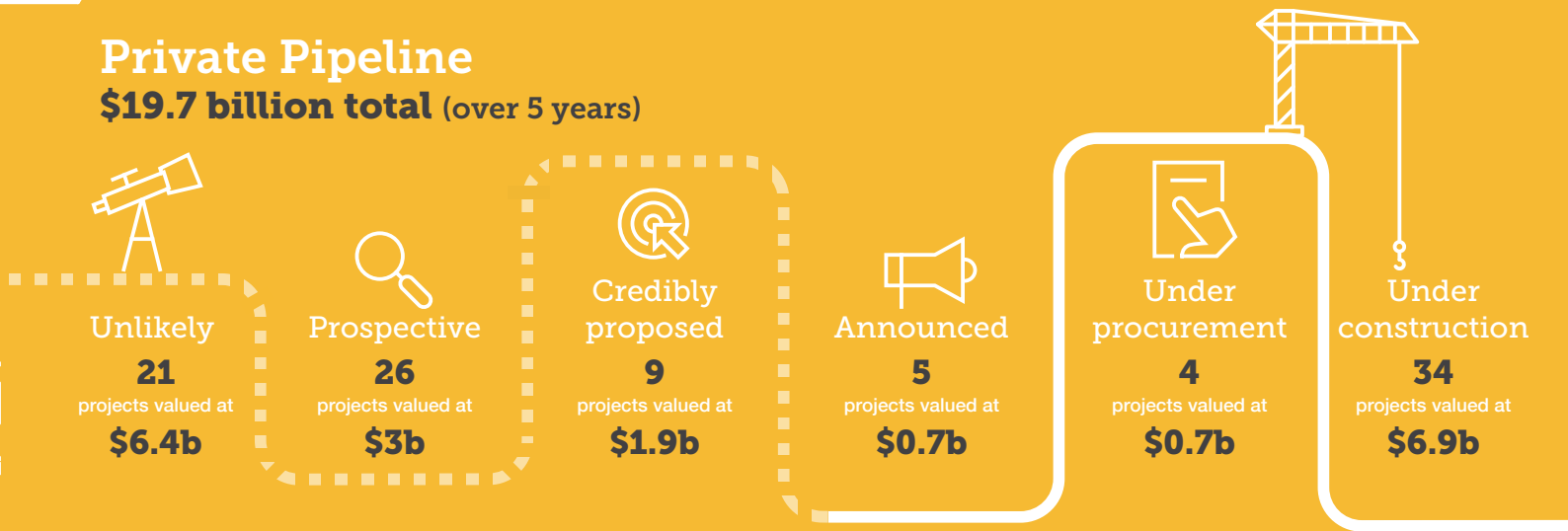


Unfunded $4.7 billion

Funded $15.5 billion

Private Pipeline

$19.7 billion total (over 5 years)



Unfunded $11.4 billion

Funded $8.3 billion

ECONOMIC OUTLOOK

The Queensland economy has traditionally been one of the stronger state performers in Australia but has been suffering the effects of a prolonged downturn in public and private investment.

While one of Australia's key 'resources' states – and one of the largest exporters of coal (and now gas) – the State economy remains highly diversified and increasingly linked into global trade networks through tourism, agriculture and education industries. Mining investment is at a trough and rising non-mining investment and service credits will help offset expected falls in private dwelling investment.

Key points:

- Global economic growth is predicted to strengthen in 2018, before moderating in the longer run. World Gross Domestic Product (GDP) growth has risen from 3.2% in calendar 2016 to 3.7% in 2017 and is forecast to rise to 3.9% in 2018. From 2019, the world economy will begin to show gradually slower growth, linked to long-term fundamentals, with growth forecast to average 3.3% over the five years to 2027.
- Global prices for a number of commodities are expected to retreat over 2018, before slowly recovering over subsequent years as the global oversupply in a number of commodities dissipates. Bulk commodity (coking coal and iron ore) prices rebounded in 2016/17 but have come down from recent peaks – though they are still well above the trough in early 2016. Prices are set to consolidate in the near term for most other commodities but rise in the medium to longer term supporting Australian producers.
- Australia's annual GDP growth is forecast to remain around 2.5% for the next three years. GDP will be boosted by net exports, with solid growth in export volumes forecast. Underpinning this will be healthy global growth (which will drive demand for services exports), new Liquefied Natural Gas (LNG) capacity, and moderate growth in capacity in other key commodities. Rural and manufacturing exports are also expected to contribute, with both sectors taking advantage of Australia's comparative advantage in high quality, high value-added output.
- Queensland's economic growth (as measured by Gross State Product or GSP) slowed marginally in 2016/17 to 1.8% following 2.6% growth in 2015/16. This mild deceleration was driven by a slowdown in housing investment combined with the continued fall in non-dwelling mining construction. Yet these declines were offset by growth in exports as LNG production ramped up in conjunction with rising service credits (tourism).
- Queensland State Final Demand (SFD) rose in 2016/17 after two years of decline. Over the past year, growth in SFD has been underpinned by modest growth and contributions from household spending, business equipment purchases, government recurrent expenditure and dwelling investment, although growth in dwelling investment has slowed sharply over recent quarters after strong growth over the previous four years.
- Employment growth gained momentum, pushing the unemployment rate down to 5.2%. Annual employment growth is now over 4%, on-trend with the bumper jobs growth seen at the national level over the same period. The employment participation rate has also gradually improved, reaching over 65.5% for the first time since February 2016, significantly improving the health of the labour market.
- The worst of the mining investment slump has now past and Queensland's economy is forecast to slowly pick up over the next two to three years despite a downturn in residential construction. Growth in SFD, GSP and employment are all forecast to be similar to the national average over the next few years, although state economic growth will remain well below historical averages of over 4% per annum (for SFD and GSP).

Despite the rising risks, the global economy is still positive for Queensland

While there is no shortage of commentary surrounding the risks inherent in global economic growth – ranging from the sustainability of Chinese growth and resilience of its financial system to the effect and impact of new trade sanctions – the fact remains that economic conditions on the ground have improved in the US and across Queensland's major trading partners.

World GDP growth was robust in calendar 2016 (reaching 3.2%) and growth accelerated to 3.7% through calendar 2017. Growth is being supported by rising manufacturing activity and global trade flows. Developed economies are leading the way for the first time in a decade. From 2019 onwards, the world economy is expected to slow somewhat, linking once again to long-term fundamentals (falling population growth and structurally slower productive gains), but it is still expected to average 3.5% per annum over the five years to 2022.

Australia's trading partner growth (weighted by export proportions) will grow at a faster rate of 3.8% over the next five years, due to the high weights of China, East Asia and India in Australia's export mix. Although these economies will experience slower growth going forward, they are still expected to outpace the global average. In the US, business investment is forecast to accelerate, driven by improving domestic demand and export gains from a more competitive US dollar and a stronger global climate, rebounding energy sector activity and corporate tax cuts.

Figure 5

Economic Growth by Region and Country

	Real GDP/GNP#							
Year Ended December	OECD (1)(4)	US	Japan	Euro area	China	India	Other East Asia(3)(4)	World GDP(4)
2008	0.2	-0.3	-1.1	0.4	9.6	6.2	7.7	3.0
2009	-3.5	-2.8	-5.4	-4.3	9.5	5.1	4.4	-0.5
2010	3.0	2.5	4.2	2.1	10.6	10.9	4.8	5.3
2011	2.0	1.6	-0.1	1.7	9.5	6.9	4.3	4.1
2012	1.4	2.2	1.5	-0.4	7.8	5.5	4.2	3.3
2013	1.5	1.7	2.0	0.3	7.8	6.2	3.8	3.4
2014	2.2	2.6	0.3	1.8	7.3	7.1	4.0	3.5
2015	2.5	2.9	1.4	2.2	6.9	7.5	4.5	3.2
2016	1.8	1.5	0.9	1.9	6.7	7.9	4.3	3.2
2017	2.5	2.3	1.8	2.4	6.9	6.2	4.2	3.7
Forecast								
2018	2.5	2.8	1.7	2.2	6.4	7.5	4.1	3.9
2019	2.0	2.0	0.9	1.8	6.0	7.0	4.0	3.6
2020	1.6	1.5	0.0	1.6	5.7	6.9	4.0	3.5
2021	1.6	1.5	0.9	1.5	5.4	6.6	3.9	3.4
2022	1.6	1.5	0.9	1.4	5.2	6.4	3.8	3.3
Average Growth Rates								
2003–2007	2.8	2.9	1.7	2.5	11.7	8.6	4.5	4.9
2008–2012	0.6	0.7	-0.2	-0.1	9.4	6.9	5.1	3.0
2013–2017	2.1	2.2	1.3	1.7	7.1	7.0	4.2	3.4
Forecast								
2018–2022	1.9	1.9	0.9	1.7	5.7	6.9	4.0	3.5
2023–2027	1.5	1.6	0.5	1.2	4.7	6.2	3.6	3.3

(1) Organisation for Economic Co-operation and Development: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

(2) Euro area: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, Spain.

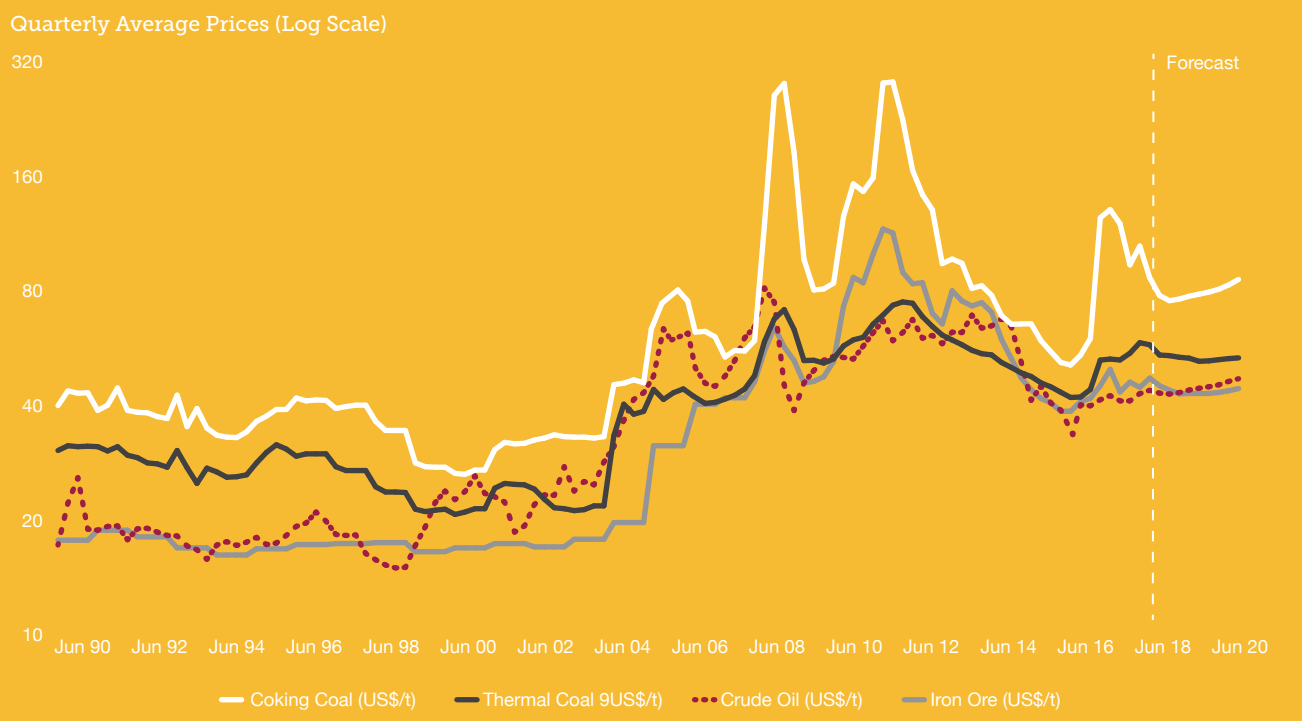
(3) Other East Asia: Indonesia, South Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Vietnam.

(4) 2017 is an estimate.

(5) Trading partner countries include: China, Japan, Hong Kong, United States, New Zealand, India, Europe and Other East Asia.

Annual Per Cent Change.

Figure 6 – Commodity Prices ($US)



Source: BIS Oxford Economics, BREE data

The combination of solid increases in employment and improved (although still moderate) wage growth should drive higher household incomes, consumer spending and residential investment.

Meanwhile, the Eurozone is expanding at the fastest pace in a decade. Firming domestic demand is driving the economy, with investment recovering and weaker inflation, strong consumer confidence and employment supporting household spending. The overall Eurozone unemployment rate is at a nine-year low.

Japan is expected to benefit from ongoing monetary and fiscal stimulus, including a delay in a sales tax hike in response to ongoing weakness in private demand growth. Meanwhile, China, while gradually slowing, is still the world's largest economy and will continue to make significant contributions to global growth. India and ASEAN-5 (Indonesia, Philippines, Malaysia, Thailand and Vietnam) GDP growth is expected to pick up pace over the next two years while Russia and Brazil – currently in recession – are expected to recover from 2017 adding to world growth.

Further declines in bulk commodity prices are anticipated, before a longer term recovery, affecting Queensland royalty revenues (and impacting on the Australian dollar)

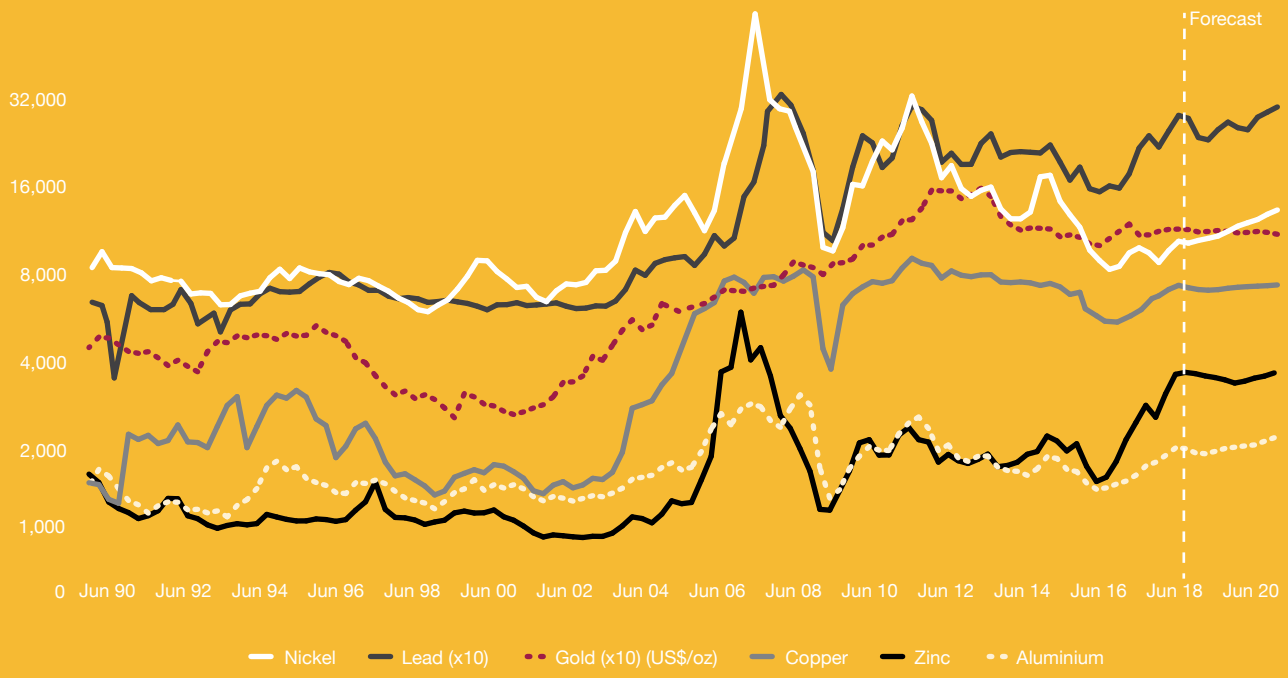
After recording strong gains from supply side concerns, coking coal prices are forecast to fall over the next two years driven by both increased coking coal production in China and a return to average (normal) production levels in Australia. A sustained recovery is forecast from early next decade as global growth builds momentum against constrained supply, and as the path of development in emerging economies becomes more steel intensive. For thermal coal, prices are still elevated, although a correction is expected over 2018 and 2019 as 'one-off' recent price drivers dissipate and markets come back to balance. A modest price recovery is forecast from next decade as demand is expected to outweigh supply.

Queensland – and Australia more broadly – continues to be well positioned to supply commodities

A combination of geographical proximity to Asian demand centres, favourable policies, supporting infrastructure, being at the lower end of the cost curve for several commodities, and high quality / low impurity content of mineral endowments will all support future exports from Australia. This will help counter the negative effects of several mines reaching their end-of-life and the possibility of discovering lower quality ore body during exploration. However, lower prices for coal, if realised, present a risk to state government royalties. To some extent however, the fall in commodity prices (combined with rising interest rates in the US) is also likely to keep the Australian dollar below recent highs, which will help offset lower US-dollar commodity prices – and also provide a boost to Queensland's trade exposed industries.

Figure 7 – Commodity Prices ($US)

Quarterly Average Prices (Log Scale)



Source: BIS Oxford Economics, BREE data

Offsetting investment cycles keep the Australian economy subdued

The Australian economy has strong fundamentals, now enjoying 27 years of uninterrupted growth since the 1990/91 recession. Population growth is among the highest of the developed economies, which has helped underpin household consumption and demand for dwelling and infrastructure construction. Government debt is comparatively low by global standards, with the Federal Government and the larger state economies of New South Wales and Victoria maintaining AAA credit ratings. Overall economic risks are low and the Australian economy is well situated in the fast growing Asia Pacific region.

Nevertheless, growth in GDP and particularly domestic demand has been lower over the past five years than the previous two decades.

The main factor dragging down growth has been a major decline in mining investment, which has coincided (and contributed to) weakness in non-mining business investment.

The shift in the Australian economy back to broad-based growth following the mining boom continues to progress slowly. Growth is still below trend–GDP growth has averaged around 2.5% annually over the last five years, with FY2017 coming in below that, at 2.1%. There are some positive signs. Net exports are contributing positively to demand, with the global upswing and a competitive Australian dollar (albeit recently flirting with US$0.80) helping to drive export volumes growth. But despite stronger profitability, non-mining business investment remains patchy, and with spare capacity still to absorb in the labour market, household income and consumer spending growth is forecast to remain below trend this year and next.

Overall, however, the Australian economy has been unable to sustain economic growth above 3% since the peaking of the resources investment cycle in 2012/13. Much of this weaker economic performance is due to very weak growth in domestic demand during the period, which has been negatively impacted by the ongoing decline in resources investment.

While partially cushioned by a boom in residential investment since 2013/14 and, more recently, by a recovery in public infrastructure investment, economic growth has also been hampered by record low growth in wage incomes, with households spending more of what they earn and reducing savings to maintain just moderate household expenditure growth. Weak wage growth has also driven weaker than budgeted tax revenues for governments, lengthening the time horizon required to return to sustainable budget surpluses, and limiting the firepower of governments to counter weak private investment with higher public investment without further increasing public debt.

Unlike many other resources-exporting economies, Australia did not experience a recession in the wake of the resources investment bust. Strong growth in mining production and exports from world class, competitive deposits, and supercharged by a much lower dollar – which also stimulated other exports of goods and services, such as tourism, education services, agriculture, manufacturing and business services – has helped offset some of the pain from weaker demand growth. Economic growth (which includes net exports) has generally been higher than growth in domestic demand.

The challenge for Australia is that mining exports, particularly, are highly capital – rather than labour – intensive. Stronger, sustainable growth in employment requires stronger growth in local expenditures; and in domestic demand. In turn, this requires the return of growth in non-mining business investment, which has remained stalled since the GFC.

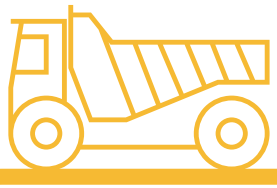
The problem for non-mining industry sectors has generally been weak growth in demand, weak profits and excess capacity. In that environment, it is foolhardy for businesses to invest ahead of requirements, straining cash flows and locking in additional costs before they had the revenue to support them. Most businesses are still in cost-cutting mode, preserving cash and deferring investment until demand recovers.

Low interest rates in this environment have had relatively little impact. While there have been plenty of funds available, this just hasn't been the business environment for strong private investment.

The next growth phase in the Australian economy will be driven by non-mining business investment. When it does recover, it will be to service growing demand, driven by a growth logic (evidenced by rising profits) and augmented by a technology catch-up. In turn, this will have a strong multiplier through business services into the rest of the economy. While non-mining business profits have increased, it is still too early to say that businesses are confident in the path of future demand and profits, and are willing to make the psychological shift from caution to a 'go for growth' investment mentality.

Part of the reason for this is that nationally, by region and industry, growth and profitability is highly fragmented. Very strong economic growth has returned to New South Wales and Victoria, after spending much of the mining boom years suppressed. But growth in demand is still very weak in many other regions. Some states such as Western Australia and Queensland saw outright declines in State Final Demand in recent years.

There remain challenges ahead for the Australian economy that are likely to keep business confidence and investment on a weak plane over the next one to two years. Wage growth, except for skilled professions and trades in some sectors and states, is likely to remain relatively weak, affecting retail trade and household expenditures. Politics is highly adversarial, with major political parties unable to forge a workable consensus on many important policy areas surrounding taxation, energy security, and the environment. But, more importantly, investment cycles across Australia are likely to remain highly unsynchronised over the next two years – keeping overall economic growth constrained to around 2.5% per annum on average over 2017/18 and 2018/19.



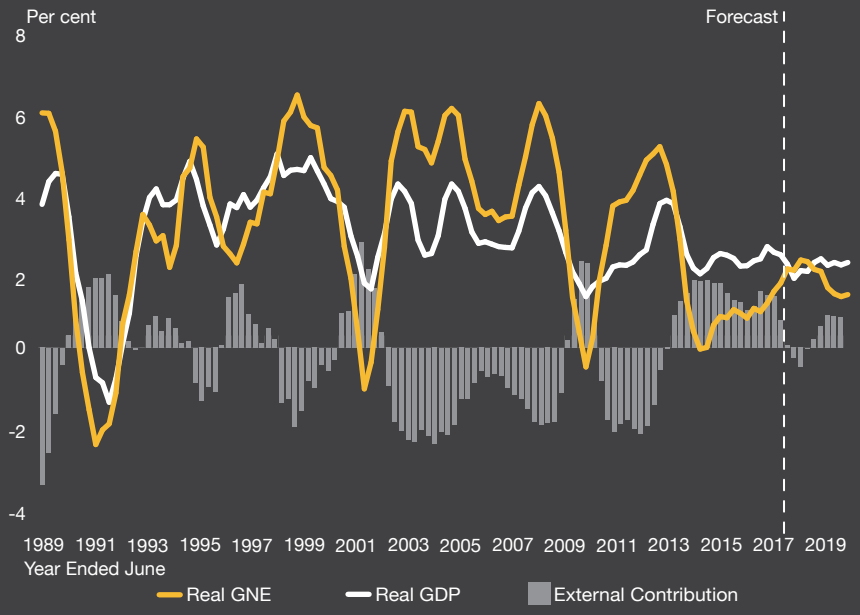
Mining construction will decline around

78%

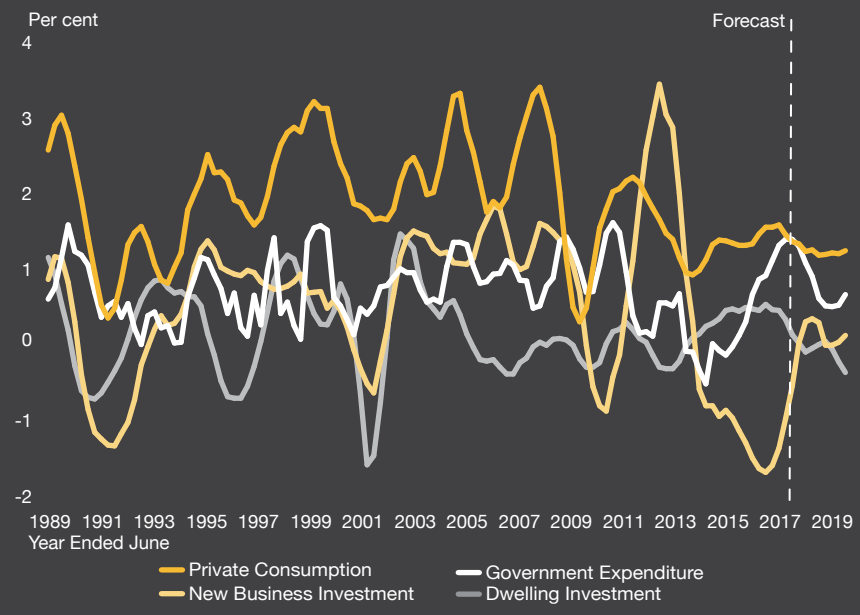
from the 2013/14 peak to the trough

Figure 8

Major Project Work Done by Segment



Contribution to Domestic Demand – Percent



These unsynchronised investment cycles include:

— **Residential investment**, a key driver of growth over the three years to 2015/16, which is expected to peak and then decline over the next three years, with particularly large declines expected in the volatile high density apartment market.

— **Mining investment nationally**, which is in the final stages of decline as the LNG investment boom finally runs its course in Western Australia and the Northern Territory (having already wound down in Queensland). Overall, mining construction will decline around 78% from the 2013/14 peak to the trough, although mining equipment purchases and exploration have started to recover across most commodities (indicating the initial stages of the next upturn).

— **Public investment**, which has finally started to recover after five years of decline, surging 16% in 2016/17 alone. Growth in public investment is being supported by new transport infrastructure but will be offset in part after 2018/19 by sharply falling investment in Australia's largest public infrastructure project – the NBN. Even considering a strong phase of growth in transport infrastructure, growth in total public investment is expected to be either flat or falling (and hence be a drag on Australia's economic growth) by the end of the decade.

— **Non-mining business investment**, which is currently showing only modest growth but is expected to strengthen from last decade as higher profitability, demand and capacity utilisation (in turn supported by a slightly weaker Australian dollar) drive a change in business confidence and investment.

Domestic demand is predicted to improve late this decade as the expected declines in mining and residential investment bottom out and start showing signs of recovery. Capacity constraints and expected improvements in business confidence are predicted to drive an acceleration in non-mining business investment. But until that time, economic growth and inflation is expected to remain relatively subdued, with the Reserve Bank unlikely to be in a strong position to raise interest rates until 2019/20.

Differences in the timing and magnitude of investment cycles by region are creating large differences in economic performance (and construction activity) by state. Strong pipelines of infrastructure projects, relative undersupply in housing, higher population growth and private sector confidence to invest is driving a construction upswing in New South Wales and Victoria, which in turn is spilling over into broader industry growth.

By contrast, total investment and construction activity remains relatively flat (or falling) in the former resources boom states of Queensland and Western Australia. These states are now generating strong growth in mining production and exports as a direct consequence of the previous resources investment boom, boosting Gross State Product (GSP). However, growth in State Final Demand (SFD), the sum of household consumption, government consumption and investment – (both public and private) has been very weak or negative in recent years. This is important, as growth in SFD tends to be a greater driver of growth in employment and incomes than growth in (capital-intensive) mining exports.

There are vast differences in economic performance by state

Queensland's economic challenge

The end of the mining boom was always going to be a trying time for the Queensland economy. Economic growth weakened markedly from 2011/12 driven by falling mining and public investment. Growth in GSP averaged 4.4% per annum over the 10 years to 2009/10 then fell to average 2.5% per annum over the five years to 2014/15.

Meanwhile, growth in SFD – a measure of domestic demand or spending in the local economy which is highly correlated with employment – slowed to just 0.9% in 2013/14 (compared to growth rates of between 5% to 9% during the boom years), and then fell 3.6% in 2014/15 and a further 1.2% in 2015/16. Employment growth weakened in unison, with the unemployment rate averaging 5.9% over the five years to 2014/15 (compared to 4.5% over the five years to 2009/10). This weakness continued into 2015/16, and the first half of 2016/17, with monthly employment falling consecutively on more than three occasions over the period. More recently, however, the labour market has shown some strength with the annual employment growth rate rising above 4%.

Private engineering construction, which is dominated by resources-related construction, peaked at $39 billion in 2013/14 and then plunged 68% over the next two years. There were also large declines in equipment purchases and exploration by the Queensland mining industry over the 2013/14 to 2015/16 period. Although mining and heavy industry construction decreased a further 10% in 2016/17, the smaller decline off a much smaller base of investment has delivered a smaller negative contribution to SFD. Meanwhile, the jump in coal prices and higher base metals prices over 2016/17 has seen coal mines in Queensland re-opened and increases in mining equipment purchases.

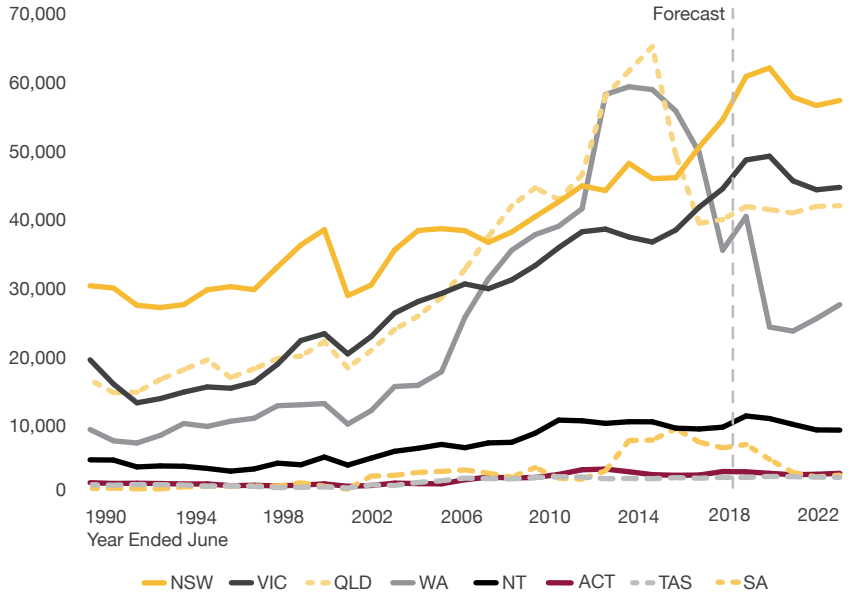
Yet in one important sense, the Queensland economy has been partially sheltered from the severity of the downturn in mining investment. Significant components of mining and mining-related investment and equipment were sourced from overseas, and were therefore classed as imports, detracting from GSP. As mining investment retreated, so did these imports. So, although the local economy did not receive all the benefits of the resources construction boom during the upswing, it conversely did not suffer the whole negative magnitude of the downturn.

Mining now accounts for a falling share of total engineering construction. At the 2013/14 peak, mining and heavy industry construction, pipelines construction and railways construction accounted for around 90% (or $35.9 billion of the total $39.2 billion) of privately funded engineering construction. Since then, resources-related engineering construction has simply plummeted. The void left by retreating mining-related engineering construction is being partially offset by a recovery in public investment. After little growth in the previous three years, Government Consumption Expenditure (GCE) jumped over 5% in 2015/16 and 2016/17. Strong rises in education and health-related employment is contributing to the rise in GCE and the healthier total employment figures.

Higher levels of private dwelling investment helped offset declines in private engineering construction. The recent upswing in residential building followed a six-year decline (2007/08 to 2012/13), which occured at the same time that the mining boom was stimulating robust population growth from both interstate and overseas, resulting in an undersupply of housing. This undersupply has now been eliminated, with private dwelling investment growing at an average of 12% per annum over the three years to 2015/16 and peaking in 2016/17.

Figure 9

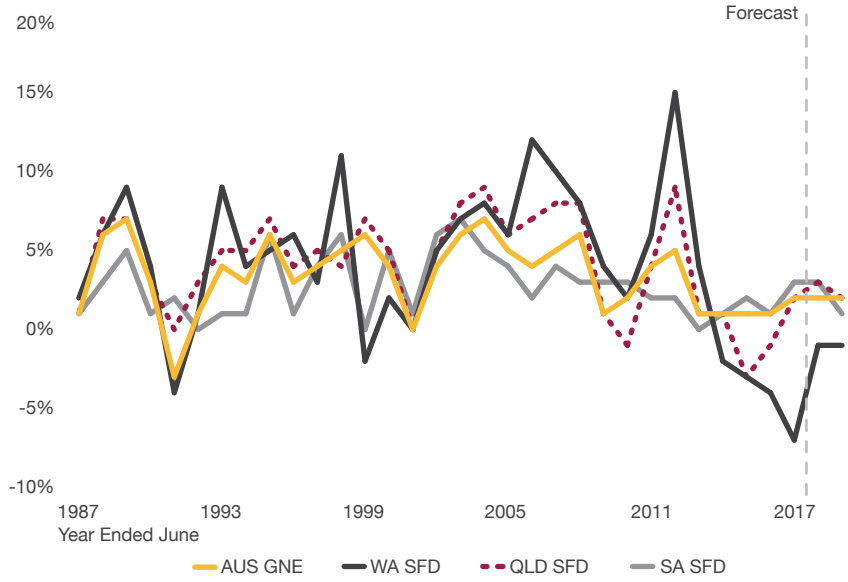
Total Construction Work Done by State (2015/16 Constant prices)

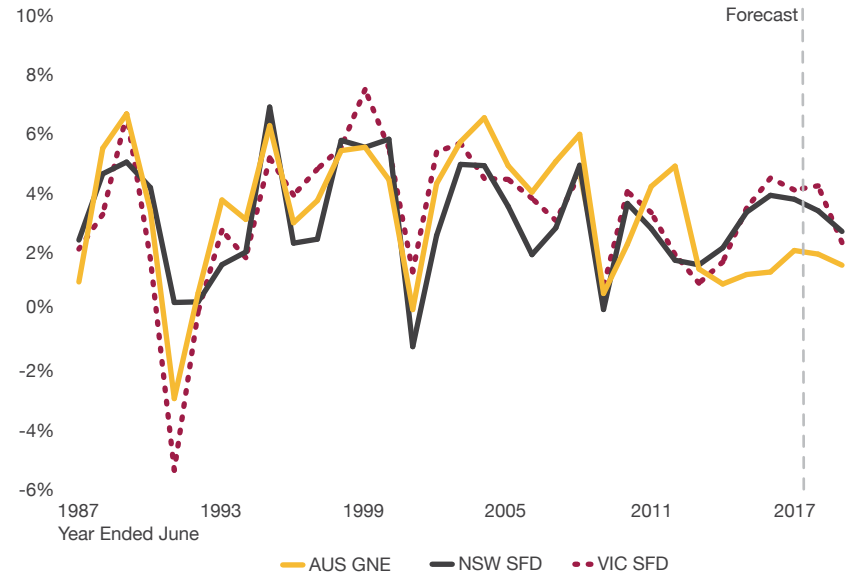


Source: BIS Oxford Economics, BREE data

Figure 10

Comparisons of State (SFD) and National (GNE) Growth in Final Demand





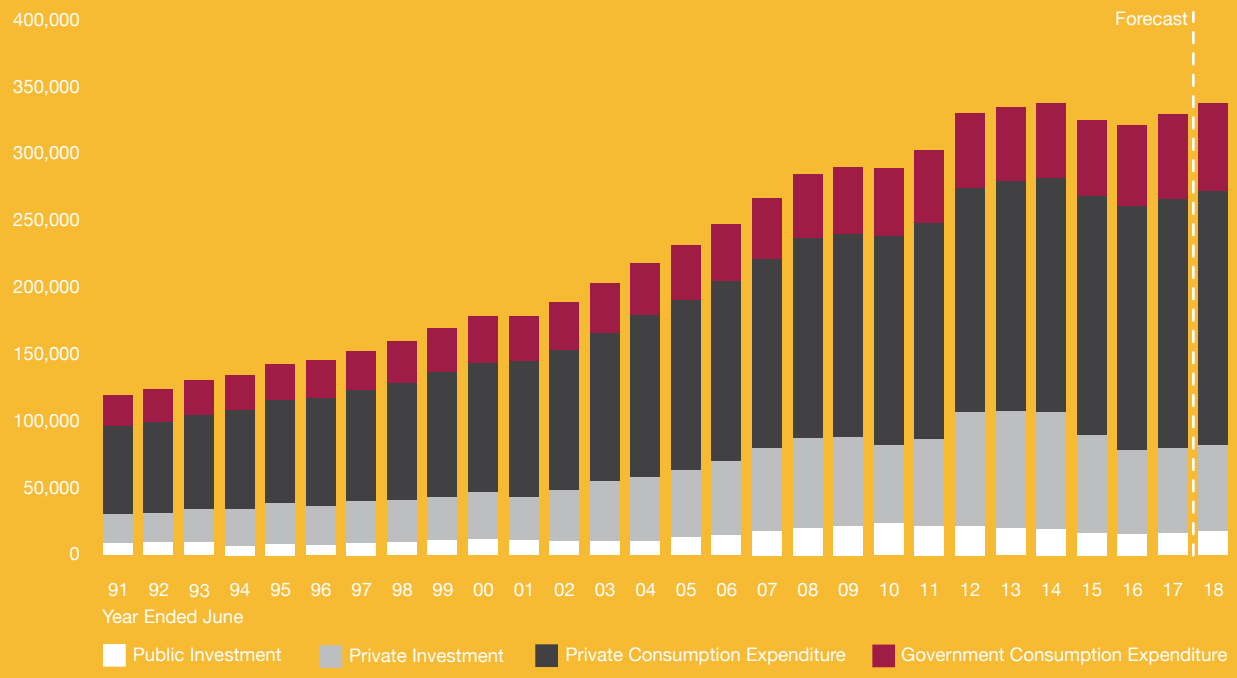
Queensland economy to pick from here, but growth likely to be constrained

The Queensland economy is showing signs of recovery. The lower, post-boom Australian dollar has helped boost tradeables such as tourism and educational exports, with manufacturing also likely to benefit over the forecast horizon. Meanwhile, public investment has returned after a number of years of weakness.

Public investment had been a drag on the Queensland economy for several years, having fallen by over a third over the six years to 2015/16 from the 2009/10 peak. Public non-dwelling building had fallen to its lowest level since 1993/94 (in real terms). However, it is now bouncing back, led by education-related and other social and institutional buildings. Public engineering construction also picked up strongly over 2016/17 and further strong growth is predicted for 2017/18 and 2018/19, driven by roads, harbours, defence, water and telecommunications-related infrastructure. Further modest rises are expected thereafter, with falling telecommunication construction – as the NBN roll-out winds down – moderating the overall increases.

Figure 11

Queensland Economy – Components of State Final Demand



Source: BIS Oxford Economics, BREE data

A sizeable chunk of the funding for this pick-up in activity is coming from Commonwealth infrastructure allocations. Without increased income, State Government finances are unable to support major increases in infrastructure spending. Public sector debt has continued to escalate and the Queensland Government has lost its AAA credit rating. The fall in coal and minerals prices over the three years to 2015/16 also weakened royalty revenues. On the other hand, State Government revenues have benefitted from the residential property recovery and corresponding increases in stamp duties. Generally higher coal prices (since the trough in early 2016) and rising LNG production should help boost government revenues and underwrite healthier increases in public investment as well as modest rises in GCE.

Falling residential building activity will dampen overall growth...

A key challenge facing the Queensland economy is the expected decline in residential building, following strong growth over the past four years. With the level of dwelling building now well above demand, an oversupply is manifesting, particularly in the apartment heavy inner Brisbane market. Private dwelling investment slowed to 2.8% in 2016/17 and is expected to contract over the three years to 2019/20 inclusive.

... with non-residential building investment a mixed bag

Private non-residential building declined over 2016/17, after six years of solid growth, but further growth is expected over the next three years. Over the next year, higher activity in the hotels segment (boosted by the lower dollar), warehouses and private schools building should more than offset declines in other sectors, particularly in the health sector as work winds down on the (mainly privately funded) $1.2 billion first stage of the Sunshine Coast University Hospital.

Office building work has declined sharply in recent years, with only weak growth in prospect, largely due to oversupply related to the decline in mining investment-related business services which were a key component of office demand. Retail building is also expected to be relatively flat over the next few years in line with consumer spending, but strong growth is anticipated in hotel and accommodation construction.

A competitive Australian dollar will continue to support service exports

The 'X factor' for the Queensland economy remains the value of the Australian dollar and the improved attractiveness of Queensland's key service exports.

Townsville Ring Road

The Queensland tourism industry has been buffeted for almost a decade – first by the GFC and then by the high Australian dollar which made holidaying in Australia more expensive relative to other destinations in the region (for both domestic and international visitors). However, after a decade of constraint, non-mining trade-exposed industries are beginning to recover. At the national level, tourism related service exports grew 15% over 2016/17. The low dollar has also supported growth and employment in Queensland's education sector. These sectors will need to refurbish and then expand to meet demand. Other dollar-exposed industries are benefiting from the improved competitiveness of a lower dollar, showing initial signs of recovery. That will broaden to growth and, eventually, investment in the non-mining sectors. But it is expected to be a long process.

While rising interest rates in the United States and a near term correction in some key commodity prices (e.g. coal and iron ore) would suggest that the Australian dollar may depreciate further against the US dollar in coming years, there is the risk that the Australian dollar will remain stubbornly around the US$0.75 mark for some time, and may even appreciate, particularly as the Australian economy improves later this decade. Consequently, it will be important for Queensland businesses to take advantage of the competitive gains already rendered by the fall in the dollar now – and not wait or rely on further falls in the currency as part of a longer-term growth strategy.

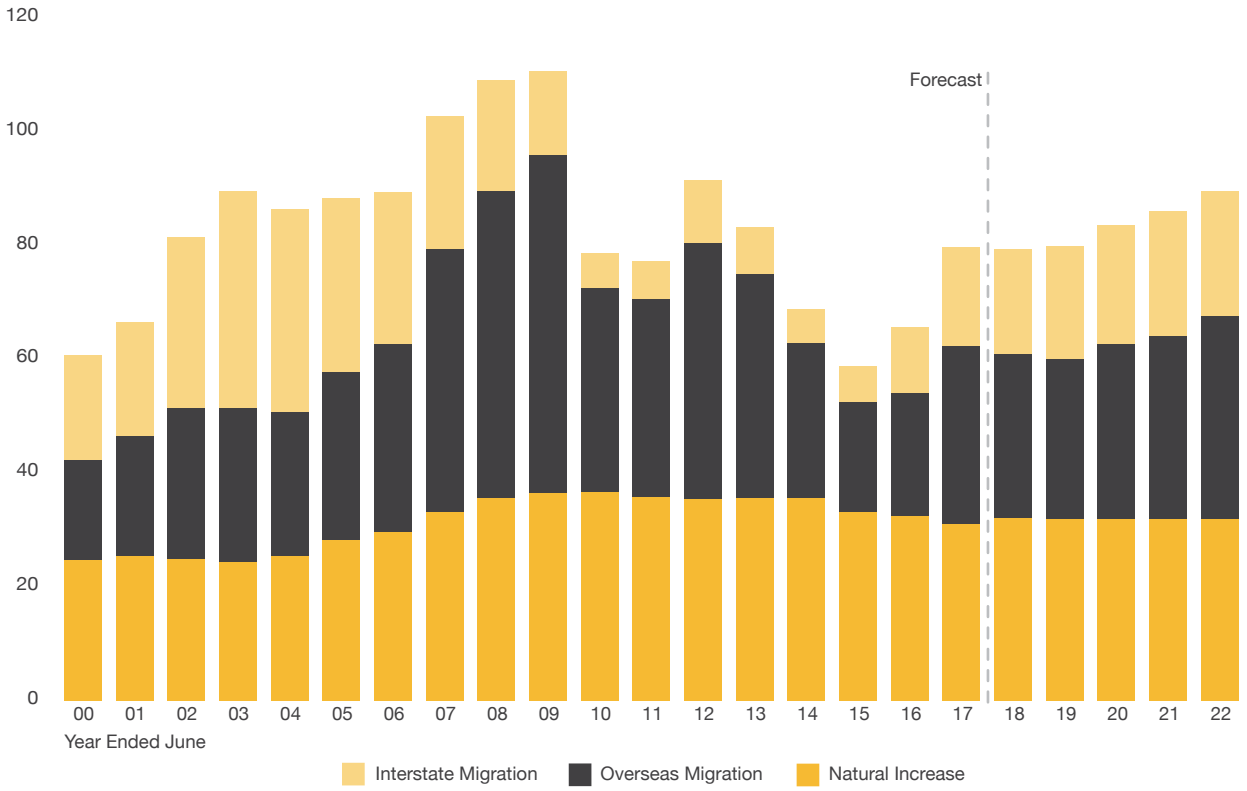
Employment improving, yet recent growth to moderate

After negligible growth through 2016/17, employment growth has ramped up significantly through 2017/18 to date, with annual growth over the year to February 2018 just shy of 4%. Strengthening public and business investment and renewed tourism growth have been key drivers. However, overall employment growth will likely weaken over the next two years, keeping household spending growth muted, similar to the last four years. Previous employment growth was spurred by much higher rates of population growth. Queensland's population growth has come back to the pack and, at 1.6% annual growth, is around the national average – after decades of population growth well above the national average.

GSP boosted by stronger SFD growth over the medium term

Figure 12

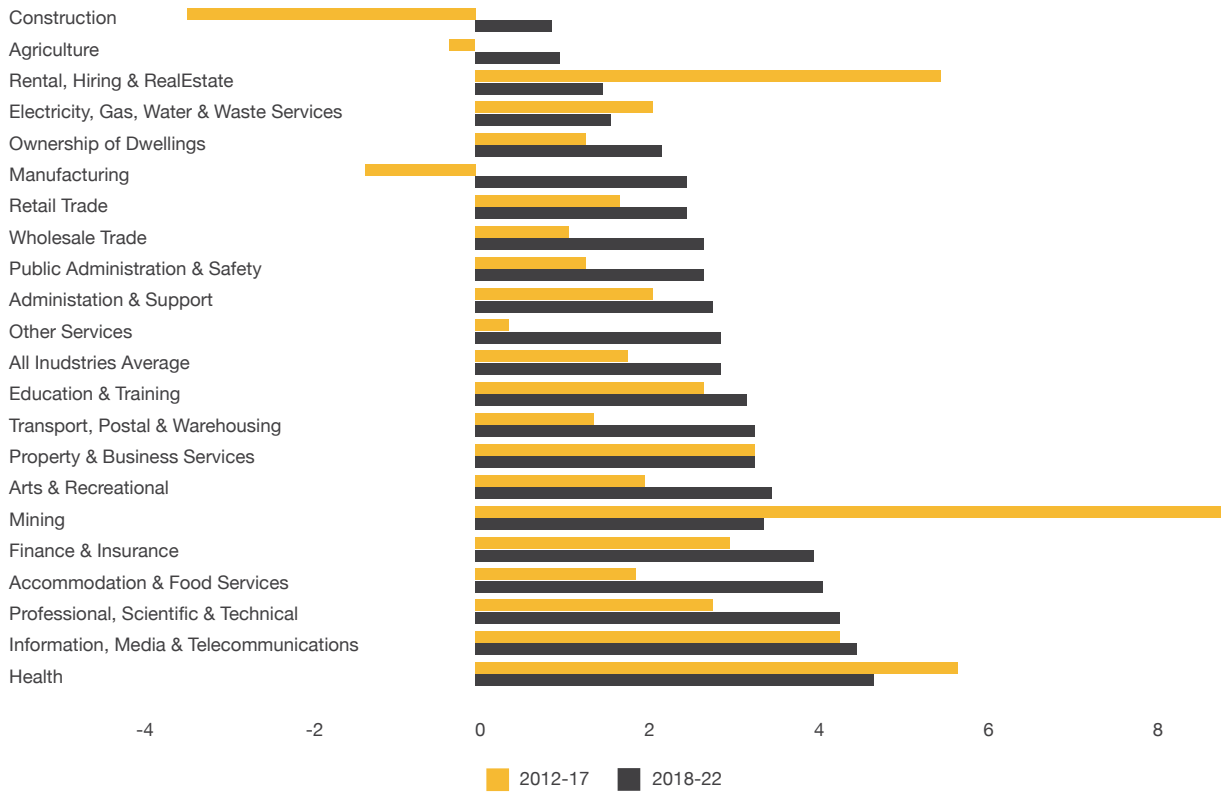
Queensland Annual Population Increase by Source



Source: BIS Oxford Economics, BREE data

Figure 13

5 Year Compound Annual Growth by Industry Sector, Queensland



Source: BIS Oxford Economics, BREE data

Export growth remained strong in 2016/17 (around 7%) as capacity and production ramped up further at the Gladstone LNG plants. But as these plants hit capacity, export growth over 2017/18 and particularly 2018/19 will decelerate. GSP growth is forecast to remain subdued at around 2.5% over this year and next, before gradually accelerating towards the end of the decade and into the early 2020s.

Longer term, Queensland economic growth is expected to be sustained in the 3-4% per annum range as growth becomes more broadly based, and its benefits more evenly distributed. Queensland has a diversified economy, and the competitive realignment of its key trade-exposed industries – including agriculture, manufacturing, tourism, education and mining- is expected to be the main spur to economic growth.

Technical change, lower dollar, and investment cycles to drive differences in outlook industry

Over the next five years, the lower Australian dollar should continue to encourage growth in trade-exposed industry sectors in the Queensland economy – but technological change, changing demographics and differences in the stage of long run investment cycles will also play a significant role, as shown in Figure 13.

Over the past five years, mining, rental and hiring, health and information, media and telecommunications (ICT) were standout growth industries in Queensland, with all industries growth averaging a relatively weak 1.8% per annum growth between 2011/12 and 2016/17. By contrast, construction, agriculture, manufacturing, trade (wholesale and retail) and accommodation performed relatively poorly. However, over the next five years, the performance of all of these 'low growth' sectors will be stronger as investment recovers and the lower dollar stimulates trade-exposed industries. Technological development and demographic change should keep growth in health strong through the next five years, while other 'high growth' sectors in activity terms will be finance and insurance, mining, accommodation, professional scientific and technical services and ICT.

However, developments in automation will affect employment growth differently for each sector. BIS Oxford Economics expects the strongest growth sectors in terms of employment over the next five years will be accommodation and food services, arts and recreational services, transport, administration and support and education. By contrast, the weakest sectors in terms of employment growth will likely be ICT (despite growing strongly in terms of Gross Value Added, and hence producing large productivity gains), manufacturing, finance and insurance and construction – with the latter affected, particularly by a downturn in residential building which comprises the bulk of construction trades. A more detailed discussion of the outlook for the construction workforce is provided later in this Report.

Private engineering construction, which is dominated by resources related construction, peaked at **$39 billion** in 2013/14 and then plunged

68%

over the next two years

LONG-TERM QUEENSLAND MAJOR PROJECTS PIPELINE

By region, Northern Queensland has the **strongest major project growth prospects**

Major project work for roads and bridges has risen strongly in 2016/17 and will remain on a growth path over 2017/18 and 2018/19

Some sectors simply do not have enough projects in the pipeline – whether funded or unfunded – to sustain major project work through the next five years

Non-water utilities and rail

offer the strongest prospects for activity across the five- year forecast period

There are significant risks with the

water and sewerage

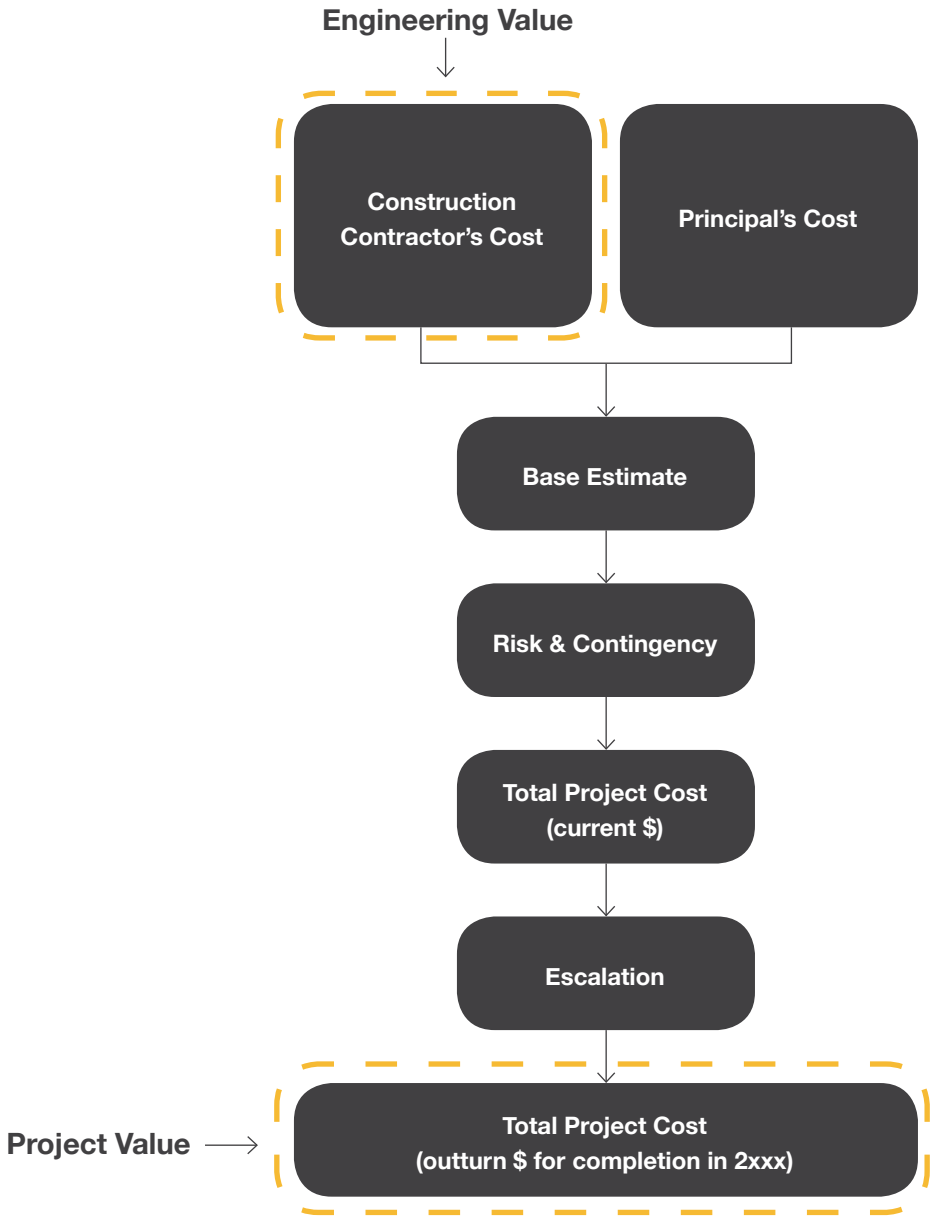
major projects outlook. Many major projects, such as the Nullinga Dam and the Paradise Dam Primary Spillway Improvement Project, are subject to future business cases

LONG-TERM QUEENSLAND MAJOR PROJECTS PIPELINE

The 2018 Major Projects List is presented in the Appendix of this Report. The Major Projects List includes engineering projects in excess of $50 million and was developed by BIS Oxford Economics in coordination with QMCA and IAQ members and CSQ input throughout January and February 2018.

Figure 14

Definition of Project Value and Engineering Value



The Appendix provides both the Project Value and Engineering Value of each project. The figures and Australian dollar amounts stated throughout this Report are derived from aggregation of the Engineering Values, which typically exclude Project Owner's costs such as land acquisition.

Total Major Projects Outlook

Figures 15 and 16 highlight the current activity and projections for major project work for the period 2017/18 to 2021/22 based on the 2018 Major Projects List, as well as historical data to 2011/12. Key points from this analysis are:

— As forecast in last year's Report, there was a decline in total major project work done over 2016/17. Queensland engineering construction for major projects fell to $3.9 billion in 2016/17, down over 75% from the 2012/13 peak. Despite the continued fall in mining and heavy industry construction work, non-mining major project activity rose substantially over 2016/17, with electricity, telecommunications, defence and roads activity rising throughout the year. Accordingly, the mining and heavy industry share of total major project work decreased again in 2016/17, falling to just 20% of major project work done, from a peak of 85% in 2014/15.

Major project engineering work completed has risen by 58% in 2017/18 to $6.9 billion after two successive years of low activity. Subject to funding commitments for credibly proposed projects, activity in 2018/19 will be retained at a similar level.

— With a drop in funding commitments for numerous private mining and industrial projects, the value of public sector projects that have funds committed or are currently under procurement now outstrip the private sector by a factor of 6 to 1. The ability of governments to identify and deliver on their planned infrastructure has therefore assumed even greater importance to the continued short-term sustainability of the major projects contracting sector.

— There are substantial risks to the sustainability of the major projects pipeline, however. Work done on currently funded projects is still expected to decline in 2018/19 before falling back to recent trough levels at the turn of the decade as work on large, existing projects moves to completion. As highlighted in last year's Report, more projects need to move from the unfunded to funded category if the recovery in major project work in 2017/18 proves to be more than a one-year phenomenon highlighting the need to work on funding strategies.

— Furthermore, some sectors simply do not have enough projects in the pipeline – whether funded or unfunded – to sustain major project work through the next five years. Roads activity is expected to decline 44% over three years following the peak in 2018/19. Non-water utilities activity, comprising mostly electricity and telecommunications work, is forecast to decline 65% over the same period.

— Non-water utilities and rail offer the strongest prospects for activity across the five-year forecast period, notwithstanding a collapse in work done forecast for non-water utilities during the early 2020s as telecommunications (particularly the NBN) and renewable energy projects wind down. Compared to the previous five-year period, the value of projects in the pipeline for the next five years are 129% and 85% higher for non-water utilities and rail segments respectively.

— By region, Northern Queensland has the strongest major project growth prospects over the next five years, with the value of projects in the pipeline worth $8.2 billion – 361% higher than the previous five years. At $13.6 billion, South East Queensland still commands the largest share of major project work listed in the pipeline, and is itself 167% higher than the actual work done over the past five years, albeit not all of this is currently funded.

More projects need to move from the unfunded to funded category if the recovery in major project work in 2017/18 proves to be more than a one-year phenomenon, highlighting the need to work on funding strategies

Figure 15

Major Project Work Done: All Segments

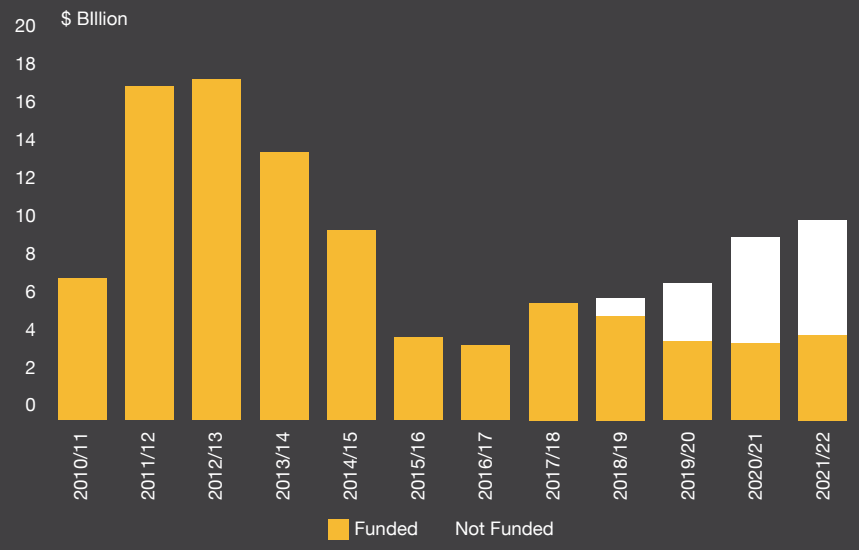


Figure 16

Major Project Work Done by Segment

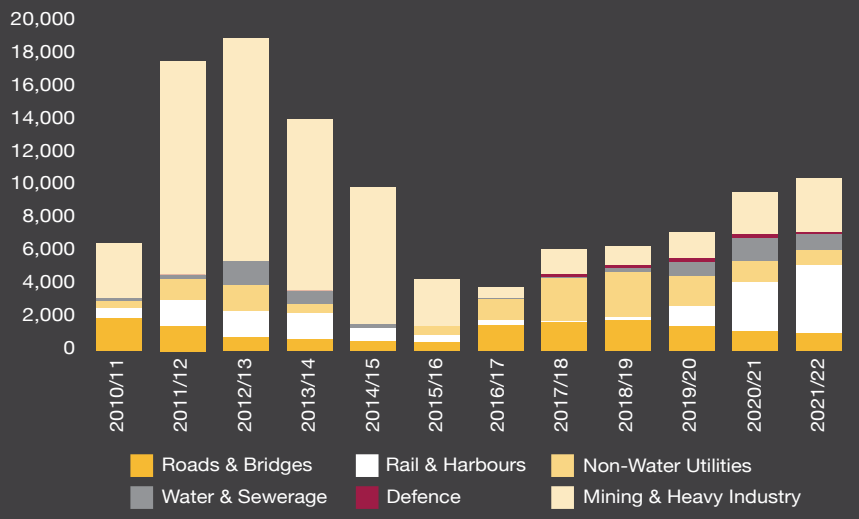
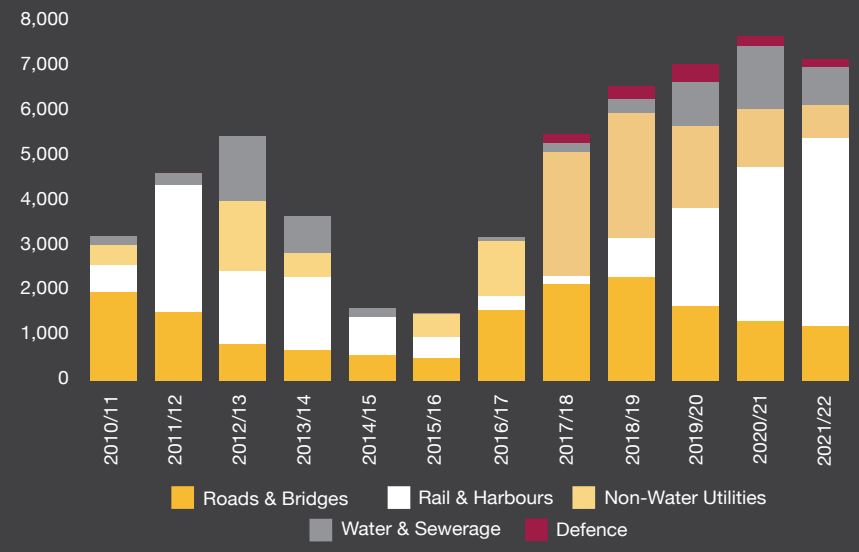


Figure 17

Major Project Work Done by Segment (Excluding Mining and Heavy Industry)



Funded versus Unfunded Projects

This projection is based on a considered view of both funded and unfunded projects. Consequently, it is likely to provide a more realistic outlook of major projects activity in Queensland.

"Funded" project categories include:

- **Announced:** projects which have funding support but have not yet entered the procurement stage (as at March 2018).
- **Under procurement:** projects in a procurement stage but have not yet started construction (as at March 2018).
- **Under construction:** projects in flight / under construction.

"Unfunded" project categories include:

- **Unlikely:** projects considered not to occur in the next five years, even if announced.
- **Prospective:** projects considered likely to occur over next five years but not yet formally proposed.
- **Credibly Proposed:** projects that are supported by governments and/or the private sector but still in prefeasibility / business case mode and so do not have funding committed.

Figure 18 illustrates the outlook for major project activity based on the subcategories of funded and unfunded work. While total major project activity is expected to rise through much of the forecast period, the outlook for funded work (incorporating those projects announced, under procurement or under construction) is much different, peaking in aggregate during 2017/18. The funded forecast view is similar to that of a "worst case scenario" outlook, should international developments or public sector finances deteriorate significantly further, or the combination of threats to the Queensland construction industry remain unaddressed.

To have a growing pipeline of major project work beyond this requires shifting currently unfunded projects into the funded category. In our view, the most likely scenario for major project work excludes "unlikely" projects, but these are included here to show their potential impact on major project work, particularly later in the forecast.

The Addressable Market for Local Contractors

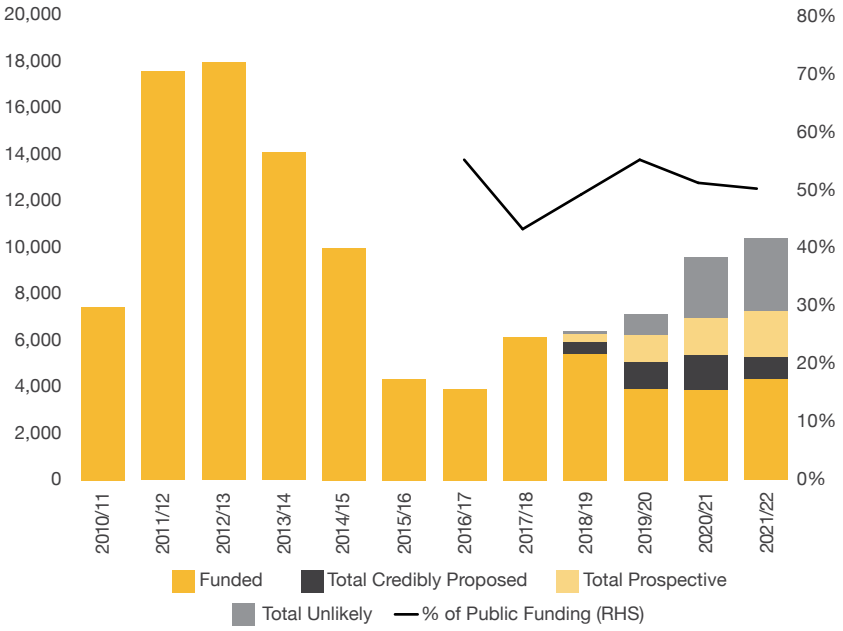
Given the high level of imported materials, equipment, and buildings and structures attached to LNG projects, as well as the use of direct labour employment contracts in assembling downstream LNG components on site, an alternative measure of major projects work for this Report, which better captures the market for which local contractors can effectively compete, has also been produced. This analysis is based on discussions with major contractors regarding the approximate percentage of LNG major project value year by year (both upstream and downstream) that tends to be imported, offered through direct labour employment contracts or tendered as packages of work to local contractors.

Figure 19 shows this Report's estimates of local contractor work done versus offshore (imported) LNG construction elements. In 2011/12, the expansion of the contractor market was likely not as steep as indicated by the total value of major project work alone (and official ABS engineering construction data, which includes the value of imported LNG components).

During this period, the three major Gladstone-based LNG projects began to ramp up construction considerably, but this period also coincided with a large increase in imports. The analysis shows, however, that the local contract market continued to grow into 2012–2013, corresponding well with the data on construction employment that also rose during the same year. A downturn in local contractor work occurred from 2013/14, with declines continuing into 2015/16.

Figure 18

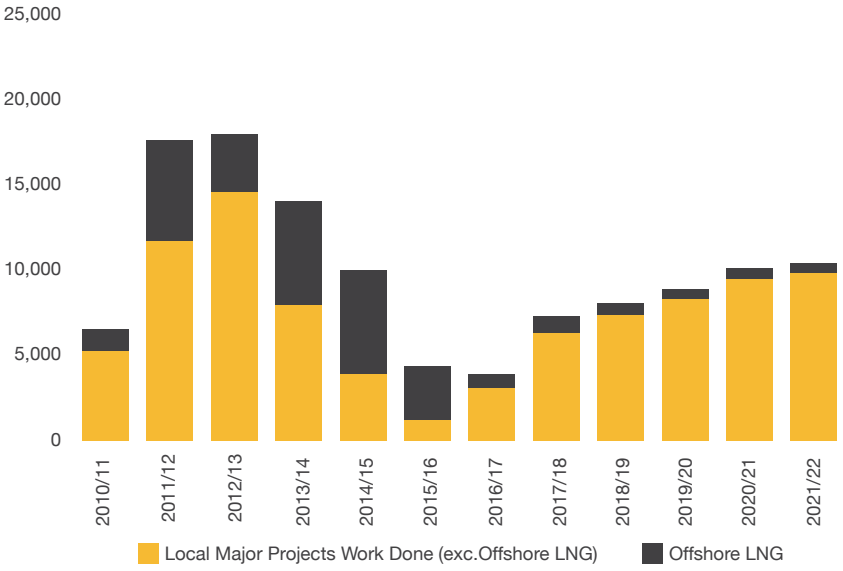
Major Project Work Done by Funding Status



Source: BIS Oxford Economics, BREE data

Figure 19

Local Major Projects Work Done



By contrast, with the completion of the downstream LNG processing facilities, a much greater proportion of major project work after 2015/16 is assumed to be won by local contractors (being more upstream related LNG work, other inland resources projects and public infrastructure).

Roads and Bridges

Major project work for roads and bridges has risen strongly in 2016/17 and will remain on a growth path over 2017/18 and 2018/19. Growth is being driven by the current round of funding under the Commonwealth Government's Infrastructure Investment Program (IIP) – focusing heavily on the Bruce Highway – and the addition of the Toowoomba Second Range Crossing, Gateway Upgrade North (GUN), the Ipswich and Pacific Motorways and the Kingsford Smith Drive and Caloundra to Sunshine Motorway upgrades.

As shown in Figure 20, major project road and bridge construction work done contracted around 70% between the peak of 2010/11 and the trough of 2015/16. However, major project work more than tripled in 2016/17, driven by the current round of IIP projects.

Given the project pipeline, Queensland roads and bridge major projects work is expected to reach a new peak of over $2.3 billion by 2018/19. However, major project work in this segment is also projected to be highly cyclical, with work falling away again significantly after the 2018/19 peak, particularly over 2019/20 and 2020/21 as the next round of projects reach completion. Reducing the degree of cyclicality will entail increasing the number of funded projects later this decade.

Railways and Harbours

Major project work across the railways and harbours segments in Queensland moved to a higher plane in the early 2010s, peaking at over $1.6 billion in 2013/14, before falling to just $320 million in 2016/17 with the completion of the Moreton Bay Rail Link. Harbours major project construction work has been driven predominantly by the demands of the resources sector, but across railways there are also significant contributions from the public sector for passenger and freight projects.

Since our previous Report, the Cross River Rail project has become fully funded, and this will be a key major project driving railways activity into the future. While early preparation works have already commenced, the majority of work for this project will commence from 2020/21 onwards. Adding to this will be works on the Inland Rail from the Queensland border to Acacia Ridge. This project has secured Commonwealth funding and construction is expected to commence from 2018/19. Work on Inland Rail will compromise a significant proportion of total activity over the subsequent years, although it is noted that the exact timing of work is subject to risk.

In the nearer term, work in this segment will be supported by the RG Tanna Coal Terminal upgrade as part of the Port of Gladstone and the North Coast freight line upgrade, as well as privately funded port facilities for the Amrun Project (bauxite). Other publicly funded harbour works expected to underpin activity are the Port of Gladstone – Second Shipping Lane (Gatcombe and Golding Cutting Channel Duplication Project) and the Port of Townsville – Outer Harbour Expansion (Berths 14+15).

Work on Adani-related projects, which includes upgrading Abbot Point and building further rail infrastructure, is still unfunded. Other unfunded rail projects in the pipeline include the Townsville Eastern Access Rail Corridor (requiring private funding) and the Beerburrum to Nambour, Landsborough to Nambour upgrades, as well the Ipswich Rail Line – Darra-Redbank 3rd track (requiring funding from the public sector to proceed). If these projects secure funding, construction is expected to commence post 2019/20, supporting activity later in the forecast period.

In the long-term, another $4 billion will likely be needed to complete the rail line from Acacia Ridge and the Port of Brisbane itself. However, the timing of construction is likely to fall outside the scope of this report (>2021/22) with substantial planning required given the urban nature of this project.

Water and Sewerage

Water and sewerage work done on major projects spiked in 2012/13, largely underpinned by new water treatment facilities and pipeline construction projects supporting upstream CSG field development in the Surat Basin. However, as these projects moved to completion, work done weakened substantially, falling under $50 million in 2015/16.

Activity rose marginally in 2016/17, and should do so again this financial year, but stronger growth is forecast ahead, initially driven by an expanding pipeline of sewerage upgrade works.

The Commonwealth Water Infrastructure Ministerial Working Group has identified key water infrastructure projects across Queensland that have the potential for Commonwealth Government involvement. Commonwealth funding has already been allocated to the Rookwood Weir and the Haughton Channel Capacity Upgrade. Furthermore, the Northern Australia Infrastructure Facility (NAIF) could help prospective private projects across Queensland, particularly agricultural food bowl opportunities, such as the Three Rivers Irrigation Project.

Cross River Rail and Inland Rail will drive railway activity from 2020/21 onwards

There are significant risks with the water and sewerage major projects outlook. Many major projects, such as the Nullinga Dam and the Paradise Dam Primary Spillway Improvement Project, are subject to future business cases. Also, as many of the projects driving work done and workforce demand are coal or oil and gas related pipeline work that are not yet funded, they retain significant start date flexibility. If conditions do not prove ideal for these projects, they could be further delayed or pushed out beyond the forecast horizon, considerably weakening the industry growth profile.

Taken together, these projects have the potential to substantially boost activity into 2019/20 and 2020/21. Work done could reach a new cyclical peak of just over $1.4 billion by 2020/21 if all unfunded projects in the pipeline were to proceed, before pulling back into 2021/22.

Electricity, Pipelines and Telecoms

Electricity, pipelines, and telecoms major project work done peaked at a record $1.6 billion in 2012/13 driven mainly by booming LNG-related gas pipeline construction. In the electricity sector, a host of new Powerlink distribution and supply projects were a key driver. The completion of these major projects saw work done decline sharply over 2013/14 and 2014/15.

During 2016/17, electricity, pipelines and telecoms major project work done jumped back above $1.2 billion, driven heavily by surging NBN activity and a host of smaller electricity projects getting underway. For 2017/18, activity is expected to more than double, rising above $2.8 billion – a new record. While a ramp-up in the NBN and the North East Gas Interconnector (Queensland Section) is partially responsible, a large part of the increase is driven by a boom in renewable energy projects.

Figure 20

Roads and Bridges Major Project Work Done by Funding Status

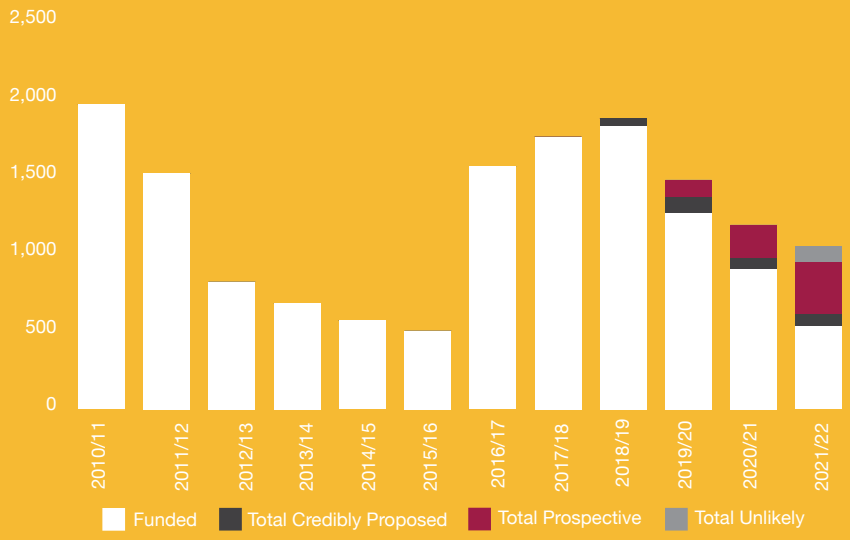


Figure 21

Railways and Harbours Major Project Work Done by Funding Status

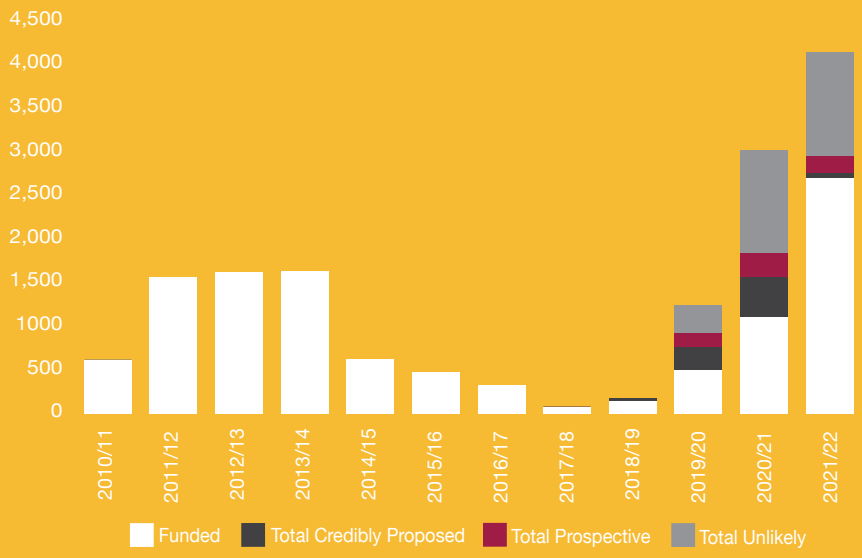


Figure 22

Water and Sewerage Major Project Work Done by Funding Status

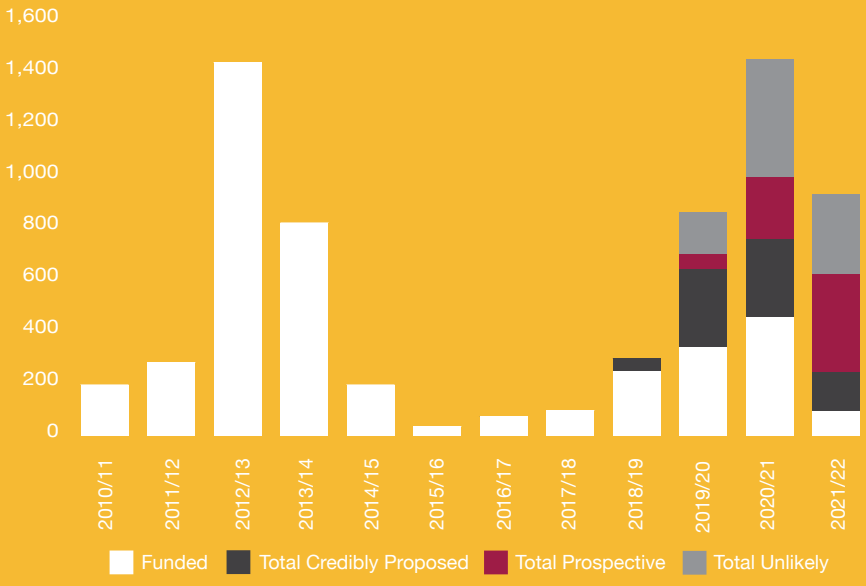


Figure 23

Electricity, Pipelines and Telecoms Major Project Work Done by Funding Status

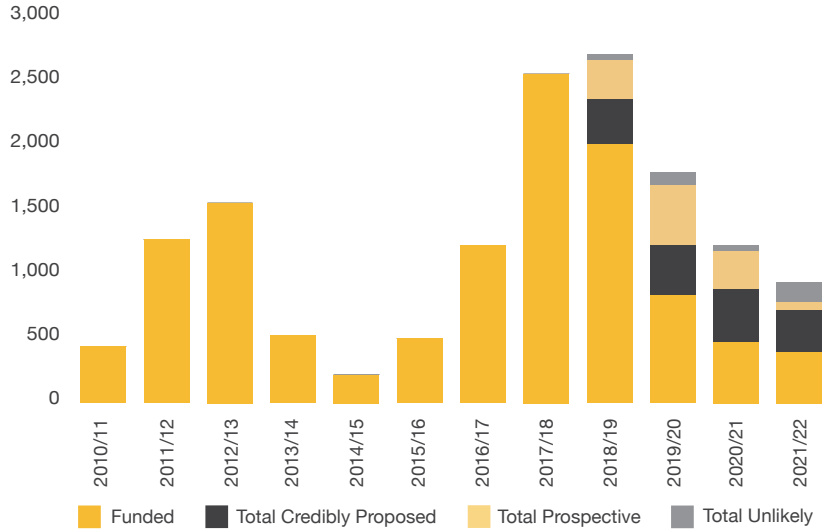


Figure 24

Defence Major Project Work Done

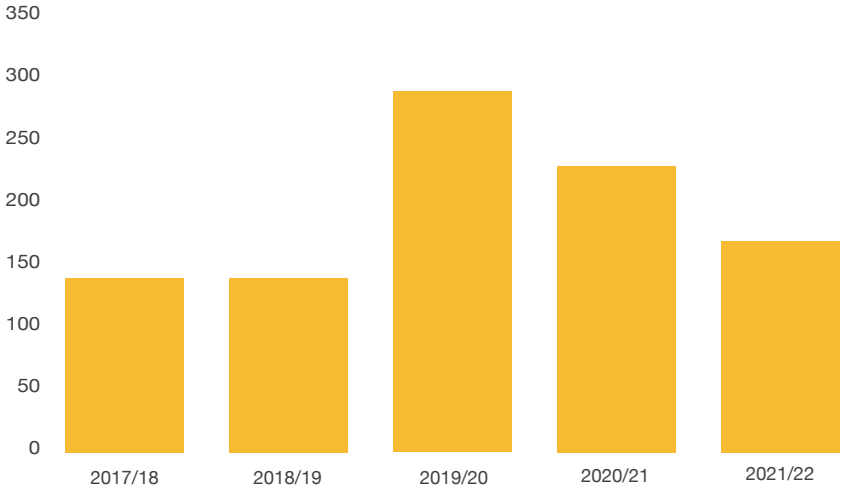
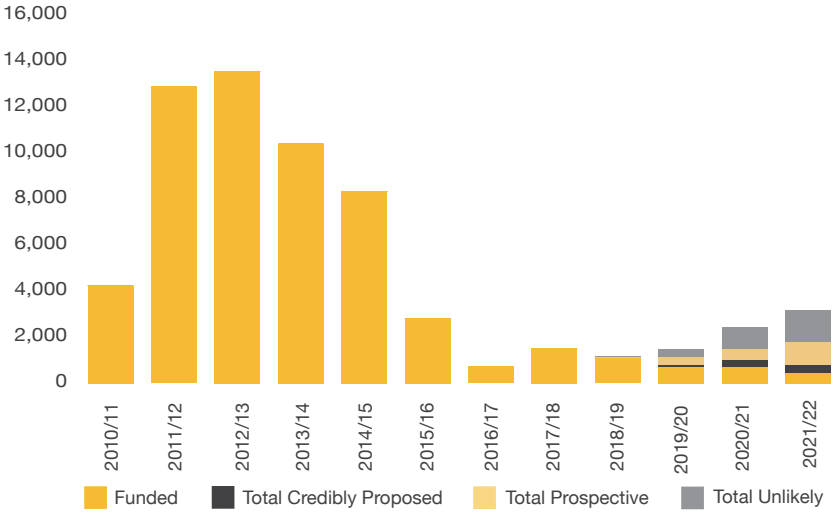


Figure 25

Mining and Heavy Industry Major Project Work Done by Funding Status



Progress is being made to reach the 2020 Renewable energy target (RET) as Queensland, suitably nicknamed the 'sunshine' state, enters a renewable energy construction boom. This boom is being led by the construction of solar farms, but also includes some wind and hydro projects. Over twenty solar and wind projects are included in the Pipeline as under construction in 2017/18 and a similar number of projects are forecast for 2018/19. Large-scale solar projects include Kidston Solar Project - Stage 2 (270 MW), Daydream Solar Farm (150 MW) and the Clare Solar Farm Project (100MW), while wind and hydro projects include the Kidston Hydro Project, the Kennedy Energy Park and the Mt Emerald Wind Farm (180 MW).

Beyond 2019/20, activity is expected to drop as renewable energy construction boom tapers off and the NBN rollout winds down. The ongoing development of the coal seam gas fields to feed Queensland's LNG processing facilities will require continual upstream investment in pipelines (and other infrastructure) over the long term. The Arrow Bowen Pipeline has been identified as a potential major project in this space. There are also several significant announced projects that remain unfunded which could keep activity at a relatively high level. These are focused in the electricity sector and include further renewables projects such as the Burdekin Dam Hydro Project, the proposed North Queensland power station and potential transmission works to mining regions.

Defence

Queensland is benefiting from the latest round of Commonwealth-funded defence initiatives. Projects include maintenance infrastructure upgrades and the construction of the new Growler Airborne Attack Capability facilities at South East Queensland's RAAF Base Amberley. Activity should also be boosted by the Australia – Singapore Military Training Initiative.

The Initiative will provide increased access to Australian military training areas for the Singapore Armed Forces, building on Australia and Singapore's existing defence cooperation. Training facilities will be redeveloped at the Fitzroy's Shoalwater Bay, which will first be remediated, as well as a training facility further north in Townsville.

Combined, the aforementioned projects account for $1.1 billion in the Pipeline over the forecast horizon. This value has downside and upside risk. On the downside, there may not be as much engineering construction in the defence projects listed in the Pipeline than anticipated here. However, on the upside, a Queensland-based contractor has won a $5 billion tender in March 2018 to build the next generation of light armoured vehicles. While the contract includes the building of an Excellence Centre in Redbank, only a small amount of the vehicle contract value is expected to involve engineering construction.

Mining and Heavy Industry

Mining and heavy industry major project work boomed between 2010/11 to 2012/13, increasing collectively by over 200% to reach a new peak of $13.6 billion. This represented a second, LNG-focused phase of the resources boom in Queensland, but there was also substantial coal developments during this time including the construction of the Broadmeadow, Caval Ridge, Daunia and Grosvenor coking coal mines, which also sustained a high level of work.

The completion of the "once in a generation" large LNG projects in Queensland saw mining and heavy industry major project work collapse to just $700 million in 2016/17, a mere shadow of the previous peak. Major downstream LNG project construction has now ceased and activity in 2016/17 was solely supported by LNG sustaining work and upstream field developments, estimates of which have been revised downwards given lower than expected activity in this area, both historically and in the forecast.

However, GLNG's new Roma East Project, which aims to increase domestic gas supply, will see LNG activity rise over the short-term. Outside of gas-related projects, major project activity will continue to be supported in the near term by the development of the Amrun Project and the Dugald River Zinc Project. Moving forward, total activity is expected to pick up but remain modest relative to the previous peak. Projects supporting this uptick include new coal projects such Byerwen and Styx, the re-opening of existing mines such as Wilkie Creek and potential expansions at Caval Ridge and Peak Downs.

Other resource projects include copper and gold projects in Northern Queensland. While activity is expected to rise into the future, it is important to note that the majority of the projects in the list still remain unfunded, and subject to movements in global commodity prices and demand. Consequently, there is still a high degree of uncertainty surrounding the pace and scale of the recovery.

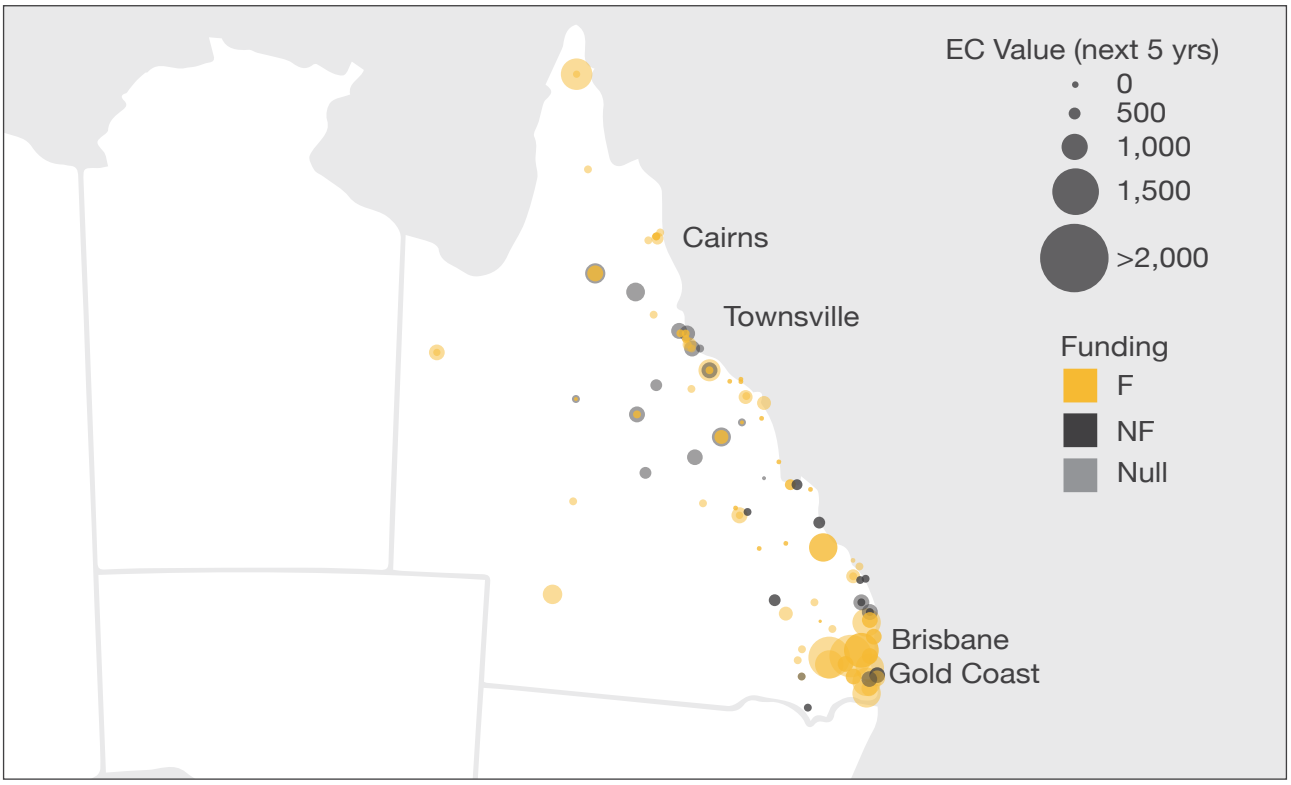
In particular, Adani's $16 billion Carmichael coal project is still categorised as 'unlikely' and the outcome of this project has the potential to significantly change the outlook for the category. Substantial risks surround the outlook for this project (and related infrastructure works elsewhere in the list) given uncertainties over future coal prices and the risks surrounding finance for Adani's very large Galilee Basin railway line that would stimulate development of its Carmichael mine. Even if the Adani mine were not to proceed, some coal projects (currently slated to commence in the 2020s) may still be pulled forward if coal prices were to remain relatively high.

In terms of LNG, it has been assumed that no new downstream train expansions will take place over the next five years given the outlook for energy prices and the supply / demand balance in the LNG market. Nonetheless, ongoing development of Coal Seam Gas (CSG) fields over the operational life of LNG facilities will require continual investment in related field infrastructure, including roads, water, and pipelines and gas facilities. Again, while not as significant as downstream processing and infrastructure projects, in aggregate they will keep the volume of activity high compared to pre-boom times and offer a higher share of work for domestic contractors compared to the LNG trains.

Adani's
$16 billion
Carmichael coal project is still categorised as '**unlikely**' and the outcome of this project has the potential to significantly change the outlook for the category

Figure 26

Funding & Engineering construction value (next 5 years) by location



Queensland Regional Focus

Significant shifts in major project work are projected at the regional level in Queensland over the forecast period. While major project activity will be rising in aggregate terms, a much greater share of this work is expected to be focused in the South East Queensland region, but also the Northern Queensland region. While South East Queensland is expected to see the largest volumes of major project work over the next five years, the strongest growth in work is expected in Northern Queensland. An interesting feature of the outlook by region is the differences in the size and status of projects and hence the certainty of projects proceeding. As our maps demonstrate, most of the larger, more securely funded major projects are located in the South East corner, with a greater proportion of unfunded (and generally smaller) projects located in Queensland's central and northern regions

The outlook for resources investment, coupled with rising transport infrastructure and renewable investment, will be the key driver of differences in regional activity and is expected to see South East Queensland's overall share of activity shift to a higher plane through the forecast period. Much of this recovery is dependent on public investment decisions by State and Federal Governments, with much of the Pipeline remaining unfunded.

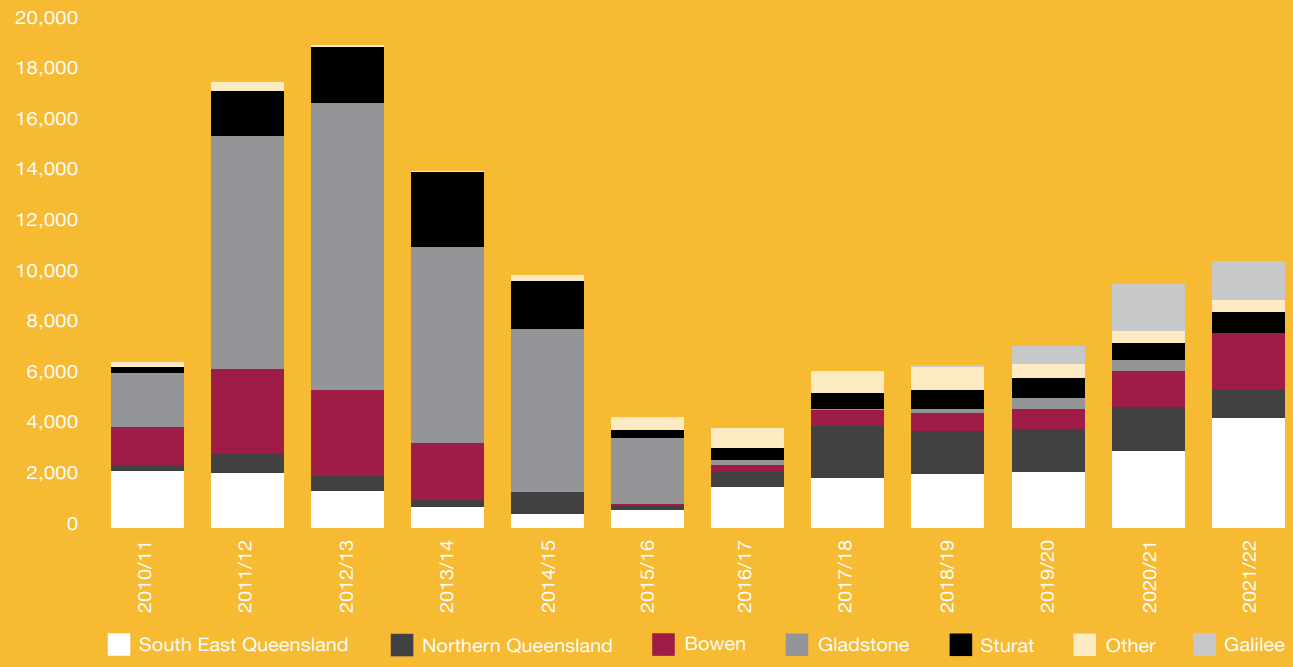
Northern Queensland has already benefited from mining projects in recent years (Amrun and Dugald River) but activity will broaden if the Northern Australia Infrastructure Facility (NAIF) begins to award concessional finance to proposed private sector projects. Northern Queensland already has a stronger pipeline of funded work including several large sections of the Bruce Highway (including the Mackay Ring Road Stage 1 and the Cairns Southern Access Corridor Stages 3 and 4) and Cape York Regional Roads Package, the North Coast Rail Capacity Upgrade, as well as a plethora of renewable energy projects.

The Bowen region, meanwhile, is more heavily dependent on major project work related to coal mine development and will be supported by Byerwen and the expansion and reopening of existing mines. There are also other projects getting underway including the Peak Downs Highway Upgrade and a significant number of solar projects. This will see Bowen's share of total major project activity rise over the forecast horizon.

While the pace of the shift in work will be slower than that which occured in Gladstone during the LNG boom, remote regions such as Northern Queensland and the Bowen Basin will have their own challenges to overcome. The regional towns and cities that will inevitably service projects in these regions will face a number of social and economic changes and will be competing against South East Queensland (as well as interstate) for skills.

Figure 27

Major Project Work Done by Region



This will require detailed planning by Federal, State and Local Governments in conjunction with project proponents in order to keep the project pipeline intact in these regions whilst maintaining harmonious and sustainable communities.

As history has proven, the South East Queensland region has considerable experience in handling significant shifts in major project work and employment such as those forecasts in this Report.

However, the current forecast upswing will occur at a time when other Australian states and cities (particularly Sydney and Melbourne), as well as other global cities, will also be undergoing increasing levels of major project investment. This will likely see competition for skilled labour and plant and equipment intensify, which will create a challenging period for procurement.

Most of the larger, more securely funded projects are located in the South East corner, with a greater proportion of unfunded (and generally smaller) projects located in Queensland's central and northern regions

Strengths, Weaknesses, Threats by Region

South East Queensland

Publicly funded infrastructure works are the key driver in South East Queensland, with roads and railways work to remain the principal source of major project activity, notably the large Cross River Rail. In this sense, the projection of increasing levels of public investment and major project works in this region will give local contractors many new opportunities over the forecast horizon (generally $2-3 billion per annum in major project work through the forecast period and progressively increasing). Much will depend on the willingness of the Queensland and Commonwealth Governments to fund these projects. Given the plethora of rail projects occurring in New South Wales and Victoria, there may also be risks to the timing of signature rail projects in South East Queensland.

Gladstone

The strengths, weaknesses and threats to the Gladstone region are shaped by the outlook for LNG and coal development. Major project demands peaked in 2013/14 and have since declined sharply given the completion of various LNG projects and the Wiggins Island Coal Export Terminal (WICET). A recovery in Gladstone major project work depends heavily on whether further stages to existing LNG projects, or new LNG projects commence during the forecast period or are delayed by high cost pressures and the emergence of competitive threats (such as from US shale gas). The current pipeline does not expect another major downstream LNG development occurring until beyond 2021/22. Higher than anticipated coal prices, however, may see currently unfunded coal-related developments proceed earlier than expected, which presents an upside risk to the current (very low) outlook for work in the region.

Bowen Basin

Coal-related major projects shape the Bowen Basin region, but it is also becoming a focus for solar energy projects. While many proposed coal projects remain unfunded, there are some notable exceptions that will support activity in the short term including the new Byerwen mine, and potential expansions at Caval Ridge and Kestral. Activity in the Bowen Basin is increasingly underpinned by investment in renewables energy. Notable renewable projects include the Moranbah Solar Farm (170MW) and the Daydream Solar Farm (150 MW). Roads work (Peak Downs Highway), as well as water and port works will also support major projects activity. Overall, it is expected to be a relatively stronger growth region and could see upside if coal prices were to remain at higher levels.

Galilee Basin

While several very large Galilee Basin projects remain proposed, only one project, Adani's Carmichael project, features on the 2018 Major Projects List, albeit as an unlikely starter. There remains a very high risk that this project will not occur at all given the long-term price outlook for coal, as well as issues regarding project finance, costs, remoteness and environmental issues. Together, Galilee Basin projects in the list account for nearly $7.5 billion dollars of major project work, but these are classified as unlikely to proceed. The absence of these projects sees major project work effectively flatline from 2018/19, as shown in Figure 27.

Surat Basin

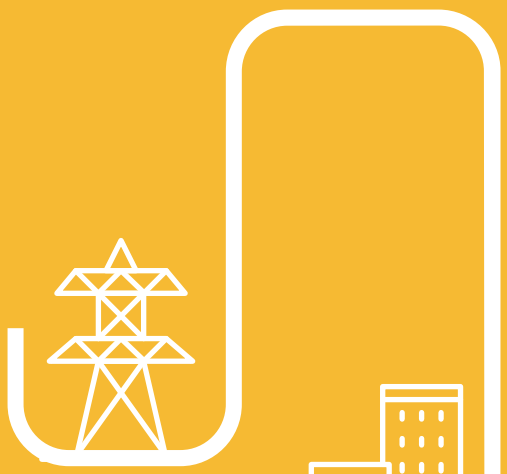
Ongoing upstream coal seam gas work is currently driving activity levels in the Surat Basin. This Report forecasts relatively stable levels of activity in this region going forward, but the need to replace ageing wells whilst simultaneously increasing upstream capacity for the LNG processing facilities could see a more significant increase in CSG and related infrastructure activity. The new Roma East project is one such project. Outside of CSG, there is also expected to be a substantial number of renewable energy investments, including Bulli Creek Solar Farm Stage 1 (100 MW) and the Darling Downs Solar Farm (106.8 MW).

Northern Queensland

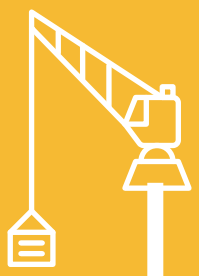
Northern Queensland has benefited recently from multiple major resources, yet the Pipeline suggests many future resources projects currently remain unfunded, the outcome and timing of which is dependent on the state of the global economy and demand for metals and minerals. Apart from minerals development, Northern Queensland is benefiting from measures to boost regional economic growth through infrastructure investment. These measures include upgrades to the Bruce Highway (Sarina to Cairns) and the Cape York regional package. Northern Queensland is also at the forefront of a large round of renewable energy investment. These include the Ross River Solar Farm (142 MW), Mt Emerald Wind Farm (180 MW) and the Kidston Solar Project – Stage 2 (270 MW). This is expected to see North Queensland emerge as the strongest regional growth centre for major project work.

Northern Gas Pipeline

WORKFORCE AND EMPLOYMENT OUTLOOK



Subject to project funding decisions, the amount of work forecast for the next two years will hold employment around the levels that prevailed prior to the mining boom



Tthe industry needs to take a longer-term approach to planning for the future workforce in a way that links infrastructure planning to business capacity building, workforce planning and skills development

It has been estimated that

20-40%

of construction costs are waste: wasteful spending, wasteful delays and wasteful communication

Currently there are

4.4 Australians

of working-age for every person over 65

By 2040, that ratio will be

two to one

WORKFORCE AND EMPLOYMENT OUTLOOK

The pipeline of work forecast in this Report demands a strong labour response. The industry has embarked on an upswing in activity that is more modest in scale than the mining boom, but which is also more stable and sustainable for Queensland's workforce.

The Pipeline of projects captured in this Report represents a significant engine of job creation for Queensland's engineering construction workers.

Subject to project funding decisions, the amount of work forecast for the next two years will hold employment around the levels that prevailed prior to the mining boom.

The extent to which the increased activity in 2018/19 can be sustained will depend on how much of the unfunded portion of the Pipeline can be converted into live projects. Overall, it is probably reasonable to expect levels of employment on major projects in the range of circa 12,000 jobs.

.

Occupational Profile

The engineering construction workforce is made up of more than 75 occupations. Yet 20 of these occupations account for almost 80% of the total workforce, while half of the entire workforce is concentrated in just 10 occupations. Concreters, labourers, construction managers and drivers of plant are the most populous engineering construction occupations.

Queensland Government Building and Construction Training Policy

The Queensland Government's Building and Construction Training Policy (Training Policy) requires contractors to employ apprentices and trainees and undertake other workforce training as a condition of being awarded work on eligible Queensland Government projects.

The Training Policy is one element in a longstanding partnership between the building and construction industry and the Queensland Government to develop the industry's skills base and future workforce capability. CSQ administers contractor compliance data on behalf of the Queensland Government through the Training Policy Administration System, which enables contractors to electronically report their compliance with the Training Policy.

It is estimated that approximately 94 projects captured in this Report are likely to be required to comply with the Training Policy. This is anticipated to generate around 17 million in training hours over the life of this pipeline of work. As a result, if all Queensland Government projects listed in this Pipeline are fully realised, around 10,000 new apprenticeship and traineeship places will be created from public investment in infrastructure.[1] In addition to these new jobs created, existing workers in the industry will be able to take advantage of skilling opportunities made available through this pipeline of work assisting them in gaining new skills and knowledge and to help support their career progression in the industry.

1 These figures have been calculated with the assistance of the Department of Employment, Small Business and Training and reflect the total project cost for all government-procured projects captured in this Report, both funded and unfunded. The realised figures will vary depending on the proportion of unfunded projects that do not proceed, any variations to the contract value from current estimates, and how the work is procured (the stages) which could affect eligibility and deemed hour calculations. The figures do not include private projects that are required to, or are choosing to comply with the Training Policy.

Figure 28

Major Project Jobs Outlook

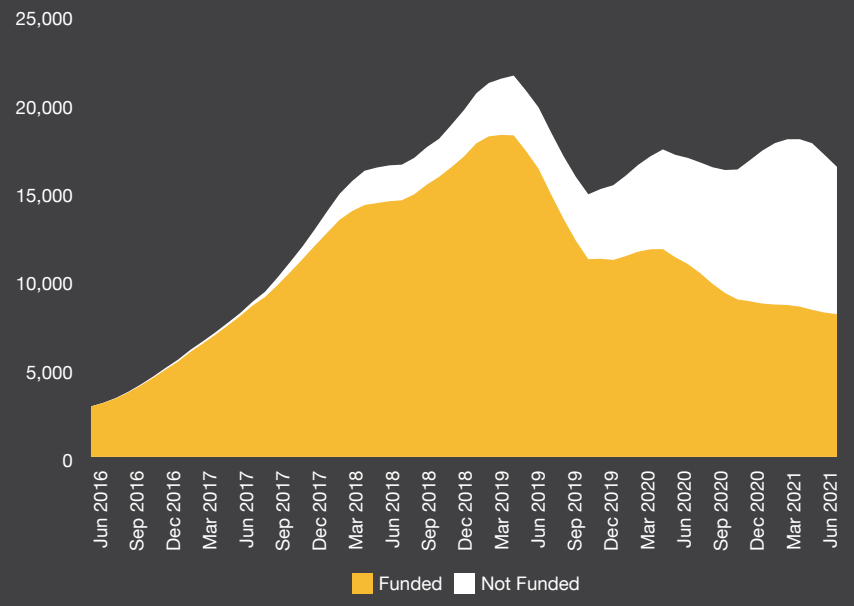
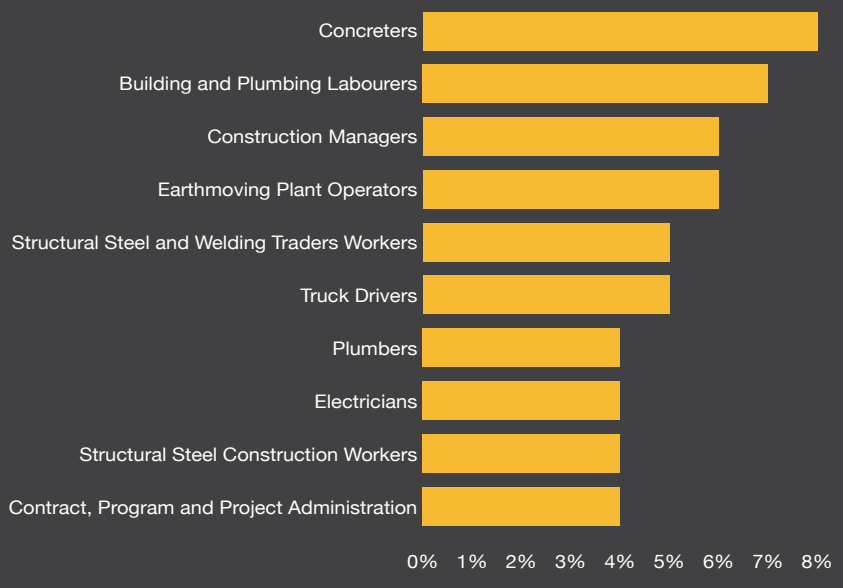


Figure 29

Major Projects Occupational Profile



The engineering construction workforce is made up of more than 75 occupations. Yet, 20 of these occupations account for almost 80% of the total workforce, while half of the workforce is concentrated in just 10 occupations

As has been advocated in previous years in this Report, the industry needs to take a longer-term approach to planning for the future workforce in a way that links infrastructure planning to business capacity building, workforce planning and skills development.

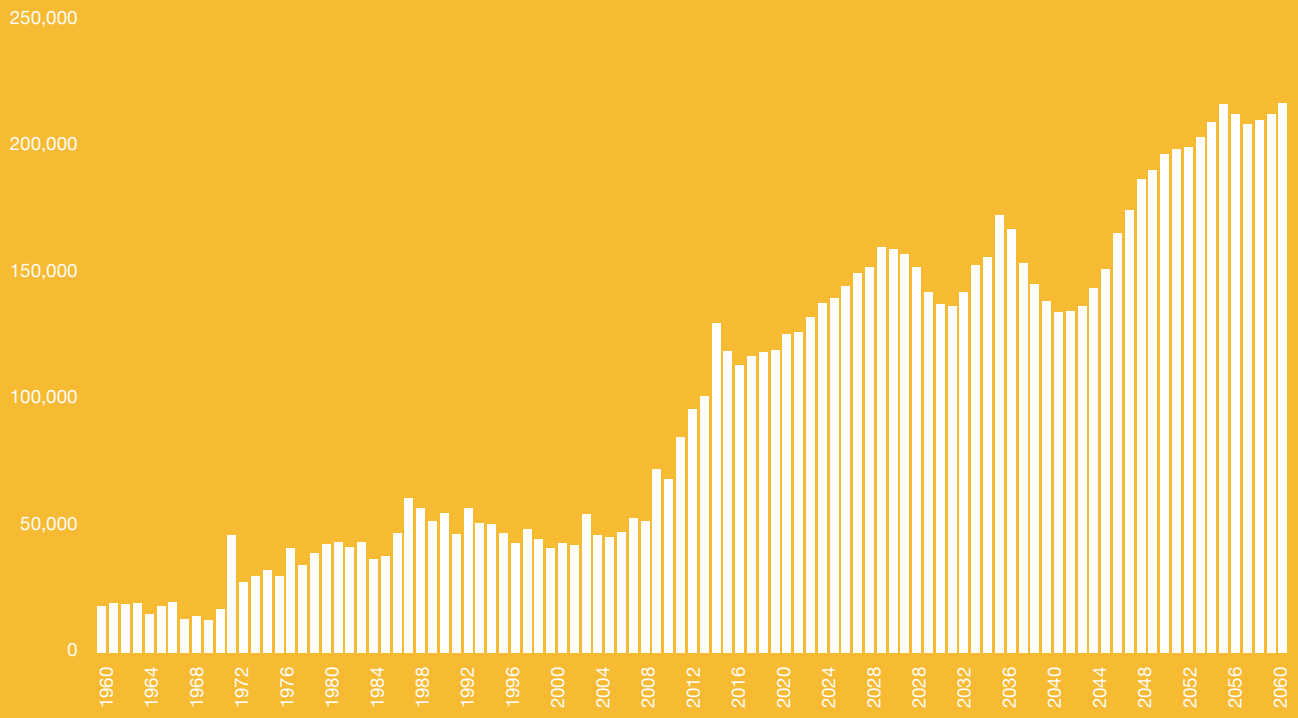
This is a challenge that will be compounded not only by digital disruption but by Queensland's and Australia's changing demographics.

Australia's population continues to grow relentlessly – we will be two-thirds larger by 2050. This in turn demands year-on-year increases in construction activity. Yet it is not the growing population, per se, that is so disruptive. It is the ageing profile of that population.

Australia's ageing population means that workers won't just be older; they will be fewer. While the population expands, the proportion of the population available to work is shrinking. Currently there are 4.4 Australians of working-age for every person over 65. By 2040, that ratio will be two-to-one.

Figure 30

Annual growth in over 65's, Australia



There are two paths to meeting expanding demand with an ageing and shrinking workforce. The first is for people to work longer. The second is to produce more per hour.

Whilst the construction industry would seem ripe for disruption there remains significant barriers for any new entrant into the market looking to provide alternative delivery solutions.

It is therefore more likely that disruption will take the form of new technologies being adopted by existing contractors either at the behest of major clients or in order to gain a competitive advantage. Some of these key technologies are detailed in the following pages.

Offsite Construction (Prefabrication)

Moving the construction process from the construction site to the factory is an accelerating trend that will catalyse other technologies. Robotics and 3D printing, for example, are very difficult to implement in the ever-changing and uncertain conditions of a construction site, but become far more feasible in a controlled environment. Similarly, a world of digitisation and the 'internet of things' is far easier to achieve offsite.

Another advantage of offsite construction is that it dramatically reduces materials handling. Materials handling represents the single biggest opportunity for productivity gains in the construction process – studies have found that more than a third of construction workers' time is spent idle or non-productive while waiting for materials and tools.[2]

Materials handling is also the activity that causes the most accidents and injuries on construction sites.[3]

Offsite fabrication promises to reduce this source of waste and risk, delivering significant productivity and workplace health and safety benefits. Workers will be able to keep working longer as their manual burden will be reduced. It is also likely that a shift to production in an offsite environment will encourage more women to enter the industry.

The move to offsite construction also involves a productive cultural shift. The manufacturing ethic that takes over once inside a factory means that all of the discipline and rigour of operations management can be applied – such as standardisation, lean production, process optimisation, continuous improvement and total quality management.

2 Jenkins, J, and Orth, D. (2004) 'Mechanical and General Construction Productivity Results,' Cost Engineering, 46(3): 33-36

3 Perttula, P. et al (2003) 'Accidents in materials handling at construction sites,' Construction Management and Economics, 21(7): 729-36

It is worth noting that China, India and Indonesia now dominate prefabrication globally, accounting for more than 67% of global revenue. The main barrier to offsite construction is the limited ability of construction companies to raise the capital needed to bring a solution to market. There are only a handful of players in a financial position for such an undertaking. There is also significant regulatory and industrial uncertainty in this space, with the prevailing industry structures entrenched in traditional on-site methods.

For this reason, the emerging players in offsite construction are not contractors but firms from other parts of the supply chain. The leaders in this space are the likes of CSR (a building products company), Stoddarts (a steel fabrication business) and Hyne Timber (a timber mill).

A notable exception to this rule is the large multinational contractor, Lendlease, who has made a significant investment in a prefabrication plant in Western Sydney. There are also a range of smaller players in the prefabricated 'modular' and 'kit home' market, such as Happy Haus and ArchiBlox, but this remains a largely cottage industry. Mainstream adoption will be led by the big players.

Automation

Industries such as agriculture and manufacturing realised significant productivity improvements over the last century through automation. In the 1920s, the agricultural industry employed almost one third of the entire labour force.

Today, widespread adoption of labour-saving technologies means the industry accounts for less than 3% of the workforce, even while the volume of output is far greater. This industrial revolution glanced off the construction industry without so much as a flesh wound – construction employs roughly the same proportion of the workforce today as it did a century ago.[5]

A shift to offsite construction will have significant consequences as it implies a structural rebalancing away from construction toward manufacturing

4 www.technavio.com/report/global-construction-prefabricated-market

5 www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/1301.0Feature%20Article142001

There are some prominent signals that the construction industry will not be able to avoid the next industrial revolution. Many technologies are starting to appear and enter into common use that promise to deliver labour productivity gains on a scale similar to that seen in other industries:

— Civil construction operations are increasingly combining the power of satellite positioning with 3D modelling to direct earthmoving tasks. Where civil contractors once relied on a labour-intensive process of placing and replacing survey stakes to guide cut/fill operations, technology is now available that allows machine operators to work from digital site plans in a manner not unlike in-car navigation. These sophisticated machines are transforming a once highly specialised task into one that requires no more than a few hours' training to perform proficiently. The Japanese company, Komatsu, is taking the next logical step, pairing fully autonomous, driverless plant with surveying and inspection drones to measure, doze and grade a site without any human intervention.

— Concrete and masonry work is traditionally the most labour intensive and back-breaking of all construction tasks. This domain has already seen some labour-saving technologies enter the mainstream, such as concrete pumps, finishing machines and precast concrete panels. More ambitious and experimental, but well-funded, robotic solutions such as the Semi Automated Mason (SAM) and Hadrian X provide accurate and efficient placement of masonry units. These solutions are claimed to at least triple the productivity of the typical bricklayer, while significantly reducing the manual burden on the worker.

— Prefabricated components are increasingly used throughout the commercial and engineering sectors, including structural steel elements, roofing systems, bathroom pods, wall and floor cassettes, and other structural and finish materials. This componentry is produced in factory conditions with equipment employing varying degrees of automation, including 3D printing. These methods are delivering productivity benefits combined with installation processes that do not expose workers to adverse ergonomic impacts.

— Site inspectors and surveyors are increasingly making use of high resolution drone technology to undertake site surveys and building inspections. Drone technology enables rapid mapping of sites for engineering design with unparalleled accuracy. Building inspectors are now able to inspect areas of buildings that were previously inaccessible or only at great expense.

These innovations have, to date, been used primarily by large contractors completing large engineering and industrial projects. The coming decades are likely to see these technologies penetrate the bulk of smaller contractors as the costs to access automated equipment falls, and as the supply chain continues to re-tool around these capabilities.

Digitisation and BIM

It has been estimated that 20-40% of construction costs are waste: wasteful spending, wasteful delays and wasteful communication.[6] Information breakdowns are often the root cause: information that's outdated, inaccurate, undocumented, or just uncommunicated.

Building Information Modelling (BIM) software systems provide a collaborative environment for information to be shared, coordinated and disseminated between the project participants, reducing the incidence of clashes between the different disciplines as design evolves and encouraging design innovation and value engineering. Whilst this results in significant cost / time savings during the construction of the project, even greater savings can be achieved over the life cycle of the asset if the use of BIM is maximised to include recording of project data such as equipment specifications and warranties. This allows an asset owner to readily call up details of a faulty piece of equipment such as maintenance history, supplier details and warranty information.

It is probably because the majority of savings are realised post construction, that BIM has been slow to be adopted by contractors and there needs to be increased incentivisation for its adoption or mandating of its use by owner organisations in order to realise the significant benefits that it can deliver.

Digitisation, of course, goes beyond just BIM. Under the right conditions, a raft of related technologies can improve productivity of construction, including:

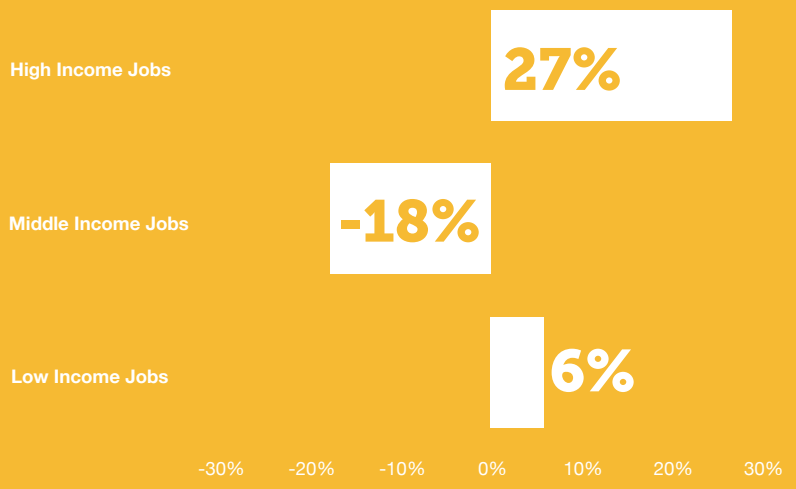
— **augmented realit**y, which will help construction workers complete tasks with greater precision and clarity by overlaying onto the physical world digital information about the task at hand, such as workflows, quality parameters, work instructions, etc.

— **the internet of things**, where all elements of the construction process–people, plant and material–are embedded with sensors and networked, producing oceans of data that can be leveraged to improve the efficiency of construction processes

6 Flyvbjerg, B., Holm, M. S., and Buhl, S. (2003) 'How common and how large are cost overruns in transport infrastructure projects?' Transport Review, 23(1): 71–88

Figure 31

Change in share of work, Europe, 1933–2006



Technological change is amplifying a trend towards a more polarised workforce. The Construction Industry has so far not been impacted by this change but as use of offsite fabrication and technology increases the construction industry will experience a similar decline in Middle Income jobs

— **artificial intelligence**, which digests the data produced by the internet of things to quickly and accurately make decisions about things like the most optimal flow of trades and material throughout a site.

These digital technologies, while technically feasible, are unlikely to make significant headway in isolation. Much of the promise of digital technology in construction relies on it being integrated with digital plans and schedules. Their potential can therefore only be realised in an environment of mature and widespread BIM adoption.

Lean Construction

Lean construction refers to tools and processes that have been developed, based in part on lean manufacturing techniques pioneered by Toyota after the Second World War, with the aim of reducing waste and improving productivity in the construction industry.

When fully implemented, lean construction tools and processes have been demonstrated to result in cost savings of up to 30% of budget and schedule savings of up to 20%.

Workforce Implications

The disruptive trends we have identified imply significant change for the workforce. A shift to offsite construction, in particular, will have significant consequences as it implies a structural rebalancing away from construction toward manufacturing. This means that employment in the 'construction' industry will fall, offset by increasing employment in 'manufacturing.'

These disruptions are also likely to deliver a more polarised workforce. This will bring the construction industry into line with patterns playing-out across other countries and industries. At one end of the skill spectrum, there has been an increase in the proportion of highly-educated, well-paid knowledge professionals, while at the other, there has been growth in low-skilled manual jobs. The middle sector has seen a corresponding decline (Figure 31). All indications are that technological change is amplifying rather than attentuating this trend across advanced economies.

The construction industry is one of the few industries maintaining a high proportion of mid-skilled trade workers, with two thirds of its workforce falling into the middle income 'trade worker' category.

As offsite fabrication and automation takes hold, we will see a bifurcation of construction jobs along similar lines to that seen in agriculture and manufacturing. A cohort of highly skilled technical, design and engineering professionals will form the engine room of the construction workforce. At the lower end of the skills spectrum, a small army of construction labourers will perform a range of unskilled installation and handling tasks both on- and off-site.

At the same time, as we move toward a more flexible and polarised workforce, individual workers will exercise a stronger voice in determining what collection of skills they wish to cultivate to achieve their career goals. Regulators will set the boundaries, but individuals will demand far more scope to craft unique skilling and career pathways.

IMPLICATIONS, CHALLENGES AND RISKS

Major project work is
recovering now
but, subject to funding and feasibility, may fall back again in coming years

Sustaining growth in the Queensland economy requires putting into place plans and policies that will encourage and sustain both private and public investment in the state over the long term

Meeting the infrastructure challenge ahead will also mean budgeting for larger increases in the maintenance to sustain the existing capital stock

Around two-thirds of the currently unfunded pipeline of work over the next two years needs to be funded just to sustain 2017/18 levels of major project activity in those years

Breaking the underspend pattern on planned infrastructure investment which in 2016/17 amounted to

$1 billion

The availability of funding for sustainable productive infrastructure investment should not derail investment itself – exploring innovative funding mechanisms remain critical to the outlook for the pipeline and the Queensland economy

IMPLICATIONS, CHALLENGES AND RISKS

Figure 32 compares last year's Major Projects Pipeline five-year outlook to the present forecast (note 2016/17 is now historical rather than forecast). As per the 2017 Major Projects Pipeline, we include all major engineering construction projects above $50 million (previous Reports only considered projects above $100 million in value).[7] Several key points are worth emphasising:

- As forecast in the previous Report, major project work fell again in 2016/17. While the decline was small, 2016/17 represented the trough in major project work in the State.
- The total value of projects in the 2018 pipeline is $39.9 billion, compared to $39.1 billion in the 2017 pipeline. However, the value of funded work in the pipeline is only $23.7 billion, with both public and private projects still awaiting funding commitments.

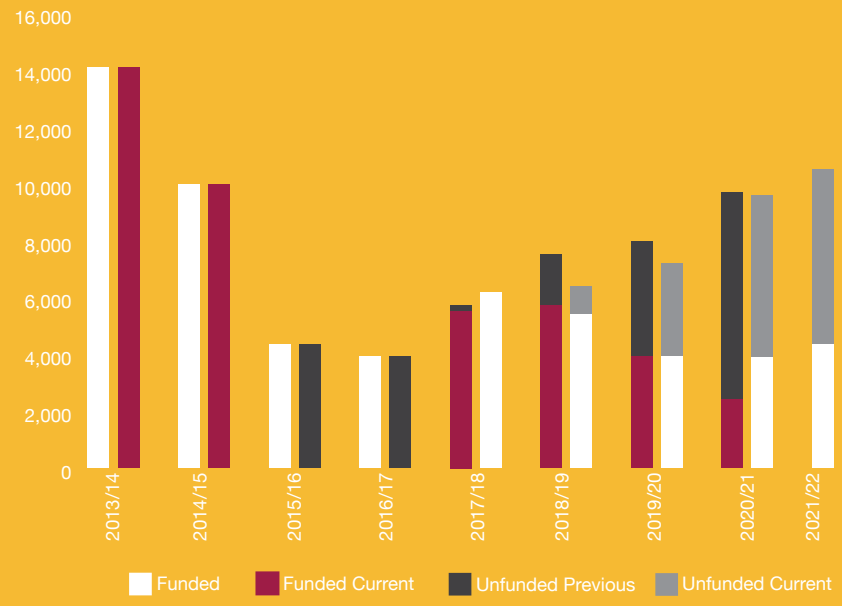
Sustaining positive conditions for private and public investment from here will be important in keeping major project work on an upward trajectory

- Major project activity is now rising from the 2016/17 trough – but the main challenge will be keeping activity at sustainable levels into the future. 2017/18 represents a better year for major project activity, both in terms of comparison to activity the previous year, and against the expectation for 2017/18 in last year's Report. Keeping this momentum going in subsequent years is the key message from the pipeline. Despite funding commitments for Cross River Rail and Inland Rail, many other projects remain unfunded from both the public and private sectors. Meanwhile, some sectors such as roads, electricity and telecommunications simply do not have enough projects – funded or unfunded – to prevent declining levels of work in future.
- New public and private investment – including projects in the Major Projects Pipeline – is having a broader, stimulatory effect on the Queensland economy. From a position of falling State Final Demand (SFD) and weak employment growth over 2014/15 and 2015/16, SFD grew 2.6% through 2016/17, with public investment (+4.1%) and positive growth in private investment (+1.2%) for the first time since 2012/13 the key drivers. Annual employment growth has recovered to around 4% — the strongest rate since 2006/07.
- Public and private sector investment is driving the current recovery in major project work. New public investment is currently centred on roads and telecommunications (the NBN), but is anticipated to broaden into rail and water projects in coming years. By contrast, privately funded major project work is focused on electricity, airport upgrades and resource-related projects. Sustaining positive conditions for public and private investment from here will be important in keeping major project work on an upward trajectory.
- Queensland still lags New South Wales and Victoria in terms of funding and delivering infrastructure investment. As New South Wales and Victoria further ramp up infrastructure investment over the remainder of this decade, challenges are likely to re-emerge in procuring construction services. To minimise risks of project delays, failures and rising construction costs, Queensland needs to apply a longer-term approach to planning for capacity and capability in the construction industry. Such a plan should cover future workforce requirements and skills, as well as planning for required construction materials andmeeting critical transport and logistics challenges as major projects reach the construction phase.

7 In providing a more consistent comparison with last year's outlook we have also revised down previous optimistic forecasts for upstream oil and gas sustaining capital expenditures, and also removed the new Townsville Stadium development, which is more correctly classified as a non-residential building project.

Figure 32

Major Project Work Done Forecast: 2018 versus 2017



2016/2017 represented the trough in major project work in the State but the challenge will be keeping activity at a sustainable level into the future given how much of the pipeline is currently unfunded

Implications and Challenges

The key finding of this Report is that major project work is recovering now but, subject to funding and feasibility, may fall back again in coming years. Major project activity – mirroring the broader Queensland economy – has been through a rollercoaster over the past decade. However, the 2017/18 year has seen a 58% recovery in major project work from the trough in 2016/17. Maintaining this momentum is the core challenge facing the state, requiring a range of initiatives to improve levels of funding for infrastructure, ensure capability and capacity to manage a growing pipeline and, fundamentally, provide positive conditions and frameworks that support the economy's growth engines: public and private investment.

While it is sometimes convenient to slate economic success or failure to particular governments, politicians and policies, the volatile performance of the major projects market in Queensland and the broader Queensland economy can perhaps be more accurately put down to the impact of large, long investment cycles – with both the public and private sectors playing important roles.[8]

Queensland was already experiencing strong, balanced growth prior to the 2000s resources boom, with State Final Demand (SFD) growth averaging 7% per annum over the five years to 2005/06. Renewed business confidence following the global economic downturn in the early 2000s, a recovery in housing following the introduction of the GST, accelerating population growth (boosting both consumer spending and housing activity) and a low Australian dollar supercharged private investment during this time.

93%

of unlikely projects are privately funded

8 Investment in economics represents the addition to capital stock or productive capacity. It mostly consists of the construction of buildings and structures and purchases of plant and equipment, but also includes growth in livestock, minerals exploration and intellectual property. This is a very different meaning from finance, where investment refers to the purchase or creation of an asset with the expectation of generating financial returns.

Amrun Export Facility

With investment and major project work now positive, so too is growth in the Queensland economy...

By contrast, public investment took a back seat during first half of the 2000s, following very strong growth by delivering Year 2000 infrastructure projects the previous decade. While the Queensland economy rumbled along without growth in public investment – and particularly public infrastructure investment – its absence inevitably led to the emergence of infrastructure gaps, constraints and bottlenecks later in the 2000s, particularly given Queensland's rate of economic growth, the strong global economy (and particularly the emergence of China and its demand for metals and minerals), as well as robust increases in population.

As the need for greater infrastructure investment became increasingly apparent, the challenge was how this would be funded and financed.

This funding challenge would be solved in two ways. Firstly, the introduction of the GST combined with steeply increasing company profits and stamp duties eventually provided governments at the State and Commonwealth level with greater revenues that could be put towards infrastructure investment – although there was a significant delay between the improvement in underlying government finances and new investment. Between 2004/05 and 2007/08, public investment in Queensland doubled in value (from around $10 billion per annum to $20 billion) and SFD growth oscillated between 7-8% per annum.

But the second, and arguably more significant development, was the second phase of the resources investment boom following the global financial crisis (GFC) in 2008 – and very much driven by GFC-related stimulus policies around the world, and particularly China.

For Queensland, the second phase of the resources boom between 2008/09 and 2012/13 ushered in a new wave of gas (particularly LNG), coal and related infrastructure investment spanning pipelines, jetties and harbours, railways, electricity, water and roads. Total privately funded engineering construction activity more than tripled between 2008/09 to a peak of $39.2 billion by 2012/13, and much of this was reflected in the strong profile of major project work at the time, as evidenced in this Report. The strong economic boost provided by the resources boom also helped sustain government revenues and funding for public investment projects that had also been boosted in the wake of the GFC. While the GFC saw Queensland SFD decline slightly in 2009/10, it simply surged again over the following two years, peaking at over 9% growth in 2011/12 alone.

Between 2012/13 and 2015/16, both public and private investment in Queensland collapsed, driving sharp falls in major project work. While the resources investment bust was the main contributor, its impact was amplified by a significant reduction in public investment over the same period.

In turn, falling major project work impacted heavily on the Queensland economy, and especially those businesses operated by Queensland construction contractors and suppliers. Double digit declines in investment over 2014/15 and 2015/16 (despite the strong pickup in housing) were the primary architect of shrinking Queensland SFD and relatively sluggish growth in employment and incomes. Over this period, the state of Queensland was effectively in a historically deep demand recession, despite accelerating mining exports keeping overall economic growth (as measured by GSP) mildly positive.

Given this history, the positive growth in both public and private investment in Queensland through 2016/17 is welcome news. Major project work still eased over 2016/17, but has lifted in 2017/18, and so too has growth in the broader economy. Importantly, this year's Pipeline shows there are many projects coming through which, if funded, could drive further growth in investment, employment and economic growth in coming years. Finding sustainable mechanisms for funding these projects remains the challenge.

... but Queensland still has a substantial growth challenge ahead

While investment is finally turning around in Queensland, the outlook for growth in investment, employment and the broader economy is not exactly spectacular. Rather than the high growth rates experienced during much of the 1990s and 2000s, economic growth (as captured by Gross State Product or GSP) is expected to average around 2.8% per annum through the next five years, with SFD growth averaging a slightly better 3.3% per annum.

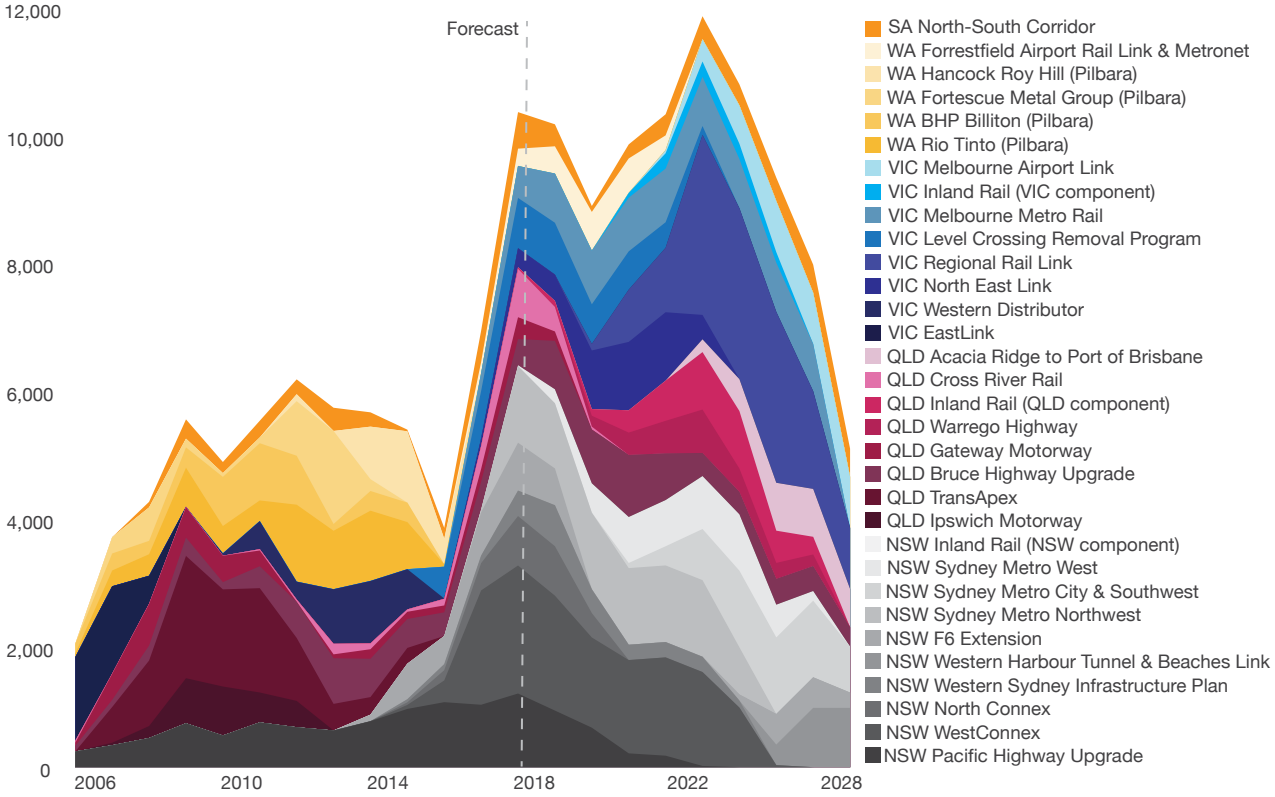
Whereas Queensland used to significantly outperform the Australian economy, the next five years only sees very marginal outperformance overall.

Key challenges facing Queensland major project work, investment, and the broader state economy include:

- **Imminent downturn in residential investment**. Thus far, the transition (at the national and state level) to more balanced economic growth has been assisted by new residential investment, in turn spurred by the lower Australian dollar and loose monetary policy from the Reserve Bank. However, there is only so much lower interest rates can do to spur private investment, particularly if sectors are already oversupplied, demand growth is weak and there is a general lack in business confidence. The residential building boom is near the peak at a national level, and is now falling back in Queensland. We expect residential investment to undergo a substantial correction in the short term while future demand will be impacted by an "oversupplied" housing market (particularly in the Brisbane area where the high density apartment boom was the most intense), high house prices, rising household debt, tighter lending restrictions and foreign capital controls, and weak income growth.
- **Funding and financing major project activity remains a critical issue**. Queensland is currently relying heavily on new Commonwealth and private sector funding to drive the upswing in major project work. Through the remainder of the decade, the majority of proposed major project work remains unfunded, presenting risks to the sustainability of the project pipeline, while the magnitude of the increases may not be enough to alleviate existing and emerging infrastructure deficits. While the Queensland Government has recently announced full funding for the $5.4 billion Cross River Rail project as its largest single infrastructure initiative, there are still challenges regarding the extent to which the State Government can fund broader infrastructure plans and programs across the state given its high level of debt, combined with the potential for weaker revenue growth from royalties and stamp duties if commodity and house prices cool.
- **Competing for scarcer construction resources as Queensland gradually turns the infrastructure taps on again**. New South Wales and Victoria, particularly, have taken full advantage of excess capacity which emerged in the national major projects industry in the wake of the downturn in resources investment in recent years (as well as public investment, nationally). With public investment finance supercharged by long-term asset leases, these two states have embarked on a massive program of infrastructure investment which still has many years left to run (Figure 33), absorbing capacity effectively idled in Queensland and Western Australia. Consequently, the national major projects market – and demand for skills and construction materials – has tightened considerably over the past year, and this is evidenced by rising prices for construction work as captured by known price indices such as the Road and Bridge Price Index and the Engineering Construction Implicit Price Deflator (Figure 34). Recent data shows that prices for construction work are now rising at the fastest rate since the end of the resources boom. If Queensland is to realise growth in major projects work as outlined in this Report, it will need to address a range of challenges across procurement to minimise risks to construction industry capacity and capability.

Figure 33

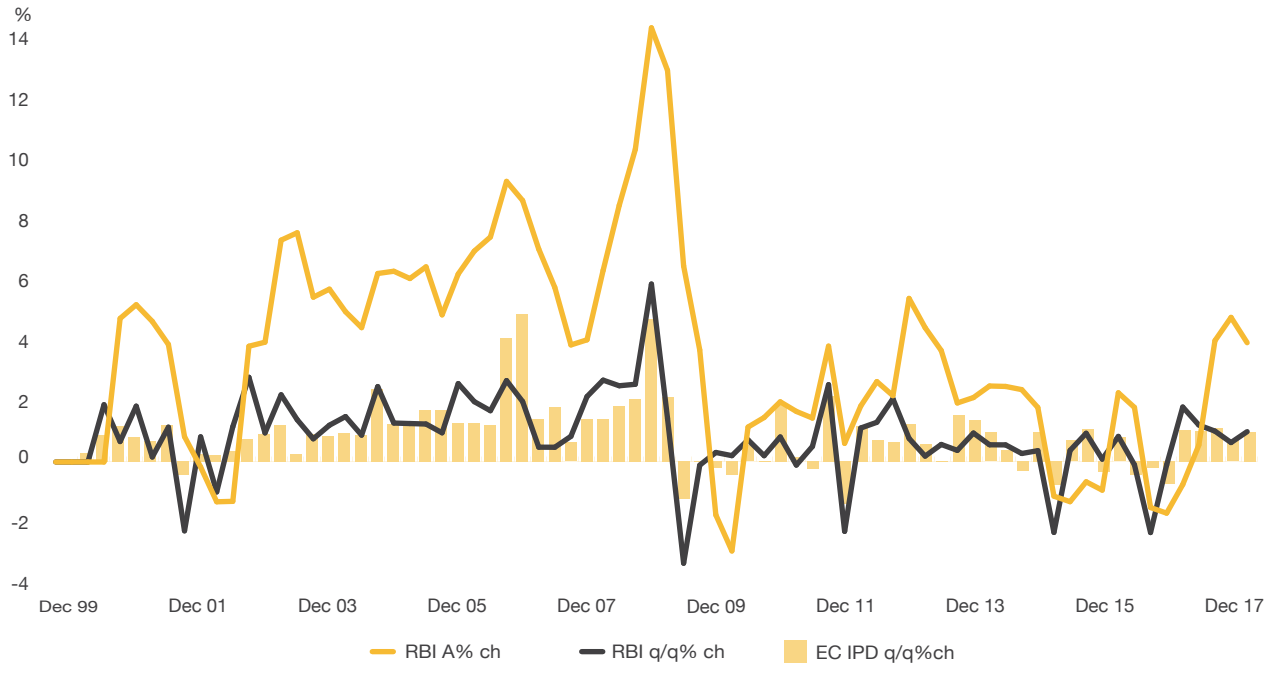
Work Done on Major Transport Projects (above $2 Billion)



Source: BIS Oxford Economics

Figure 34

Growth in Construction Price Indices - Queensland



Source: BIS Oxford Economics, ABS Data

— **Breaking the underspend pattern on planned infrastructure investment**. Even with 100% funding secured (including rising cost escalation), major projects can still be affected by underspending compared to what was planned in Budgets. As highlighted in the previous Pipeline report, there continues to be differences in planned public investment (measured as 'purchases of non-financial assets' in various Budgets) and actual spending outcomes. The 2016/17 State Budget, for example, planned for $8.3 billion in such investment, which the subsequent Mid Year Fiscal and Economic Review (MYFER) confirmed to be $7.3 billion – around a $1 billion shortfall. While the 2017/18 spend is projected to be on the rise, it will still be $1.5 billion below that projected in the 2016/17 Budget and marginally lower than that planned in the 2017/18 Budget. The better news is that projected spend here is forecast to rise significantly over the next few years, but realising this outcome means breaking the pattern of underspend which accrued over successive Budgets between 2012/13 and 2016/17 (Figure 35).

— **Managing the assets already in place**. Tight government finances can often make it challenging to provide adequate sustaining capital and maintenance to the public assets – across transport and utilities – that are already in place, particularly when building new projects offers greater political visibility and prestige. However, meeting the infrastructure challenge ahead will also mean budgeting for larger increases in maintenance to sustain the existing capital stock. The 2017/18 Budget refers to a $38 billion infrastructure program over four years to 2020/21, a figure drawn from gross investment data. In net terms, allowing for the fact that depreciating infrastructure needs to be refurbished or replaced, infrastructure expenditure is substantially lower and, after peaking in 2018/19, declines again over the remainder of the forward estimates. Under the 2017 MYFER, net acquisitions of non-financial assets are expected to be just $3.1 billion by 2020/21, compared to over $8 billion during the peak years at the turn of the previous decade. This is at least an improvement on the 2016/17 Budget, which provided $2.2 billion in net public investment by 2019/20.

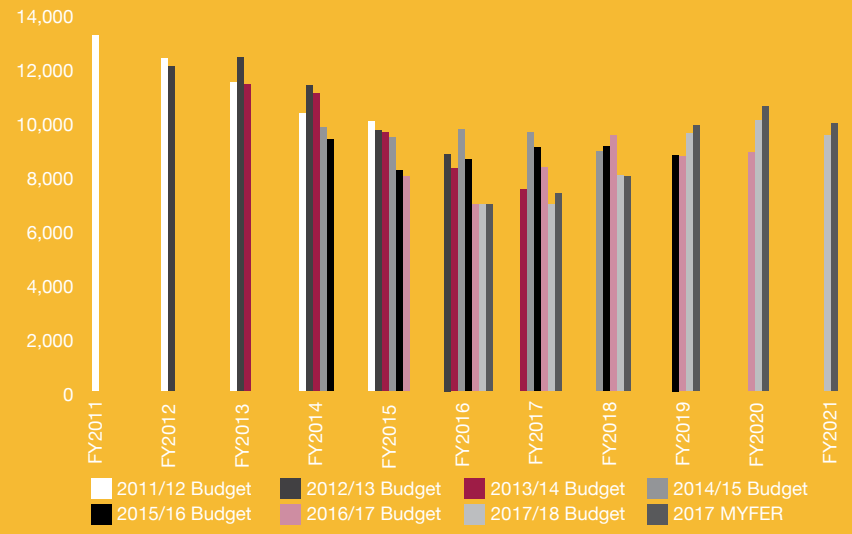
— **Relatively weak population growth in Queensland expected compared to the 'boom years'**. Population growth has slowed sharply in Queensland in recent years, from typically 2–3% per annum during much of the 1990s and 2000s, to between 1.3–1.7% in recent years. This, in turn, reflects the lagged impact of weaker economic activity and job opportunities in the state relative to other regions of Australia (e.g. New South Wales and Victoria) as well as the rest of the world. As economic conditions improve in Queensland vis-à-vis the rest of Australia and globally, an acceleration in population growth is expected, but it is not projected to return to the pace previously set. That said, weaker population growth is coming from a higher base, so this still translates to approximately 80,000–90,000 persons a year that need to be accommodated, which is roughly the level experienced in the early to mid-2000s, but lower than during the boom years.

— **Exposure to global developments and the Australian dollar**. Queensland's increasing integration into the global economy also presents challenges and opportunities for Queensland businesses and the broader economy. Since the 2017 Report, there continues to be substantial risks to global growth, although the underlying global growth story remains positive and beneficial to the Queensland economy. Moves to rationalise China's coal and steel industries amid concerns over the sustainability of Chinese economic growth, further interest rate increases in the United States and their impacts on currencies and asset prices, and recent moves in the US and China to implement trade sanctions all represent a clear and present danger to the Queensland economy.

Against this, the Australian dollar will continue to act as a stabiliser and 'X factor' for the Queensland economy. The associated rise in the Australian dollar during the resources boom drove a structural change away from dollar-exposed industries and thereby weakened the rest of the state economy. Now, following the investment bust, the lower Australian dollar is reversing that structural change away from mining industries and regions and rebuilding activity in dollar-exposed and services regions such as tourism, agriculture, manufacturing, education and other exports. Irrespective of the benefits or otherwise of currency fluctuation, being exposed to trade exposed industries will inevitably open Queensland's economy to challenges.

Figure 35 – Purchases of Non-Financial Assets

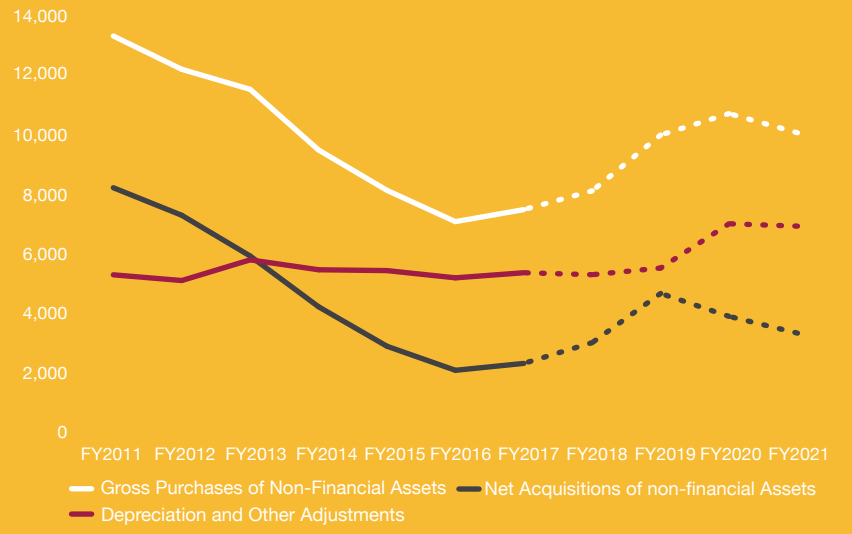
$Billion Non-Financial Public Sector, Queensland



Source: Queensland Budget Papers, Various

Figure 36 – Purchases of Non-Financial Assets

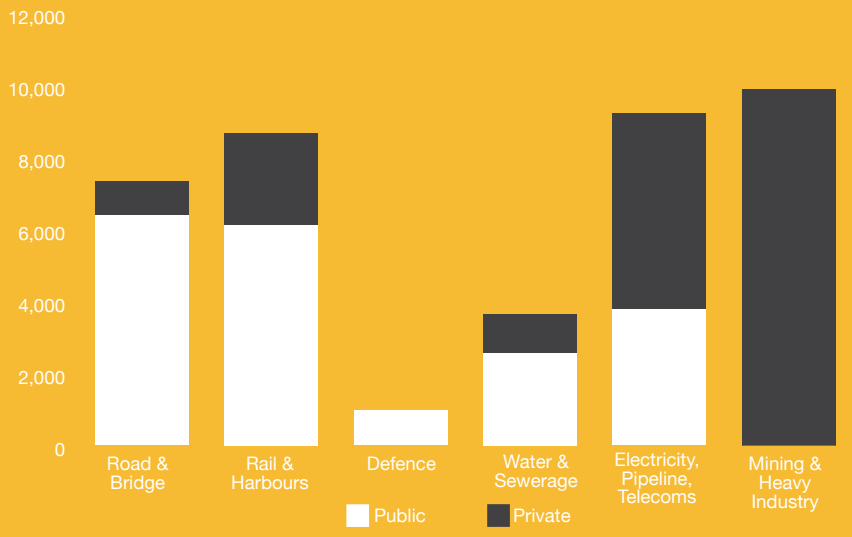
Non-Financial Public Sector, Queensland



Source: Queensland Budget Papers, Various

Figure 37

Share of Major Project Work Done by Funding Source: Sectors and Total



Overall, sustaining growth in the Queensland economy requires putting into place plans and policies that will encourage and sustain both public and private investment in the state over the long-term

Queensland's long-term economic strategy should concentrate on leveraging from (or improving) core (or potential) strengths. For Queensland, this includes its vast natural resource wealth, its close proximity to Australia's largest trading partners, its iconic Australian tourism destinations and enviable lifestyle benefits. State Government strategy should continue to focus on boosting programs to create more jobs and attract businesses and enable Queensland's economy to transition to be more balanced, innovative and productive.

Sustainable growth in public investment will be important. While the share of public sector investment in total engineering construction is lower in Queensland than in other states such as Victoria and New South Wales due to higher private sector funded mining-related activities, publicly funded projects play a major role in driving the State's economic growth. The challenge remains achieving these longer-term economic goals under a tighter budgetary environment through well thought out policies that provides sustainable funding for public investment whilst encouraging collaborative private investment. Sustained investment in productive infrastructure will remain a critical component of a broader economic strategy of Queensland to ensure cities and regional centres offer competitive benefits and help keep cost of living (and cost of business) pressures contained.

It also means investing in critical infrastructure for new growth regions – which are benefiting from the lower post-boom Australian dollar – to 'crowd in' private business investment decisions.

According to the Pipeline, the public sector will continue to play a significant role in funding and developing many categories of infrastructure over the coming five years, particularly in roads and bridges, railways, and water and sewerage. Over the next five years, public sector funded major project work (whether currently funded or not) makes up 50% of the total Pipeline, but the share is much higher in non-mining segments of activity.

The availability of funding for sustainable productive infrastructure investment should not derail investment itself – exploring innovative funding mechanisms remain critical to the outlook for the Pipeline and the Queensland economy

Despite its weakened post-boom financial position, the Queensland Government still has other, important funding levers available to it. Crucially, asset recycling has not been used to the same degree in Queensland as it has in other states and this remains a potential source of finance for future infrastructure projects, so long as there is effective post-sale regulation of privatised assets to ensure prices remain competitive. Introducing tolling on major roads (possibly in the form of, or introducing time-of-use tolling to manage peak demands) or more fundamental reform such as a broad-based road user charge, could also help fund future infrastructure projects – as well as potentially pushing out the timing for reinvesting in crowded roads networks.

And there are other funding options too, as detailed in last year's Report, including expanding the number of City Deals (bringing all levels of government to the table for a region), value capture, and implementing genuine tax and expenditure reforms.

Queensland has been able to extract greater value from the Commonwealth Government in recent years in helping to fund major public sector projects. Furthermore, the prospects of a tight Federal election ahead will no doubt see many promises of further Commonwealth funding assistance for Queensland infrastructure in coming months, particularly if there is evidence that these projects are productive and have a positive net benefit under rigorous analysis. At the time of writing, the Federal Opposition has already promised over $2 billion in funding for the Cross River Rail project, which would allow the State Government some flexibility to accelerate other major projects in the Pipeline. While it is wise, politically, for Queensland to maximise benefits in this way, at the end of the day it is no substitute for real tax and expenditure reform that can offer sustainable, lasting funding streams for infrastructure investment.

Interestingly, the Pipeline does provide some indication of the level of new funding commitments required to keep annual activity on major projects on an upward trajectory (or at least to keep it from falling back towards recent lows). According to the Pipeline, a further $681 million in activity on major projects is required on top of currently funded work to sustain 2017/18 levels of activity into 2018/19. By 2019/20, this additional funding requirement grows to $2.04 billion. The challenge is that there is only $909 million in unfunded major project work in the pipeline in 2018/19 and $3.06 billion in unfunded work in 2019/20. In other words, around two-thirds of the currently unfunded pipeline of work over the next two years needs to be funded just to sustain 2017/18 levels of major project activity in those years. Failing that, new projects may need to be found and funded to help reduce this gap.

According to the Pipeline, the following (currently unfunded) public sector projects are due to commence in the next two years. Decisions to fund, or accelerate, the development of these projects will likely assist in sustaining current levels of major project work over the next two years:

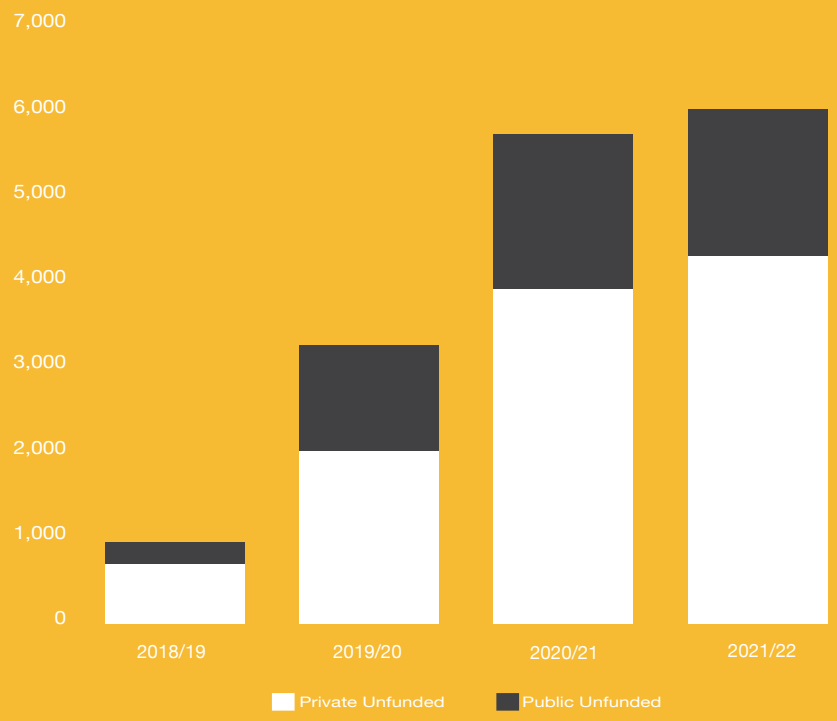
According to the pipeline the following public sector projects are capable of sustaining levels of major project activity if ways can be found to resolve their funding impasse and advance their procurement to take advantage of current market capacity in Queensland:

M1 Varsity Lakes to Tugan
Beerurrum to Nambour Rail Upgrade
Gold Coast Light Rail Stage 3
Paradise Dam Spillway Improvement
Townsville Port Expansion Project

There is also an opportunity to accelerate the delivery of projects which are close to being 'shovel ready' such as those Bruce Highway projects that fall within the "announced" category (ie Section D of Conroy to Curra). Conversely, if these projects slip they could well find themselves caught up in the competition for resource in the inevitable up-cycle to come.

Figure 38

Future Unfunded Work Done Profile: Public versus Private Sector



Encouraging currently unfunded private sector projects to proceed will be vital to avoid a future slump in major project work as the bulk of currently unfunded activity in the Pipeline is related to private sector projects

Harnessing new private investment will also be critical

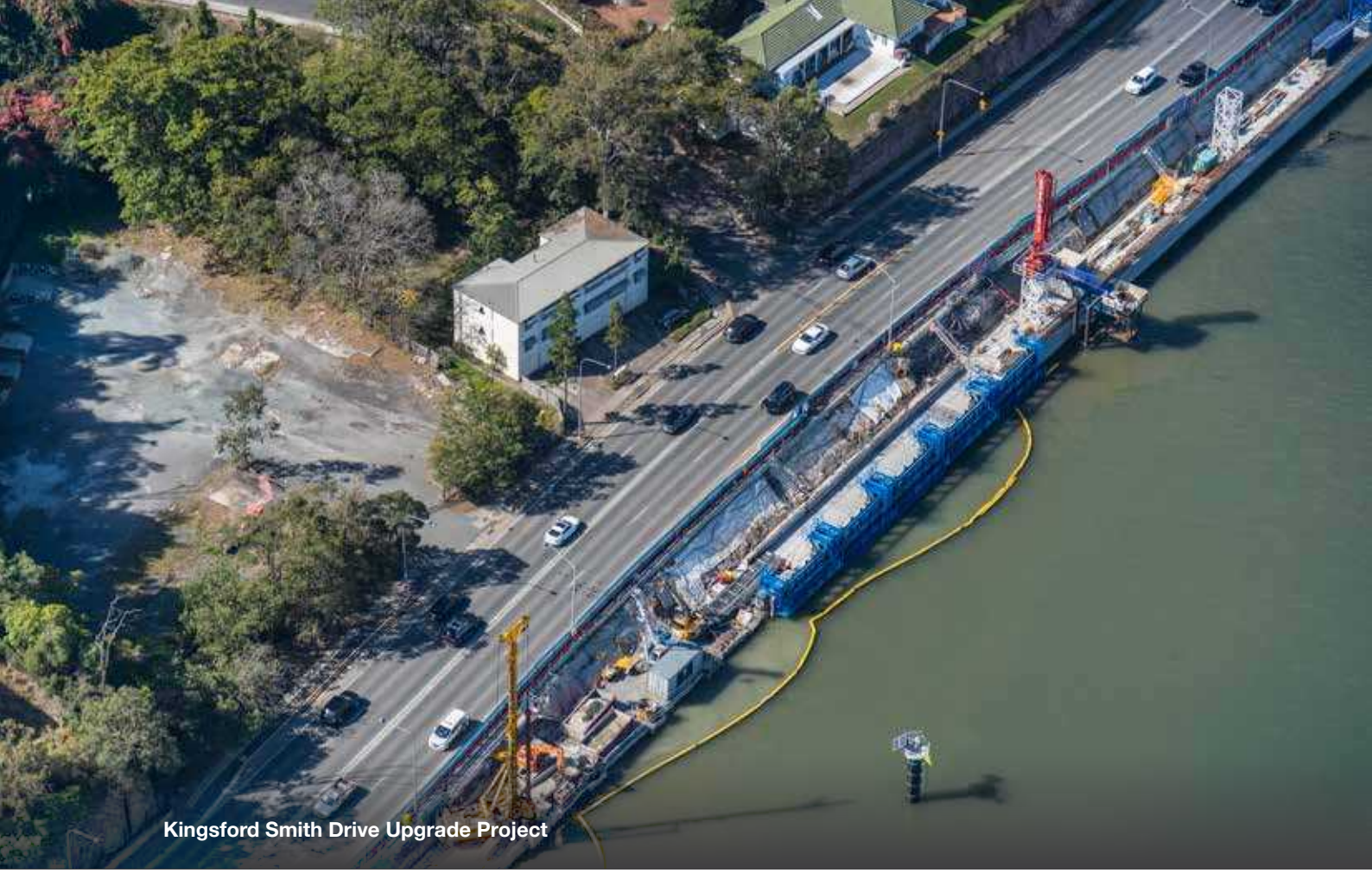
While public infrastructure investment is very important, it is not an end in itself. A core aim of public infrastructure investment – and Queensland's broader economic strategy – should be to attract businesses and people back to the State by encouraging private investment. From a Pipeline view, also, encouraging currently unfunded private sector projects will be vital to avoiding a slump in major project work in the coming years. As shown in Figure 38 above, the bulk of currently unfunded activity, year by year, is actually related to private sector projects.

Therefore, avoiding a future slump in major project work means governments either doing whatever possible to provide the right conditions for these projects to proceed (while recognising that there may also be broader constraints, such as the state of global commodity markets) or being prepared to develop and fund other productive public infrastructure projects.

The public sector only makes up a very small part of the total Queensland economy (around 26 per cent in expenditure terms), however, and this is not expected to change substantially in the future. Consequently, achieving long-term economic goals will depend crucially on how the public sector can develop policies to stimulate private decisions on where to invest and live. Beyond public investment itself, State and Federal Governments should also be looking at ways to encourage the return of private investment (by far the bigger part of the investment 'pie') and re-establish the positive growth mindset.

While supporting market-led proposals is an important plank here, the overall record of success for getting these projects to the construction phase is not strong. Meanwhile, the Northern Australia Infrastructure Facility (NAIF) was also supposed to encourage private sector projects but no projects have yet materialised.

Boosting private sector investment can also be achieved through good public investment choices which 'crowd in' private investment (e.g. building better transport links which encourage broad regional investment by the private sector, or investing in lower cost energy to attract industry and other business). Perhaps more importantly, governments should also set clearer messages about future policy to give the private sector confidence to invest. Unfortunately, the record here has not been consistent, with arguments over energy policy, mining, financing, and tax and spend policies likely to have had a deleterious impact on business confidence.



Kingsford Smith Drive Upgrade Project

Finally, given the importance of the major projects construction industry in building new infrastructure assets, there is also a particular need to ensure that the industry has the capacity and capability to deliver

This means:

- it has the appropriate level of skills now and is developing the skills required for the future,
- it has affordable access to construction materials and other key inputs,
- its services are procured in a way which provides true long-term value for asset owners and asset users, rather than simply aiming to minimise costs.

Meeting emerging capacity and capability challenges

This Report shows that, subject to funding, major project activity could rise in Queensland over the next few years. Another key challenge here is that Queensland will be re-entering a major projects market which has become significantly tighter given demands from the large infrastructure programs being rolled out by other states (New South Wales and Victoria in particular – as per Figure 33). The sheer size and scale of the infrastructure construction task is likely to create potential risks to the capacity and capability of industry to deliver, and is already having an impact on construction costs (Figure 34). In this context, capacity refers to the quantity of resources available.

Capability means the ability and quality of those resources (including workforce skills and business capability) to achieve maximum project benefits. Capacity and capability can be affected by several factors including logistical (having reliable access to essential inputs (skills and materials) by producers)), technological (the ability to use an optimal combination of inputs to produce outputs) and institutional (full participation by industry in tenders and legacy programs).[9]

9 BIS Oxford Economics (2017) NSW Construction Delivery Assessment: Capacity and Capability, North Sydney, NSW.

For Queensland, these challenges should be very familiar, given the capacity and capability challenges experienced by the State's construction industry during the resources boom. The pressures of the boom introduced "transformational" thinking and solutions to meet extremely tight development and construction timeframes, including the increased use of Fly In Fly Out (FIFO) workforces and construction camps, regional development initiatives to service key construction hotspots, the offshoring of significant volumes of engineering, design and fabrication work, and the intensive use of prefabrication and modularisation particularly in the LNG construction market. Having been trialled during the resources boom, these approaches are expected to remain a part of the construction industry's "response kit" to future investment and construction cycles.

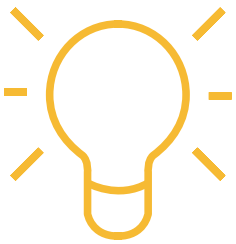
Resource boom solutions enabled a lot of construction activity to be delivered in a short space of time, but did not prevent significant increases in construction costs. In part, this was because the resources boom coincided with a tremendous investment cycle globally, affecting prices for key imported inputs such as steel and oil products. However, much was also self-inflicted with strong demand pressure also brought to bear on local supplies of skills and materials. In retrospect, pursuing aggressive increases in public infrastructure investment in Queensland (following several years of weakness) to coincide with the demands of the resources investment boom, likely affected the timeliness and value-for-money delivery of state infrastructure projects.

While industry generally has a high confidence in meeting the challenge ahead – particularly if they are given long lead times to address these challenges in the form of a clear, industry-wide long-term project pipeline as shown in this Report – much will also depend on getting industry settings and engagement right and putting policies in place so that construction is delivered in a timely and 'value for money' way.

The lessons from the resources boom are clear:

- Develop a clear and credible long-term pipeline of major projects – both publicly and privately funded – so that industry can transform and invest in capacity and skills. This remains a core aim of the Report.
- Provide room in the procurement process for innovation and industry investment in capacity and capability. Allow the construction industry to use their knowledge and skills to come up with innovative solutions that boost productivity. Furthermore, the procurement model adopted should allow for an optimal sharing of risks to those parties who are most able to deal with them. Industry needs to be part of the new investment culture, but it is less likely to participate in major projects – let alone invest in expanding capacity and capability – if it wears a disproportionate share of risks (and consequently unsustainably low industry margins).
- Be aware of other demands on the industry, whether in the private sector, regionally, interstate or across different levels of government – and be prepared to retain flexibility in the pipeline to avoid excessive pressures on key materials and labour inputs.
- Effectively plan for and manage the regional nature of major project work. While South East Queensland will continue to be a regional hotspot for activity, the strongest growth in activity will be in other regions, particularly Northern Queensland. Ensuring essential skills and access to construction materials will be vital for these regions.

If these challenges are managed well, not only will infrastructure projects be delivered on time, but also on budget and to a high quality, providing long-term value for money. Getting it wrong will likely result in project delays, potential project and business failures (including costly litigation, rectification works as well as social costs) and, overall, higher industry cost escalation. While cost escalation was not an issue in Queensland when major project activity was much lower, recent data shows it is accelerating once again at the fastest pace since the resources boom.



The availability of funding for sustainable productive infrastructure investment should not derail investment itself – exploring innovative funding mechanisms remain critical for the outlook of the pipeline and the Queensland economy

Recent research on capacity and capability risks in New South Wales prepared by BIS Oxford Economics for Infrastructure NSW indicate that there are currently challenges at every phase of construction. It is highly likely that Queensland (amongst other states) will be facing similar issues:[10]

- **Pre-construction risks**: significant pressure has been placed on the procuring agencies in the public sector, resulting in a substantial recruitment drive to take skills from the private sector, limiting their own capability to respond. Furthermore, the form of procurement and risk allocation models used can heavily impact on resources required for this stage.
- **Construction risks**: industry has reported risks surrounding the availability of core 'onsite' construction skills, particularly foremen and site managers as well as crucial infrastructure trades and professions ranging from onsite engineers to form workers, tunnellers and mechanical and electrical trades as well as the availability and cost of materials, with the greatest challenge likely to be in sourcing natural sand for use in cement. Transport and logistical risks are also highly significant, with the heavy concentration of work targeted in the metropolitan region necessitating even more intensive use of the urban road network to haul construction materials from primary sources, distribution and manufacturing locations to construction sites, as well as managing the removal of spoil. Finally, and most topically, the risk of working around existing utilities continues to be a major challenge particularly in brown field locations.
- **Operations and maintenance risks**: procurement models, such as Integrated Project Delivery, which provide scope for industry innovation in design, the use of high quality materials and new processes or products are likely to impact on the ultimate operations and maintenance requirements of the built asset. Ideally, the procurement model chosen incentivises both government agencies and contractors to choose approaches which minimise 'life cycle' costs of the asset (including operations and maintenance) rather than focusing just on the cost of construction itself. In other words, "value for money" should be a long-run, not a short-run, concept.

To minimise risks of project delays, failures and rising construction costs, Queensland needs to apply a longer-term approach to planning for capacity and capability in the construction industry

10 Ibid, pp119-125.

CONCLUSION AND RECOMMENDATIONS

This Report shows that, for the first time in several years, major project activity in Queensland is rising. The appropriate identification of infrastructure gaps, choosing the most productive projects, and coming up with funding and financing solutions will remain critical if growth in major project activity is to be sustained into the future, meeting Queensland's infrastructure needs in a timely and cost-effective way.

Here, the conclusions and recommendations from previous Reports are still valid, particularly:

- Ensure that the best infrastructure projects are picked. This means that the business cases for short and long-term public investment programs are based on maximising economic benefits through transparent cost benefit analysis (CBA). For Queensland, the creation of Building Queensland (BQ) has been a very positive development. A key function of BQ is to develop independent, rigorous business cases for projects using transparent and disciplined frameworks including cost benefit analysis on projects where potential government investment is between $50–$100 million and lead the preparation of business cases where investment exceeds $100 million[11] – in conjunction with Infrastructure Australia – which is responsible for evaluating business cases submitted for Commonwealth funding as well as publishing national infrastructure priority lists – there is now far more rigorous analysis undertaken in project evaluation and selection in Queensland than in the past.
- Ensure there is appropriate funding and financing solutions in place. As noted previously, Queensland's current funding arrangements will not cover the Major Projects List, let alone other projects that will be required to meet broader infrastructure challenges. Sustaining growth in major project work means moving more projects from 'unfunded' to 'funded' categories in coming years – or accelerating developments. The high cyclicality of State government revenues create challenges here for publicly funded work as it encourages more spending on infrastructure in the good economic times (at a time when industry capacity to deliver infrastructure is more stretched and costs are higher) and then pull back on infrastructure spending in the bad economic times (when the broader economy could do with the spending boost and costs can be lower). Because of this, governments should continue to look for ways to smooth and increase project finance such as through City Deals, asset leases, market-led proposals, value capture and the judicious use of debt finance. Inevitably, sustainable financing of infrastructure over the long-term will require genuine tax and expenditure reforms.

11 http://buildingqueensland.qld.gov.au/about-us/

This Report also highlights, however, growing risks to capability and capacity in the major projects industry, given large infrastructure programs already being rolled out in New South Wales and Victoria, as well as rising infrastructure spending overseas. As Queensland major projects activity rises, plans and policies should be put into place to minimise risks to industry capability and capacity, which in turn will limit the risk of project delays, failures and excessive construction cost escalation in coming years, with all the social challenges that it also brings (e.g. litigation, disruption).

To some degree, capacity and capability risks are driven by external factors, ranging from demographic change – affecting the availability of skills – to the state of global demand for materials and resources and trade policies – affecting the price and availability of imported materials and skills. However, there is much that is within the control of government and planning agencies to minimise capacity and capability risks. The current challenge provides an opportunity to innovate, to come up with better ways of doing things, and in so doing, to provide a long-term positive legacy that will assist in managing future investment cycles.

This includes:

— The provision of a clear and coherent long-term project pipeline to give industry the best possible chance of responding, rather than separate pipelines by governments and the private sector. Maintaining a sustainable, strong pipeline for work (and avoiding booms and busts where possible) will also assist in leaving a legacy in that it encourages the retention of skills, training of the next generation of staff, and increasing productivity. Ideally, this pipeline will have bipartisan political support to avoid situations such as the cancellation of contracted major projects by incoming administrations (e.g. East West Link in Victoria and the Roe 8 / Perth Freight Link project in Western Australia) which increased sovereign risk. The pipeline should also identify gaps in major project activity in regional areas that could present a risk to retaining skills in those regions.

— Develop and maintain a plan for construction materials, so that the demand and supply balance for scarce quarry products can be quantified, mapped, emerging gaps identified quickly, and strategies put into place to accelerate the development of new supply sources and related logistics where appropriate. This is particularly important for quarry products given the very long lead times required to develop and approve new quarries, affecting the supply of hard rock, aggregates and sand, and limited sources of supply. With the addition of each project to the long-term project pipeline, account should be taken of that projects call on natural material resources, how these resources are sourced and transported, and how this call could be reduced through other initiatives, such as recycling or utilising new or substitute materials (e.g. structural steel-focused engineering solutions rather than concrete) if critical input constraints emerge.

— Continue to focus on workforce development initiatives so that demand for key onsite skills can be met. Here, there have been positive developments with the Queensland Government Building and Construction Training Policy (Training Policy) requiring that a minimum of 10% of the total labour hours on eligible projects be undertaken by apprentices and/or trainees and through other workforce training. From 1 September 2017, this core requirement increased to a minimum of 15% for major building and/or civil construction projects over $100 million in value. The Training Policy supports employment opportunities and skills development in Queensland's building and civil construction industry. The Training Policy also focuses on increasing the economic independence for Aboriginal and Torres Strait Islander Queenslanders. This policy now also extends to Government Owned Corporations (GOCs) and Public Private Partnerships (PPPs).

  Over the longer term, given changes in technology and construction techniques, a more strategic approach to workforce planning and skilling will be required to ensure that the supply of skills into the future match the likely demand by industry. Here, research undertaken by Construction Skills Queensland for this Report, as well as perspectives of Queensland construction jobs for the future remain vital.[12]

12 For example, Quezada G, Bratanova A, Boughen N and Hajkowics S (2016) Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036, CSIRO, Australia

— Similarly, attention needs to be focused on the development and maintenance of a construction transport and logistics plan to avoid bottlenecks, delays and rising costs for construction materials as a result of congested road transport networks, particularly in metropolitan regions where construction activity may be most focused (e.g. during the construction of the Cross River Rail project). This may include demand management tools, such as putting a price on road use in the CBD and nearby construction zones, but also taking more advantage of non-road transport options such as rail and water as used in other global capitals such as London (for its own £14.8 billion Crossrail project).

— Engage with industry for improvements in procurement that encourage industry participation, innovation and investment in capacity and capability. In particular, processes should be reformed if they:
  — create long-term risks to industry sustainability and costs by inadvertently encouraging contractors to take risks on quality
  — take up scarce resources through the tendering process
  — do not provide a sustainable risk/margin balance that will encourage firms to invest in skilled staff and new technology
  — do not encourage innovation or the use of new technologies and tools, ranging from Building Information Modelling (BIM), new resource-saving materials or construction techniques, productivity improving (lean) tools and techniques or appropriate skills development.

While engagement between government agencies and the construction industry can often be competitive and at times adversarial, the looming capacity and capability challenge will likely require a greater partnership approach that maximises the legacy of the infrastructure program. Rather than being incentivised to secure the lowest priced work on each and every project, procurement will increasingly need to encourage industry investment in capacity and capability, reward innovation (and hence productivity), and consider value for money in a "long-term" sense which results in a sustainable industry delivering quality, long-lived infrastructure.

The provision of a clear and coherent long-term pipeline rather than separate pipelines by governments and the private sector will greatly assist industry to manage future investment cycles

Risks to the Outlook

A key conclusion of this Report is that major project activity is now expanding following several years of (significant) decline. However, this outlook is subject to significant upside and downside risks; that despite the mildly cyclical profile of work projected, there is still the potential for further, more volatile, cycles ahead given Queensland's natural strengths and advantages: increasing connections with the fast growing economies of Asia, strong population growth, and access to high quality natural resources.

As in previous Reports, the biggest global risk still relates to the economic outlook for key trading partners, the strategic decisions they make in achieving sustainable growth, and how this will impact on the global trade of resources for which Queensland has a strong supply position, particularly coking coal, thermal coal, and gas. Much of this remains outside of the control of the Queensland government and industry.

Over 2017, global oil and gas prices continued to rise and, while there was also some reversal in prices for thermal and coking coal (as well as iron ore) following a spike in prices in 2016, prices still remain at higher levels compared to where they were a few years ago. Not only is this boosting royalty revenue for the Queensland government (which can assist in funding public infrastructure works), but it also has the potential to put more coal mining projects back into consideration. While there are 'high growth' and 'low growth' global economic scenarios that we have considered in preparing this Report, overall we believe that this Report represents a reasonable balance between these scenarios. Consequently, there is both upside and downside risk to the projection of major project activity.

Our outlook for global economic growth is detailed in the Economic Outlook section of this Report, which is our baseline forecast. However, there are upside and downside risks to this outlook. Both upside and downside scenarios are heavily influenced by how US and Chinese policy decisions play out on their economies. Upside risks include a more stimulatory than expected stance of US fiscal policy and, particularly, the impact of corporate tax cuts and higher public infrastructure investment, which in turn could feed into demand for commodities and commodity prices. Downside risks include the distinct possibility of higher trade barriers and controls imposed by the United States and China, and possible retaliation in the rest of the world. On the domestic front, the key risk factors which may influence the projections in this Report are (i) projected housing investment activity in Queensland as well as (ii) government approaches to debt consolidation and public investment via fiscal policy and (iii) the impact of current and future energy policies.

With regards to housing investment, it is expected that the current recovery in housing activity peaked in 2016/17 and will decline in subsequent years, mainly as a result of overbuilding high density apartments in Brisbane. This, in turn, is expected to drive a weakening in stamp duty revenues from 2017/18 that may threaten public funding for major infrastructure projects.

This outlook is slightly pessimistic compared to the housing investment forecasts presented in both the Commonwealth and State Budgets. However, stronger than anticipated population growth (for example, in a "high growth" global scenario which drives high investment and population inflows into Queensland) could see higher housing investment and stamp duty revenue than in the baseline case presented here. This, in turn, could drive higher major project activity than modelled here.

The forecasts presented in this report also assume that governments – both State and Commonwealth – seek a balanced path between debt consolidation/deficit reduction on the one hand and sustaining public investment on the other. Over the next few years, it is assumed that public investment will rise in line with the Queensland and Commonwealth 2017/18 Budgets. Meanwhile, minor adjustments to recurrent tax and transfer policies, as well as stronger nominal economic growth, are expected to contribute to a gradual improvement in the underlying budget and net public debt position. However, there remains risk on both the upside and downside to this position. On the downside, failure to achieve improvements in the financial positions of governments, both State and Commonwealth, could see more significant cuts to public expenditure in future Budgets, including that slated for capital works.

On the upside, a "high growth" global scenario could see better than expected budgetary outcomes, providing scope for stronger increases in public investment.

Finally, the future direction of energy policy in Australia also presents a risk factor for this Report. Its most direct impact is on the timing and magnitude of many renewable energy projects in Queensland, spanning wind, solar and hydro. Indirect impacts may also include aggregate generation investment, the path of energy prices and confidence to invest in energy-intensive industry which affects broader construction activity. Current policies incorporate a national renewable energy target (RET) of 33,000 GWh of large scale generation by 2020, and a separate 50% RET by 2030 for Queensland. These policies have encouraged a substantial wave of investment in renewable generation projects in Queensland, as evidenced in the Pipeline. While the national RET expires in 2020, the Commonwealth Government is undertaking further analysis of a proposed National Electricity Guarantee (NEG) to encourage new investment in clean and low emissions technologies while allowing the electricity system to continue to operate reliably.[13] Overall, the impact of the shift from a national RET to NEG is still to be determined and presents a risk to the outlook. Furthermore, given the relatively high state-based RET, more renewables projects may emerge in coming years which could be added to the Pipeline.

Over the longer term, given changes in technology an construction techniques, a more strategic approach to workforce planning and skilling will be required to ensure the supply of skills in the future match the likely demand of the industry

13 www.coagenergycouncil.gov.au/publications/energy-security-board-update

2018 MAJOR PROJECTS LIST

As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
ROADS, BRIDGES and RUNWAYS			
Brisbane City Region			
Kingsford Smith Drive Upgrade	Brisbane City Council	650	440
Brisbane Metro Busway System	Brisbane City Council	944	700
Brisbane Airport / Port			
Brisbane New Parellel Runway Phase 2	Brisbane Airport	830	380
Dryandra Drive	Brisbane Airport	120	108
Port of Brisbane Motorway – Port Connect Stage 3	Port of Brisbane	110	88
Greater Brisbane			
Logan Motorway Enhancement Project	Transurban	512	420
Yamanto to Ebenezer Upgrade	Qld Government	340	263
Centenary Hwy Bus Lanes – Ipswich Mwy to Toowong	Qld Government	400	240
Jabiru Island Bridges (Hope Island Road (Oxley Drive) road duplication – stage 4)	Qld Government	136	102
Eastern Busway – Stage 3 - Buranda to Coorparoo: Mains Avenue to Bennetts Road	Qld Government	480	182
Ipswich Motorway			
Rocklea to Darra Stage 1 – Between Suscatand Street and Oxley Road Inc. Bridge	Qld Government & Federal Government	400	200
Rocklea to Darra – Further Stages	Qld Government	1442	750
Gateway Motorway Upgrade North (GUN)			
Gateway Motorway Upgrade North (GUN) – Single Package (Updated timing)	Qld Government & Federal Government	1142	700
Pacific Motorway			
Section (C) Daisy Hill to Logan Motorway at Loganholme	Qld Government & Federal Government	250	188
Miles Platting Road to Rochedale Road (Gateway Merge)	Qld Government & Federal Government	196	160
Mudgeeraba to Varsity Lakes Capacity Upgrade	Qld Government & Federal Government	180	165
Sunshine Coast Region			
Sunshine Coast Airport – New East-West Runway	Queensland Airports Limited	297	240
Sunshine Motorway Mooloolah River Interchange	Qld Government	430	200
Gold Coast Region			
Gold Coast Runway Upgrades	Queensland Airports Limited	150	100
M1 - Varsity Lakes to Tugun	Qld Government & Federal Government	1030	450
Rockhampton Region			
Rockhampton Ring Road	Qld Government & Federal Government	950	750

							Funded	Unfunded
	Project Status	Commencement Date	Completion Date	2017/18 ($m)	2018/19 ($m)	2019/20 ($m)	2020/21 ($m)	2021/22 ($m)
	Under Construction	2015/16	2018/19	175	106	30		
	Announced	2019/20	2021/22	1	33	105	275	208
	Under Construction	2017/18	2019/20	20	200	160		
	Under Construction	2016/17	2018/19	38	35			
	Under Construction	2016/17	2017/18	50				
	Under Construction	2016/17	2018/19	240	170			
	Prospective	2020/21	>2021/22				38	98
	Prospective	2020/21	2023/24					18
	Prospective	2020/21	2023/24				10	20
	Unlikely	2021/22	2025/26					53
	Under Construction	2017/18	2020/21	20	50	130		
	Unlikely	>2021/22						50
	Under Construction	2015/16	2018/19	250	80			
	Prospective	2019/20	2022/23				20	100
	Under Construction	2018/19	2020/21	30	80	50		
	Under Construction	2018/19	2020/21	10	58	58	9	
	Under Procurement	2018/19	2020/21	50	150	40		
	Prospective	2018/19	2020/21		50	100	50	
	Under Construction	2016/17	2017/18	50				
	Prospective	2020/21	2023/24			50	100	100
	Unlikely	>2023/24						

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
ROADS, BRIDGES and RUNWAYS			
Toowoomba Region			
Toowoomba Range Second Crossing	Qld Government & Federal Government	1606	1250
Warrego Highway Upgrade Program (WHUP)			
Warrego Highway Upgrade Program	Qld Government & Federal Government	635	404
Bruce Highway			
Caloundra Road to Sunshine Motorway	Qld Government & Federal Government	929	442
Pine River to Caloundra Interchange	Qld Government & Federal Government	671	350
Deception Bay Road Upgrades	Qld Government & Federal Government	150	65
Maroochydore Road Interchange Upgrade	Qld Government & Federal Government	187	80
Cooroy to Curra – (Section D) – Keefton Road to Curra (Gympie bypass)	Qld Government & Federal Government	1000	500
Curra to Sarina – Yeppoon Road to the North of Boundary Road (east) – Rockhampton Northern Access Upgrade Stage 1	Federal Government	121	91
Sarina to Cairns – Cairns Southern Access Corridor Stage 3 – Edmonton to Gordonvale	Federal Government	481	120
Sarina to Cairns – Cairns Southern Access Corridor Stage 4 – Kate Street to Aumuller Street	Federal Government	135	60
Sarina to Cairns – Haughton River & Pink Lily Lagoon Upgrade	Qld Government & Federal Government	515	240
Sarina to Cairns – Mackay Ring Road / Bypass – Stage 1	Qld Government & Federal Government	497	215
Sarina to Cairns – Cattle Creek and Frances Creek Upgrades	Qld Government & Federal Government	119	55
Sarina to Cairns – Mackay Northern Access Upgrade	Federal Government	80	60
Sarina to Cairns – Inhgam to Cardwell Range Deviation	Federal Government	460	280
Sarina to Cairns – Saltwater Creek Upgrade	Federal Government	103	77
Sarina to Cairns – Tiaro Flood Immunity Upgrade	Federal Government	107	80
Northern Queensland			
Peak Downs Highway Improvements – Eton Range	Qld Government & Federal Government	189	120
Peak Downs Highway – Walkerston Bypass	Qld Government & Federal Government	150	113
Far North Queensland			
Smithfield Transport Corridor Upgrade	Qld Government & Federal Government	150	75
Roads and Bridges Major Projects	**Work Done**	**19,274**	**11,503**
	Funded		**60%**
	Not Funded		

Funded Unfunded

Project Status	Commencement Date	Completion Date	2017/18 ($m)	2018/19 ($m)	2019/20 ($m)	2020/21 ($m)	2021/22 ($m)
Under Construction	2015/16	2018/19	450	185			
Under Construction	2016/17	2019/20	150	150	33		
Under Construction	2016/17	2020/21	60	125	150	92	
Announced	2018/19	2022/23		10	50	150	102
Announced	2019/20	2022/23			10	50	5
Announced	2019/20	>2021/22			10	50	20
Announced	2018/19	2023/24		100	100	100	200
Announced	2018/19	2022/23		30	31	30	
Announced	2018/19	2021/22		25	75	20	
Announced	2018/19	2021/22		15	30	15	
Under Procurement	2017/18	2021/22		60	100	80	
Under Construction	2017/18	2019/20	50	120	45		
Under Construction	2017/18	2018/19	50	5			
Credibly Proposed	2018/19	2020/21		15	35	10	
Prospective	2023/24	2025/26					
Credibly Proposed	2020/21	2022/23				19	38
Credibly Proposed	2022/21	2022/23					40
Under Construction	2016/17	2018/19	65	0			
Prospective	2019/20	2020/21			65	48	
Under Procurement	2018/19	2020/21		25	25	25	
			1,759	**1,877**	**1,482**	**1,190**	**1,051**
			1,759	**1,812**	**1,232**	**896**	**535**
			0	**65**	**250**	**294**	**516**

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
RAIL			
(Passenger)			
Beerburrum to Namboor Rail Upgrade	Qld Government / QR	780	500
Varsity Lakes to Elanora Extension	Qld Government / QR	859	600
Ipswich Rail Line – Darra-Redbank 3rd track	Qld Government	218	153
Cross River Rail Brisbane			
Early Works – Site Preperation + Demolition	Qld Government	100	100
Northen & Southern Surface Works, Twin 5.9km Tunnel and 5 Underground Stations (TSD)	Qld Government	4500	3500
Rail, Integration and Systems package (RIS)	Qld Government	900	700
Three new stations (Pimpama, Helensvale North and Worongary-Merrimac)	Qld Government / BCC	120	80
Gold Coast Light Rail Stage 3	Qld Government / Private	500	300
Sunshine Coast Light Rail	Sunshine Coast Council	500	300
(Coal / Freight)			
North Coast Line Capacity (Brisbane to Cairns)	Qld Government	116	70
Townsville Eastern Access Rail Corridor	QR	250	200
Townsville Port Related Rail	Private Developer	90	63
Inland Mainline Freight Upgrade – Queensland Border to Acacia Ridge			
— NSW/QLD Border to Gowrie	ARTC	1600	1350
— Gowrie to Kagaru	ARTC	3500	3000
— Kagaru to Acacia Ridge & Bromelton	ARTC	150	100
Brisbane Freight Corridor (POB Connection)	Port Of Brisbane / Government	4000	3250
North Galilee Basin Rail	Adani	2200	1800
Rail Major Projects	**Work Done**	**19,583**	**16,066**
	Funded		**82%**
	Not Funded		
HARBOURS / PORTS			
Port of Cairns – Cruise Terminal Expansion – Trinity Inlet Dredging	Far North Queensland Ports Corporation Ltd (trading as Ports North)	120	80
Brisbane International Cruise Terminal (including dredging)	Port of Brisbane	150	120
Gold Coast Cruise Ship Terminal (Broadwater)	GCCC/TBA	120	90
Port of Gladstone – Clinton Vessel Interaction	Gladstone Ports Corporation	100	75
Port of Gladstone – Second Shipping Lane (Gatcombe and Golding Cutting Channel Duplication Project)	Gladstone Ports Corporation	280	196
Amrun (South of Embly) Port upgrade	Rio Tinto	150	120
Townsville Port Expansion Project – Outer Harbour Expansion (berths 14+15)	Qld Government	200	150
Townsville Port Expansion Project – Channel Capacity Upgrade	Qld Government	193	150
Townsville Port Expansion Project – RG Tanner Coal Terminal	Qld Government	225	200

							Funded	Unfunded
Project Status	Commencement Date	Completion Date	2017/18 ($m)	2018/19 ($m)	2019/20 ($m)	2020/21 ($m)	2021/22 ($m)	
Prospective	2019/20	2021/22			75	150	150	
Prospective	>2022/23							
Prospective	2019/20	2022/23				57	56	
Under Construction	2017/18	2018/19	50	50				
Under Procurement	2020/21	2023/24			150	450	1400	
Under Procurement						100	200	
Credibly Proposed	<2024/24							
Credibly Proposed	2019/20	2021/22			50	200	50	
Unlikely	2022/23	2024/25					50	
Unlikely	2018/19	2020/21		10	40	20		
Unlikely	2018/19	2021/22			40	100	60	
Unlikely								
Announced	2021/22	2024/25					80	
Announced	2019/20	2023/24			200	400	1000	
Announced	2019/20	2023/24			20	60	20	
Unlikely	>2022/23							
Unlikely					250	750	300	
			50	**60**	**825**	**2,287**	**3,366**	
			50	**50**	**370**	**1,010**	**2,700**	
			0	**10**	**455**	**1,277**	**666**	
Credibly Proposed	2019/20	2020+			40	40		
Under Procurement	2018/19	2020/21		30	50	40		
Unlikely	2020/21	2022/23				60	30	
Credibly Proposed	2020/21	2021/22				75		
Credibly Proposed	2018/19	2020/21		35	100	61		
Under Construction	2015/16	2017/18	30					
Prospective	2019/20	2021/22			75	75		
Credibly Proposed	2019/20	2020/21			75	75		
Announced	2018/19	2020/21		60	80	60		

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
HARBOURS / PORTS			
Abbot Point Coal Terminal Expansion (35mt)	Adani	2500	2000
Harbours Major Projects	**Work Done**	**4,038**	**3,181**
	Funded		**79%**
	Not Funded		
DEFENCE			
RAAF Amberley – C17 Maintenance Facility (Air 8000)	Qld Government	180	150
RAAF Amberley – Growler Project	Qld Government	180	150
RAAF Amberley – C17 project	Qld Government	200	180
Shoalwater Bay – Remediation	Qld Government	140	120
Singapore – Shoalwater Bay	Qld Government	800	600
Singapore – Townsville	Qld Government	800	600
Defence Major Projects		**2,300**	**1,800**
			78%
WATER			
Lower Fitzroy River Infrastructure Project – New Weir at Rookwood on the Fitzroy River Stage 2	Gladstone Area Water Board (GAWB)	352	195
Gladstone to Fitzroy River Pipeline	Gladstone Area Water Board (GAWB)	250	120
Three Rivers Irrigation Project	Stanbroke	250	120
Shell / Arrow Water Treatment Facilities Bowen	Shell/Arrow/Bow	250	175
Wyaralong Dam WTP Stage 1	SEQ Water	200	150
Cedar Grove Connector (was Southern Regional Pipeline extension)	Qld Gov	100	70
Nullinga Dam	Federal/Qld Governemnt	323	250
Somerset Dam Upgrade	SEQWater	600	450
Brisbane Flood Plain Management	Qld Government	200	150
Haughton Channel Capacity Upgrade	Townsville Council	90	70
Urannah Dam	Bowen Collinsville Enterprises	250	200
Burdekin Falls Dam – Saddle Dam and Monolith Improvement	Sunwater	330	210
Gorge Weir to Byerwen Coal Project Pipeline project (110km)	Sunwater for QCoal	240	180
Hells Gate Dam – Upper Burdekin	Townsville Enterprise	313	250
Further CSG water treatment plants		250	188
Hells Gate Diversion Canal – 240km from Hells Gates to a Delineated Area	Townsville Enterprise	490	400
Hervey Bay and Maryborough Water Networks Interconnection	Local Councils / Qld Government		
New Surface Water Storages (Galilee Basin, Gilbert and Flinders Catchments)	Local Councils / Qld Government		
Paradise Dam Spillway Improvement Project	Sunwater	600	400

						Funded	Unfunded
Project Status	**Commencement Date**	**Completion Date**	**2017/18 ($m)**	**2018/19 ($m)**	**2019/20 ($m)**	**2020/21 ($m)**	**2021/22 ($m)**
Unlikely	2020/21	2023/24				250	750
			30	**125**	**420**	**736**	**780**
			30	**90**	**130**	**100**	**0**
			0	**35**	**290**	**636**	**780**
Under Construction	2017/18	2020/21	60	10	0		
Under Construction	2017/18	2020/21	0	60	60	30	
Under Construction	2017/18	2020/22	80	20			
Under Procurement	2018/19	2020/21		50	50	20	
Under Procurement	2019/2020	2022/23			150	150	150
Under Procurement	2019/2020	2022/23			30	30	20
			140	**140**	**290**	**230**	**170**
			140	**140**	**290**	**230**	**170**
			0	**0**	**0**	**0**	**0**
Credibly Proposed	2019/20	2020/21		35	65	95	
Unlikely	<2022/23	2019/20					
Prospective	2020/21	2021/22				60	60
Prospective	2021/22	2022/21					88
Prospective	2019/20	2020/21				50	20
Unlikely	2019/20	2019/20			15	55	
Prospective	2019/20	2020/21			50	100	100
Credibly Proposed	2019/20	2020/21			150	150	150
Credibly Proposed	2018/19	2020/21		50	50	50	
Announced	2019/20	2021/22			20	50	
Credibly Proposed	2019/20	2020/21			100	100	
Announced	2018/19	2022/23		3	7	40	95
Unlikely	2018/19	2020/21				100	80
Unlikely	<2020/21						
Prospective	<2020/21						
Unlikely	<2020/21						
Prospective							
Prospective							
Prospective	2019/20	2023/2024			5	30	110

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
WATER			
Connors River Dam	Sunwater	500	400
Connors River Dam Pipeline to Moranbah	Sunwater	400	300
Galilee Basin Flood Mitigation and Water Supply Dam	Adani	300	225
Galilee Basin Flood Mitigation and Water Supply Pipeline	Adani	600	450
Water Major Projects	**Work Done**	**6,888**	**4,953**
	Funded		**72%**
	Not Funded		
SEWERAGE			
S1 Sewer Upgrade – Brisbane	Queensland Urban Utilities (QUU)	160	120
NTPW	Queensland Urban Utilities (QUU)	226	226
STPW	Queensland Urban Utilities (QUU)	198	198
Gold Coast Council Long Term Water Recycled Water Release Stage 1	GCCC	75	60
Gold Coast Council Long Term Water Recycled Water Release Stage 2 – South Stradbroke Pipeline	GCCC	250	188
Kawana Sewage Treatment Plant Upgrade	Sunshine Coast Council	74	59
Sewerage Major Projects	**Work Done**	**983**	**851**
	Funded		**87%**
	Not Funded		
ELECTRICITY			
North Queensland Power Station	Private / Qld Government / Federal Government	800	600
Ross River Solar Farm (142 MW)	ESCO Pacific / Palisade	225	135
Mt Emerald Wind Farm (180 MW)	Ratch-Australia Port Bajool JV	380	228
Cooper's Gap Wind Farm – Stage 1 (175 MW)	AGL	300	150
Kennedy Energy Park Stage 1 (Wind 40MW)	Windlab / Eurus Energy	88	53
Wandoan South Solar Farm Stage 1	Equis Energy	300	150
Kennedy Energy Park Stage 2 (Wind 150MW)	Windlab / Eurus Energy	260	156
Bulli Creek Solar Farm Stage 1 (100 MW)	Solar Choice	200	120
Bulli Creek Solar Farm Stage 2 (100 MW)	Solar Choice	200	120
Bulli Creek Solar Farm Stage 3 (100 MW)	Solar Choice	200	120
Clarke Creek Solar Farm (350 MW)	Energy Pacific Vic Pty Ltd	310	190
Raglan Solar (350MW)	Eco Energy Group	310	190
Columboolan Solar farm (Miles) (310MW)	Luminous Energy	300	180
Bouldercombe Solar Farm (250MW)	Eco Energy Group	240	120
Darling Downs Solar Farm (106.8 MW)	APA	210	126

			Funded		Unfunded		
Project Status	**Commencement Date**	**Completion Date**	**2017/18 ($m)**	**2018/19 ($m)**	**2019/20 ($m)**	**2020/21 ($m)**	**2021/22 ($m)**
Unlikely							
Unlikely							
Unlikely	2019/20	2021/22			50	100	75
Unlikely	2019/20	2021/22			100	200	150
			0	**88**	**612**	**1180**	**928**
			0	**53**	**327**	**490**	**395**
			0	**35**	**285**	**690**	**533**
Under Construction	2014/15	2018/19	68	30			
Under Procurement	2018/19	2021/22		60	80	86	
Credibly Proposed	2018/19	2021/22		50	90	58	
Under Construction	2015/16	2017/18		40	20		
Announced	2019/20	2020/21			60	128	
Under Construction	2017/18	2018/19	30	30			
			98	**210**	**250**	**272**	**0**
			98	**210**	**250**	**272**	**0**
			0	**0**	**0**	**0**	**0**
Credibly Proposed	2019/20	2020/21			100	250	250
Under Construction			117				
Under Construction	2016/17	2018/19	123	45			
Under Construction	2017/18	2018/19	80	70			
Under Construction	2017/18	2017/18	26	26			
Prospective	2017/18	2018/19		150			
Credibly Proposed	2018/19	2019/20		100	56		
Under Procurement	2017/18	2018/19	40	80			
Credibly Proposed	2018/19	2019/20		40	80		
Credibly Proposed	2019/20	2020/21			40	80	
Prospective					100	90	
Prospective					100	90	
Credibly Proposed				140	40		
Prospective					60	60	
Under Construction	2016/17	2017/18	84	22			

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
ELECTRICITY			
Kidston Solar Project – Stage 1 (50 MW)	Genex Power	110	66
Kidston Solar Project – Stage 2 (270 MW)	Genex Power	400	300
Munna Creek Solar Farm project (120 MW)	Renewable Energy System Technologies	150	100
Kidston Hydro Project – Stage 2 300MW	Genex Power	500	400
Moranbah Solar Farm (170MW)	Adani	200	100
Clare Solar Farm Project (100MW)	FRV	200	120
Collinsville Solar Farm (42 MW)	RATCH Australia	100	60
Oakey Solar Farm Stage 2 (55 MW)	Oakey 1 AssetCo Pty Ltd	106	64
Lilyvale Solar Farm (100 MW)	FRV	200	120
Childers Solar Farm (80 MW)	ESCO Pacific	125	75
Stanwell Power Station Works	Qld Government	131	100
Rollingstone Solar Farm (110 MW)	ESCO Pacific	210	126
Emerald Solar Farm (70 MW)	RES Australia	100	60
Whitsunday Solar Farm (57.5 MW)	Edify Energy / Wirsol	112	67
Hamilton Solar Farm (57.5 MW)	Edify Energy / Wirsol	112	67
Daydream Solar Farm (150 MW)	Edify Energy / BlackRock Real Assets	300	180
Hayman Solar Farm (50 MW)	Edify Energy / BlackRock Real Assets	100	60
Sun Metals Solar Farm (125MW)	Sun Metals (Korea)	267	160
Ingham Bio-Energy Project (110MW)	North Queensland Bio-Energy Corporation	640	110
Aramara Solar Farm (140 MW)	Eco Energy World (EEW) Australia	280	168
Powering North Queensland: Transmission Line	Powerlink	150	128
Burdekin Falls – hydro-electric power station (50MW)	Stanwell	200	120
Substation Upgrades at Various SEQ Locations	Qld Government	110	80
SunCoast Powerline Project – Palmwoods to Maroochydore	Qld Government	89	69
Lockyear Valley gas Power Station	Quin Brook	100	80
Galilee Basin Transmission Project	Adani	300	200
Electricity Major Projects	**Work Done**	**9,615**	**5,818**
	Funded		**61%**
	Not Funded		

Funded Unfunded

Project Status	Commencement Date	Completion Date	2017/18 ($m)	2018/19 ($m)	2019/20 ($m)	2020/21 ($m)	2021/22 ($m)
Under Construction	2017/18	2018/19	16	50			
Under Construction	2017/18	2018/19	150	150			
Announced	2019/20	2020/21			50	50	
Under Procurement	2018/19	2019/20		200	200		
Announced	2018/19	2018/19		100			
Under Construction	2018/19	2017/18	102				
Under Construction	2017/18	2018/19	60				
Prospective				30	34		
Under Construction	2017/18	2018/19	96	24			
Announced				18	57		
Under Construction	2015/16	2018/19	40	8			
Prospective				36	90		
Under Construction	2017/18	2018/19	36	24			
Under Construction	2016/17	2018/19	45				
Under Construction	2016/17	2017/18	45				
Under Construction	2017/18	2018/19	150	30			
Under Construction	2017/18	2018/19	48	12			
Under Construction	2017/18	2018/19	60	100			
Announced			30	80			
Prospective				84	84		
Under Procurement	2018/19	2020/21	0	50	50	28	
Prospective	<2020/21					60	60
Under Construction	2013/14	2018/19	35	35			
Under Construction	2015/16	2018/19	53	9			
Under Procurement	2018/19	2019/20		50	30		
Unlikely	>2020/21			50	100	50	
			1,436	**1,813**	**1,271**	**758**	**310**
			1436	**1,183**	**387**	**78**	**0**
			0	**630**	**884**	**680**	**310**

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
PIPELINES			
North East Gas Interconnector (Queensland Section)	Jemena	1000	350
Arrow Bowen Pipeline	Shell/Arrow/Bow	450	360
Pipelines Major Projects	**Work Done**	**1,450**	**710**
	Funded		**49%**
	Not Funded		
TELECOMMUNICATIONS			
National Broadband Network – Qld component	NBN Co.	6928	4850
Public Safety Regional Radio Communication	Qld Government	500	300
Telecommunications Major Projects	**Work Done**	**7,428**	**5,150**
	Funded		**69%**
	Not Funded		
OIL & GAS			
Queensland Curtis LNG Upstream Field Development (Sustaining)	QGC & Shell	700	650
Gladstone LNG Upstream Field Development (Sustaining)	Santos & Petronas	550	500
GLNG Roma East Project	Santos & Petronas	750	400
Australia Pacific LNG Upstream Field Development (Sustaining)	Origin/Conoco Phillips	700	650
Arrow – Upstream Field Development (Sustaining)	Arrow/Shell	1500	1000
Oil & Gas Major Projects	**Work Done**	**4,200**	**3,200**
	Funded		**76%**
	Not Funded		
BAUXITE, ALUMINA & ALUMINIUM			
Amrun (South of Embly)	Rio Tinto Alcan	1900	1125
Bauxite Hills	Metro Mining	100	70
Bauxite, Alumina & Aluminum Major Projects	**Work Done**	**2,000**	**1,195**
	Funded		**60%**
	Not Funded		
OTHER HEAVY INDUSTRY			
North Queensland Bio Energy – Ethanol Plant	North Queensland Bio Energy	640	200
Phosphate Hill	Incitec Pivot, Dyno Nobel, UGL, Lendlease and GRACosway	100	70
Other Heavy Industry Major Projects	**Work Done**	**740**	**270**
	Funded		**36%**
	Not Funded		

Funded Unfunded

Project Status	Commencement Date	Completion Date	2017/18 ($m)	2018/19 ($m)	2019/20 ($m)	2020/21 ($m)	2021/22 ($m)
Under Construction	2016/17	2017/18	280				
Unlikely	>2020/21						160
			280	**0**	**0**	**0**	**160**
			280	**0**	**0**	**0**	**0**
			0	**0**	**0**	**0**	**160**
Under Construction	2010/11	>2020/21	848	830	453	400	400
Credibly Proposed	2018/19	2020/21		75	75	75	75
			848	**905**	**528**	**475**	**475**
			848	**830**	**453**	**400**	**400**
			0	**75**	**75**	**75**	**75**
Under Construction	2009/10	>2019/20	150	50	150	150	150
Under Construction	2009/10	>2021/22	100	100	100	100	100
Under Construction	2017/18	>2021/22	120	120	80	40	40
Under Construction	2009/10	>2024/25	150	50	150	150	150
Prospective	2019/10	>2024/25			150	150	150
			520	**320**	**630**	**590**	**590**
			520	**320**	**480**	**440**	**440**
			0	**0**	**150**	**150**	**150**
Under Construction	2016/17	2018/19	450	338			
Under Construction	2016/17	2017/18	63				
			513	**338**	**0**	**0**	**0**
			513	**338**	**0**	**0**	**0**
			0	**0**	**0**	**0**	**0**
Prospective	2018/19	2020/21			75	75	50
Under Construction	2016/17	2018/19	40	10			
			40	**10**	**75**	**75**	**50**
			40	**10**	**0**	**0**	**0**
			0	**0**	**75**	**75**	**50**

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
COAL			
Eagle Downs Coking Coal	Aquila / Vale	1250	600
Byerwen	Qcoal	300	250
Overland Conveyor System Caval Ridge	BHP Billiton / Mitsubishi Alliance (BMA)	265	160
Red Hill hard coking deposit (Formally Goonyella riverside).	BHP Billiton / Mitsubishi Alliance (BMA)	1500	750
Ensham Central Project	Ensham Resources	1200	720
Maryborough (Colton)	Northern Energy (Owned By New Hope)	300	180
New Acland Stage 3 Expansion	New Hope Corporation	350	210
Caval Ridge Expansion (part of the gazetted Bowen Basin Coal Growth Project)	BHP Billiton / Mitsubishi Alliance (BMA)	200	160
Peak Downs Expansion	BHP Billiton / Mitsubishi Alliance (BMA)	460	345
South Walker Creek	BHP / Mitsui	150	100
Grosvenor Underground Stage 2	Anglo Coal	500	350
Styx's Coal project	Waratah Coal / Queensland Nickel	300	270
Middlemount coking coal mine stage 2	Peabody / Yancoal	325	284
Hail Creek Extension – Underground	Rio Tinto	1100	660
Rolleston expansion	Xstrata / Glencore	400	120
Alpha Coal Project	Hancock	6500	
Yarrabee	Yancoal	260	150
Boundry Hill South Mine Extension	Anglo Coal	100	70
Ellensfield coking coal	Vale	400	280
Belvedere Coal Project	Aqulla Resources	1100	500
Olive Downs	Pembroke Resources	500	250
Kevins Corner	Hancock	3000	1000
South Burnett Coal Project (Tarong)	MRV Tarong Basin Coal	250	200
South Burnett Coal Project – Transport corridor (Road or Rail ?)	MRV Tarong Basin Coal	500	300
Curragh Mine – Next stage Expansion	Wesfarmers	200	160
Baralaba Coal Mine Expansion	Cockatoo Coal	313	150
Jellinbah		110	90
Kestral Expansion		120	80
Wilkie Creek New Black Energy		250	200
Carmichael Coal Mine Project (Stage 1)	Adani	4000	3500
Coal Major Projects Work Done	**Work Done**	**26,203**	**12,089**
	Funded		**46%**
	Not Funded		

			Funded				Unfunded
Project Status	**Commencement Date**	**Completion Date**	**2017/18 ($m)**	**2018/19 ($m)**	**2019/20 ($m)**	**2020/21 ($m)**	**2021/22 ($m)**
Prospective	2020/21	2022/23				158	228
Under Constuction	2017/18	2019/20	50	50	50	50	
Under Construction	2017/18	2019/20	30	90	40		
Prospective	<2020/20						163
Prospective	<2020/21						240
Prospective	<2020/21						66
Unlikely	2020/21	2022/23				60	90
Under Construction	2017/18	2018/19		80	80		
Credibly Proposed	2020/21	2022/23				80	160
Credibly Proposed	2019/20	2020/21			20	40	40
Credibly Proposed	2020/21	2021/22				70	105
Announced	2017/19	2018/20			50	220	
Prospective	>2019/20						65
Unlikely	>2020/21						150
Prospective	>2020/21						70
Unlikely	>2020/22						
Prospective	>2019/20						
Prospective	>2019/20						
Prospective	>2019/20						
Unlikely							
Unlikely							
Unlikely							
Prospective	>2019/20						
Prospective	>2019/20						
Prospective	>2019/20						
Under Construction	2016/17	2018/19	50	50			
Under Procurement	2017/18	2018/19	20	70			
Under Procurement	2017/18	2018/19	10	70			
Prospective	2018/19	2020/21		50	100	50	
Unlikely	>2019/20				250	750	1000
			160	**460**	**590**	**1,478**	**2,376**
			160	**460**	**320**	**320**	**0**
			0	**0**	**270**	**1,158**	**2,376**

2018 MAJOR PROJECTS LIST As at February 2018

Queensland Project Description	Sponsor	Total Project Value ($m)	Engineering Value ($m)
OTHER MINERALS			
Dugald River	MMG	1456	874
Cannington Expansion	BHP Billiton	400	120
Capricorn Copper Project	Lighthouse Minerals	152	83
Merlin Project Molybdenum	Chinova Resources	345	250
Roseby Copper (Little Eva)	Altona Resources	320	96
Red Dome Mungana	Mungana gold mines	330	215
Ravenswood Extension Project	Resolute Mining	167	92
Charters Towers	Citigold Corporation	246	135
SCONI Scandium Project (Phase 1)	Metallica Minerals	247	148.2
Sarsfield	Resolute Mining	250	100
Paradise Phosphate South project	Legand International Holdings	400	300
Other Minerals Major Projects	**Work Done**	**4,313**	**2412**
	Funded		**56%**
	Not Funded		
TOTAL MAJOR PROJECTS	**Work Done**	**109,015**	**69,196**
	Funded		**63%**
	Not Funded		

			Funded			Unfunded	
Project Status	**Commencement Date**	**Completion Date**	**2017/18 ($m)**	**2018/19 ($m)**	**2019/20 ($m)**	**2020/21 ($m)**	**2021/22 ($m)**
Under Construction	2015/16	2017/18	260				
Unlikely	2016/17	2018/19			30	60	30
Under Construction	2016/17	2017/18	42				
Unlikely	2020/21	2021/22				100	150
Unlikely	2018/19	2020/21		21	45	30	
Credibly Proposed	2019/20	2021/22			65	85	65
Unlikely	2018/19	2019/10		38	54		
Prospective	>2019/20				35	80	20
Prospective	>2020/21	2021/22					
Prospective	>2020/21						
Unlikely	>2020/21						
			302	**59**	**229**	**355**	**265**
			302	**0**	**0**	**0**	**0**
			0	**59**	**229**	**355**	**265**
			6,176	**6,404**	**7,201**	**9,625**	**10,521**
			6,176	**5,495**	**4,239**	**4,236**	**4,640**
			0	**909**	**2963**	**5389**	**5881**


Leica

qldmpp.com.au