Australia Pacific LNG Project

Volume 5: Attachments

Attachment 44: KPMG Economic Impact Assessment Report –

Gas Fields, Pipeline and LNG Facility

The Australia Pacific LNG Project

Economic Impact Assessment

This report was prepared for Australia Pacific LNG

27 January 2010

AUDIT ▪ TAX ▪ ADVISORY

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Abbreviations

ABARE – Australian Bureau of Agricultural and Resource Economics

ABS – Australian Bureau of Statistics

ANZSIC – Australia New Zealand Standard Industry Classification

APLNG – Australia Pacific LNG

CGE – Computable General Equilibrium

CPI – Consumer Price Index

CSG – Coal Seam Gas

EIS – Environment Impact Statement

GDP – Gross Domestic Product

GOS – Gross Operating Surplus

GRP – Gross Regional Product

GSP – Gross State Product

IO – Input-output

LNG – Liquefied Natural Gas

MMR – Murphy Model Regional

MM600+ – Murphy Model 600+

MTPA – Mega Tonnes Per Annum

PJ – Peta joule

SLA – Statistical Local Area

TAF – Temporary Accommodation Facilities

ToR – Terms of Reference

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1. Key Findings

1.1 Economic Impacts of the APLNG project

The proposed Australia Pacific LNG project is the largest coal seam gas (CSG) to liquefied natural gas (LNG) project that is currently under consideration in Australia. At the national level, the construction phase of the Australia Pacific LNG project is estimated to contribute an average of 9,900 jobs (directly and indirectly) over eleven years from 2010 to 2020, inclusive.

The Australia Pacific LNG project is expected to generate substantial benefits to the national economy. Compared to the baseline case of the project not proceeding, this project, when fully operational, is expected to lead to:

- higher real Gross Domestic Product (GDP) by around $1.3 billion annually, on average;
- increased real national income, driving both higher consumption and investment; and
- higher consumer welfare by around $573 million annually, on average.

At the state level, once the Australia Pacific LNG project is fully operational:

- it is estimated to lead to higher employment in Queensland by an average of 9,000 jobs, with 5,000 of those jobs in the mining industry (including petroleum and gas); and
- Queensland's Gross State Product (GSP) is expected to be $2.0 billion higher on average each year (or 0.9 %) than would otherwise be the case.

1.2 Property values

The LNG facility is estimated to gradually increase housing prices in Gladstone until 2020. The impact will ramp up as each additional train is completed. Spread over 7 years from when the first train becomes operational in 2014, to when the fourth train is operational in 2020, the impact will be roughly 1.2% per year. This results in the average house price in Gladstone being 8.9% higher than they would have been without the facility in 2020.

The gas pipeline is expected to have minimal impact on property values at the project level, but could contribute to a significant cumulative increase if multiple developments proposed for this region go ahead.

The impact of the gas field on property values will depend on the project's ability to source workers locally and the proportion of non-local workers that migrate from Temporary Accommodation Facilities into the surrounding towns. As more workers migrate permanently to the surrounding towns, this is expected to increase housing prices in the area. With multiple developments proposed in this region, the project could contribute to a significant cumulative increase in housing prices until additional stock (new construction) fulfils demand.

1.3 Cumulative Impacts of Upcoming Major Projects including the APLNG Project

This study also estimates the cumulative impact of 30 major projects (including the Australia Pacific LNG project). Once these projects are fully operational, the national economy will benefit from:

- higher real GDP in each year by around $6.1 billion annually, on average;
- increased real national income, driving both higher consumption and investment; and

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- higher consumer welfare of around $1.1 billion annually, on average.

At the state level, once the projects are fully operational:

- they are estimated to lead to higher employment in Queensland by an average of 55,000 jobs; and
- Queensland's GSP is expected to be $6.9 billion higher on average each year (or 3.6 %).

At the regional level, the projects at full operation are estimated to have the following impacts.

- In the Darling Downs-South West region, the projects are estimated to lead to higher employment by an average of 39,300 jobs;
- Darling Downs-South West's Gross Regional Product (GRP) is expected to be $5.2 billion higher on average each year (or 41.4 %) with the projects at full operation;
- In the Mackay-Fitzroy-Central West region, the projects are estimated to lead to higher employment by an average of 15,400 jobs;
- Mackay-Fitzroy-Central West's GRP is expected to be $2.6 billion higher on average each year (or 10.0 %).

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2. Executive Summary

The proposed Australia Pacific LNG project is the largest Coal Seam Gas (CSG) to liquefied natural gas (LNG) project that is currently under consideration in Australia. The Australia Pacific LNG project will convert Australia's largest CSG resource into LNG for export. LNG is a key energy source in the international energy market. It is used for a variety of industrial and domestic purposes. At the industry level, it can be used to supply gas to power stations, while domestically it can be used for heating and cooking. This major project is co-owned by Origin Energy Ltd and ConocoPhillips and involves three components:

- the development of the CSG fields;
- a gas transmission pipeline to the Queensland coast; and
- a LNG plant and associated facilities.

After the gas is transported (by pipeline) to Gladstone, it will be cooled and liquefied at the LNG facility in Gladstone. The LNG will then be exported.

KPMG Econtech has been commissioned to undertake an economic analysis of the impact of the Australia Pacific LNG project. This is to address the specific components of the Environmental Impact Statement (EIS) Terms of Reference (ToR) for the Australia Pacific LNG project.

In broad terms, KPMG Econtech has undertaken the following tasks to address the specific economic components of the ToR for the Australia Pacific LNG project EIS.

- KPMG Econtech has estimated the direct and indirect economic impacts of the construction and operation of the Australian Pacific LNG project. Importantly, KPMG Econtech has modelled the direct and indirect economic impacts at three geographic levels: the national economy of Australia, the state of Queensland, and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West. The Darling Downs-South West region covers the areas in which the gas field and pipeline will be located. This includes Statistical Local Areas (SLA) such as Chinchilla, Murilla (Miles), Tara, Wambo, Bendemere (Roma) and Millerman. The Mackay-Fitzroy-Central West region covers Gladstone and surroundings, where the LNG facility and section of the pipeline will be located.
- KPMG Econtech has also considered the significance of the Australia Pacific LNG project in an economic context. In addition, KPMG Econtech has also analysed the key flow-on or indirect impacts on future land use and potential development in the locality.
- KPMG Econtech has estimated the impact on property values arising from the Australia Pacific LNG project.
- KPMG Econtech has estimated the direct and indirect cumulative economic impacts of the Australia Pacific LNG project in association with 30 other projects currently under consideration. These 30 projects were agreed with the Queensland Department of Infrastructure and Planning.
- KPMG Econtech has developed preliminary strategies to mitigate any potential problem impacts identified in the tasks outlined above. These preliminary mitigation strategies have been developed for regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.
- The approach used by KPMG Econtech is outlined diagrammatically in Box A.

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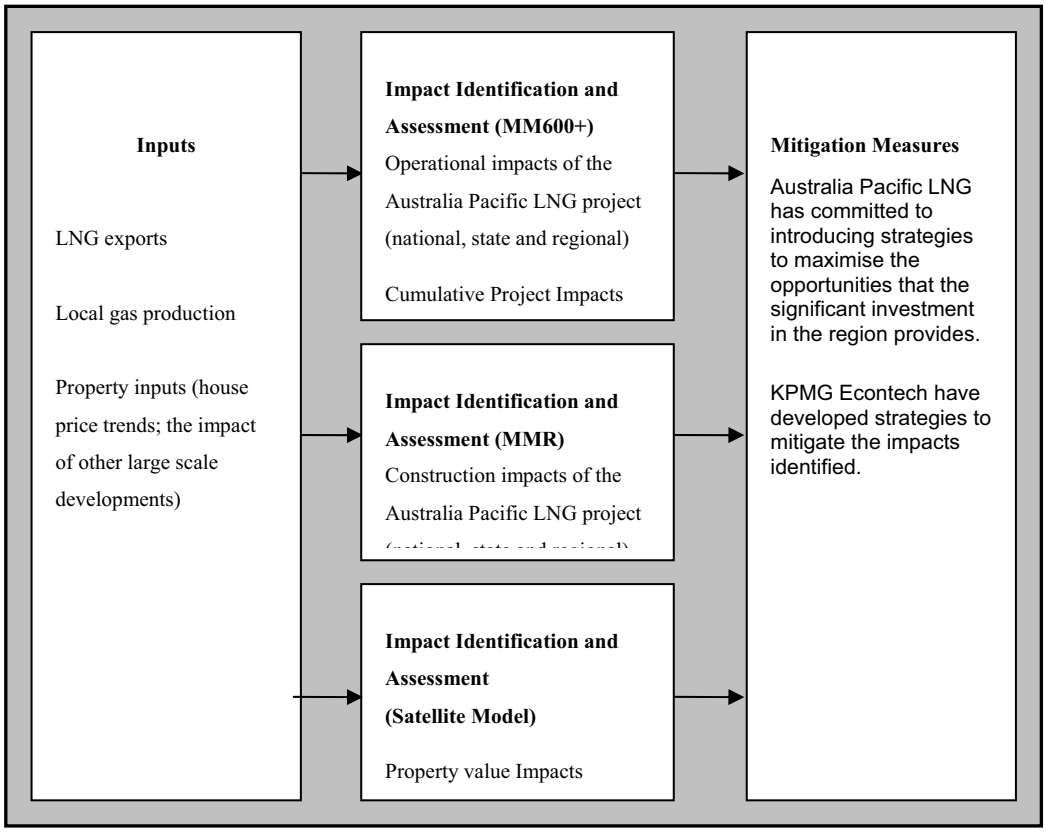
Box A: The KPMG Econtech Approach



Broadly speaking, the direct impact of each scenario considered were fed into the economic models (MM600+, MMR, Property Values satellite model) to determine the total (direct and indirect) economic impacts at the national, state and regional levels. Following from the estimated economic impacts, KPMG Econtech then developed preliminary mitigation strategies to mitigate these impacts.

The following section summarises the key results.

Contribution of the Australia Pacific LNG Project during construction

The Australia Pacific LNG project will impact on the Australian economy both directly and indirectly during its construction. The direct effects relate to the additional employment and output in the construction industry that occurs because of the construction of the Australia Pacific LNG project. The indirect effects are due to the additional demand for goods and services that the project's construction sites and construction workers stimulate. Overall, during the construction of the project, activity across the economy is expected to be higher than it would have been without the project. Figure A shows that construction of the Australia Pacific LNG project would (directly and indirectly) contribute to the economy.

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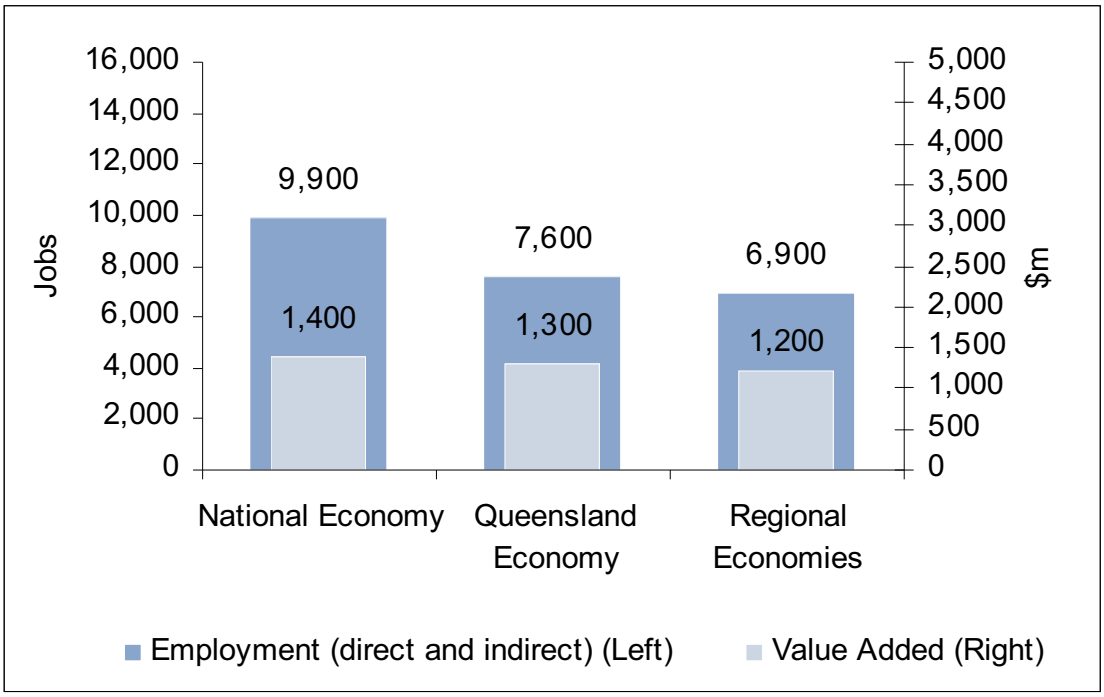
Figure A: Average Economic Impacts of the Construction Phase of the Australia Pacific LNG Project



Source: KPMG Econtech's MMR simulation.

Contribution of the Australia Pacific LNG Project once operational

The Australia Pacific LNG project will also impact on the Australian economy both directly and indirectly once the project is fully operational. The results presented below focus on the long-term effects of the change (after the economy has fully responded). This is because projects should be judged against their overall impacts on the economy and not just their direct effects in the first few years. Further, the operational impacts presented here are an estimate of the average annual impacts the Australia Pacific LNG project will have on the economy over the life of the project.

At the national level, real Gross Domestic Product (GDP) is expected to be $1.3 billion higher annually than it would have been without the project. These estimates include both the direct and indirect contribution from increased activity in industries that supply inputs to (upstream), and purchase output from (downstream), the project.

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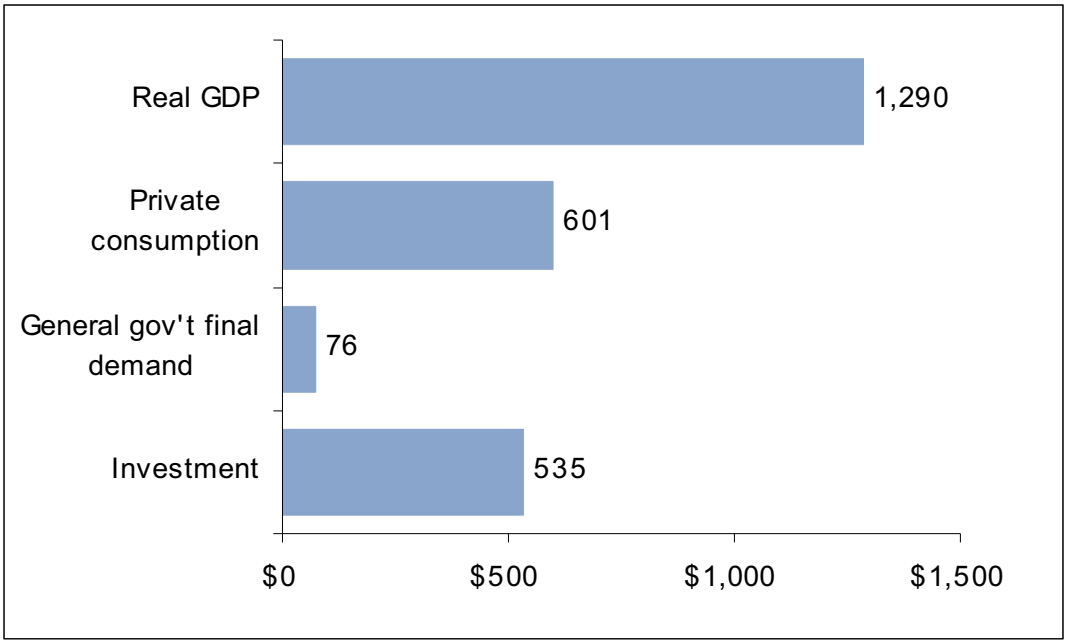
Figure B: Annual Operation Scenario National Macroeconomic Effects ($m in 2006-07 prices)



Source: KPMG Econtech's MM600+ simulation.

Clearly, real GDP is expected to be higher with the Australia Pacific LNG project than without it. In turn, this would mean a higher real national income than would otherwise be the case. The higher real income would result in both higher consumption and investment. Consumers would adjust to the higher real income by spending more on goods and services, while higher incomes would also enable industries to invest in new capital stock to take advantage of profit opportunities.

Figure B also shows that during operation of the Australia Pacific LNG project, private consumption is estimated to be higher by about $600 million on average in each year[1]. Further, annual investment would be about $535 million higher when the Australia Pacific LNG project in fully operational[2].

The Queensland Gross State Product (GSP) impacts are larger in overall magnitude than the national GDP impacts because the Australia Pacific LNG project is located in Queensland. Economic resources would be reallocated from other states to Queensland to meet the needs of the new project, thus lowering the productive capacity in those other states while increasing productive capacity in Queensland. The Australia Pacific LNG project is estimated to increase GSP by $2.0 billion annually, compared to the case where the project did not go ahead.

The impact on the standard of living is best measured by changes in consumer welfare. In the Operation Scenario of the Australia Pacific LNG project, annual consumer welfare is estimated to be $573 million higher in real terms (2006-07 dollars), than if the Australia Pacific LNG project did not proceed.

The Impact of the Australia Pacific LNG Project on Property Values

The Australia Pacific LNG project will be a major development in the region. In 2020, it is estimated to create around 1,000 ongoing jobs[3] in the region, gradually increasing until 2027 as the gas fields are fully developed. If

[1] This estimate is based on annual real household consumption figures for the 2007-08 year by the ABS.
[2] This estimate is based on annual real private business investment figures for the 2007-08 year by the ABS.
[3] 1,000 workers in the operation phase of the Australia Pacific LNG project.

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the timing of the development changes, then the timing of the impacts would also change. This figure refers to the direct operating employees in the region. The development of such a significant project, and substantial job creation, is likely to have a positive impact on the average house prices in the region.

2.1.1 LNG facility

Indicative modelling shows that the impact of the LNG facility on the average house price in Gladstone will be around 1.2 % per annum on average, over 7 years from 2014 to 2020. This occurs as the LNG facility ramps up to full operation, spreading the total impact across this time period. The Australia Pacific LNG recognises that a major development, creating around 325 news jobs in Gladstone, is likely to have an impact on the local housing market.

The impact on the Gladstone housing market can occur through increased economic activity and demand for houses by the operational workforce.

It is expected that the first train will commence operation in 2014, followed shortly by the second in 2015. The third train is expected to commence operation in 2019, followed by the fourth train in 2020. The first train will require 100 workers with each additional train requiring 75 additional workers. Using this profile, it could be expected that the impact on property values will ramp-up following this profile. However, it is reasonable to assume that market forces such as speculation, will cause the increase to be spread more evenly across the ramp-up period.

If this occurs, the total impact of 8.9 % by 2020 implies an average annual increase of 1.2 % in property values in Gladstone compounded over 7 years from 2014 to 2020.

2.1.2 Gas pipeline

Construction of the gas pipeline is expected to have little direct impact on the housing market in the region. As the construction workers will be housed in Temporary Accommodation Facilities (TAFs) across the pipeline region, there is expected to be minimal direct interaction in the region's housing market, from these workers.

The gas pipeline will be largely self-contained when it is fully operational. Given this, the operational workforce will be relatively small. While it is expected the workforce will be housed locally in the town of Miles, they will have minimal impact on the pipeline region's housing market. While the Australia Pacific LNG project will only contribute a small amount of workers requiring housing in Miles and other towns along the pipeline route, this impact could be compounded by the cumulative effect of multiple developments in the region.

2.1.3 Gas field

The construction of the gas fields is expected to peak at around 2,000 workers. Where possible the Australia Pacific LNG project will source these construction workers locally. To the extent the Australia Pacific LNG project attracts construction workers to migrate into the region and seek permanent local housing, this will increase demand for housing in the region, particularly in towns such as Roma, Miles and the Chinchilla region, which are located close to the development.

It is expected that initially, most of the operational workers will be housed in permanent accommodation facilities that will be set up by Australia Pacific LNG in the vicinity of key infrastructure within the fields. Australian Pacific LNG aims to encourage the transition of these workers into local workers, by encouraging them to permanently move to the surrounding towns.

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Similar to the construction workforce, the impact on housing prices will depend on the extent that the operational workforce chooses to reside locally. While initially most workers will be housed in the TAFs, a large proportion are expected to gradually find permanent accommodation in the area. Combined with the further demand expected from other projects being developed in the area, this could contribute to further upward pressure on housing prices in the region.

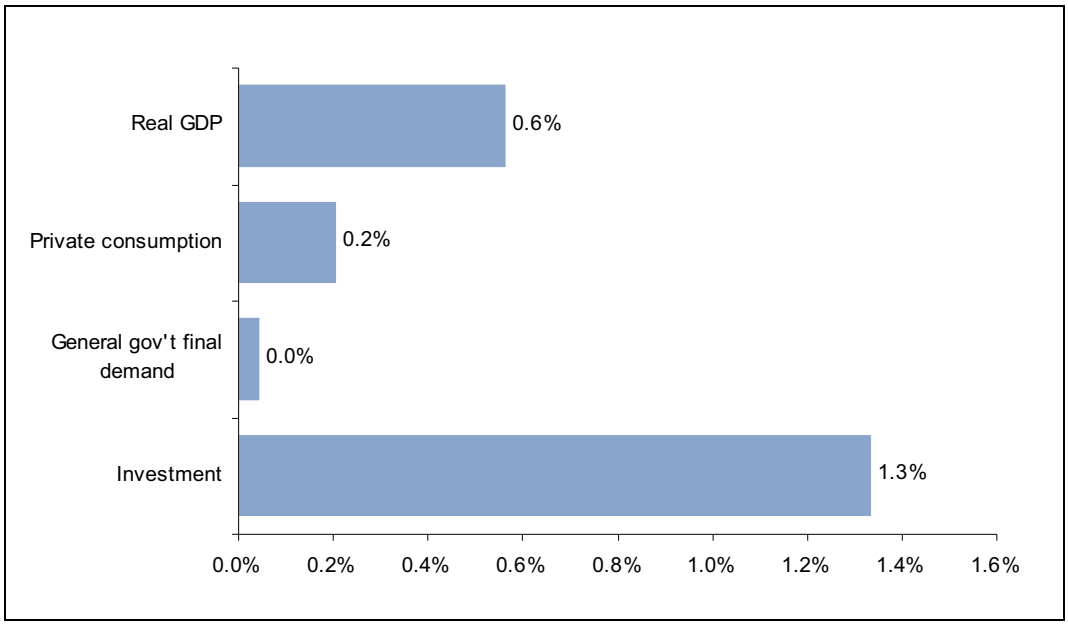
The Combined Contribution of Upcoming Major Projects including the Australia Pacific LNG Project

This study also examines the impact of the Australia Pacific LNG project in conjunction with other upcoming major projects. This "cumulative impact" modelling captures the impact on the national, state of Queensland and regional economies of 30 major projects (including the Australia Pacific LNG project)[4]. It is assumed that all 30 projects proceed to full operation and ignores the possibility that some of the proposed projects may not go ahead. See Appendix B for a detailed list of the projects included in this component of the economic modelling.

At the national level, the cumulative impact modelling estimates that real GDP would be an average of $6.1 billion (or 0.6%) higher than what would otherwise be the case. This estimate includes both direct and indirect contributions through upstream and downstream industries. The cumulative impact modelling indicates a particularly significant increase in the production value of the mining industry.

The increases in real GDP would be less than the overall increases in output from the industries outlined above. This is because the labour force is constrained to be fixed in the long-term, which is a conservative assumption built in to the MM600+ model. To achieve the increase in output in the industries noted earlier, labour is redirected from other sectors in the economy to contribute to these industries. As such, the reduction in labour from the other sectors leads to a decrease in output from these sectors.

Figure C: Annual Cumulative Project Scenario National Macroeconomic Effects (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

[4] This list of 30 projects were agreed with the Department of Infrastructure and Planning prior to undertaking the analysis.

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The cumulative impact modelling indicates a positive contribution to real GDP, which means a higher real national income than would otherwise be the case. The increase in real income results in both increased consumption and investment. Consumers adjust to the increased real income by spending more on goods and services, while industries invest in new capital stock to take advantage of profit opportunities.

Overall, Figure C shows that real private consumption is, on average, 0.2 % higher than without the projects. Figure C also shows that investment would be 1.3 % higher under the cumulative impact modelling, than would otherwise would be the case.

As well as contributing to the Australian economy, the projects would also contribute to the Queensland economy. Notably, in contrast to the national industry production effects, most of the industry production effects in Queensland are positive, as a result of the projects being built in this state.

The cumulative impact modelling suggests that production in the Queensland mining industry (including petroleum and gas) would be around 34.2 % higher than otherwise would be the case. This industry production effect would be the direct contribution of the projects to output in Queensland.

Impact Analysis and Recommended Mitigation Strategies

The analysis above identified both the potential positive and adverse impacts of the Australia Pacific LNG project on the regional economy. The impacts are those that effect consumers, industry or both groups. Specifically, KPMG Econtech analysis focused on analysing the following areas relevant to consumers and industry which are likely to be impacted by the Australia Pacific LNG project:

- cost pressures;
- higher paid jobs and improvements in living standards;
- skill shortages during both the construction and operation phases;
- improvements in labour force participation;
- decline in workers entering traditional rural industries; and
- cost pressures from infrastructure capacity constraints.

For consumers, the KPMG Econtech analysis focussed on the following areas relevant to consumers that are likely to be impacted by the Australia Pacific LNG project:

- house prices;
- rents; and
- the economic impact of changes in access to economic and social infrastructure.

For industry, the KPMG Econtech analysis focussed on the following areas relevant to industry that are likely to be impacted by the Australia Pacific LNG project:

- building materials;
- commercial and industrial property prices;
- commercial and industrial rents;
- short term accommodation availability and tourism;
- pressures on local employment;

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- capacity of local businesses to attract and retain workers;
- opportunities for local suppliers;
- economic impact of changes in land use;
- removal of millable timber;
- disruptions to commercial fisheries; and
- impact of dust and noise on local businesses.

Potential mitigation strategies have been formulated for Australia Pacific LNG to use to help to offset the potential adverse impacts of the project. These mitigation strategies were developed in consultation with Australia Pacific LNG based on the results of economic modelling, Social Impact Assessment consultation with project team members from Australia Pacific LNG, desktop analysis and research.

These mitigation strategies include methods to address changes to industry practices and the impact on households during the construction and operation phases of the Australia Pacific LNG project. The types of strategies available to Australia Pacific LNG include looking to:

- continue to use and develop methods to attract people local to the region to the workforce;
- implement a Local Content Strategy whereby Australia Pacific LNG participates in or establishes programs which assist qualified local and regional businesses with the opportunity to tender for provision of goods and services for the Project;
- continue to use and develop methods to attract under-represented groups to the workforce;
- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- ensure contracts with suppliers and contractors include provisions for sustainable growth of communities and are aligned with Australia Pacific LNG's sustainability principles and objectives work together with the CSG/LNG industry through the CSG/LNG Skills Taskforce of Energy Skills Queensland to help address skill shortages by:
  - the creation of awareness in the communities for the CSG/LNG industry;
  - enhancing vocational training; and
  - facilitating career advice and work readiness programs for new entrants and mature entrants from related industries;
- offer competitive remuneration that is in line with current industry standards, and consider offering non-financial benefits to staff including part-time work, job sharing, purchased annual leave, and off-site work where appropriate;
- encourage new suppliers to enter the market particularly in sectors where key price pressures are anticipated, and working with large national suppliers to establish operations and local outlets within the region;

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- continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the Project;
- continue to participate with government in local and regional planning processes and provide information about the Project to inform discussion and decision making in a timely manner;
- continue to work to mitigate the project impacts on local landowners throughout the project life by:
  - engaging with each landowner within the project area in advance of any project activity on their land;
  - working where possible towards mutually beneficial outcomes;
  - assigning a dedicated liaison officer to each landowner in the Project Area; and
  - locating and scheduling Project activities to reduce impacts on landowner activities;
- participate in CSG/LNG gateway programs with high schools in the Project region in partnership with providers such as the Queensland Minerals and Energy Academy to implement programs that promote career opportunities and facilitate employment in the CSG/LNG industry;
- expand competency based training and skills development programs for Production and Process Plant Operators, including further development of the dedicated training facilities at the Peat gas processing plant near Wandoan;
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs;
- collaborate with government, industry and other providers to mitigate the impact on health services in local communities including providing the appropriate level of medical facilities for camps and operating plants;
- develop community investment programs that support sustainable community development;
- provide housing for non-local construction staff and contractors in temporary accommodation facilities and consult with stakeholders including the local council as part of the site selection process for these facilities;
- during operations:
  - for the gas fields and pipeline: transition non local operations workforce from temporary accommodation facilities to live in the community only when housing stock becomes available; and
  - for the LNG facility: look to placing the Australia Pacific LNG operations workforce within the local community in the general housing pool;
- work through committees established under the Sustainable Resource Communities Policy to identify housing market issues, forecasts and possible responses; and
- Australia Pacific LNG community programs should include working with Government and agencies that provide housing to people in distress so as to mitigate potential impacts on housing affordability and availability.

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3. Introduction

The Australia Pacific LNG project will convert Australia's largest coal seam gas (CSG) resource into liquefied natural gas (LNG). LNG is a key energy source, used for a variety of industrial and domestic purposes. At the industry level, it can be used to supply gas to power stations, while domestically it can be used for heating and cooking. This significant project is co-owned by Origin Energy Ltd and ConocoPhillips and involves three components:

- the development of the CSG fields;
- a gas transmission pipeline to the Queensland coast; and
- a LNG plant and associated facilities.

After the gas is transported (by pipeline) to Gladstone, it will be cooled and liquefied at the LNG facility in Gladstone. The LNG will then be exported. Ultimately, there will be as many as four LNG trains producing 16 million tonnes per year of LNG. The production level could rise to 18 million tonnes per year which would create an even larger impacts than those estimated in this report.

KPMG Econtech has been commissioned by Australia Pacific LNG to undertake an economic analysis of the impact of the Australia Pacific LNG project. This is to address the specific components of the Environmental Impact Statement (EIS) Terms of Reference (ToR) for the project. This report provides details of the models and the methodology that have been used to estimate the impact of the LNG facility component of the project. It also provides detailed modelling results. Wherever possible, KPMG Econtech has used the results of the previous report Australia Pacific LNG commissioned KPMG Econtech to prepare, "Economic Impact of Australia Pacific LNG Liquefied Natural Gas Project", 2009. This report supersedes the previous reports and contains updated information. This report uses data and information gathered through research of publicly available resources and data provided by Australia Pacific LNG.

3.1 Report structure

The report is structured as follows.

- Section 2 outlines the approach used to estimate the economic impact of the Australia Pacific LNG project to the national economy of Australia, the state economy of Queensland and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West. Section 2 also outlines our approach to the development of strategies to mitigate any potential adverse impacts of the project.
- Section 3 presents the identified impacts of the Australia Pacific LNG project on the national economy of Australia, the state economy of Queensland and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.
- Section 4 outlines the identified cumulative impacts of 30 major projects (including the Australia Pacific LNG project) on the national economy of Australia, the state economy of Queensland and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.
- Section 5 presents the preliminary strategies to mitigate the impacts identified in the previous sections. These preliminary mitigation strategies have been developed for the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West levels.

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4. Methodology

This section provides details of the approach used to estimate the direct and indirect economic impacts on the national economy of Australia, the state economy of Queensland and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West, of the Australia Pacific LNG project. This section also outlines our approach to developing the preliminary strategies to mitigate the direct and indirect impacts of the Australian Pacific LNG project.

The section is structured as follows.

- Section 2.1 discusses the modelling approach used to estimate the direct and indirect economic impacts of the Australia Pacific LNG project.
- Section 2.2 discusses the modelling approach to estimate the impact of the Australia Pacific LNG project on property values.
- Section 2.3 discusses the modelling approach used to estimate the cumulative direct and indirect economic impacts of 30 major proposed developments in the gas fields, gas pipeline and LNG facility regions (including the Australia Pacific LNG project).
- Sections 2.4 outlines the approach in the development of preliminary strategies to mitigate the potential impacts of the project. These preliminary mitigation strategies were developed for the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.

4.1 Economic Impact Modelling

4.1.1 Economic Impact of Australia Pacific LNG project

To capture the economic impacts of the Australian Pacific LNG project, the analysis is split into two parts. The first part focuses on the impacts of the project during its construction. The second part focuses on the ongoing impact of the project once it is fully operational.

For the **construction phase** of the Australia Pacific LNG project, the impacts on the Australian economy were estimated using KPMG Econtech's MMR model (see box 2a).

Box 2a: MMR

MMR is a Computable General Equilibrium (CGE) model that estimates the effects of policies or projects that are state or region specific. It models medium-term equilibrium for each regional economy, which would be broadly achieved over a period of about three years, and it distinguishes between industries that produce tradeables and industries that produce non-tradeables. MMR divides Australia into 33 regions with 18 industries corresponding to the Australian and New Zealand Standard Industry Classifications (ANZSIC) used by the Australian Bureau of Statistics (ABS). Each region is modelled individually but following a consistent approach.

Additional detail on MMR is included at Appendix C.

The MMR model captures the effects of the construction of the Australia Pacific LNG project at the state and regional level over the medium term. This means the construction impacts are captured more effectively than a long-run model, as the impacts do not last long after the construction is completed. On this basis, MMR is an

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appropriate analytical vehicle to assess the impacts of the construction phase of the Australia Pacific LNG project. MMR uses statistical information from the ABS Input-Output tables and labour force survey. The regional breakdown is based on the ABS statistical regions from the labour force survey. MMR is calibrated using national and regional data for 2006/07.

The economic impacts of the construction phase of the Australia Pacific LNG project in the short to medium-term will arise as a result of the direct stimulus that is provided to the economy through investment in the construction of the CSG operations, pipeline and LNG plant. The economic impacts will mainly manifest in construction related industries, as new buildings and infrastructure are erected as a result of the Australia Pacific LNG project. The extent to which these direct impacts are expected to flow through to the rest of the economy and cause second round effects will be identified and quantified by economic modelling. This happens as the supply chain of the construction industry is stimulated and as business and consumer demand is encouraged within the regional economy.

For the **operational phase** of the Australia Pacific LNG project, the impacts on the Australian economy were estimated using KPMG Econtech's MM600+ model (see box 2b). The operational phase refers to the impacts of the operation of the Australia Pacific LNG project over the life of the project.

One of the key benefits of using MM600+ for this part of the analysis is that it captures the project-life effects more effectively than a short to medium-run model, as it is not influenced by short run fluctuations. This provides a more accurate representation of the impacts of the projects once it is in normal operation mode. Further, the product detail in MM600+ means that LNG is separately identified from natural gas and oil production - which is a very important distinction for this analysis.

Box 2b: MM600+

MM600+ is a long-term CGE model of the Australian economy that models a long-run equilibrium (approximately 5 to 10 years). It distinguishes 108 industries that produce 672 products, making it six times more detailed than any comparable model. Importantly, MM600+ distinguishes LNG export industry from domestic natural gas production and from oil production, whereas simpler models treat oil and gas as a single product.

MM600+ has three distinctive features that make it suitable for analysing alternative pre-commitment regimes.

First, its high level of detail means that MM600+ can effectively analyse the impacts on specific industries to a high level of detail.

Second, MM600+ recognises that consumers make choices between different forms of product demand. Other models use a single-tier approach to modelling consumer demand, which is unrealistic. MM600+ recognises that consumers are more likely to substitute between similar items,

Finally, MM600+ is designed to measure gross changes in consumer welfare such as those associated with the creation of the Australia Pacific LNG project. MM600+ uses closure assumptions that are sustainable in the long-term. This avoids spurious estimates of gains in consumer welfare that depend on unsustainable increases in employment, the trade deficit, the budget deficit, or household borrowing and adds to the robustness of estimates produced by MM600+.

Additional detail on MM600+ is included at Appendix D.

The MM600+ is also used to estimate the ongoing impacts of the Australia Pacific LNG project at the state level (Queensland) and in the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.

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MM600+ contains a regional module, which allows results to be extended from the national level to the state and regional level. Specifically, MM600+ distinguishes 33 regions in Australia, of which eight are located in Queensland, including the Mackay-Fitzroy-Central West statistical division and the Darling Downs-South West statistical division.

CGE models like MM600+ and MMR provide better estimates than simple input-output (IO) models because they take into account that the structure of the economy responds to changes in relative prices and so is not rigid; and that there are important long-run national economic constraints in the following areas – labour supply, budget balance, external balance and private savings. This makes CGE modelling results more conservative but also more realistic. Further, MM600+ provides estimates of average effects over the project-life. This is important because policy change should be judged against their overall impacts, not just their impacts in a particular year. The MM600+ model will also capture any substitution and flow on effects arising from a project or policy.

4.1.2 Scenarios

To simulate the economic impacts of the Australia Pacific LNG project, the following three scenarios have been modelled:

- Scenario 1 (**Baseline Scenario**). This scenario assumes that the proposed additional LNG exports and natural gas production resulting from the Australia Pacific LNG project do not proceed.
- Scenario 2 (**Construction Scenario**): This scenario models the average annual economic impacts of constructing the Australia Pacific LNG project over eleven years from 2010 to 2020, inclusive.
- Scenario 3 (**Operation Scenario**): This scenario assumes that Australia Pacific LNG project's production of CSG and LNG increases by the amount expected from the Australia Pacific LNG project. Scenario 3 was modelled with KPMG Econtech's MM600+ model.

The differences in economic outcomes between the Construction and Operation scenarios and the Baseline Scenario are calculated to determine the estimated economic impacts of each stage of the Australia Pacific LNG project.

The main inputs for each of the scenarios are outlined in the following section.

4.1.3 Model Inputs

The Australia Pacific LNG project contributes to the development of CSG fields in Queensland, the construction of a gas transmission pipeline, and the construction of a LNG plant and associated facilities to export the gas. The first step in modelling the impacts of this project is to estimate the direct impacts in terms of employment and production. These direct impacts were then used to derive the economy-wide impacts using KPMG Econtech's MMR and MM600+ models.

As discussed earlier, the Construction Scenario looks at the national economy of Australia, the state economy of Queensland and the combined regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West during the construction phase of the Australia Pacific LNG project. The capital value of the Australia Pacific LNG project is approximately $35 billion (nominal dollars) to be carried out over 11 years of construction[5]. However, this cost includes expenditure on supplies and labour sourced overseas. The overseas

[5] The eleven year construction period was modelled between 2010 and 2020, inclusive.

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component (approximately 34%) is not included in the modelling, as this expenditure does not have an impact on the Australian economy during the construction phase.

Importantly, the modelling simulates the average effect of the construction during 11 years of construction of the Australia Pacific LNG project. During the construction phase, the average increase in full time equivalent employees directly involved in the Australia Pacific LNG project Australia wide, is approximately 3,300[6]. These workers will be involved in the development of the CSG fields in Queensland and construction of the gas transmission pipeline, a LNG plant, and associated facilities to export the LNG.

For the Operation Scenario, the total volume of Australian LNG exports is set to increase by approximately 800 peta joules (PJ) per annum and domestic production of natural gas is set to increase by approximately 60 PJ per annum when the Australia Pacific LNG project is complete. These figures could potentially increase as the ultimate configuration of the project is determined. Importantly, this assumes that the LNG exports and gas production from other markets (i.e. the Western Australia and Northern Territory markets) are not affected by the Australia Pacific LNG project.

Using this approach KPMG Econtech estimated the economy-wide impacts of the Australia Pacific LNG project.

4.2 Impact on Property Values

In addition to modelling the expected direct and indirect impacts of the project on the economy, this study also looks at the potential impact of the project on property values at a regional level.

The Australia Pacific LNG project is likely to impact on property values in the regions in which it operates7. This section outlines the methodology used to examine these impacts for each project region.

In broad terms, the impacts on property values were estimated by combining quantitative analysis (where possible) and qualitative discussion. It should be noted that the methodology used to estimate changes in property values is conditional on a range of factors (such as zoning laws) and these factors are subject to change over time. Hence, this analysis provides an indicative estimate of the proposed changes to property values over the long term. The approach used for each respective project region is now discussed in turn, with the impacts discussed in Section 3.

4.2.1 LNG Facility

The impact of the LNG facility on property values in the Gladstone region is conducted using a quantitative approach, supported with a discussion of the potential impacts in Gladstone. The modelled impacts are based on the long run operational phase of the project, rather than the short run construction phase. This approach has been modelled using a four-step process and is described below:

- Identify a major project, similar in nature and location.
- Gather historic data on population and property values (over the period in which the similar project commenced operation).
- Calculate a price impact ratio based on information about the similar project.

[6] Data used to estimate the direct employees involved in the construction of the Australia Pacific LNG project was provided by Australia Pacific LNG. The direct employees include both onsite and offsite construction workers.
[7] For this analysis, property values include the value of land with dwellings. It excludes the value of vacant land and commercial property.

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- Use price impact ratio in conjunction with specific Australia Pacific LNG project employment data to calculate the impact on property values.

Using the impact of a previous similar project provides an estimate of the impact on property values that focuses on the Gladstone area. This means that region specific influences are accounted for. Also, by using average house price data, this method accounts for supply and demand factors in the region.

This method ensures that outer region bias does not influence the modelling results. Outer region bias would be introduced if impacts in other regions were used as a proxy for estimating the impact of this project. To ensure this bias is avoided, data is exclusively taken from the Gladstone region to estimate the property value changes in the Gladstone region.

Thus, the four-step approach draws on historical experience in the region to provide an estimate of the impact the Australia Pacific LNG facility on property values.

4.2.2 Gas Pipeline

The impact of the gas pipeline on property values in the pipeline region will discuss the impacts of both the construction and operation of the pipeline. This discussion will primarily focus on the long run impacts in the operation phase. The impacts will be predominantly felt in the town of Miles and other towns along the pipeline route, where the operational workers will be housed.

4.2.3 Gas Fields

Similar to the gas pipeline discussions, the impact of the gas field development and operation will be discussed in terms of the impacts of both the construction and operation phase of the development. The issues surrounding housing arrangements of the workforce and impact on property values in the local region will be discussed in detail in the property value impacts in section 3.2.

4.3 Cumulative Impacts

The previous sections examined the likely impact of Australia Pacific LNG Project as a stand-alone project. However, there are a number of other major projects under consideration and it is important to understand how this group of projects (including the Australia Pacific LNG project) will impact as whole. Thus, this section discusses the approach used to model the cumulative impacts of 30 major proposed developments in the same regions as the Australia Pacific LNG project's gas fields, gas pipeline and LNG facility.

The cumulative impact modelling captures the impact on the national, state and regional economies if 30 major projects (including the Australia Pacific LNG project) proceed to full operation. These 30 projects are from a list agreed with the Department of Infrastructure and Planning. This scenario assumes all 30 proposed projects proceed to full operation. That is, the cumulative impacts of all 30 projects are examined at the national, state and regional economies on the basis that all 30 proposed projects go ahead. The actual impacts of these projects will depend on a variety of broader economic conditions, government policies and other factors where the project proponent has little control. Therefore, if the details of these 30 proposed project change, this would alter the outcome of the modelling and analysis.

To explore the cumulative economy wide impacts of this scenario, KPMG Econtech used the MM600+ model. Due to the specific geographical nature of the projects, these impacts were then also examined at a state and regional level.

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4.3.1 Scenarios

To simulate the cumulative economic impacts of the Australia Pacific LNG project, the following two scenarios have been modelled:

- Scenario 1 (**Baseline Scenario**). This scenario assumes that the proposed additional projects do not proceed.
- Scenario 2 (**Cumulative Impact Scenario**): This scenario assumes that Australian production increases by the amount expected from the various projects. As mentioned above, this scenario assumes that all 30 major proposed projects in the region proceed to full operation.
- The differences in economic outcomes between the Cumulative Impact Scenarios and the Baseline Scenario are calculated to determine the estimated cumulative economic impacts of all 30 projects proceeding to full operation.

4.3.2 Model Inputs

As noted earlier, the Cumulative Impact Scenario captures the economic impacts of 30 major proposed projects proceeding to full operation. These projects cover a variety of products, and these have been summarised in Table 2.1 (for a detailed project list and descriptions, see Appendix C).

For the cumulative modelling, each project was separately examined and the expected direct impacts of the individual project were identified. Table 2.1 shows the estimated direct cumulative impacts of the projects in terms of their production of different products (assuming the projects proceed to full operation). That is, these direct impacts represent the direct increase in production/capacity for products in the Australian economy. Where more than one project fell into the same MM600+ product category (for example LNG production), the impacts were aggregated across that product.

Thus, the inputs into the modelling are based on the expected direct impacts of the project. The results of the modelling (presented in Section 4) capture the total impact of the 30 projects on the economy - including both the direct and indirect impacts.

Important individual methodological points are highlighted below:

- The nature of the infrastructure projects mean that they will be built to service the expansion of the mining and manufacture industry projects. For example, a rail line connecting a coal mine to a port is purely related to servicing the project. Because the MM600+ model incorporates detailed cost structures by industry, the modelling implicitly captures any expansion in required infrastructure resulting from an expansion of the mining and manufacture industries. Thus, as part of this analysis, these relationships were carefully examined in the modelling to ensure no 'double counting' of infrastructure needs.
- In the case of the Cobalt and Nickel projects, the impact is aggregated into the impact on total non-ferrous metal production, using appropriate weights calculated from the latest ABARE data[8].
- In the case of projects that simply 'replace' current production, such as the Aluminium smelting project, the impact on Australian production was modelled as it still represents a contribution to the Australian economy over what would have existed without replacement.
- In this analysis it was assumed the expansion of natural gas production was solely for the LNG export industry. As such, natural gas production for the domestic market remained unchanged. It is important to

[8] Australia Bureau of Agriculture and Resource Economics, Australian Mineral Statistics, June quarter 2009

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note that under the Operation Scenario (Section 2.1.2) an increase in domestic gas supply was modelled as project specific information was available.

Table 4.1: Cumulative scenario summary

Project category	Projects	Impact on Australian production/capacity
Mining		
Black coal	4 Black coal projects (3 port expansion projects, expanding coal exports)	22.6%
Liquefied Natural Gas	5 LNG projects (2 CSG natural gas projects, 4 gas pipelines and 1 power station, supplying LNG industry)	351.9%
Limestone	1 Limestone project	13.0%
Non-ferrous metal ore (Cobalt and Nickel)	1 Non-ferrous metal ore (Cobalt and Nickel) project	0.4%
Manufacturing		
Diesel (synthetic)	1 Diesel (sythetic) project	1.0%
Steel	1 Steel production project	0.1%
Alumina refining	1 Alumina refining project	10.2%
Aluminium smelting	1 Aluminium smelting project	27.7%
Infrastructure and Transport		
Rail freight	3 Rail freight projects	26.0%
Water capacity	2 Water capacity projects	0.1%
Total	**30 projects**	

Sources: Data on each project came from Australia Pacific LNG project and each respective project's website and released information. Data on total Australian production from ABARE.

KPMG Econtech used its MM600+ to model the cumulative impact of all 30 proposed projects going ahead to full operation. The MM600+ model is outlined in box 2b in section 2.1.1 and described in detail in Appendix D. Importantly, MM600+ distinguishes LNG from domestic natural gas production and from oil production, whereas simpler models treat oil and gas as a single product. It also distinguishes Black coal production from Brown coal production, allowing it to capture the expansion of the Black coal industry separately from the Brown coal industry. This high product level detail allows the MM600+ to clearly capture the impacts of all 30 proposed projects.

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The results of the modelling reflect the impacts relative to the baseline where none of the 30 proposed projects (including the Australia Pacific LNG project) proceed to full operation. These results are presented in Section 4 of this report.

4.4 Mitigation and Enhancement

The final section of this report (Section 5) discusses Mitigation and Enhancement strategies relating to the Australia Pacific LNG project.

This section details potentially adverse economic impacts that may result from the Australia Pacific LNG Project. The impacts on consumers and industry are addressed separately. Where it was possible, the potential size of the adverse impact has been quantified. This is based on a number of different sources of data and information, including:

- results from the economic modelling, including both the general modelling and the cumulative impacts modelling, with the focus being on the regional impacts - in the Darling Downs-South West Queensland region (gas fields and gas pipeline) and the Mackay-Fitzroy-Central West Queensland region (gas pipeline and LNG facility);
- ABS data, including Census, employment, industry, tourism and demographic data;
- commercial and industrial property price data from Property Data Solutions;
- data from the Queensland Office of Economic and Statistical Research, particularly relating to prices and employment;
- Energy Skills Queensland data on skill shortages, as published in the Workforce Planning Report to inform the Workforce and Competency Development Strategy Plan for the Queensland Coal Seam Gas/Liquefied Natural Gas Industry;
- information detailed in the *Socio-Economic Impact Assessment* baseline study; and
- information from Australia Pacific LNG, particularly around workforce numbers and specific project impacts.

Section 5 also presents potential mitigation strategies available to Australia Pacific LNG to use to help to offset the potential adverse impacts of the project. These mitigation strategies were developed in consultation with Australia Pacific LNG based on the results of economic modelling, Social Impact Assessment consultation with project team members from Australia Pacific LNG, desktop analysis and research.

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5. Impacts Identification and Assessment

This section presents the estimated impacts of the Australia Pacific LNG project on the national economy of Australia, the state economy of Queensland and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West. Specifically, this section outlines:

- the results of modelling the economy-wide impacts of the construction and operation of the Australia Pacific LNG project;
- the impact of the Australia Pacific LNG project on property values during the construction and operation phases; and
- the impact of the Australia Pacific LNG project on factor incomes; other indirect impacts; and future development.

5.1 Economic Impact of the Australia Pacific LNG project

This sub-section details the impacts on output and employment provided by the Australia Pacific LNG project. It presents the modelling results from both the construction and operation phases of the Australia Pacific LNG project.

5.1.1 Industry Output

Construction Phase

The $35 billion Australia Pacific LNG project consists of the further development of gas fields, construction of a pipeline connecting the fields to an LNG facility in Gladstone and the Gladstone facility.

The modelling shows that the construction phase of the Australia Pacific LNG project would directly and indirectly contribute to industry value added in the national economy, the state economy of Queensland and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West. The construction phase of the project's direct contribution to value added refers to the total value of services provided by the construction contractors, net of goods and services that the construction contractors purchase from other businesses. As such, value added represents the payments to labour and profit.

The construction phase of the Australia Pacific LNG project will directly contribute an average of approximately $1.02 billion annually to construction industry value-added in Australia. This is equivalent to boosting value-added above what it would have been without the project, by:

- 1.2 % in the national construction industry;
- 5.0 % in the Queensland construction industry; and
- 33.6 % in the construction industry of the combined regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.

The additional annual value added will be divided between additional profits for the construction companies and wage payments to the additional construction industry workers in each of the geographical areas being considered.

In addition to directly increasing the construction industry value added, the construction phase of the Australia Pacific LNG project would also indirectly impact industry value added. This reflects the stimulus to the

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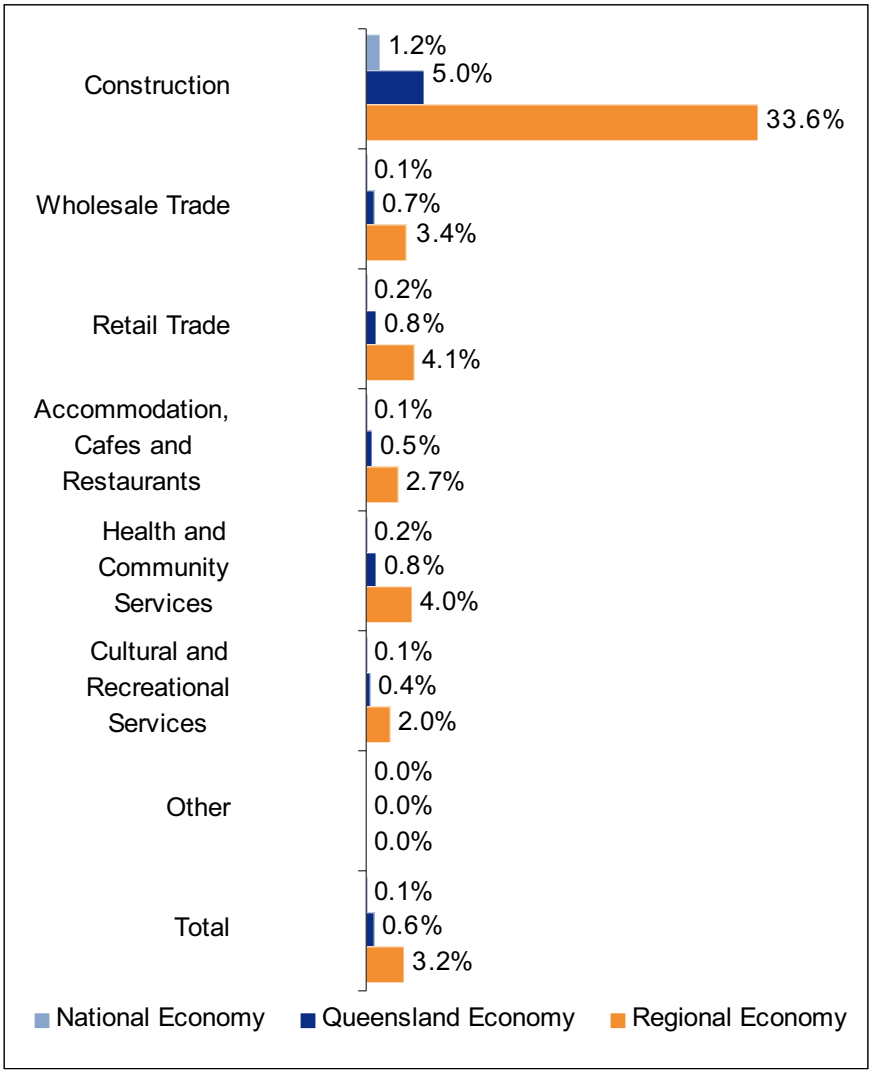
construction industry supply chain, and consumer spending by additional construction industry workers, offset by a loss in competitiveness of other industries due to higher costs. These indirect effects are now discussed.

The construction phase would lead to higher demand by construction companies for inputs from its supply chain. For example, the wholesale trade industry would gain as it is an important supplier to the construction industry, as seen in Chart 3.1.

Chart 5.1: Australia Pacific LNG Project's Contribution to Value Added by Industry, during Construction phase (% deviations from baseline)



Source: KPMG Econtech's MMR model simulation.

Note: Other includes: Agriculture, Forestry and Fishing; Mining; Manufacturing; Electricity, Gas and Water Supply; Transport and Storage; Communication Services; Finance and Insurance; Property and Business Services; Government Administration; Education; Personal and Other Services and Ownership of Dwellings.

The construction phase would also draw workers to the construction industry in Queensland. This in turn increases demand for goods and services consumed by these workers. For instance, Chart 3.1 shows that the retail trade and the health and community services industries would benefit from the spending in Queensland by the additional construction workers. The effects on the "other" industries net to zero, as shown in Chart 3.1.

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More details of the contributions to value-added from the Australia Pacific LNG project for the national economy, the Queensland economy and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West in Queensland by ANZSIC industry classification can be found in Table A2 of Appendix A.

Operation Phase

At full operational capacity the plant will consist of 4 trains with a combined processing capacity of 16 Mtpa of LNG. This capacity could ultimately expand to around 18 Mtpa.

Once fully operational, the Australia Pacific LNG project would have a positive impact on the level of activities in various industries in Australia. Specifically, the Australia Pacific LNG project would directly contribute to production value ("output") in the mining[9] industry, as well as indirectly stimulating output in industries upstream to the oil and gas sector. LNG production is defined in both the ABS input-output tables[10] and the ANZSIC industry definitions[11] as mining output. This section outlines these impacts.

The Australia Pacific LNG project will provide significant benefits to both the national, state and regional economies of Australia. These benefits include an increase in mining industry, boosting production above what it would have been without the project, by:

- 1.8 % in the national mining industry;
- 8.1 % in the Queensland mining industry, and
- 24.6 % in the mining industry of the combined regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.
- Through a significant expansion of the mining industry, the Australia Pacific LNG project will contribute to an increase in output by:
- 0.1 % in the national real GDP;
- 0.9 % in the Queensland real GSP; and
- 4.4 % in the total production value of the combined regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West.

Chart 3.2 shows the economy-wide impacts in the Operation Scenario.

[9] Based on the ABS classification, the Mining industry in the MM600+ model captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

[10] ABS cat. no. 5216.0, *Australian National Accounts: Concepts Sources and Methods (2000)*, p. 156

[11] ABS cat. no 1292.0, *Australia and New Zealand Standard Industrial Classification (2006)*, p. 66

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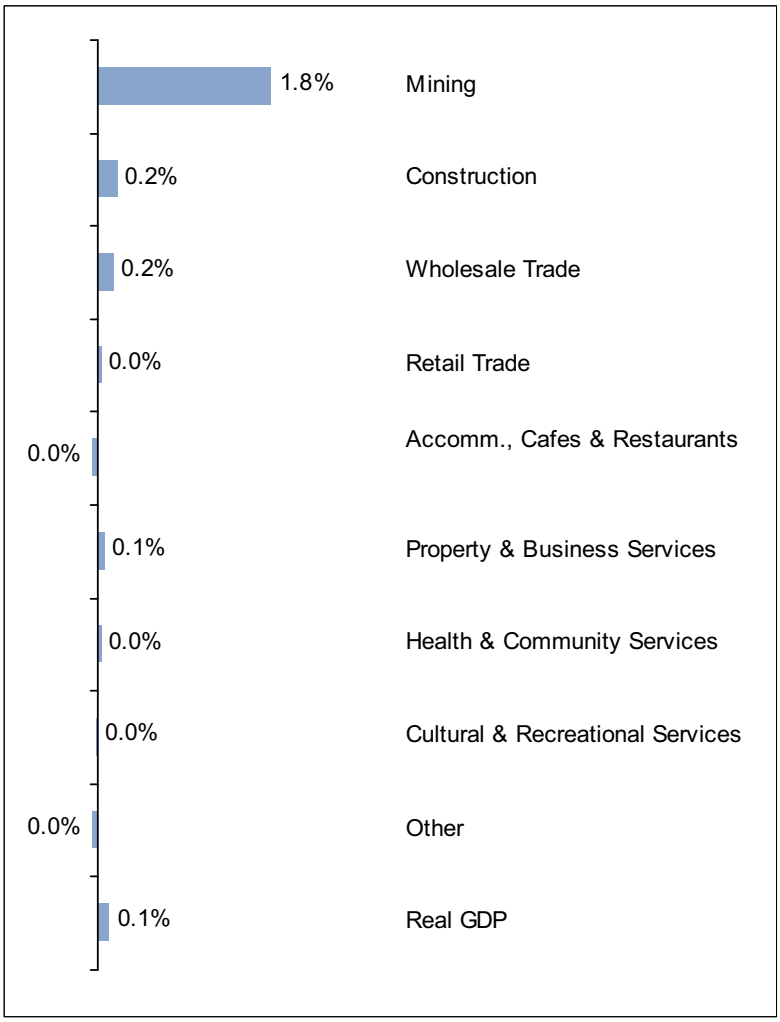
Chart 3.2 Australia Pacific LNG Project's Contribution to National Production, during Operation phase (% deviations from baseline)



Source: KPMG Econtech MM600+ model simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Note: 'Other' includes: Agriculture, Forestry and Fishing; Manufacturing; Electricity, Gas and Water Supply; Transport and Storage; Communication Services; Finance and Insurance; Government Administration; Education; Personal and Other Services and Ownership of Dwellings.

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Table 3.1 Australia Pacific LNG Project's Contribution to National, State and Regional Production, during Operation phase (% deviations from baseline)

	National	State	Region
Mining	1.8%	8.1%	24.6%
Construction	0.2%	0.6%	3.3%
Wholesale Trade	0.2%	0.5%	3.3%
Retail Trade	0.05%	0.5%	3.3%
Accomm., Cafes & Restaurants	-0.05%	0.3%	2.9%
Property & Business Services	0.1%	0.1%	0.1%
Health & Community Services	0.05%	0.4%	3.4%
Cultural & Recreational Services	0.00%	0.2%	3.4%
Other	-0.04%	0.04%	0.7%
Total	0.1%	0.9%	4.4%

Source: KPMG Econtech MM600+ model simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Note: 'Other' includes: Agriculture, Forestry and Fishing; Manufacturing; Electricity, Gas and Water Supply; Transport and Storage; Communication Services; Finance and Insurance; Government Administration; Education; Personal and Other Services and Ownership of Dwellings.

As mentioned previously, national mining industry output would be higher by around 1.8 % nationally when compared to the Baseline Scenario. This industry production effect is the direct contribution of the Australia Pacific LNG project to output in the mining industry.

By purchasing goods and services from industries upstream to the oil and gas sector, the Australia Pacific LNG project is estimated to stimulate additional production in these industries. For example, Chart 3.2 shows that the construction industry would benefit from activity by the Australia Pacific LNG project. The construction industry would be responsible for maintenance of the Australia Pacific LNG project, as well as other production and transport facilities. The construction industry would also benefit from the building activities needed to house the workforce of the Australia Pacific LNG project. Particularly, the Australia Pacific LNG project would boost production in the construction industry by 0.2 %.

Property and business services is another industry that would benefit from the Australia Pacific LNG project as it is a supplier of technical services to the oil and gas sector. For instance, the Australia Pacific LNG project would use services such as geological and geophysical services and seismic surveying services, which are part of the property and business services industry. Indeed, Chart 3.2 shows the Australia Pacific LNG project would add around 0.1 % to production in the Australian property and business services industry.

As mentioned earlier, the additional industry activity in Australia stemming from the Australia Pacific LNG project would bring more revenue to the community. This, in turn, would boost demand for consumption of goods and services. As a consequence, the Australia Pacific LNG project would raise production in the consumer-oriented industries. These industries include the retail trade and health and community services.

For industries that are trade-exposed, prices are determined on world markets and the exchange rate plays a vital role in determining activity in those industries. Higher real national income (stemming from the increased activity in the oil and gas production sector) would lead to a higher value of the Australian dollar. A higher Australian dollar, in turn, lowers demand for other Australian exports. Therefore, the production gains in the

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consumer-oriented industries and the industries upstream to the oil and gas sector would be somewhat offset by losses in production in other trade-exposed industries.

For example, manufacturing and agriculture are trade-exposed industries. Hence, these industries are expected to experience lower production levels following the appreciation of the Australian dollar.

Tourism is another exchange-rate exposed industry. In general, production in tourism-related industries (such as accommodation, cafes and restaurants and transport) is lower than otherwise would be the case. This is a result of the higher Australian dollar.

5.1.2 Employment

The construction and operation of the Australia Pacific LNG project will generate additional employment in the region. These jobs will be generated as a direct and indirect consequence of the Australia Pacific LNG project.

The direct employment effect is identified as the extra jobs that are created for people to work on the project. The indirect employment effects stem from the extra jobs that are created due to the boost to activity in other industries. In the following subsections of the report, both the direct and indirect employment impacts are considered during the construction and operation phases, separately.

Construction Phase

The Australia Pacific LNG project would attract resources from other regions in Australia. Labour would be drawn into the Queensland economy and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West from elsewhere in Australia. This means there would be a redistribution of workers from other regions in Australia to the Queensland regional economies.

The Australia Pacific LNG project is expected to make a positive contribution to the national economy, the Queensland economy and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West during its construction phase through a boost to employment. During the Australia Pacific LNG project's construction phase, employment in the construction industry is expected to be higher by 0.3 %, 1.3 % and 8.8 % for the national economy, the economy of Queensland and the combined regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West, respectively. This means that the construction phase of the Australia Pacific LNG project is expected to directly contribute approximately 3,300 jobs in these regions.

Over the 11-year construction phase, there will be an approximate average of 3,300 people working on the Australia Pacific LNG project each year. Employment will peak from 2012 to 2014 inclusive.

The additional construction activity is expected to boost activity in other industries. These indirect effects are due to the increased demand for goods and services by the Australia Pacific LNG project's construction sites and construction workers, which stimulates additional production and employment in industries across Queensland. Overall, after taking into account the impact of the Australia Pacific LNG project on employment in other sectors of the economy, the modelling shows that the construction phase of the Australia Pacific LNG project would directly and indirectly contribute to higher employment across the economy. The total impact of Australia Pacific LNG project is estimated to contribute an annual average of:

- 9,900 jobs (or a boost of 0.1%) to the national economy;
- 7,600 jobs (or a boost of 0.4%) to the state economy; and
- 6,900 jobs (or a boost of 2.1%) to the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West during its construction phase.

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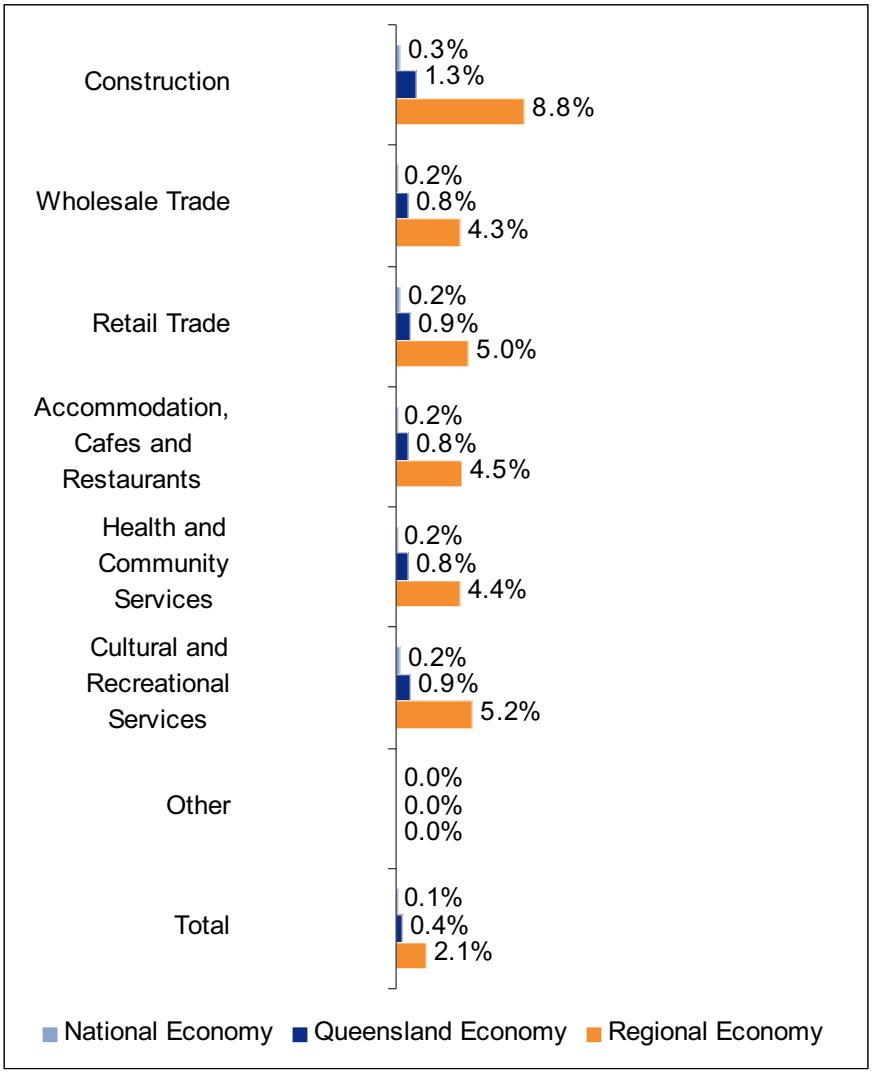
Chart 3.3 shows the differences in the total impact of the construction phase of the Australia Pacific LNG project across selected industries in the national economy, state economy and regional economies. Some of these additional jobs would be at the construction sites, while others would be located elsewhere in Queensland involving construction workers producing supplies for the project.

Chart 5.3: Australia Pacific LNG Project's Direct and Indirect average annual contribution to employment by industry during construction phase (% deviations from baseline)



Source: KPMG Econtech's MMR model simulation.

Note: Other includes: Agriculture, Forestry and Fishing; Mining; Manufacturing; Electricity, Gas and Water Supply; Transport and Storage; Communication Services; Finance and Insurance; Property and Business Services; Government Administration; Education; Personal and Other Services and Ownership of Dwellings.

More details of the contributions to employment from the Australia Pacific LNG project for the national economy, the Queensland economy and the regional economies of Mackay-Fitzroy-Central West and Darling Downs-South West in Queensland by ANZSIC industry classification can be found in Table A1 of Appendix A.

As discussed above, in addition to the job gains in the construction industry, the construction of the Australia Pacific LNG project would also lead to job gains in other industries in Queensland. This is due to the stimulus to the construction industry supply chain, which is expected to boost jobs in industries such as wholesale trade, as

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well as the stimulus to industries providing consumer goods and services to construction workers, such as health and community services and retail trade.

While the Australia Pacific LNG project would have a total positive impact on employment at the national, state and regional levels, some industries would have lower employment as a result of the Australia Pacific LNG project. This is a result of the increased construction activity leading to an increase in demand for some goods and services and this pushes prices up.

This increase in prices would impact on all import-competing and export oriented sectors. Therefore, those import-competing and export oriented sectors would have lower employment and production when compared to the baseline (without the Australia Pacific LNG project). One exception is the employment impact of the mining sector which is estimated to be negligible. This is a result of the capital intensive nature of the mining industry.

For some service sectors which are considered to be both locally tradable and relatively labour intensive (such as property and business services and government administration), the lower employment levels are a result from the competition of the local labour market as well as the inter-regional trade market. At the local labour market, such industries would face some competition from more productive sectors in the region. At the same time, at the inter-regional trade market, their competitiveness deteriorates relative to other regions as discussed above.

Operation Stage

When analysing the impacts of an industry change, important impacts to consider are the project-life effects of the change, after the economy has fully responded. This is appropriate because projects should be judged against their overall impacts on the economy and not just their direct effects in the first one or two years. The project-life impacts presented here are the average annual impacts the project has on the economy over the life of the project.

Australian workers will benefit from increased investment in the Australian economy. In broad economic terms, as the stock of capital in the economy increases, demand for labour will also increase and this will result in an appreciation in real wages in the long run, making workers better off.

The simulated economy-wide employment impacts of the Australia Pacific LNG project for industries upstream and downstream of the oil and gas sector are now presented.

Chart 3.5 shows that the Australia Pacific LNG project would cause some changes to the distribution of the employment across industries. During the operation phase, there would be no overall effect on national employment because the model assumes that the long run impact on total national employment is zero. This is because national employment depends on the overall efficiency of the national labour market, which is unlikely to be changed by the Australia Pacific LNG project. Moreover, in our simulations, labour is assumed to be completely mobile in the long run. So, any employment displacement in one sector will be absorbed into another sector in the long run[12]. This means that the combined loss of employment in industries such as manufacturing and transport (shown in Chart 3.5 as "other") is part of a redistribution of fixed national employment between other industries, such as mining (which includes natural gas and LNG production). In particular, Chart 3.5 shows that during the operation, employment would be boosted by an average of 1.3 % in the mining industry and this is equivalent to about 3,000 jobs, relative to the baseline.

[12] Note that this differs from the construction phase of the Australia Pacific LNG project, where there would be an increase in the employment. This is because the construction phase is short term, whereas the operational phase is long term.

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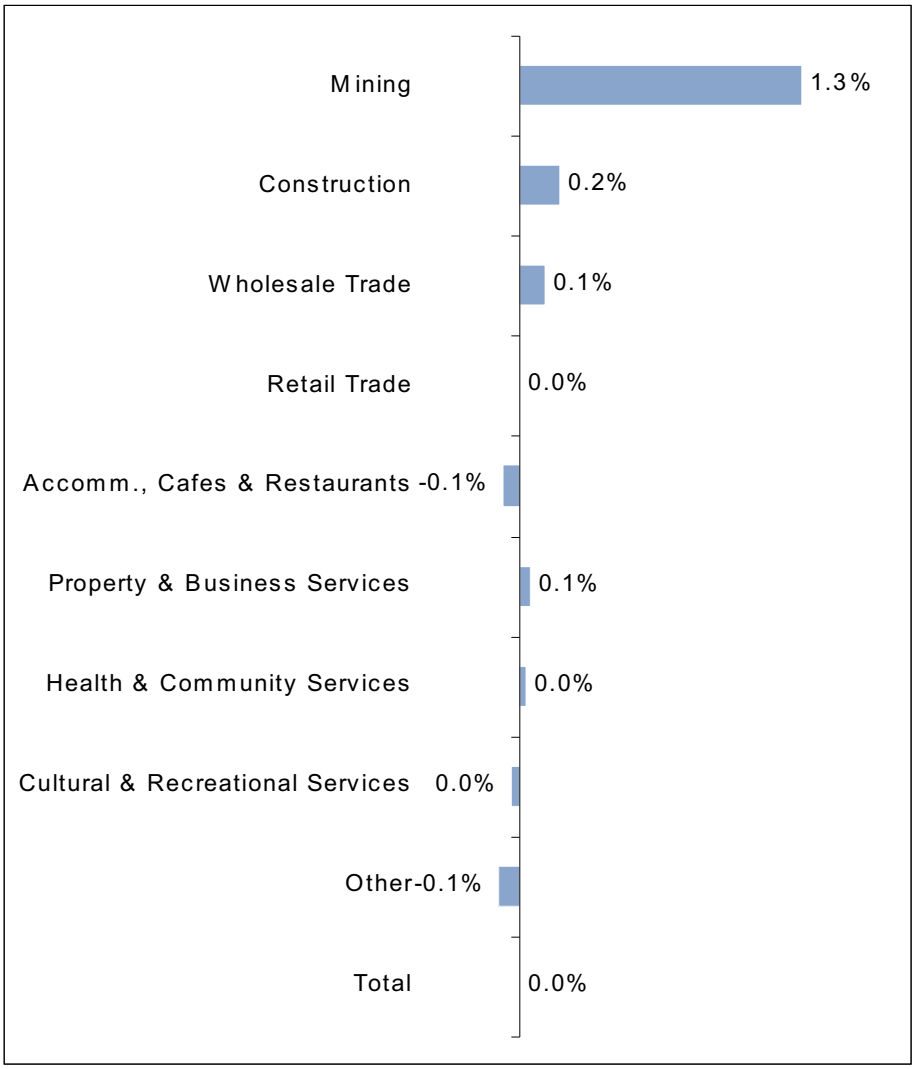
The Australia Pacific LNG project would also have indirect impacts on employment in other industries. In particular, the Australia Pacific LNG project would stimulate employment in the industries upstream to the oil and gas sector and the consumer-oriented industries.

By stimulating demand for output from industries upstream to the oil and gas sector, the Australia Pacific LNG project would boost employment in all of these industries. Indeed, Chart 3.5 shows that, on average, the Australia Pacific LNG project leads to higher employment in the construction industry by 0.2 % and the wholesale trade industry by 0.1 %.

Chart 3.4: Average National Industry Employment Effects during Operation phase (% deviations from baseline)



Source: KPMG Econtech's MM600+ model simulation.

Note: 'Mining' captures the Australia Pacific LNG project as well as the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Note: Other includes: Agriculture, Forestry and Fishing; Manufacturing; Electricity, Gas and Water Supply; Transport and Storage; Communication Services; Finance and Insurance; Government Administration; Education; Personal and Other Services and Ownership of Dwellings.

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5.2 Impact of the Australia Pacific LNG project on Property Values

The Australia Pacific LNG project will be a major development in the region. In 2020, it is estimated to create around 1,000 permanent jobs for the operation of the project. This will gradually increase up until 2027 as the gas fields are fully developed. This figure refers to employees directly employed in the operational activities of the project in each the regions. The development of such a significant project, and substantial job creation, is likely to have a positive impact on the average house prices in the region. This section examines the impact of the Australia Pacific LNG across each project phase and region.

Construction Phase

The Australia Pacific LNG project is a major development in the region and will create substantial employment opportunities during the construction phase. Where possible, the Australia Pacific LNG project will employ local construction workers. This refers to both workers sourced from the current population, and workers who migrate into the region and thus become local. The Australia pacific LNG project will aim to employ a significant proportion of its construction workforce from the local areas.

Australia Pacific LNG will construct Temporary Accommodation Facilities (TAFs) to house the non-local workers during the construction phase. These accommodation facilities will be largely self-contained, so there will be little direct interaction in the region's housing market from the construction workforce housed in the TAFs. However, increased spending in the region by these workers will stimulate the local economies and contribute to upward pressure on housing prices.

It is expected the large influx of workers required for the construction phase will put upward pressure on housing prices. This upward pressure will come from an influx of construction workers migrating to the region, as well as increased spending in the region by the construction workforce. However, even with the large scale job creation, these impacts will be mitigated by the TAFs and the aim to where possible, source the construction workforce locally.

The construction of the Australia Pacific LNG project is expected to create substantial flow on benefits to the region through stimulation of the region's economy. These flow-on benefits will include stimuli to the region through increased demand from the Australia Pacific LNG project's supply chain, as well as increased demand for services supporting the construction workforce. It is expected these flow-on benefits will increase incomes in the region and push up the average house price.

Operation Phase

The Australia Pacific LNG project will create substantial permanent employment in the region. It is estimated there will be around 1,000 ongoing positions in the region from 2020 and this permanent job creation will push up demand for housing in the region. A brief summary is provided in the dot points below and this is then discussed in more detail.

- It is expected that most operational workers in the **gas fields** will initially be housed in permanent work facilities and hence have little direct interaction with the region's housing market. However, Australia Pacific LNG will encourage these workers to gradually move into private accommodation locally as the housing market responds to increased demand.
- It is expected that the operational workers of the **gas pipeline** will be housed in Miles and other towns along the pipeline route. However, the number of workers required in this case will be few - so it is not expected that the pipeline will have much of an impact on the local housing market.

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- There will be an increase in average house prices in Gladstone, where the **LNG facility** will be built. As the LNG facility will create a substantial increase in employment opportunities in Gladstone, it is expected this will increase demand for housing.

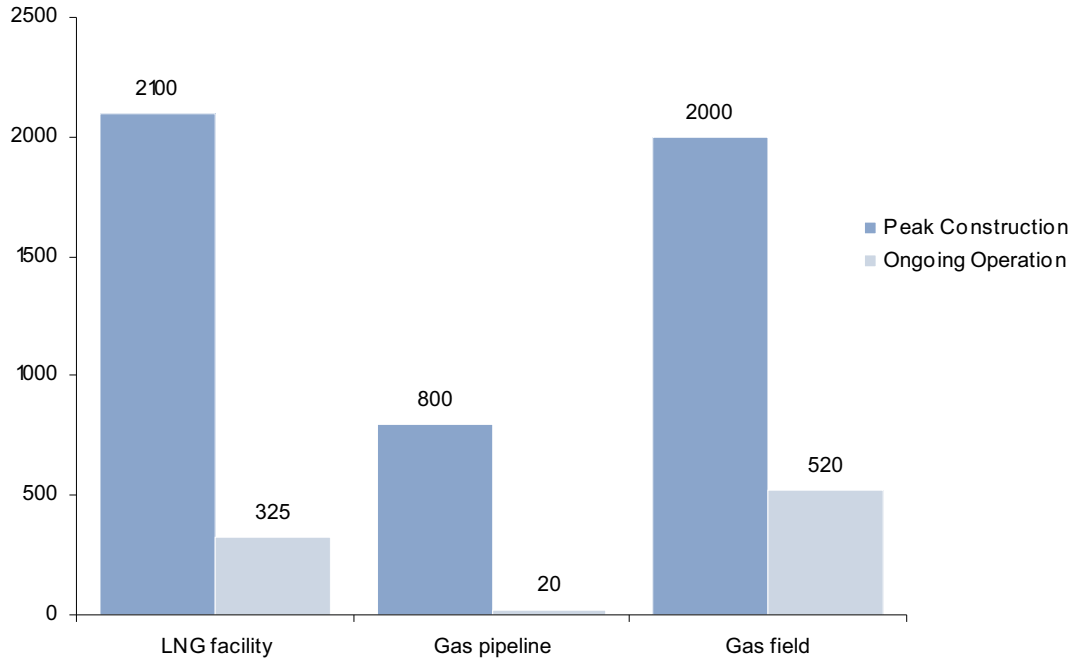
A study of the Yarwun Alumina Refinery, which was identified as a similar major development in the Gladstone area, was used to assess the impact that the Australia Pacific LNG project will have on the average house prices.

It is also expected there will be increased demand for commercial and industrial land due to the Australia Pacific LNG project. Direct and indirect stimuli to the regional economies will come from increased demand from the project's supply chain and increased spending by the project's workforce. The Australia Pacific LNG project is expected to directly increase demand for industrial land in the towns of Roma and Miles where it will set up the logistic hubs. It is also expected that the Australia Pacific LNG project will attract other businesses that support the project through its supply chain, such as the Wholesale industry. However, availability of land in the region for industrial purposes is expected to offset the increased demand.

The Australia Pacific LNG project will create significant job opportunities in the region. This influx of workers will encourage development of consumer orientated businesses that provide services to these workers. This includes the Restaurants, Cafes and Accommodation industry, and the Retail industry. This is expected to increase demand for commercial property located in the region, particularly in the towns surrounding the gas fields and could put upward pressure on commercial property values. This effect could be compounded by the development of other major projects in the region. If this occurs there could be further increases in commercial property values in the region.

The key differences between the two phases of the Australia Pacific LNG project are now highlighted. Chart 3.6 shows the direct job creation in the region, in each project stage.

Chart 5.5: Expected direct employment by the Australia Pacific LNG project (number of people, estimated peak construction and estimated ongoing operating employment in the region)



Source: KPMG Econtech

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Note: Operation employment for the gas fields and gas pipeline refers to 2016, while the operation employment of the LNG facility refers to 2020. The operation employment of the gas fields is expected to gradually increase through to 2027.

The expected impacts of each part of the project (LNG facility, Gas Pipeline and Gas Fields) are each examined in more detail.

5.2.1 LNG Facility

Construction

The construction workforce in the region is expected to peak at around 2,100 people required onsite. This peak occurs during the construction of the first two LNG trains in 2013 and again during construction of the third and fourth trains in 2018. However, even with the strong job creation due to the LNG facility, the project's direct impact on property values during the construction phase is expected to be relatively small due to the provision of a TAF located on Curtis Island. The site is intended to be relatively self sufficient, so these workers will have limited interaction with the property market of Gladstone.

As discussed, Australia Pacific LNG will seek to source a proportion of its workforce locally and construct a TAF to house any non-local workers during construction. Australia Pacific LNG expects the LNG facility construction workforce to consist of 80 % Fly-in-Fly-Out (FIFO) workers, on a 4 weeks on 1 week off rotation. These workers will be housed in the TAF. The remaining 20 % of the LNG facility construction workforce will reside locally in Gladstone. Workers that are attracted by the Australia Pacific LNG project to move permanently to Gladstone and not reside in the TAF, will directly impact the housing market in Gladstone. This impact could potentially increase demand for housing in Gladstone and put upward pressure on housing prices. This pressure is likely to be compounded by cumulative increase in construction workers migrating to Gladstone to work on other proposed major developments.

This project will be a major development in Gladstone and provide many flow-on benefits through stimulation to the local economy. The workers housed in the TAF will have little direct impact on the property market. However, they will provide a stimulus to the local economy by increased spending in Gladstone. These flow-on benefits are expected to lead to indirect property price increases throughout the construction phase, while the increase in prices caused by permanent migration may persist into the future.

Operation

The LNG facility is expected to become operational with the first LNG export around late 2014. A workforce of approximately 100 people is estimated to be required to operate the first train of the LNG plant, with approximately 75 extra people required for each additional train. Full development will require approximately 325 people.

The impact of the operation phase of the LNG facility was modelled using an approach based around the impact of a similar project in 2006.

The Rio Tinto Yarwun Alumina Refinery ("Yarwun refinery") was identified as a similar project in terms of its nature and location. The Yarwun refinery was commissioned in late 2004, with the first full year of operation in 2006. The project employed approximately 431 permanent operational staff. The Yarwun refinery is located just outside Gladstone, so it is assumed the workforce will be based in Gladstone and interact with the Gladstone housing market. The location and nature of the Yarwun refinery are similar to the Australia Pacific LNG project. Hence, the impact that the Yarwun project had on property values is used as a benchmark to estimate

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the impact that the Australia Pacific LNG project is expected to have on property values. The details of the Yarwun refinery project are outlined in the table below.

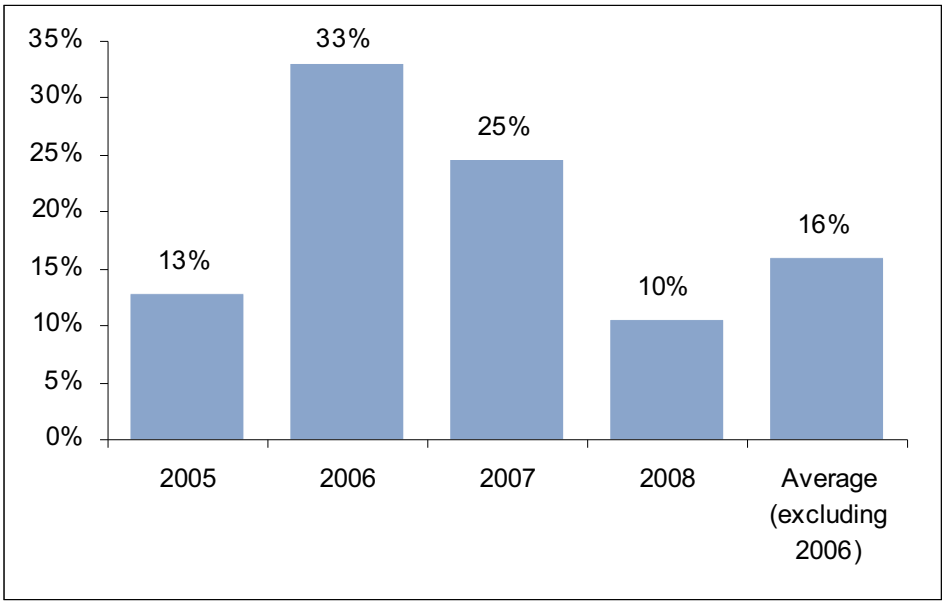
Table 5.2: Operations data of Yarwun Alumina Refinery

Operations data	
Employees	431 employees
Production (2006)	1.2 million tonnes
Products	Smelter grade alumina
Year of first operation	2006 (full year)

Source: Rio Tinto, http://www.comalco.com/31_yarwum_alumina_refinery.asp

The Yarwun refinery's first full year of operation was 2006. Hence, this is the year in which the house price impact is based. This step involves examining housing price time series data for Gladstone to determine if there were any deviations from the trend growth rate in 2006. This study compared property values in the years 2004 to 2008, to the first year of operation – 2006. Chart 3.7 below shows this comparison.

Chart 5.6: Growth rate in the average house price in Gladstone



Source: SEIA Baseline Report, Section 5.6.3

Chart 3.7 shows that the growth rate of the average house price in Gladstone in 2006 was 33 %. This is much higher than the average growth rate across 2004 to 2008 (excluding 2006) of 16 %. This indicates the operation of the Yarwun refinery may have resulted in a 17 percentage point increase (33 % less 16 %) in the growth rate of property values in Gladstone in 200613. However, there were many factors influencing housing prices in 2006. Some of these included the general mining boom and the healthy property market conditions at the time. However, in 2006, property values, due to the Yarwun Refinery and other factors were particularly strong resulting in growth of 33 %.

The average growth rate in housing prices in Gladstone has been particularly high relative to the national average. The recent mining boom has contributed significantly to this accelerated growth rate. The sharp fall in growth in 2008 is likely to reflect the onset of the Global Financial Crisis. The increased growth rate in 2006

[13] No other events were found in Gladstone in 2006 that could be considered unusual, so the Yarwun refinery opening can be considered the main cause of the above average property values growth rate in 2006.

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could be due to the Yarwun Refinery, as the high average growth rate captures the mining boom effect. However some of this impact may be explained by speculative increases, rather than the actual impact of the Yarwun refinery. Additionally, anecdotal evidence suggests some of the impact in this year may actually be delayed effects due to the influx of construction workers during the construction period. This report will use the estimated 17 % impact as the impact of the Yarwun refinery, however it is acknowledged that other factors may have influenced this impact.

Now that the overall impact on house prices has been calculated, it must be put in the context of the population change so the impact can be applied to the Australia Pacific LNG project. Specifically, the next step is to calculate the change in the population of Gladstone due to the Yarwun refinery.

According to the 2006 ABS census, the population of Gladstone in 2006 was 30,734 people. The same source shows that the average household size in Gladstone was 2.7 people. The number of workers employed in the operation phase of the Yarwun project (431) is multiplied by the average household size to give the population increase. The increase in employment of 431 people, translates into a population increase of 1,164 people (431 multiplied by 2.7) in Gladstone. It is reasonable to assume that without the development of the Yarwun refinery, the population of Gladstone would have been 29,570 (30,734 less 1,164).

It is important to note that the number of employees does not exactly translate into a population increase. For example, some workers are already living in Gladstone and will not increase the population and some workers will bring dependants. For the purpose of this analysis, the population change and the growth rate of the average house price in Gladstone is required to assess the impact of the Australia Pacific LNG project on house prices. Due to the similarities between the Yarwun Refinery and LNG facility workforce, there could be a similar ratio of locally sourced employees and dependants per worker. This similarity will mean estimating the population increase based on the number of employees will provide a reasonable approximation of the population impacts. Employment numbers can therefore be used to calculate an increase in population due to the projects.

Without the 431 employees of the Yarwun refinery (translating to a 1,164 increase in population), the population would have been 29,570 instead of the actual 30,734. This translates to a 3.9 % increase in the population of Gladstone due to the commencement of operation at the Yarwun refinery.

The price impact ratio is calculated as the increase in average property values by a 1 % increase in population. The price impact ratio is multiplied by the percentage increase in population to determine the impact on the average property values caused by the project. The price impact ratio was determined for Gladstone.

The increase in the average house price and the increase in population in Gladstone due to the Yarwun refinery, are used to calculate a price impact ratio, as shown in the table below.

Table 5.3: Price impact ratio

Price impact ratio			
Change due to the Yarwun refinery project	**Increase in population**	**Increase in house prices**	**Price impact ratio**
Impact	*3.9%*	*17.0%*	**4.3**

Source: KPMG Econtech

Table 3.3 shows the price impact ratio and the components used to calculate the ratio. It shows a 3.9 % increase in population (resulting from the operation of the Yarwun Refinery) drove a 17 % increase in average house prices in Gladstone. This can be translated to a 1 % increase in population, generating a 4.3 % increase in average house prices in Gladstone. This is a price impact ratio of 4.3.

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Naturally, rental vacancy rates will impact on property values. Specifically, if rental vacancies are low, then people who move to the region to work on the Australia Pacific LNG project will face a high degree of competition in the rental market. This increased demand for rented accommodation caused by the Australia Pacific LNG project is expected to lead to an increase in the price of rental accommodation. This in turn may lead to an increase in property values. Tight rental market conditions will also encourage people who move to the region to consider buying or building a home/unit/townhouse. In this way, the stock of dwellings will be affected by the commencement of the Australia Pacific LNG project.

The utilisation of the stock of dwellings at the commencement of the project will determine the amount of additional dwelling stock that is required to accommodate the workers. In a market where there is a low level of accommodation for rent or sale, the commencement of a project like the Australia Pacific LNG project will absorb most of the accommodation that is available, and increase demand for new dwelling stock. In practical terms, this means that there would be fewer homes for sale, lower rental vacancy rates, and an increase in the number of homes built in the region. These housing market changes would lead to increases in property values in the region until additional stock (new construction) fulfils demand.

Evidence suggests high demand for houses in Gladstone, with an average annual increase in housing prices of around 20 % from 2004 to 2008. This contrasts with the average annual increase of 11.7 % for Australia as a whole. This indicates demand for housing in Gladstone is currently outpacing demand in Australia generally.

Full operation of the LNG facility is expected around 2020. This analysis uses 2020 as a base population. The baseline population estimate for Gladstone in 2020 is 42,501 people. The LNG facility is expected to create 325 ongoing jobs in the region at full operation. This figure refers to the direct operating employees in the region. Using the method discussed above, the expected employment can be used as a proxy for the increase in population. This translates to a population increase of 878 people (325 multiplied by 2.7). The LNG facility is expected to increase the population of Gladstone by 2.1 %. By using the previously calculated price impact ratio of 4.3, this equates to a total increase in the average house price in Gladstone of 8.9 %.

Table 5.4: Impact of LNG facility on the average house price

LNG Facility					
	Population increase	Population 2016	Population impact	Price impact	Price impact
Impact	878	42,501	2.1%	4.3	8.9%

Source: KPMG Econtech

The Australia Pacific LNG recognises that a major development, creating around 325 news jobs in Gladstone, is likely to have an impact on the local housing market. The impact on the Gladstone housing market can occur through increased economic activity and demand for houses by the operational workforce.

Indicative modelling shows that the impact of the LNG facility on the average house price in Gladstone, will total around 8.9 % by 2020.

This implies an average annual increase of 1.2 % in property values in Gladstone compounded over 7 years from 2014 to 2020. This occurs as the LNG facility ramps up to full operation, spreading the total impact across this time period.

It is expected that the first train will commence operation in 2014, followed shortly by the second in 2015. The third train is expected to commence operation in 2019, followed by the fourth train in 2020. The first train will require 100 workers with each additional train requiring 75 additional workers. Using this profile, it could be expected that the impact on property values will ramp-up following this profile. However, it is reasonable to

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assume that market forces such as speculation, will cause the increase to be spread more evenly across the ramp-up period.

If this occurs, the total impact of 8.9 % by 2020 implies an average annual increase of 1.2 % in property values in Gladstone compounded over 7 years from 2014 to 2020.

5.2.2 Gas Pipeline

The pipeline will be constructed across the Statistical Local Areas (SLA) of Banana, Taroom and Calliope. These areas combined had a population of around 20,000 people in 2006 and the baseline population estimate for the pipeline region in 2016 is 20,386 people.

Construction

Construction of the gas pipeline is expected to have little direct impact on the housing market in the region. It is anticipated that a peak construction workforce in the region of approximately 800 people will be required to construct the pipeline. This workforce will be accommodated in established near to the pipeline easement. As these workers will be housed in TAFs across the pipeline region, there is expected to be little direct interaction from these workers, in the region's housing market.

Operation

The gas pipeline will be largely self contained when it is fully operational. Given this, the project will directly employ only 20 people in the region to manage pipeline operations and to monitor the pipeline. The operational workforce will be relatively small, so while it is expected the workforce will be housed locally in Miles and other towns along the pipeline route, they will have minimal impact on the pipeline region's housing market. While the Australia Pacific LNG project will only contribute a small amount of workers requiring housing, this impact could be compounded by the cumulative effect of multiple developments in the region. The housing market in Miles has seen the greatest annual average increase in housing prices the region. Miles had an average annual growth rate of 28.6 % in the average house price from 2004 to 2008, significantly larger than the 11.7 % per annum for Australia as a whole. This indicates Miles is already facing strong demand and any cumulative increase in workers seeking accommodation could significantly increase housing prices.

5.2.3 Gas Field

The gas fields region is an amalgamation of Chinchilla, Murilla (Miles), Tara, Wambo (Dalby), Bendemere (Roma) and Millmerran SLAs. As of 2006, this region had a population of around 23,000 people. It is expected to rise to around 25,041 people in 2016.

Construction

The fields will undergo a staged development over a period of at least 20 years, requiring a workforce of approximately 2,000 people in the region at its peak. Multiple construction TAFs will be established in the region to service the various gas field developments and to provide accommodation for the construction teams, with each TAF accommodating approximately 200 to 500 personnel.

The construction of the gas fields is expected to require a sizable workforce. Where possible, the Australia Pacific LNG project will source these construction workers locally. To the extent the Australia Pacific LNG project attracts construction workers to migrate into the region and seek permanent local housing, this will increase demand for housing in the region, particularly in towns such as Roma and Miles, which are located close to the development.

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Australia Pacific LNG will provide TAFs for non-local workers. As non-local workers will not require local housing, this component of the workforce will not interact directly with the regions housing market. However, as in the other project areas, the Australia Pacific LNG project will create stimuli to the local economies in the form of demand from the project's supply chain and spending via the construction workforce in the local economies. This stimulus is likely to contribute to indirect increases in housing prices in the region.

Miles, Roma and Chinchilla respectively experienced a 28.6 %, 21.3 % and 18.3 % average annual increase in housing prices from 2004 to 2008. This increase was significantly higher than the average annual increase of 11.7 % for Australia as a whole. This suggests these areas are already facing significant demand pressures. While the upward pressure on housing prices in these towns is expected to be relatively small at the project level, the Australia Pacific LNG project could contribute to a significant cumulative impact on housing prices. This impact will occur if the multiple projects proposed in the region, all contribute to demand for housing in the region over the next decade.

Operation

The operation of the gas fields will be a major development in the region, requiring an operational workforce in the region of around 520 people in 2016 (increasing to 824 people around 2027). It is expected that initially most of the operational workers will be housed in permanent accommodation facilities that will be set up by Australia Pacific LNG in the vicinity of key infrastructure within the fields. It is also expected that some of these workers will be housed in Roma (50 people in 2016) and Miles (50 people in 2016), as they will act as logistics hubs.

Australian Pacific LNG aims to encourage its workforce, where practicable, to move permanently to the surrounding towns. This transition will be a gradual process and the take-up rate of this migration is uncertain. It is estimated that other mining operations in regional Queensland with similar workforce structures have around 30% of their workforce residing locally.

Similar to the construction workforce, the impact on housing prices will depend on the extent that the operation workforce chooses to reside locally. The majority of the operational workforce of the gas fields, will initially be accommodated in self-contained accommodation facilities and have little direct interaction with existing towns housing market. It is expected there will be minimal direct impact on the housing price of the fields region as a result of the operational workforce in accommodation facilities. However, the workers housed in Roma and Miles will be required to find accommodation and so directly impact the region's housing market. As discussed, these areas are already facing strong growth in housing prices, significantly above the Australian average. While initially most workers will be housed in the self-contained accommodation, a large proportion are expected to gradually find permanent accommodation in the area. Combined with the demands expected from other projects being developed in the area, this could contribute to significant upward pressure on housing prices in the region.

Evidence from towns close to the gas fields development (Miles, Wandoan and Taroom), suggest all three towns have vacant land zoned for residential development. While this land may still need to be subdivided before beginning development of suitable new accommodation, the availability of residential land could facilitate residential development, reducing the long term pressure on housing prices. The development of land depends on receiving development approvals from local governments. One limiting factor on the residential land will be the skill shortage of construction workers in the area, as the major developments in the region will create skill shortages for other development activities. This shortage could increase the cost of building housing in the region, making home ownership less affordable and discouraging permanent migration out of the accommodation facilities and into towns.

The gas fields development could contribute to a reduction in housing affordability in the region, particularly in towns located in close proximity to the gas fields. The increase in demand for housing, as well as the limitations

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on housing supply increases, could raise accommodation costs and induce landlords to raise the rents on rental properties. The resulting increase in rental price could place pressure on current and potential renters. This will particularly affect people on low incomes such as pensioners.

5.3 Impact of the Australia Pacific LNG project on Factor Incomes

By boosting economic activity in the economy, the Australia Pacific LNG project is expected to have a positive impact on both wages and returns to capital.

5.3.1 Wages

In the long run, Australia-wide real wages are estimated to be 0.1 % higher as a result of the Australia Pacific LNG project than they would have otherwise been (see Table 3.5). This is the overall wage increase across all industries. There are likely to be short-term differences in the wage impact across industries and regions due to varying levels of skills shortages.

This increase is the result of two effects. First, the significant injection of capital generated by the Australia Pacific LNG project will mean that the labour force will be more productive. The increased labour productivity is rewarded with an increase in wages. Second, the Australia Pacific LNG project will generate increased competition in the labour market. The increased competition will be particularly prominent in the Queensland regions that the Australia Pacific LNG project will operate. The increased competition will add to real wage pressures, leading to a rise in real wages.

Table 5.5: Impact on Wages

	Percentage Deviation
Real After Tax Wage	0.1%
Real Wages	0.3%

Source: KPMG Econtech

5.3.2 Gross Operating Surplus (GOS) (returns to capital)

In the long run, assuming capital markets return to normal liquidity levels, the Australia Pacific LNG project will attract increased investment into Australia. Gas related industries are set to experience increases in GOS due to the capital injection in those industries, as a result of the Australia Pacific LNG project. In contrast, industries that are not gas-related will experience a small loss in GOS because capital from non-gas industries will be moved away from these industries, into the gas industry for the Australia Pacific LNG project. When all industries are considered, the total impact will be small and positive, with GOS 0.03 % higher with the Australia Pacific LNG project in operation.

5.4 Other Indirect Impacts

In addition to the impacts on the economy, property values and factor incomes presented above, the Australia Pacific LNG project is also expected to impact on households and, most importantly, the welfare of Australians.

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5.4.1 Households

Prices

The tables below show the expected impact of the Australia Pacific LNG project on consumption patterns. As the Australia Pacific LNG project will increase the supply of gas in the domestic market through the ramp up and construction phase, this will lead to a reduction in the price of gas. This price reduction will flow-on to reduce the price of other consumables. In addition, the Australia Pacific LNG project is expected to cause the Australian dollar to appreciate slightly. This appreciation will mean that imports to Australia are cheaper. This exchange rate effect will add to the decline in prices. Table 3.5 shows the estimated decline in the price of goods occurring during the operation phase of the Australia Pacific LNG project. Overall, it is estimated that the Australia Pacific LNG project will cause a 0.3% reduction in Consumer Price Index (CPI).

Table 5.6: Impact on CPI (deviations from Baseline)

CPI Groups	% Deviations of the APLNG project
Food	-0.19%
Alcohol and Tobacco	-0.14%
Clothing and Footwear	-0.21%
Housing	-0.52%
H/hold Furnishings, Supplies etc	-0.22%
Health	-0.16%
Transportation	-0.36%
Communication	-0.20%
Recreation	-0.22%
Education	-0.03%
Miscellaneous	-0.13%
All Groups CPI	**-0.28%**

Source: KPMG Econtech

Consumption

Table 3.6 shows that consumption is generally expected to rise as a result of the Australia Pacific LNG project. This is caused by two effects. First, the reduction in prices (Table 3.6) causes consumer demand to increase, which translates to an increase in consumption. Second, higher real wages (Table 3.5) generates an increase in consumption.

The most significant increase in consumption will be a rise of 1.3 % in the gas, electricity and fuel consumption group. As the Australia Pacific LNG project involves a direct increase in domestic gas supply, this will reduce domestic gas prices and increase consumption.

Table 5.7: Impact on Consumer Consumption (value of consumption, $)

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Consumption groups	% deviations
Food	0.0%
Cigarettes and tobacco	0.0%
Alcoholic drinks	0.1%
Clothing, fabrics and footwear	0.1%
Household appliances	0.1%
Other household durables	0.1%
Health	0.0%
Dwelling rent	0.1%
Gas, electricity and fuel	1.3%
Fares	0.0%
Purchase of motor vehicles	0.2%
Operation of motor vehicles	0.0%
Postal and telephone services	0.1%
Entertainment and recreation	0.0%
Financial services	0.0%
Other goods	0.1%
Other services	0.0%
Personal Travel Imports	0.4%
Total	**0.1%**

Source: KPMG Econtech

Living standards

The direct and indirect contribution of the Australia Pacific LNG project to the national economy, the Queensland economy, and the regional economies feeds through to contribute to living standards. Living standards are generally measured by looking at the quality and quantity of goods and services available to people and the way these services and goods are distributed within a population.

Often living standards are measured in terms of gross domestic product (or value added). However, this is not a good measure of living standards because value-added is a measure of output, rather than a measure of well-being.

As such, and in line with the Productivity Commission's practice when measuring living standards, KPMG Econtech uses consumption as the measure of living standards instead of value added. This is because living standards are derived from consumption, not value-added.

In the past, when analysing the impacts of an industry change on the national economy, the traditional focus has been on using GDP to measure the impact on living standards. However, for this report, the analysis of the economic contribution of the Australia Pacific LNG project on Australian living standards has been extended to include a measure of annual consumer welfare. In broad terms, annual consumer welfare measures the average annual real consumption per head of the population.

As noted previously, using consumption as the measure of living standards instead of GDP is standard practice at the Productivity Commission, and has long been the standard practice of KPMG Econtech. This is because living standards derive from consumption, not GDP, so in principle, consumption (that is, household final consumption expenditure as per the ABS National Accounts) is a more appropriate measure of changes in living standards than GDP.

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The KPMG Econtech modelling indicates that the Project-life scenario would produce a net annual improvement of $573 million (2006-07 prices) in consumer living standards compared to the case where the project did not proceed (baseline scenario).

The change in consumer living standards is based on sophisticated welfare economic concepts and this is a more robust measure of changes in living standards than simply measuring changes in consumption. In MM600+, this is derived from changes in non-essential consumption (consumption that is above the level required to survive). That is, the $573 million (2006-07 prices) is the change in total non-essential consumption for all Australian households because of the positive economic contribution of the Australia Pacific LNG project.

Under the MM600+ model assumption of a national labour market under which there is frictionless movement of labour between states, the gain in real wages would be spread thinly across the nation, not concentrated in Queensland. This is because any temporary Queensland wage premium resulting from the industry will be eliminated by movement of labour to Queensland.

The per capita increase in living standards in Queensland will not be significantly different to the national figure. However, it is acknowledged that in practice there may be a degree of immobility of labour between states, allowing a small Queensland wage premium to develop from the project, so that the standards of living impact in Queensland will probably exceed the national impact.

5.5 Project Importance

The sections above highlight the expected benefits to the economy of the Australia Pacific LNG project. This section provides more context around the importance of this project.

The Australia Pacific LNG project is the largest CSG to LNG project that is currently under consideration in Queensland.

The first processing train for the Australia Pacific LNG project will be fully operational in around 2014. The $35 billion project consists of the further development of gas fields, construction of a pipeline connecting the fields to an LNG facility in Gladstone and the Gladstone facility. At full operational capacity the plant will consist of 4 trains with a combined processing capacity of 16 Mtpa of LNG. This capacity could ultimately expand to around 18 Mtpa. The Australia Pacific LNG project will contribute to a significant expansion in Australia's gas production.

Construction

The Australia Pacific LNG project will contribute to significant growth in employment, both at a national and regional level. As shown in Chart 3.8, it is estimated that the construction phase of the Australia Pacific LNG project, will create an average of around 9,900 jobs (directly and indirectly) over the construction period nationally. Specifically, this will include the creation of around 7,600 jobs (directly and indirectly) in the Queensland economy, with around 6,900 of those in the regional economies of Mackay-Fitzroy-Central West and Darling Downs South West. This will represent a very significant increase in employment opportunities in the region.

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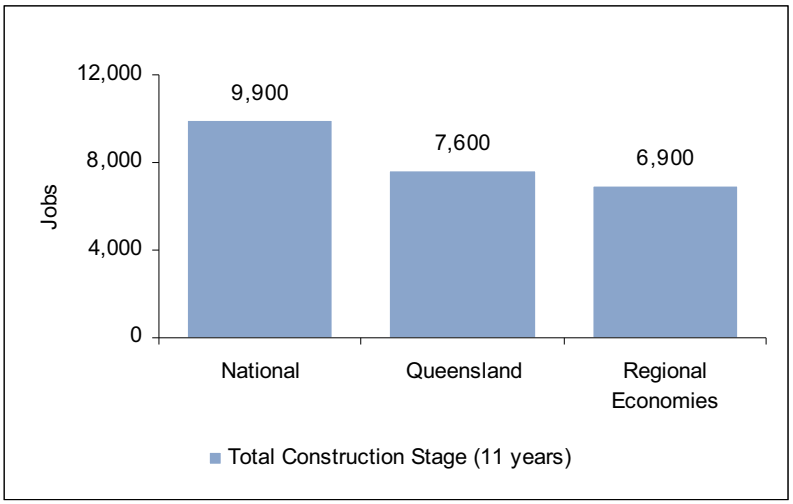
Chart 5.7: Australia Pacific LNG Project's Average Annual Contribution to Employment in the construction phase (direct and indirect) (jobs)



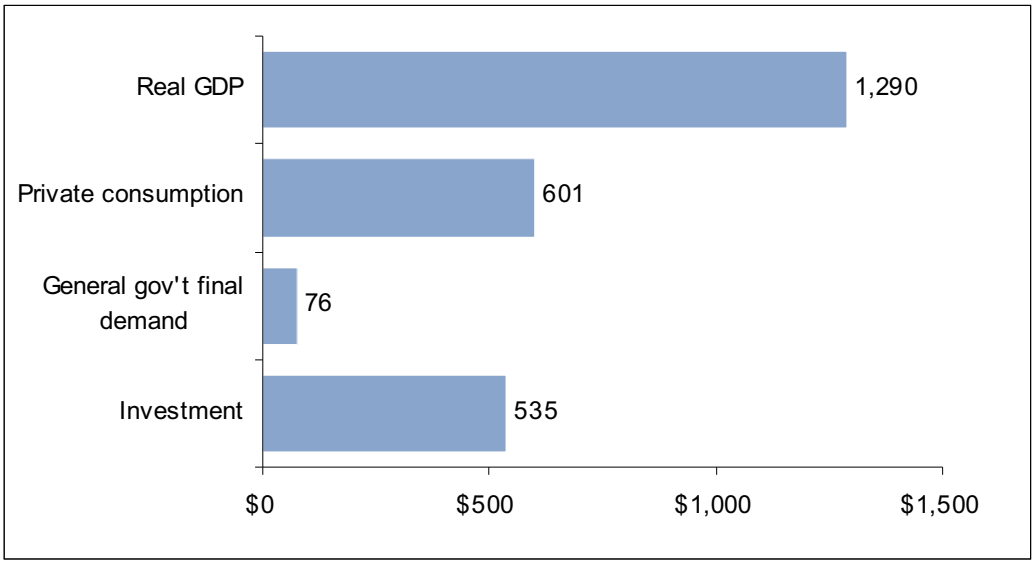
Source: KPMG Econtech's MMR simulation.

Operation

Once fully operational, the Australia Pacific LNG project is expected to create substantial economic benefits, both at a national and regional level. As shown in Chart 3.9, there is:

- An increase in real GDP of around $1.3 billion on average each year.
- An increase in private consumption of around $601 million on average each year.
- An increase in investment of around $535 million on average each year.

Chart 5.8: Annual national macroeconomic effects ($millions, 2006-07 prices)14



Source: KPMG Econtech's MM600+ simulation.

[14] The increase in general government demand mostly relates to increased government expenditure on roads, which is in turn calculated internally within the MM600+ model from road use, based on petrol and diesel consumption figures.

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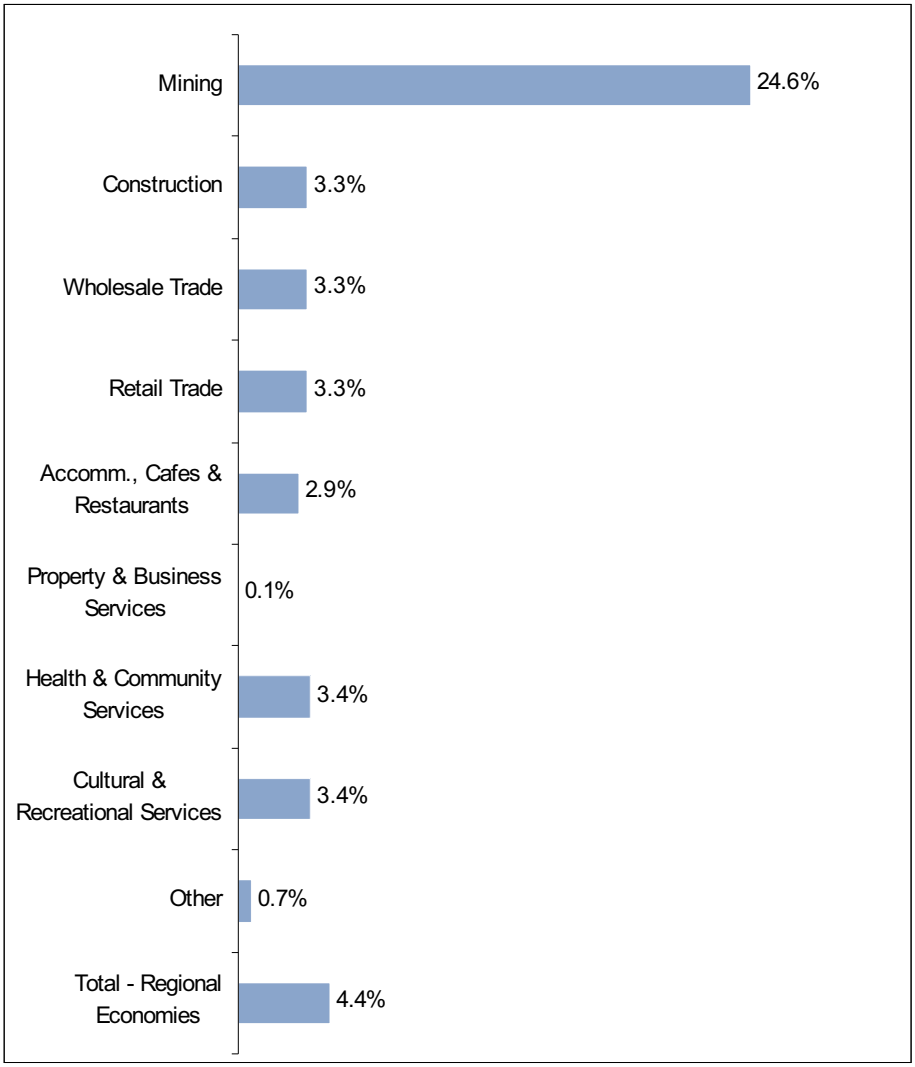
An increase in real GDP of $1.3 billion is a strong contribution to national GDP. The project will increase GDP through stimulating increased economic activity in industries that supply the Australia Pacific LNG project.

Once the Australia Pacific LNG project is fully operational, it is expected to contribute an increase of $2 billion in Queensland's GSP on average each year. This is a significant increase and will lead to the creation of an average of 9,000 jobs (directly and indirectly) each year in Queensland, including 5,000 jobs (directly and indirectly) each year in the Queensland mining industry. These figures refer to KPMG Econtech's modelling of total employment.

The following figure presents the estimated production effects on the regional economies of Mackay-Fitzroy-Central West and Darling Downs South West in Queensland. It presents the percent increase in industry output due to the Australia Pacific LNG project compared to the baseline scenario of the economies without the Australia Pacific LNG project. The project-life impacts presented here are the average annual impacts the project has on the economy over the life of the project.

Chart 5.9: Regional Industry Production Effects during Operation (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the Australia Pacific LNG project as well as the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone;

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Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Note: Other includes: Agriculture, Forestry and Fishing; Manufacturing; Electricity, Gas and Water Supply. Transport and Storage; Communication Services; Finance and Insurance; Government Administration; Education; Personal and Other Services and Ownership of Dwellings.

The Chart 3.10 above shows the Australia Pacific LNG project will provide positive impacts on the production of most industries in the Mackay-Fitzroy-Central West and Darling Downs South West regions. Specifically, the Australia Pacific LNG project will have a significant direct positive contribution to the mining industry. This will boost revenue in the Mackay-Fitzroy-Central West and Darling Downs South West economies. Higher revenue will then flow through to extra spending in consumer driven industries, such as retail trade, accommodation, café and restaurants, health and community services and cultural and recreational services.

As these figures demonstrate, the Australia Pacific LNG project will provide significant economic benefits and make a significant contribution to the Australian economy, as well as the regional economies of the Mackay-Fitzroy-Central West and Darling Downs South West regions.

5.6 Future Development

The Australia Pacific LNG project will have a positive economic benefit and create job opportunities for the region, as detailed above. Essentially, KPMG Econtech modelling indicates that the project is likely to:

- increase employment (both direct and indirect) in the Darling Downs-South West Queensland region by over 2,900 jobs during the construction phase and nearly 6,000 jobs during the operation phase;
- for the Mackay-Fitzroy-Central West Queensland region, increase employment (both direct and indirect) by around 4,100 jobs in the construction phase, and nearly 3,000 jobs during the operation phase;
- increase value added in the Darling Downs-South West Queensland region by around $441 million in the construction phase and over $900 million in the operational phase;
- for the Mackay-Fitzroy-Central West Queensland region, increase value added by $803 million in the construction phase, and by $450 million during the operation phase;
- contribute to a 0.1 % increase in real post tax wages in Australia (with the effect likely to be larger for the regions in which the Project is based);
- increase real consumption in Australia by 0.1 % (with the effect likely larger for the regions in which the Project is based);
- drive living standards higher, with the estimated improvement for Australia at $573 million;

The above details the estimated positive economic benefits from the Australia Pacific LNG project alone; it does not take into account the cumulative benefits including the other projects proposed or in development in the region.

However, there is a potential for further impacts associated with the Australia Pacific LNG project (and the cumulative impact of multiple projects in the region). These impacts could include:

- increase in the cost of living for households, including higher housing and rent prices;
- rise in wages and input costs for businesses, including commercial and industrial property prices and rents;
- skill shortages in critical occupations;

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- diversion of land, labour and/or capital from other businesses and industries, which may require structural adjustment policies;
- pressures on local infrastructure, including:
  - roads, in particular through increasing traffic volumes, and other transport infrastructure;
  - airports;
  - health and community services, including drug and alcohol, and counselling services;
  - child care facilities, schools and other educational facilities;
  - police and emergency services;
  - port infrastructure in Gladstone;
  - electricity and gas network facilities; and
  - urban water facilities.

Australia Pacific LNG has detailed its responses to the impacts in section 5 of this report. Central to the mitigation strategies put forward by Australia Pacific LNG is the need for a response coordinated by government in consultation with industry and the wider community to the negative impacts that may arise due to the cumulative impact of a number of large projects in the region.

The Queensland Government and local councils have been active in planning for the expected growth in the Surat Basin and Gladstone region associated with the development of the LNG industry over the next decade. It has either recently produced, or is in the process of developing, a number of plans and strategic frameworks to ensure that the development potential in the region is maximised through having the appropriate infrastructure, facilities and services in place to underpin and facilitate development.

These include the:

- Queensland Government's *Blueprint for Queensland's LNG Industry*, which details how the Government will further work with the industry and local communities to ensure that development of an LNG industry is progressed in a way that benefits all Queenslanders;
- *Sustainable Resource Communities Policy*, published by the Queensland Government, outlining the moves the Government is making to strengthen its coordination role, improve the linkages between social impact assessment and strategic regional planning, facilitate partnerships with local government, industry and community, and enhancing the regulatory framework for social impact assessment;
- Coordinator-General's *Draft Port of Gladstone Western Basin Master Plan*, which provides a strategic plan that considers the future development opportunities for the Port of Gladstone Western Basin and the implementation mechanisms required to achieve an efficient and coordinated development of the asset, and puts forward options include alternative transport corridors, an integrated rail system to Hamilton Point, road or bridge access from Gladstone to Curtis Island, and potential expansion of the port facilities through duplication of outer channel;
- *Major Projects Housing Policy* which is currently in development, and which will detail strategies to improve the availability and supply of housing to support major projects and guide investment in the provision of housing;

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- development of a *Coal Infrastructure Strategic Plan* which will provide a medium to long term approach to the provision of infrastructure to meet the needs of the Queensland coal industry, and which be based on workforce forecasts and a scenario of population and related impacts;
- a review and/or update of regional and local council strategic plans, including the Maranoa Regional Council's recently released *Maranoa Regional Economic Development Strategy 2009-10 to 2014-15*, the purpose of which is to ensure that there is a framework in place that can support infrastructure needs analysis and development that may be driven by future mining and petroleum industry development in the region;
- Gladstone Regional Council's *Corporate Plan 2009-13* which identifies the Council's commitment to develop an integrated regional plan in consultation with the community, business, industry and Government so as to achieve its goal of ensuring that its planning is strategic and regionally aligned, and that facilitates well managed growth and a diverse range of development options; and
- proposed Fisherman's Landing port expansion, which has been put forward as an option by Gladstone Ports Corporation and involves the northern expansion of the existing Fisherman's Landing facility through the reclamation of additional land adjacent to the existing port facility. The reclamation will provide additional land for the construction of six wharves and provide an area for the development of transport, storage, loading and unloading facilities and will be filled using dredged material.

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6. Cumulative Impacts

As discussed in the previous section, the Australia Pacific LNG project is the largest CSG to LNG project that is currently under consideration in Queensland. In addition, there are also a number of other major projects proposed in the same region. Thus, an important aspect of a study such as this is to also examine the cumulative impacts of all proposed major projects (including the Australia Pacific LNG project in the region. Thus, this section provides the results of modelling the ongoing economic impacts of a "Cumulative Impact" Scenario.

The cumulative impact modelling captures the impact on the national and regional economies of 30 major projects (including the Australia Pacific LNG project). The 30 projects examined here are based on a list agreed with the Department of Infrastructure and Planning. As discussed in the methodology section, this scenario assumes all 30 proposed projects proceed to full operation.

The 30 projects are at different stages of planning, construction and operation. Information concerning the projects' output is more definite than information about project costs. Therefore, the modelling focuses on the combined projects output in the operation phase of the projects. In doing so, the modelling assumes that each of the 30 projects proceed as planned.

The 30 projects modelled in the Cumulative Impact Scenario cover a range of projects, but can generally be listed under three broad categories:

- Mining projects;
- Manufacturing projects; and
- Infrastructure and Transport projects.

The more detailed product categories are outlined in the methodology section (section 2.2) and a full detailed project list can be found in Appendix B.

When analysing the long run impacts of an industry change, the most appropriate impacts to consider are the project-life effects of the change, after the economy has fully responded. This is fitting because projects should be judged against their long run impacts on the economy and not just their direct effects in the first one or two years.

The Cumulative Impact Scenario has assumed that each project impacts the economy independently. There is likely to be some sharing of resources between projects, creating additional benefits. An example of this is the potential for pipeline sharing between natural gas to LNG projects. If pipeline sharing occurs, this could potentially create some productivity gains - adding to the benefits already identified in this section.

Detailed sharing information is not yet available. Consequently, this analysis assumes that each project will operate independently, with no sharing of resources.

The following results represent the deviation from the Baseline Scenario, where no projects proceed. This captures the effects on the economy of all 30 proposed projects.

6.1 National Macroeconomic effects

6.1.1 GDP and other selected key macroeconomic variables

Chart 4.1 shows the average annual contribution of the Cumulative Impact Scenario (which reflects the operation phase of the 30 projects) to key economic variables in the Australian economy. Specifically, Chart 4.1 shows the

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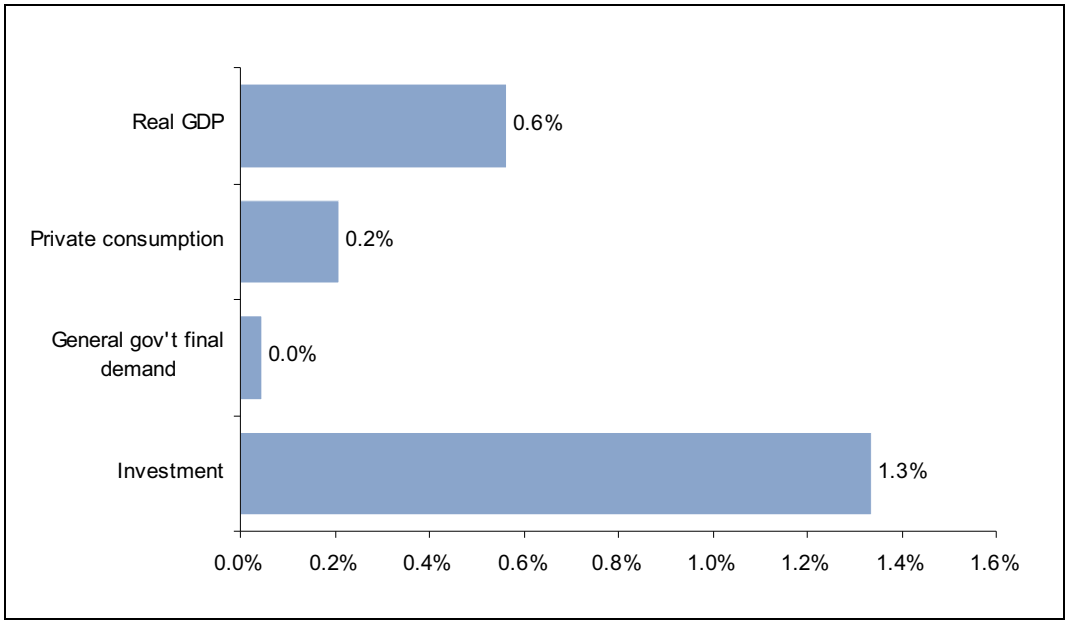
average contribution of the Cumulative Impact Scenario to private consumption, real GDP, government consumption and investment, when compared to the Baseline scenario.

At the national level, the Cumulative Impact Scenario estimates that real GDP would be an average of 0.6 % higher than what would otherwise be the case. These estimates include both direct as well as indirect contributions through upstream and downstream industries. The Cumulative Impact Scenario would result in a particularly significant increase in the production value of the mining industry.

The increases in real GDP illustrated below would be less than the overall increases in output from the industries outlined above. This is because the labour force is constrained to be fixed in the long-term, which is a conservative assumption built in to the MM600+ model. In order to achieve the increase in output in the industries noted earlier, labour is redirected from other sectors in the economy, to contribute to these industries. As such, the reduction in labour from the other sectors leads to a decrease in output from these sectors.

Chart 6.1: Cumulative Impact Scenario – Average National Macroeconomic Effects (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

The Cumulative Impact Scenario contributes positively to real GDP, which means a higher real national income than would otherwise be the case. The increase in real income results in both increased consumption and investment. Consumers adjust to the increased real income by spending more on goods and services, while industries invest in new capital stock to take advantage of profit opportunities.

Overall, Chart 4.1 shows that under the Cumulative Impact Scenario real private consumption is, on average, 0.2 % higher than the Baseline scenario. Chart 4.1 also shows the impacts of the operation of the various projects on investment. Specifically, it shows that investment would be 1.3 % higher under the Cumulative Impact Scenario, than under the Baseline scenario.

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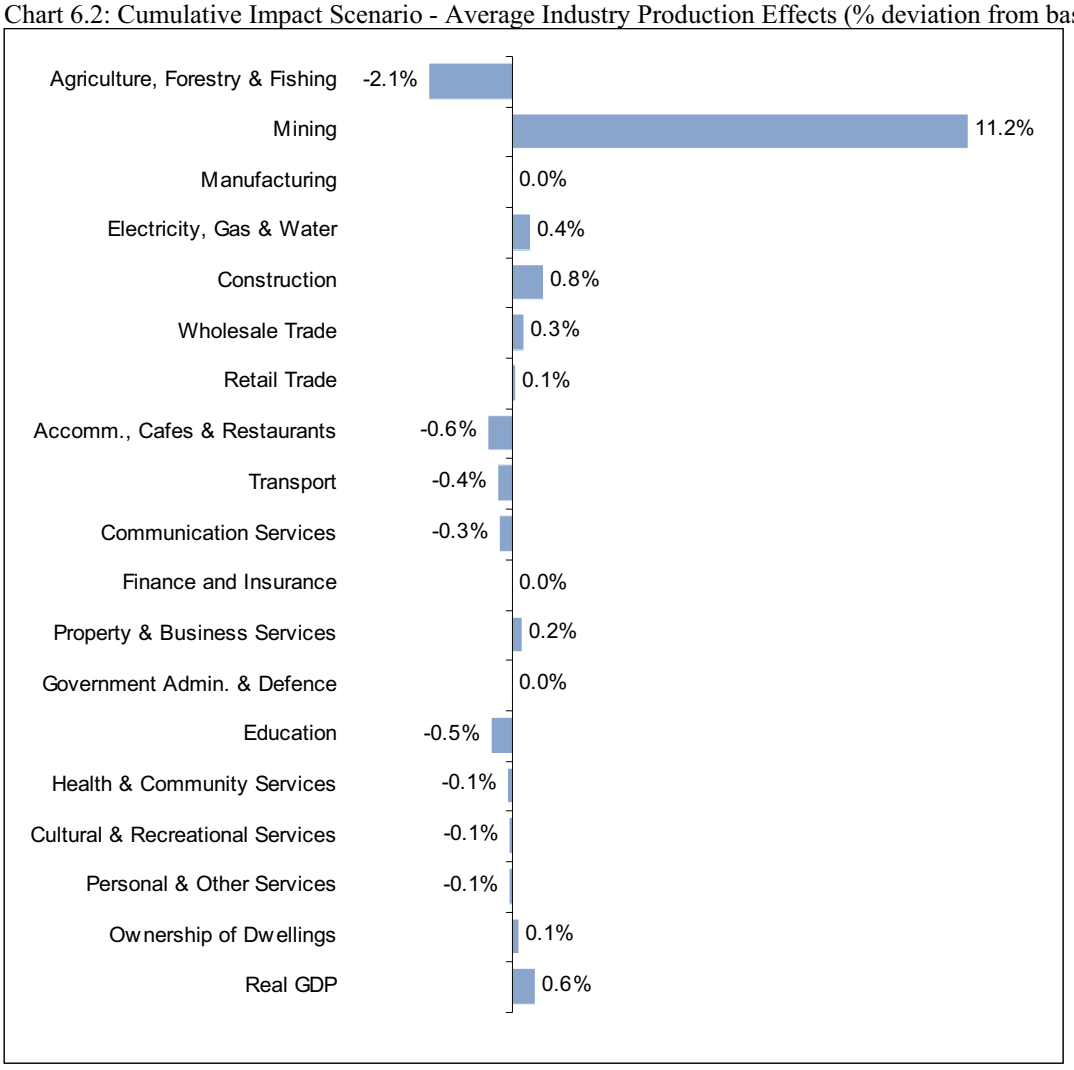
6.1.2 National Production Effects

The Cumulative Impact Scenario has a positive impact on the level of activities in various industries in Australia. Specifically, the Cumulative Impact Scenario directly contributes to output in the mining[15] industry, as well as indirectly stimulating output in industries upstream to the oil and gas sector.

Chart 4.2 shows that, in the Cumulative Impact Scenario, mining industry output would be higher by around 11.2 % when compared to the Baseline Scenario. This is equivalent to an extra $9.4 billion annually (2006-07 prices), relative to the Baseline Scenario. This industry production effect is the contribution of the Cumulative Impact Scenario to output in the mining industry.

Chart 6.2: Cumulative Impact Scenario - Average Industry Production Effects (% deviation from baseline)



Source: KPMG Econtech MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-

[15] Based on the ABS classification, the Mining industry in the MM600+ model captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

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zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Purchases of goods and services from industries upstream to the sectors in the Cumulative Impact Scenario stimulate additional production in these and other industries. For example, Chart 4.2 shows that the construction industry would benefit from activity in the Cumulative Impact Scenario. The construction industry captures the impact of the building and maintenance of the projects included in the Cumulative Impact Scenario, as well as other production and transport facilities. The construction industry would also benefit from the building activities needed to house the workforce of the various projects. Particularly, the Australia Pacific LNG project would boost production in the construction industry by 0.8 %. This is approximately equivalent to an average annual increase of $595 million (2006-07 prices), when compared to the Baseline Scenario.

Property and business services is another industry that would benefit from the Australia Pacific LNG project as it is a supplier of technical services to the oil and gas sector. For instance, the projects included in the Cumulative Impact Scenario would use services such as geological and geophysical services and seismic surveying services, which are part of the property and business services industry. Indeed, Chart 4.2 shows the Cumulative Impact Scenario would add around 0.2 % to production in the Australian property and business services industry, relative to the Baseline Scenario.

Production in the agriculture industry is expected to be 2.1 % lower due to the cumulative impact of the 30 major projects. There are three main reasons for this. First, land that was used for agricultural purposes under the baseline (no projects) is now used for gas extraction. This results in a loss in productive resources. Second, some labour resources that are used in the agriculture industry (under the baseline) will be shifted to the mining industry to undertake these 30 projects. Finally, the impact of the appreciation of the Australian dollar (discussed below) will negatively impact the trade-exposed agriculture industry.

The significant expansion of the relatively capital intensive mining industry, attracts increased amounts of capital into Australia. Under the long run condition that labour force is constrained, this expansion increases demand for labour. The long run condition of relaxed capital constraints and tight labour constraints, force all industries to become more capital intensive. This higher demand for labour, puts pressure on relatively labour intensive industries, such as service industries. This particularly effects those industries that are not directly related to the mining industry, such as the accommodation, café and restaurant industry.

For industries that are trade-exposed, prices are determined on world markets and the exchange rate plays a vital role in determining activity in those industries. An increase in national income would increase demand for all goods and services in the economy, placing upward pressure on domestic prices. In addition, the increased demand for goods and services would also place upward pressure on the real wage and other input costs, would lead to a higher value of the Australian dollar. A higher Australian dollar, in turn, lowers demand for other Australian exports. Therefore, the production gains in the consumer-oriented industries (such as retail trade) and the industries upstream to the oil and gas sector would be somewhat offset by losses in production in other trade-exposed industries.

For example, manufacturing and agriculture are trade-exposed industries. Hence, these industries are expected to experience lower production levels following the appreciation of the Australian dollar.

Tourism is another exchange-rate exposed industry. In general, production in tourism-related industries (such as accommodation, cafes and restaurants and transport) is lower than would otherwise be the case. This is a result of the higher Australian dollar.

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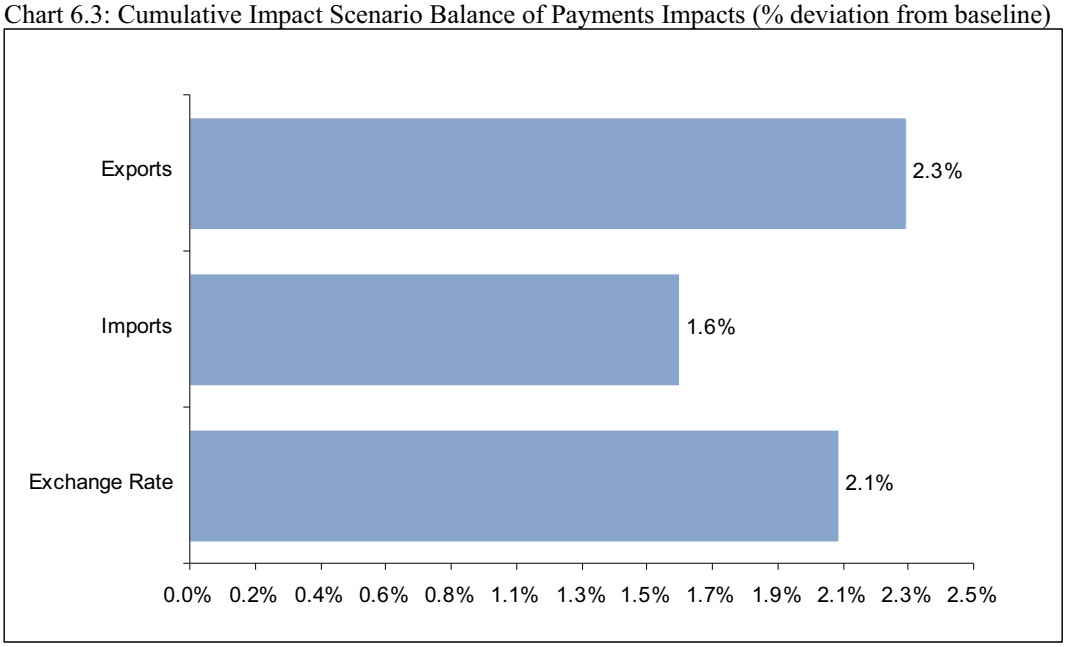
6.1.3 External sector impacts

Chart 4.3 shows the trade effects of the Cumulative Impact Scenario. In particular, it shows the contributions of the Cumulative Impact Scenario to exports, imports and its effects on the Australian dollar.

As discussed earlier, the Cumulative Impact Scenario would lead to higher Australian real national income than otherwise would be the case. As a consequence, the price of non-tradeables relative to tradeables – the real exchange rate – is expected to be higher following the increase in national income. Indeed, Chart 4.3 shows that in the Cumulative Impact Scenario, the Australian dollar would appreciate by 2.1 %.

The change in the real value of the Australian dollar would impact on both export and import levels in Australia. Specifically, with an appreciation of the exchange rate, Australia's international competitiveness on global markets would be marginally lower, leading to lower demand for Australian exports. However, most of the projects included in the Cumulative Impact Scenario would increase Australia's exports. Overall, Chart 4.3 shows that exports will be on average 2.3 % higher under the Cumulative Impact Scenario, relative to the baseline.

Chart 6.3: Cumulative Impact Scenario Balance of Payments Impacts (% deviation from baseline)



Source: KPMG Econtech's MM600+ simulation.

Further, with the higher value of the exchange rate, prices of imported goods and services would be lower than would otherwise be the case. In turn, this would lead to an increase in demand for imports. Indeed, Chart 4.3 shows that this would lead to imports being higher by an average of 1.6 % in the Cumulative Impact Scenario than the Baseline scenario.

6.1.4 Standard of Living

In the past, when analysing the impacts of an industry change on the national economy, the traditional focus has been on using GDP to measure the impact on living standards. However, for this report, the analysis of the economic contribution of the various projects included in the Cumulative Impact Scenario on Australian living standards has been extended to include a measure of annual consumer welfare.

Using consumption as the measure of living standards instead of GDP is standard practice at the Productivity Commission, and has long been the standard practice of KPMG Econtech. This is because living standards

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derive from consumption, not GDP, so in principle, consumption (that is, household final consumption expenditure as per the ABS National Accounts) is a more appropriate measure of changes in living standards than GDP. The KPMG Econtech modelling indicates that the Cumulative Impact Scenario would produce a net annual improvement of $1.1 billion (2006-07 prices) in consumer living standards compared to a baseline without the project.

This significant gain in living standards arises because of the positive economic contribution of the Cumulative Impact Scenario. The increased demand for labour, through the significant expansions, particularly in the mining industry, supports a higher level of real wages compared with the Baseline Scenario where there no projects proceed. Under the MM600+ model assumption of a national labour market under which there is frictionless movement of labour between states, the gain in real wages would be spread thinly across the nation, not concentrated in Queensland. This is because any temporary Queensland wage premium resulting from the industry will be eliminated by movement of labour to Queensland.

6.1.5 National Employment Effects

This section outlines the estimated employment impacts of the Cumulative Impact Scenario, where all 30 proposed projects go ahead. These effects are relative to the Baseline Scenario, where no projects proceed. These effects are presented in Chart 4.4.

Chart 4.4 shows that the projects would cause some changes to the distribution of the employment across industries. However, they would not have an overall effect on national employment as the model assumes that the long run impact on total national employment is zero. This is because national employment depends on the overall efficiency of the national labour market, which is unlikely to be changed by the projects. Moreover, in our simulations, labour is assumed to be completely mobile in the long run. So, any employment displacement in one sector will be absorbed into another sector in the long run. This means that the combined loss of employment in industries such as the agriculture and manufacturing industry is part of a redistribution of fixed national employment towards other industries, such as mining.

In particular, Chart 4.4 shows that the Cumulative Impact Scenario would lead to an average boost of 8.9 % to employment in the mining Industry, as the bulk of the projects fall under the mining industry. However, some of the 30 proposed projects considered under the Cumulative Scenario expand the manufacture and transport industries. While these projects directly contribute to employment in these industries, overall employment still declines due to the movement of labour into the mining industry.

The projects would also have indirect impacts on employment in other industries. In particular, the projects would stimulate employment in the industries upstream to the mining industry such as the construction industry.

Employment in the agriculture industry is expected to decline by 2.1 % due to the cumulative impact of the 30 major projects. As discussed earlier, the three main reasons for this are:

- the changed used of land (from agriculture to gas extraction);
- the shift in labour resources from the agriculture industry to the mining industry; and
- the impact of the appreciation of the Australian dollar negatively impacting the trade-exposed agriculture industry.

Chart 4.4 shows the estimated employment effects in upstream industries, such as construction and wholesale trade, as a result of the projects. In general, by stimulating demand for output from these industries upstream to the mining industry, the projects would also boost employment in all of these industries. Indeed, Chart 4.4

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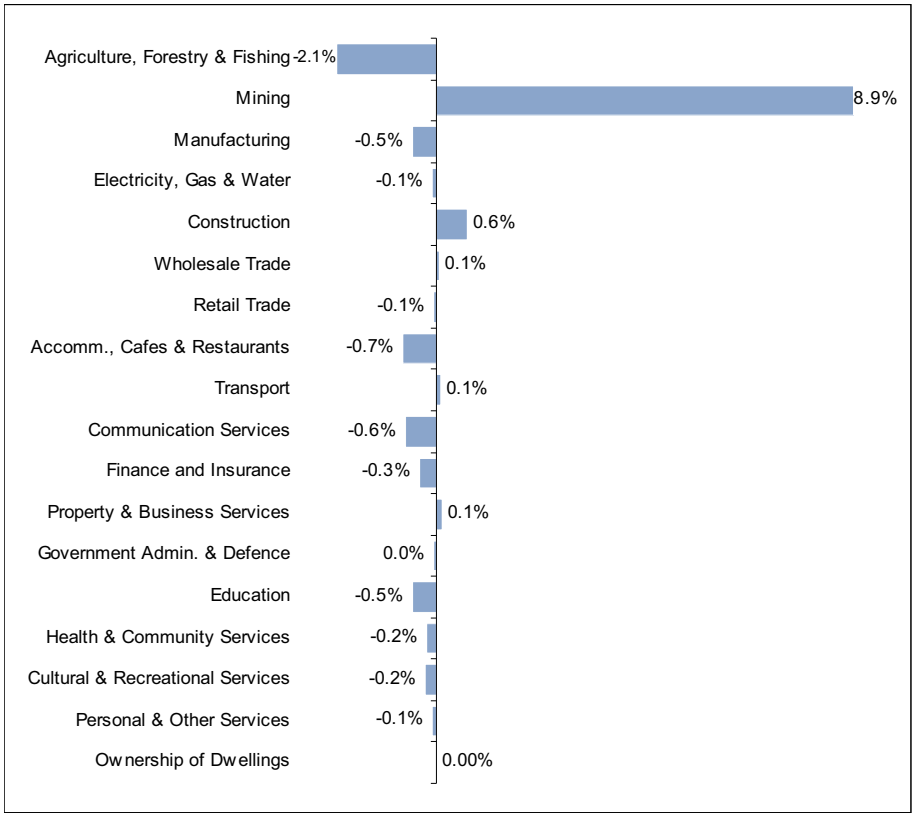
shows that, on average, the Cumulative Impact Scenario leads to higher employment in the construction industry by 0.6 % and the wholesale trade industry by 0.1 %, relative to the baseline.

Chart 6.4: Cumulative Impact Scenario Average Industry Employment Effects (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

6.2 State Effects

6.2.1 State Production Impacts

As well as contributing to the Australian economy, the projects would also contribute to the Queensland economy. Notably, in contrast to the national industry production effects, most of the industry production effects in Queensland are positive, as a result of the projects being built in this state.

Chart 4.5 shows the estimated boost to production in each industry in Queensland as a result of the projects included in the Cumulative Impact Scenario. The Cumulative Impact Scenario estimates that production in the Queensland mining industry[16] would be around 34.2 % higher than estimated in the Baseline Scenario. This industry production effect would be the direct contribution of the projects to output in Queensland.

[16] Based on the ABS classification, the Mining industry in the MM600+ model captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining;

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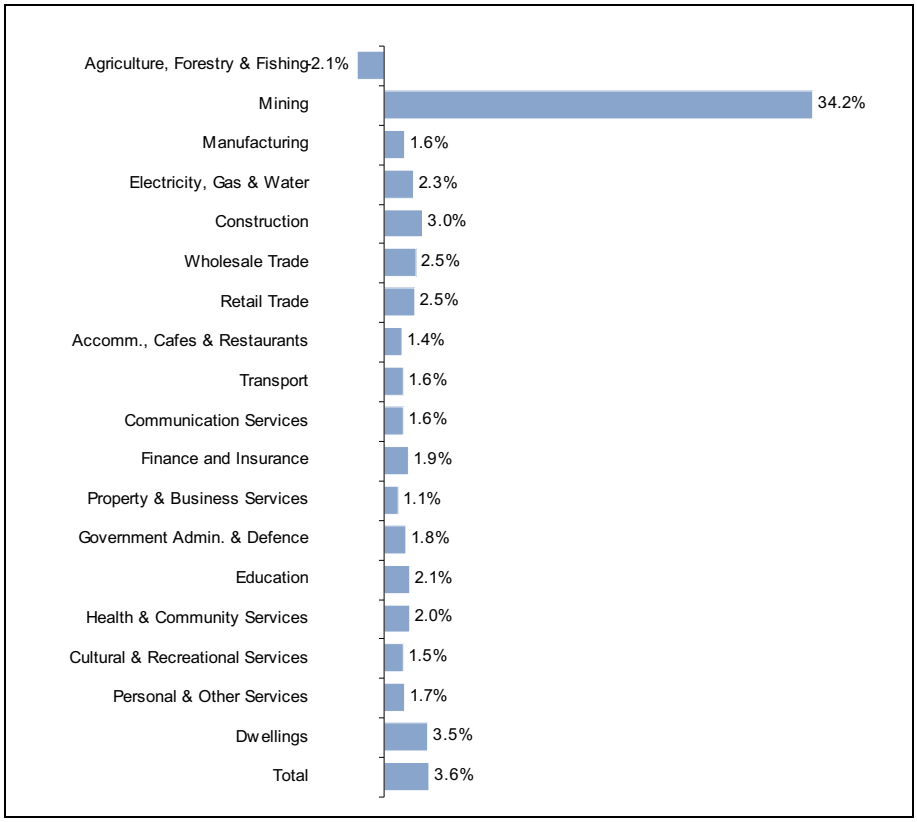
Chart 4.5 also shows that, by purchasing goods and services from upstream industries, the projects are estimated to stimulate additional production in these industries. For example, the construction industry would benefit from increased activity through the significant expansion of the mining and other industries. If all 30 proposed projects modelled under the Cumulative Impact Scenario go ahead, construction would be higher by around 3.0 % for the life of the project than otherwise would be the case.

The wholesale trade industry (which includes machinery and equipment wholesaling), and the property and business services industry (which includes technical services) are the other two main upstream industries in Queensland that would benefit from the presence of the projects. As Chart 4.5 shows, the projects would add around 2.5 % and 1.1 % to production in the wholesale trade and property and business services industries, respectively. As with the national impact, trade exposed sectors in Queensland will experience lower production due to the appreciation in the Australian dollar. In particular, the agriculture industry is trade exposed with approximately two thirds of the industry's production being exported[17].

Chart 6.5: Cumulative Impact Scenario Industry Production Effects in Queensland (% deviations from baseline)



Source: KPMG Econtech MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone ; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

[17] http://www.dfat.gov.au/trade/negotiations/trade_in_agriculture.html

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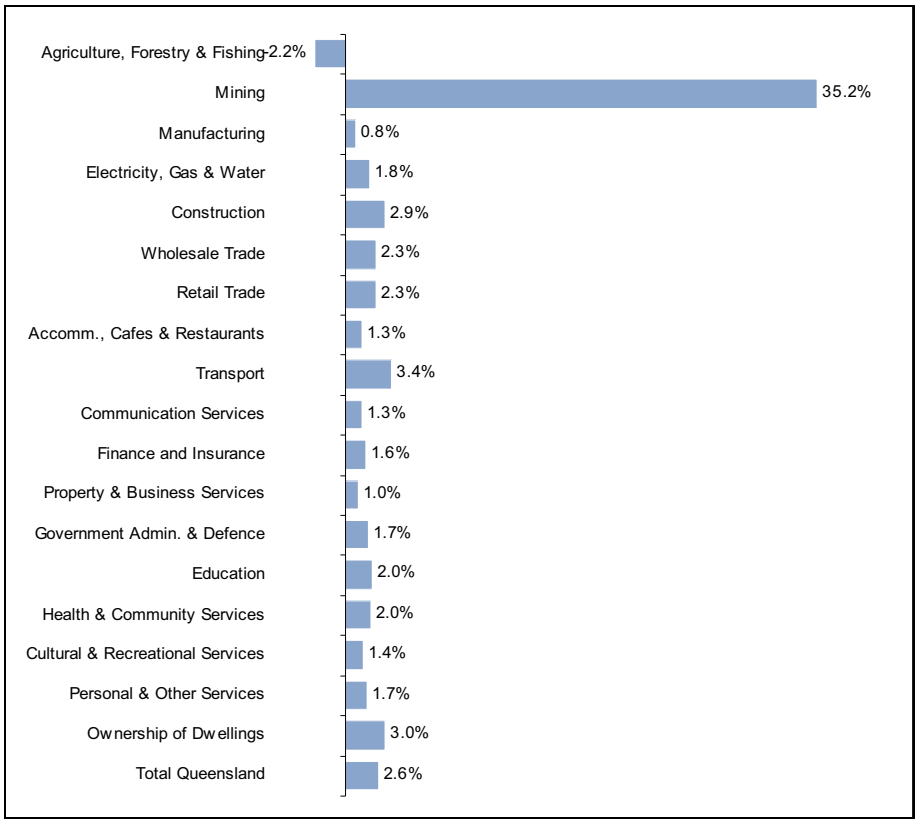
As mentioned earlier, the additional industry activity in Australia stemming from the projects would bring more revenue to the community. Higher incomes flow through to extra spending in the Queensland economy. This, in turn, results in higher demand for output in the majority of industries.

Overall, it is estimated that if all 30 proposed projects go ahead, Queensland's real Gross State Product (GSP) would be 3.6% higher than if no projects proceed.

6.2.2 State Employment Effects

The Cumulative Impact Scenario would boost employment across Queensland. Chart 4.6 shows the estimated industry employment effects if all 30 proposed projects included in the Cumulative Impact Scenario go ahead. As shown in Chart 4.6, the employment contribution of the projects follows a similar pattern to the production contribution.

Chart 6.6: Cumulative Impact Scenario Industry Employment Effects, Queensland (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

For instance, as shown in Chart 4.6, the Cumulative Impact Scenario would directly boost employment in the mining industry in Queensland by 35.2 %. Further, the projects would also contribute to employment across industries upstream and downstream to the mining industry.

In terms of the employment effects of upstream industries, by stimulating demand for output from these industries, the Cumulative Impact Scenario would also boost employment in most of these industries. For

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example, with the Cumulative Impact Scenario driving additional production in the Queensland wholesale trade and property and business services industries, this also flows through to additional employment in these industries.

Finally, as noted above, the additional industry activity in Australia stemming from the Cumulative Impact Scenario would bring higher output for most other industries. This in turn leads to employment being higher in most other industries than it would have been without the project.

Overall, it is estimated that the Cumulative Impact Scenario would boost employment in Queensland by an average of 2.6%. These contributions include the direct contribution of the projects to employment in the mining, manufacture and transport industries, as well as the indirect upstream, downstream and other industry contributions discussed above. As noted earlier, this boost to employment in Queensland is a result of the redistribution of labour from other parts of Australia so that the national employment effect is zero.

6.3 Regional Effects

6.3.1 Regional Production Effects

Charts 4.7 and 4.8 shows the estimated production effects of the Cumulative Impact Scenario on the regional economies of Darling Downs-South West in Queensland.

The Darling Downs-South West region covers the areas in which the gas field and pipeline will be located. This includes SLAs such as Chinchilla, Murilla (Miles), Tara, Wambo and Bendemere (Roma). The Mackay-Fitzroy-Central West region covers Gladstone, where the LNG facility will be built. The following discusses the impacts on production in these local regions.

As discussed in Section 3, the Australia Pacific LNG project will contribute a substantial increase in the total production value in the region. In particular, as shown is Chart 4.7, the combined impact of these projects will be a 507 % increase in the mining industry in the Darling Downs-South West region. This increase in the mining industry is primarily due to the large coal and coal seam gas developments proposed for the region.

The increase in the mining industry will support increases in almost every other industry in the region. The increases in other industries is due to the duel stimuli to the region through increased demand from the project's supply chains and demand from the project workers. The only industry likely to experience a negative impact is the agriculture industry. This is likely to occur through a substitution of resources, such as land, away from agriculture into mining and a transfer of labour away from agriculture into mining, attracted by the higher wages.

As discussed under property value impacts, the development of these 30 major projects in the Darling Downs-South West region is likely to create substantial demand in the surrounding towns. This demand will contribute to the increase in both, industry supporting the development's supply chain and logistics, as well consumer orientated businesses that cater to the development's workforce. The cumulative impact of these developments could substantially increase the industrial and commercial opportunities available in the region and greatly increase the demand and reward for industrial and commercial enterprises.

The Australia Pacific LNG project, combined with the other major developments in the region, will also have a significant impact on the of Mackay-Fitzroy-Central West region. This impact is primarily centred on the town of Gladstone and shown in Chart 4.8. These projects will contribute to a substantial increase in the town's mining, manufacturing and transport industries. This increase is primarily due to the developments of the proposed LNG facilities, aluminium smelter and refinery, as well as steel production and major port and rail redevelopments.

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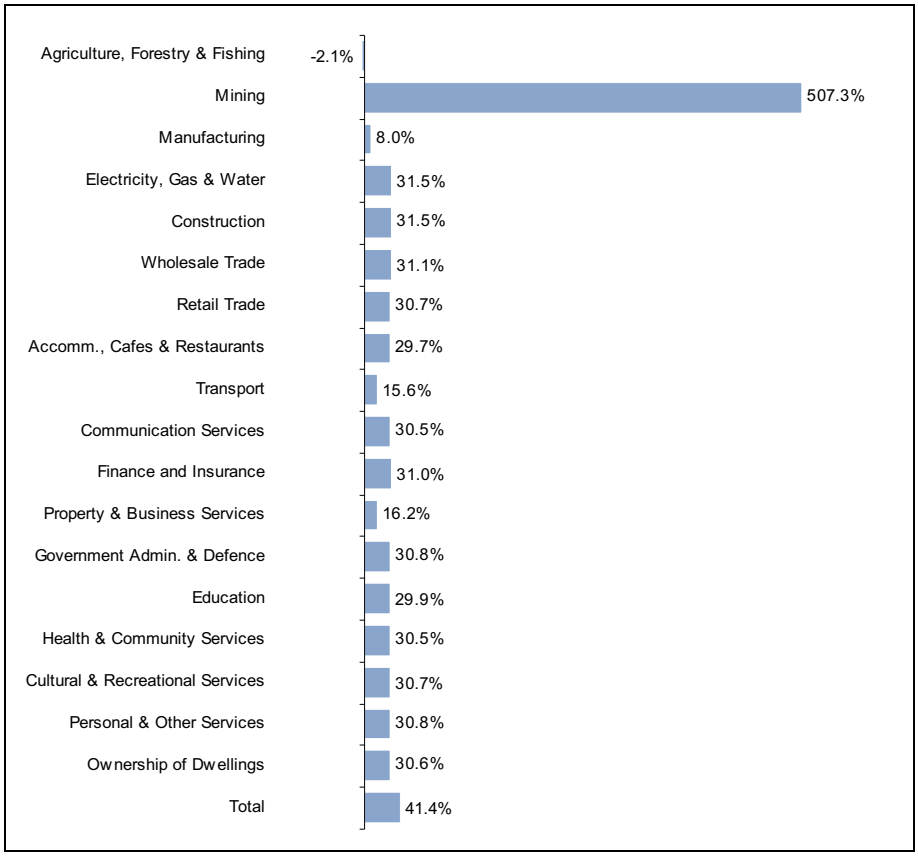
The impact on Gladstone (while substantial), is less than the impact on the gas field and pipeline region of Darling Downs-South West, as it is relatively more developed, with numerous large projects already operating.

The production impacts on each major industry in each project region are detailed further below.

Chart 6.7: Cumulative Impact Scenario Regional Industry Production Effects - Darling Downs-South West (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Chart 6.8: Cumulative Impact Scenario Regional Industry Production Effects - Mackay-Fitzroy-Central West (% deviations from baseline)

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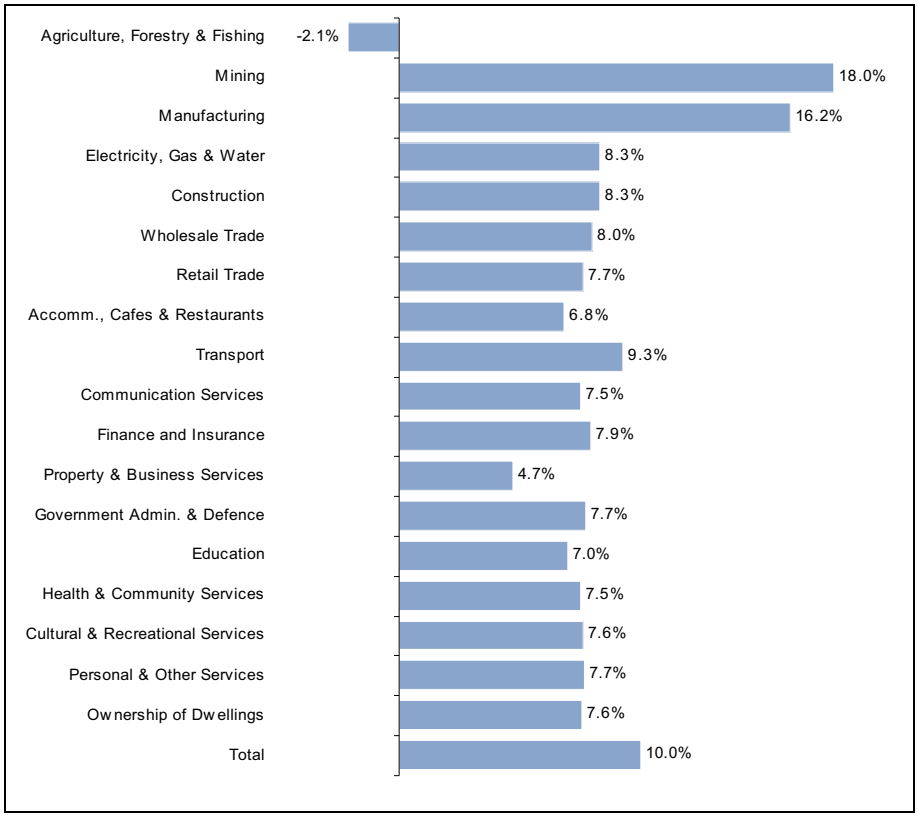

Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

As shown in Charts 4.7 and 4.8, the projects would have positive impacts on the level of activities across most of the industries in the Darling Downs-South West and Mackay-Fitzroy-Central West regions in Queensland. Specifically, if all 30 proposed projects go ahead, they would significantly directly contribute to output in the mining industry, particularly in the Darling Downs-South West region, where the majority of the mining industry projects will be built. It is estimated there would be an expansion of the mining industry in the Darling Downs-South West region of around 507%, while the Mackay-Fitzroy-Central West region's mining industry will expand by around 18%. There will also direct expansion in the manufacturing and transport industries, particularly in the Mackay-Fitzroy-Central West region's manufacturing industry, where the majority of the manufacturing projects are built.

As well as directly stimulating output, if all 30 proposed projects included in the Cumulative Impact Scenario go ahead, there will be a range of indirect flow on benefits. This will occur through an increase in demand from the projects' supply chains, and increased demand by the project workers. This, in turn, would boost revenue in the Mackay-Fitzroy-Central West and the Darling Downs-South West economies. This higher revenue will then flow through to extra spending in the regions' consumer-oriented industries, such as retail trade, health and community services and cultural and recreational services.

6.3.2 Regional Employment Effects

Chart 4.9 shows the simulated employment impacts, if all 30 proposed projects go ahead, on the combined regional economies of Darling Downs-South West and Mackay-Fitzroy-Central West in Queensland.

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The Darling Downs-South West region covers the areas in which the gas field and pipeline will be located. This includes SLAs such as Chinchilla, Murilla (Miles), Tara, Wambo and Bendemere (Roma). The Mackay-Fitzroy-Central West region covers Gladstone, where the LNG facility will be built. The following discusses the impacts on employment and production in these local regions.

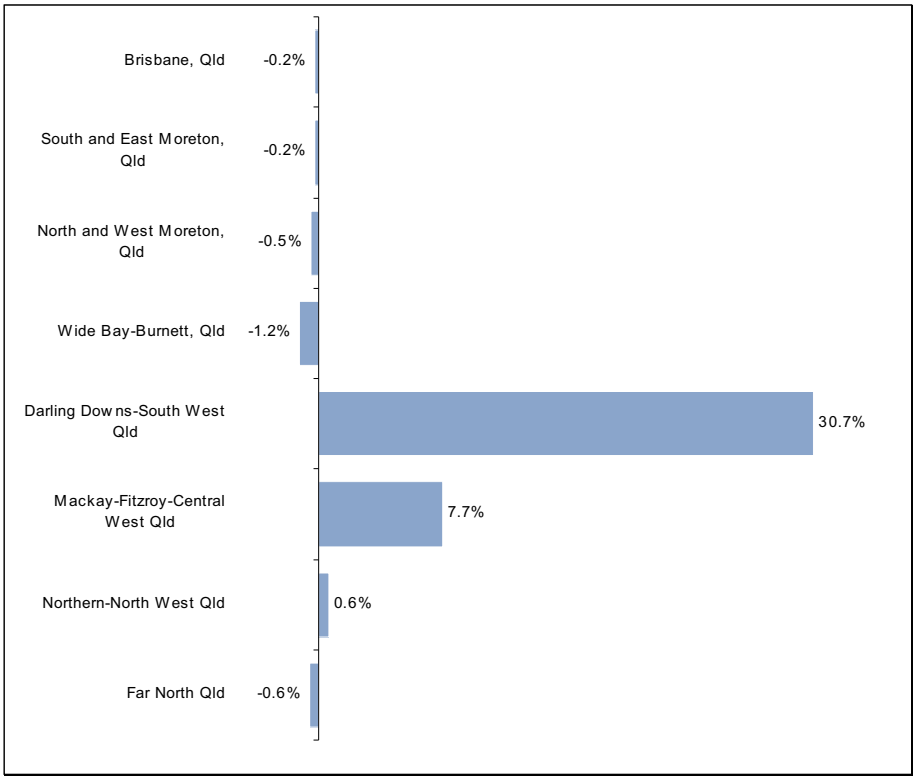
Similar to production impacts, the Australia Pacific LNG project will contribute to a substantial cumulative increase in employment in the region. As shown in Chart 4.10, there is a 527 % increase in employment in the mining industry in the Darling Downs-South West region. This increase is primary due to the large coal and gas developments proposed for the region. As discussed, these major developments will create substantial flow on increases in employment and represent a substantial increase in employment opportunities in the region. The large influx of workers required to construct and operate these developments could significantly reshape the population of the region.

As discussed under the property value impacts, the cumulative impact of these developments could also reduce affordability for existing residents. There is also a potential skill shortage problem arising through the substantial workforce required to construct and operate these developments. The impacts on the Mackay-Fitzroy-Central West will centre on the town of Gladstone. These impacts will create substantial employment opportunities Gladstone, specifically in the mining, manufacturing and transport industries, as shown in Chart 4.11. This is primarily due the development of large LNG facilities, aluminium smelter and refinery, as well as steel production and major port and rail redevelopments.

Again, the impact on Gladstone (while substantial), is less than the impact on the gas field and pipeline region of Darling Downs-South West, as it is relatively more developed, with numerous large projects already operating.

The employment impacts on each major industry in each project region are detailed further below.

Chart 6.9: Cumulative Impact Scenario Regional Employment Effects, Queensland (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

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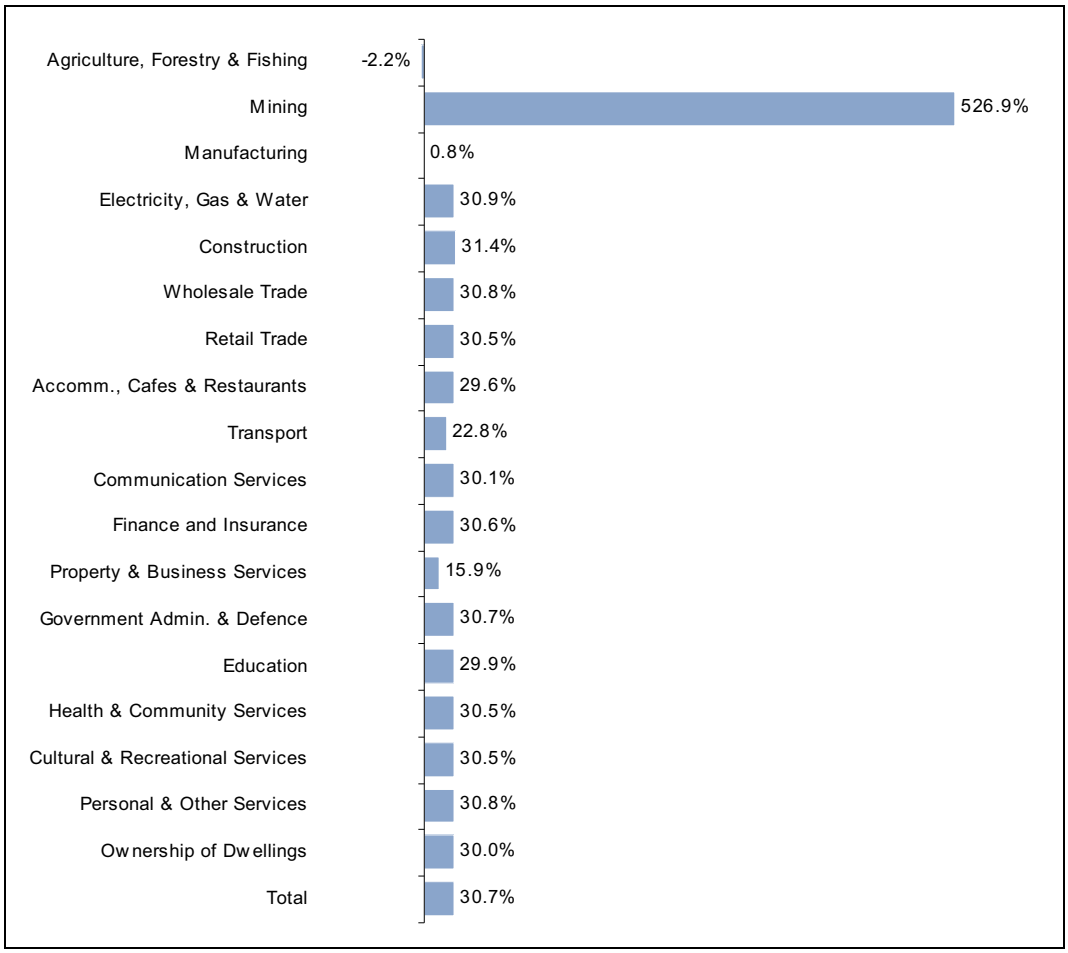
As shown in Chart 4.9, the Cumulative Impact Scenario would positively boost employment both in the Mackay-Fitzroy-Central West and the Darling Downs-South West regions in Queensland. Specifically, the Cumulative Impact Scenario would boost employment by around 30.7% and 7.7% on average, in the Darling Downs-South West and the Mackay-Fitzroy-Central West regions respectively.

The Darling Downs-South West region receives the largest employment increase due to the concentration of the large mining projects proposed to be built there. The employment effects in each region follow from the production effects described above, with the specific effects on employment in both the Darling Downs-South West and Mackay-Fitzroy-Central West regions shown below in Charts 4.10 and 4.11 respectively.

Chart 6.10: Cumulative Impact Scenario Regional Industry Employment Effects - Darling Downs-South West (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

Chart 6.11: Cumulative Impact Scenario Regional Industry Employment Effects - Mackay-Fitzroy-Central West (% deviations from baseline)

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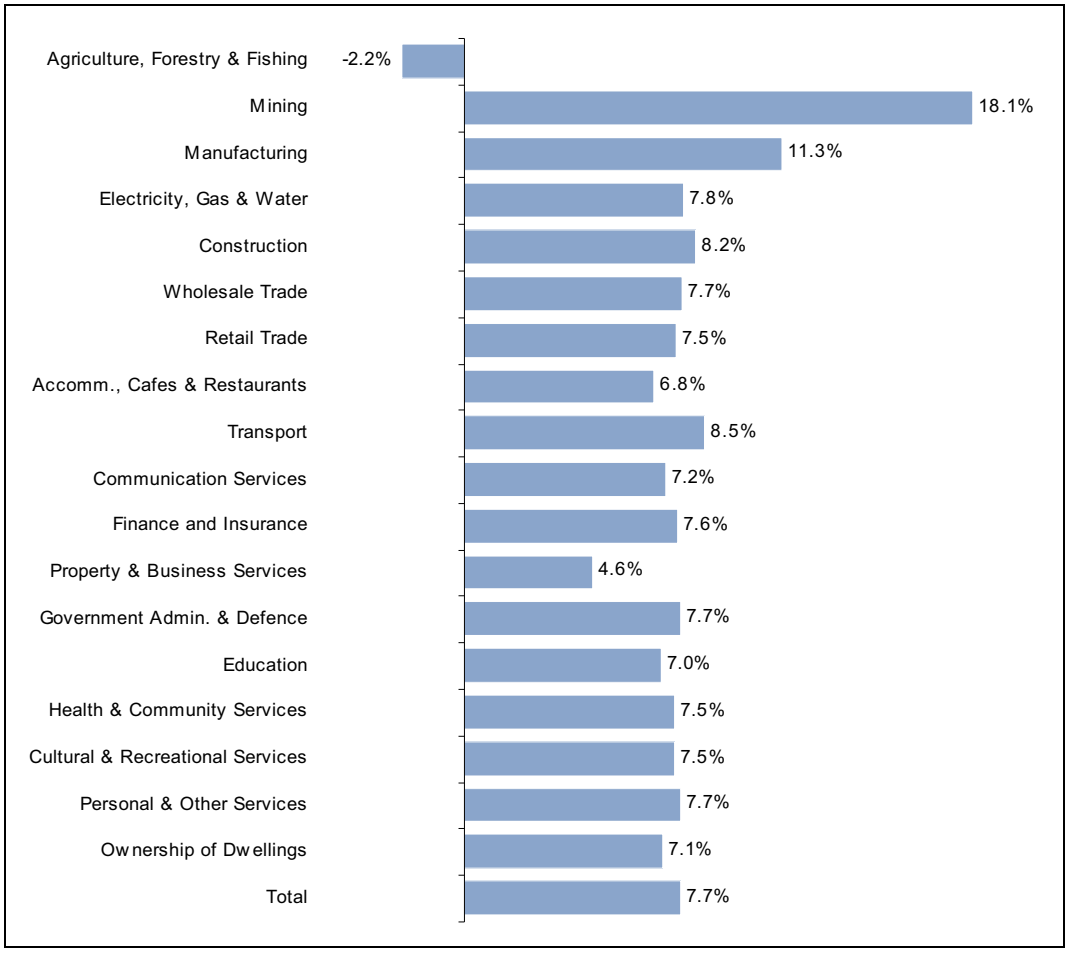

Source: KPMG Econtech's MM600+ simulation.

Note: 'Mining' captures the following products: Black Coal; Brown Coal-lignitel; Crude Oil; Natural Gas, Liquefied Natural Gas; Petroleum Gases; Oil and Gas; Iron Ore Mining; Gold Ore and Copper Ore Mining; Lead ores and concentrates (excl silver-lead-zinc ores); Silver and Zinc ores; Uranium concentrates; Gravel; Sand; Dimension stone; Limestone; Clays; Salt; Natural Phosphates; Petroleum exploration; Mineral exploration; and Mining services.

These employment gains in the Darling Downs-South West and the Mackay-Fitzroy-Central West regions are largely drawn from other regions in Queensland. Further, due to the specialised nature of the jobs required for the projects, it is expected that the projects would also draw employment from other states and territories of Australia.

Notably, as mentioned earlier, while the projects will cause changes to the distribution of the employment across states and industries, they would not have an overall effect on national employment. This means that the combined loss of employment in other states is part of a redistribution of fixed national employment between other states, such as Queensland[18]. Chart 4.12 details the state employment impact of the Cumulative Scenario.

[18] There is no overall effect on national employment because the model assumes that the long run impact on total national employment is zero. This is because national employment depends on the overall efficiency of the national labour market, which is unlikely to be changed by the projects. Moreover, in our simulations, labour is assumed to be completely mobile in the long run. So, any employment displacement in one sector will be absorbed into another sector in the long run. This means that the combined loss of employment in industries such as the agriculture and manufacturing industry is part of a redistribution of fixed national employment towards other industries.

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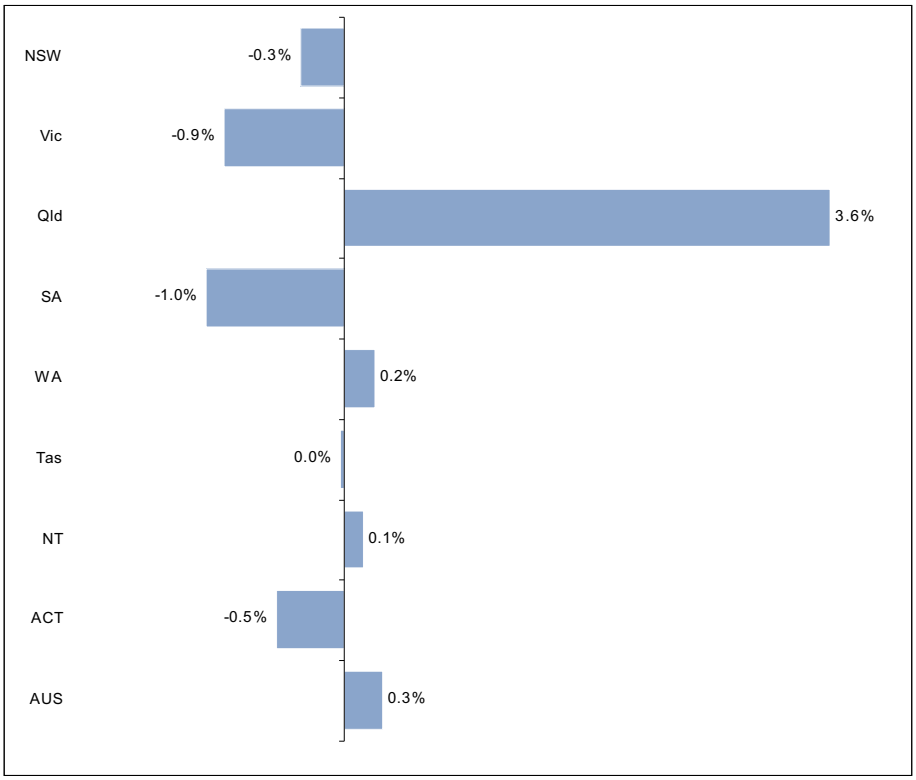
Chart 6.12: Cumulative Impact Scenario State Employment Effects (% deviations from baseline)



Source: KPMG Econtech's MM600+ simulation.

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7. Impact Analysis

The previous sections have shown that the Australia Pacific LNG project is likely to provide significant benefits to the Australian economy. It is likely that there may also be some adverse impacts – particularly during the development of the project. For example, while the project is expected to benefit the communities through increased economic activity and employment during the construction phase – it is also likely that there may also be some disruption to the community while the development proceeds.

Thus, this section discusses some of these other potential impacts on consumers and industry. It the presents a number of possible mitigation strategies to help to offset these potential impacts which were developed in consultation with Australia Pacific LNG based on the results of economic modelling, Social Impact Assessment consultation with project team members from Australia Pacific LNG, and through consultation with Senior Economists in KPMG Econtech.

7.1 Overall impacts on consumers and industry

7.1.1 Income and affordability

Cost pressures

Impact

At a regional level, the Australia Pacific LNG project has the potential to contribute to a short term increase in both costs to business, in terms of higher wages and input costs, and the cost of living for households due to inflationary pressures from higher wages and increased demand for goods and services in the region.19 In addition, increased demand for infrastructure and social services may place further upward pressure on prices in the region, in the short term. The overall impact on prices in the region is likely to be larger when the cumulative effects of the other projects are taken into account.

KPMG Econtech estimates indicate that the impact of the Australia Pacific LNG project on real post tax wages will be an increase of 0.1% (with gross real wages rising by 0.3%). The cumulative impact on real post tax wages would be an increase of 0.6%.

On a national level, the Australia Pacific LNG project is estimated to contribute to a 0.3% decline in the CPI relative to the base case, while the cumulative effect of the projects in the region will contribute a CPI growth rate that is 0.8% lower than in the base case.

However, at a regional level it is likely that the Australia Pacific LNG project will contribute to an increase in prices, in the short to medium term, as the supply side in local areas adjust to the increase in demand associated with the Project.

Gas fields

In 2006, the all items regional price index for Dalby and Roma was lower than in Brisbane, while prices were 1.2% higher than Brisbane in Chinchilla (Chart 5.1).

[19] It is important to note that the modelling presented in Section 3.4.1 which shows a fall in the CPI is based on Australia as a whole, and over a long-term time horizon.

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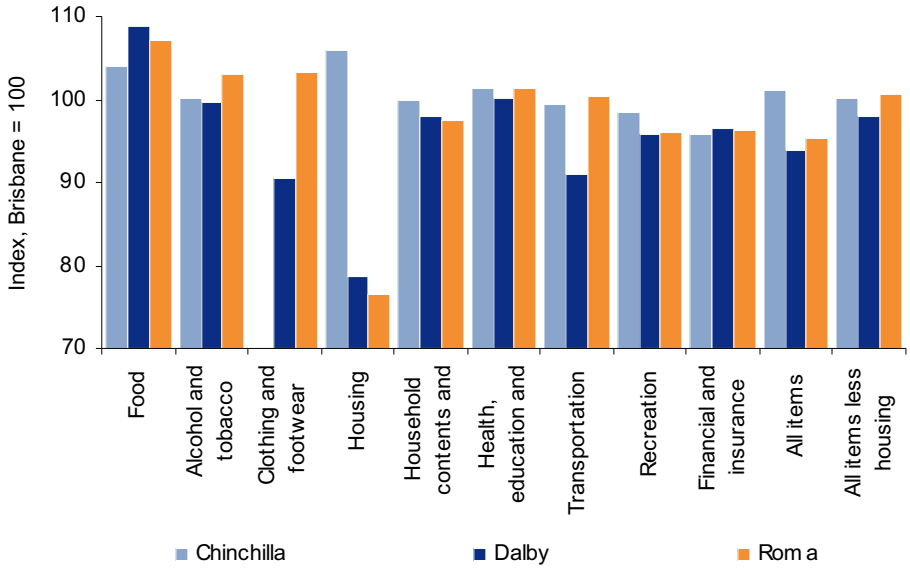
Chart 7.1: Regional price index, May 2006, Brisbane = 100



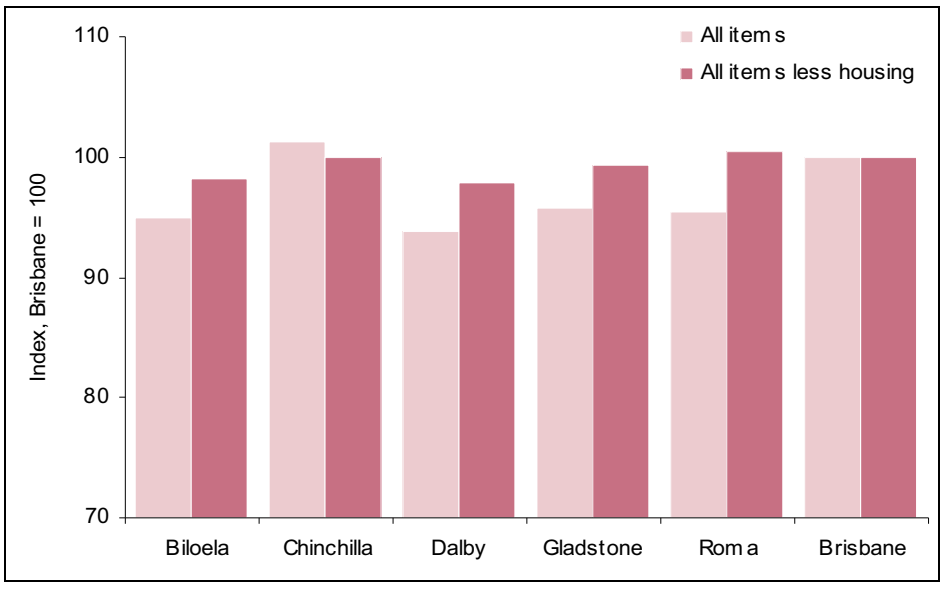
Source: Office of Economic and Statistical Research (OESR) 2006

When the subcategories are analysed, it shows that in all areas the prices of food were higher than in Brisbane, by between 4 % and 9 %. Clothing and footwear prices were 3 % higher than Brisbane in Roma, and in all areas the price of health, education and communication services were in line with or above the price in Brisbane. Housing was somewhat cheaper in all regions with the exception of Chinchilla, where housing prices were 6 % above Brisbane.

Gas pipeline

In 2006, prices in all regions except Chinchilla and Roma (when all items less housing are considered) were lower than in Brisbane (Chart 5.2).

Chart 7.2: Regional price index, May 2006, Brisbane = 100



Source: OESR, 2006

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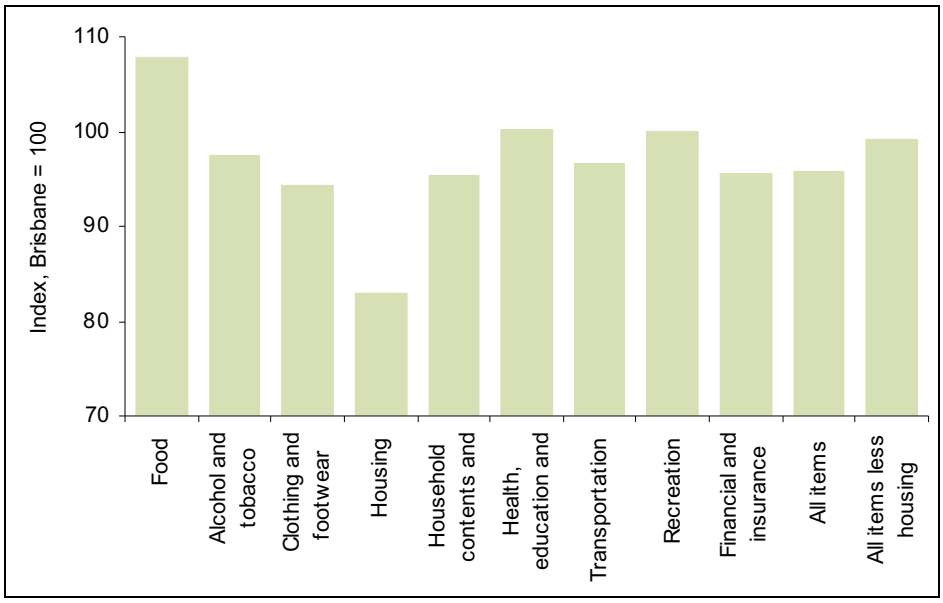
When the subcategories are analysed (not shown in Chart 5.2), it shows that in all areas except Biloela, the prices of food were higher than for Brisbane in 2006, by between 4 % and 9 %. Clothing and footwear prices were around 3 % to 4 % higher than Brisbane in Roma and Biloela, and in all areas the price of health, education and communication services were in line with or above the price in Brisbane. Housing was somewhat cheaper in all regions with the exception of Chinchilla, where housing prices were 6 % above Brisbane, and for most other items (including alcohol and tobacco, household contents and services, transportation, recreation and financial and insurance services) prices were below the Brisbane average.

LNG plant

In 2006, the all items price index, and all items except housing price index for Gladstone were lower than in Brisbane (Chart 5.3). When the subcategories are analysed, it shows that the prices of food, health, education and communication, and recreation were higher in Gladstone than in Brisbane. All other items were less expensive, with the housing cost price index for Gladstone 17 % lower than in Brisbane in 2006.

Chart 7.3: Regional price index for Gladstone, May 2006, Index, Brisbane = 100



Source: OESR, 2006

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to cost of living pressures, which include looking to:

- offer competitive remuneration that is on par with current industry levels, and consider offering non-financial benefits to staff including part-time work, job sharing, purchased annual leave, and off-site work where appropriate;
- implement a Local Content Strategy whereby Australia Pacific LNG participates in or establish programs which assist qualified local and regional businesses with the opportunity to tender for provision of goods and services for the Project;
- work with large national suppliers in sectors where key price pressures are anticipated to establish operations and local outlets within the region

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- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures, and
- continue to participate with government in local and regional planning processes and provide information about the Project to inform discussion and decision making in a timely manner.

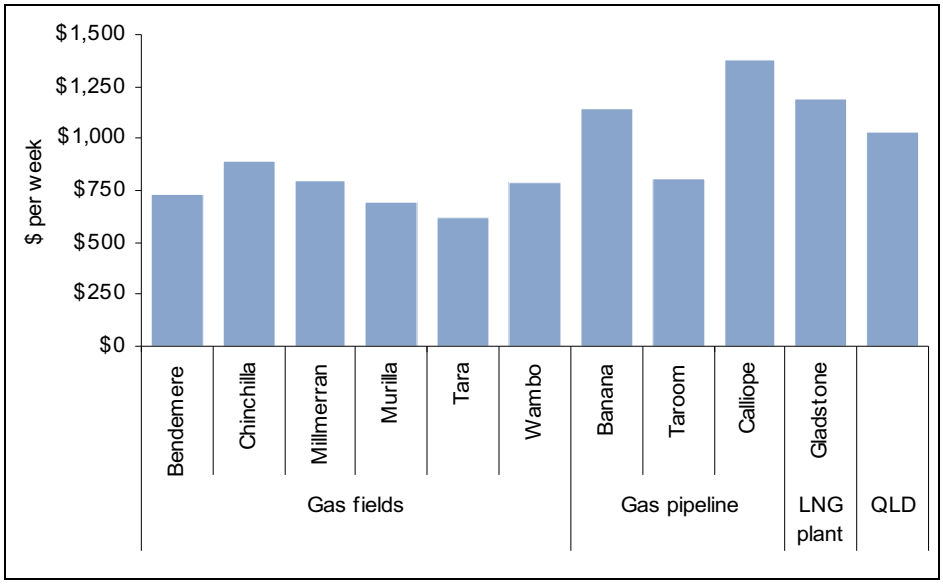
Higher paid jobs and living standards

Impact

The Australia Pacific LNG project will provide individuals within local communities with the opportunity to obtain work in higher paid jobs or, for those currently not participating in the labour force, to return to work. As such, the Australia Pacific LNG project has the potential to drive increases in incomes at a regional level, leading to improvements in living standards.

Chart 5.4 shows the median gross household weekly income in 2006 for the SLAs within the gas pipeline, gas fields and LNG plant regions, as well as for the state overall. Most of the SLAs within the gas fields region had lower median household incomes than for Queensland in 2006, with incomes 10% to 30% lower overall. With the exception of the Taroom SLA, the gas pipeline SLAs had a higher median household income in 2006 than that of Queensland, with both Banana and Calliope Part B SLAs 11 % higher than the state median. Finally Gladstone's median household income was 12 % higher than the median for Queensland in 2006.

Chart 7.4: Gross household weekly incomes, by SLA, 2006



Source: ABS Census 2006

KPMG Econtech estimates indicate that the total direct and indirect employment in the region will increase by around 6,900 jobs during the construction phase and 9,000 jobs during operations, and improve the regional value add by up to 3.2% during the construction phase, and 4.4% during operations. When the cumulative effects are considered, the operations phase will see employment in the region up by around 55,000 jobs and output by 21.7%.

By region, the KPMG-Econtech estimates indicate that the total direct and indirect employment in the Mackay-Fitzroy-Central West Queensland region will increase by around 4,100 jobs during the construction phase and

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2,800 jobs during operations, and improve the regional value add by up to $803 million during the construction phase, and nearly $450 million during operations.

And for the Darling Downs-South West Queensland region, KPMG Econtech estimates indicate the Australia Pacific LNG project will increase jobs by around 2,900 during the construction phase and 6,000 jobs during operations, and improve the regional value add by up to $441 million during the construction phase, and over $900 million during operations.

When the cumulative impacts are taken into account, total employment would be 30.7% higher in the Darling Downs-South West Queensland region, or 39,000 more jobs during the operation phase. In the Mackay-Fitzroy-Central West Queensland region, employment is expected to be 7.7% higher when the cumulative project effects are taken into account, which is equivalent to 15,000 jobs. In the regions, the industry output is expected to be 41.4% over the baseline case in the Darling Downs-South West region and 10.0% over the baseline case in the Mackay-Fitzroy-Central West region.

This translates into higher living standards and incomes to the extent that locals are employed in higher paying jobs. Indeed estimates indicate that the Australia Pacific LNG project will have a positive impact on national consumption (consumption is an indicator of individual living standards), increasing it by 0.1%, and having the effect of increasing real post tax wages by 0.1%. As such, the strategies below are focussed on maximising local employment and the benefits to regional economies.

It is also important to note that while the Australia Pacific LNG project is likely to help boost living standards in the region, it may potentially contribute to a fall in employment in some industries due to structural adjustment. This in turn may have a negative impact on household incomes if workers are unable to transition to jobs in key growth industries.

Table 5.1 shows the fall in employment projected during the construction and operation phases in the Mackay-Fitzroy-Central West Queensland area (the region in which Gladstone is located).

Table 7.1: Industries experiencing a fall in Mackay-Fitzroy-Central West Queensland region employment during construction and operation phases

Industry sector	Change in employment in construction phase (per cent)	Change in employment in operation phase (per cent)
Agriculture, forestry and fishing	-0.5%	-0.5%
Mining	-0.2%	-
Manufacturing	-0.6%	-0.1%
Electricity, gas and water supply	-0.3%	-
Transport and storage	-0.7%	-0.4%
Property and business services	-3.1%	-
Government administration	-2.4%	-

Table 5.2 shows the fall in employment projected during the construction and operation phases in the Darling Downs-South West Queensland where the gas fields and part of the gas pipeline will be located.

Table 7.2: Industries experiencing a fall in regional employment during construction and operation phases in the Darling Downs-South West Queensland region

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Industry sector	Change in employment in construction phase (per cent)	Change in employment in operation phase (per cent)
Agriculture, forestry and fishing	-0.6%	-0.5%
Mining	-0.2%	-
Manufacturing	-0.7%	-0.1%
Electricity, gas and water supply	-0.4%	-
Transport and storage	-0.8%	-0.4%
Property and business services	-3.6%	-
Government administration	-2.7%	-

When the cumulative effects of the projects are taken into account, KPMG Econtech forecasts indicate that the only sector expected to experience a fall in employment during the operations phase is the agriculture, forestry and fishing sector, which is projected to see a 2.2% decline in employment. All other industry sectors in the region are expected to see a rise in employment, of between 3% and 91%.

Some parts of the community have expressed concern that there may be minimal positive economic benefit to local community as workers and other inputs may be sourced from outside region (possibly due to lack of capacity of regional businesses and workers to meet supply requirements).

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to help maximise the opportunities for local workforce to obtain higher paid jobs, and mitigate the structural adjustment impacts, and community concern that there will be minimal positive economic benefit from the project, which include looking to:

- offer competitive remuneration that is on par with current industry levels, and consider offering non-financial benefits to staff including part-time work, job sharing, purchased annual leave, and off-site work where appropriate;
- continue to use and develop methods to attract people local to the region to the workforce;
- implement a Local Content Strategy whereby Australia Pacific LNG participates in or establishes programs which assist qualified local and regional businesses with the opportunity to tender for provision of goods and services for the Project;
- continue to use and develop methods to attract under-represented groups to the workforce;
- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- work together with the CSG/LNG industry through the CSG/LNG Skills Taskforce of Energy Skills Queensland to help address skill shortages by:
  - the creation of awareness in the communities for the CSG/LNG industry;

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- enhancing vocational training; and
- facilitating career advice and work readiness programs for new entrants and mature entrants from related industries;

- participate in CSG/LNG gateway programs with high schools in the Project region in partnership with providers such as the Queensland Minerals and Energy Academy to implement programs that promote career opportunities and facilitate employment in the CSG/LNG industry;
- expand competency based training and skills development programs for Production and Process Plant Operators, including further development of the dedicated training facilities at the Peat gas processing plant near Wandoan; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

7.1.2 Employment and training

Skill shortages during construction phase

Impact

The Australia Pacific LNG project will increase the demand for employment, both directly and indirectly, during the construction phase. KPMG Econtech forecasts indicate that the sectors with the largest increases in demand for employment in the Mackay-Fitzroy-Central West Queensland region are the construction, retail trade, health and community services, and education sectors. Table 5.3 shows the change in employment in different industry sectors in the construction phase timeframe.

Table 7.3: Industries experiencing a rise in regional employment during construction phase in the Mackay-Fitzroy-Central West Queensland region

Industry sector	Change in employment in construction phase	
	Number*	Per cent
Construction	2,200	8.8%
Wholesale trade	400	4.1%
Retail trade	800	4.9%
Accommodation, café's and restaurants	200	4.3%
Communication services	100	2.9%
Finance and insurance	200	4.7%
Education	600	4.0%
Health and community services	500	4.2%
Cultural and recreational services	100	5.0%
Personal and other services	200	4.1%

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* Rounded to the nearest one hundred employees

In the Darling Downs-South West Queensland area, KPMG Econtech forecasts indicate that the sectors with the largest increases in demand for employment are the construction, cultural and recreational services, retail trade, wholesale trade, health and community services, and accommodation, café's and restaurants sectors (Table 5.4).

Table 7.4: Industries experiencing a rise in the Darling Downs-South West Queensland region employment during construction phase

Industry sector	Change in employment in construction phase	
	Number*	Per cent
Construction	1,100	8.8%
Wholesale trade	300	4.8%
Retail trade	500	5.3%
Accommodation, café's and restaurants	100	4.9%
Communication services	100	3.2%
Finance and insurance	400	5.5%
Education	600	4.7%
Health and community services	600	4.9%
Cultural and recreational services	100	5.9%
Personal and other services	200	4.8%

* Rounded to the nearest one hundred employees

There is the potential for skill shortages to emerge in industry sectors with a high demand for additional labour during the construction phase of the Project. This is particularly the case given the likelihood that there will be a number of LNG projects in the region with an estimated increase in demand for labour of 14% in the Mackay-Fitzroy-Central West Queensland region, and 19% in the Darling Downs-South West Queensland area.

During the construction phase of the gas fields component of the project, the construction workforce will average around 1,200 staff over the next two decades (given that there will be a number of different locations at which the wells will be situated), with the workforce peaking at around 2,000 in 2013.

During the construction phase of the gas pipeline component of the Project, the construction workforce will average around 800 staff over the period during which the pipeline will be constructed (2012 and 2013).

The first stage of the construction phase of the LNG plant is from 2011 to 2015 and will peak in 2013 with 2,100 workers required during the construction of trains one and two. The second stage from 2016 to 2020 will peak in 2018, also with 2,100 workers required during the construction of the third and fourth trains. The following types of skills will be in demand during the construction phase:

- site preparation workers;
- piping trades;
- civil engineers;

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- tank workers;
- electrical trades;
- instrumentation trades;
- scaffolding trades;
- painting, fireproofing and insulation workers;
- millwright trades; and
- ironworking trades.

Energy Skills Queensland has recently undertaken a skills audit with the aim of identifying the areas in which critical skill shortages are likely to emerge with the expansion of the LNG industry. They highlight the areas in which key skill shortages are likely to emerge, which are detailed in Table 5.5.

Table 7.5: Occupations with expected critical skill shortages

Occupation category	Occupation	Required qualifications
Vocational	Drilling assistants	Certificate II in Drilling and Gas Onshore
	Production technicians	HSC Senior/Certificate III in Process Plant Operations
	Maintenance technicians	Certificate III in Engineering – Mechanical Trade (Maintenance – Diesel Fitting and vendor training)
	Electrical and instrumentation technicians	Certificate III in Electrotechnology (Maintenance Systems and Instrumentation)
	Logistics technicians/administrators	Certificate III in Transport and Logistics
Professional and paraprofessional	Petroleum engineers	Bachelor of Engineering
	Geologists and geophysicists	Bachelor of Science/Geology

Source: Energy Skills Queensland (2009) Part A – Workforce Planning Report to inform the Workforce & Competency Development Strategy Plan for the Queensland Coal Seam Gas / Liquefied Natural Gas Industry, *Confidential Draft Report, p. 18*

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to skill shortages during the construction phase, which include looking to:

- build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work together with the CSG/LNG industry through the CSG/LNG Skills Taskforce of Energy Skills Queensland to help address skill shortages by:
  - the creation of awareness in the communities for the CSG/LNG industry;

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- enhancing vocational training; and
- facilitating career advice and work readiness programs for new entrants and mature entrants from related industries;

- participate in CSG/LNG gateway programs with high schools in the Project region in partnership with providers such as the Queensland Minerals and Energy Academy to implement programs that promote career opportunities and facilitate employment in the CSG/LNG industry;
- expand competency based training and skills development programs for Production and Process Plant Operators, including further development of the dedicated training facilities at the Peat gas processing plant near Wandoan; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

Skill shortages during operation phase

Impact

The Australia Pacific LNG project will increase the demand for employment, both directly and indirectly, during the operation phase. KPMG Econtech forecasts indicate that the sectors with the largest increases in demand for employment are the mining, construction, retail trade, education, and health and community services sectors. Table 5.6 shows the change in employment in different industry sectors in the operation phase, in the Darling Downs and South West Queensland area, and the Mackay, Fitzroy and Central Western Queensland area.

Table 7.6: Industries experiencing a rise in regional employment during the operation phase

Industry sector	Change in employment in Darling Downs-South West Queensland area during operation phase (%)	Change in employment in Mackay-Fitzroy-Central Queensland area during operation phase (%)
Mining	53.6%	8.9%
Construction	5.3%	1.9%
Wholesale trade	5.3%	1.8%
Retail trade	5.2%	1.7%
Accommodation, café's and restaurants	5.1%	1.6%
Communication services	5.1%	1.6%
Finance and insurance	5.1%	1.7%
Education	5.1%	1.6%
Health and community services	5.2%	1.7%
Cultural and recreational services	5.1%	1.7%
Personal and other services	5.2%	1.7%

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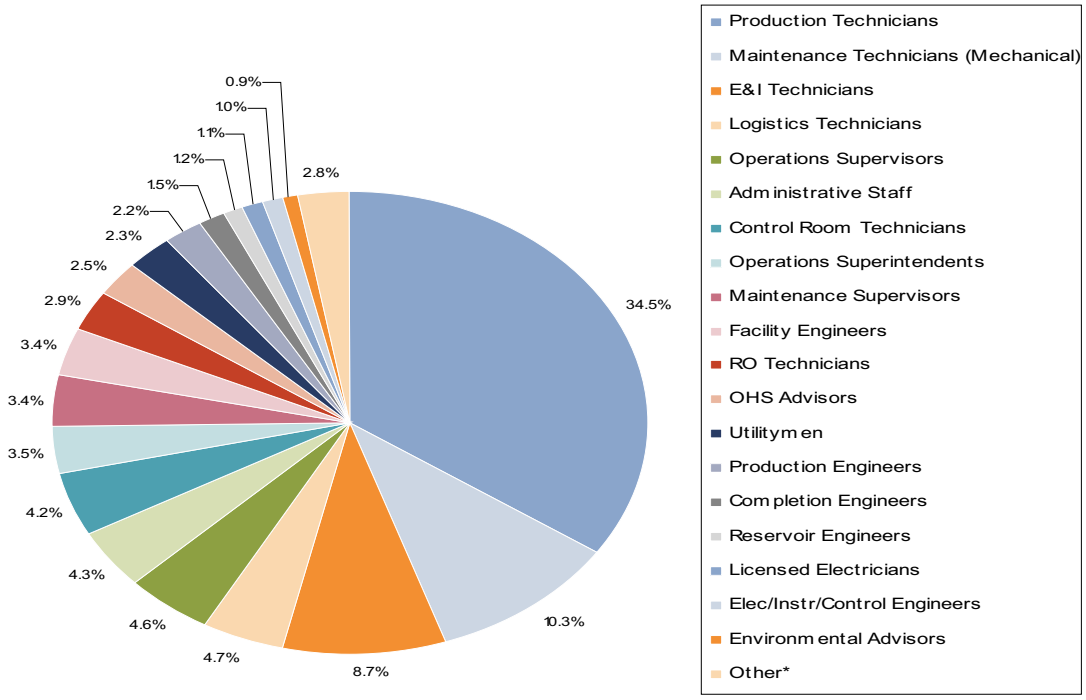
Given the high rates of employment and participation in the regions in which the Australia Pacific LNG project will be operating, there is the potential for skill shortages to emerge in industry sectors with a high demand for additional labour during the operation phase of the Project. This is particularly the case given the likelihood that there will be a number of LNG projects in the region, the cumulative effect being to compound the skill shortages.

During the operation phase of the gas fields component of the project, the workforce will average around 600 (including logistic hubs) staff over the next three decades. The share of workers by profession are detailed in Chart 5.5. The professional services most in demand are the production and maintenance technicians (mechanical), electrical and instrument technicians, and logistics technicians.

Chart 7.5: Workers required during the operation phase of the Gas Fields, by profession, share of total required 2009 to 2020



* Other includes maintenance planners, logistics supervisors, maintenance superintendents, area managers, cultural heritage coordinators, and RO supervisors

Source: Australia Pacific LNG

During the operation phase of the gas pipeline component of the Project, the operation workforce will be relatively small, at only 20 workers. The share of workers by profession are detailed in Chart 5.6.

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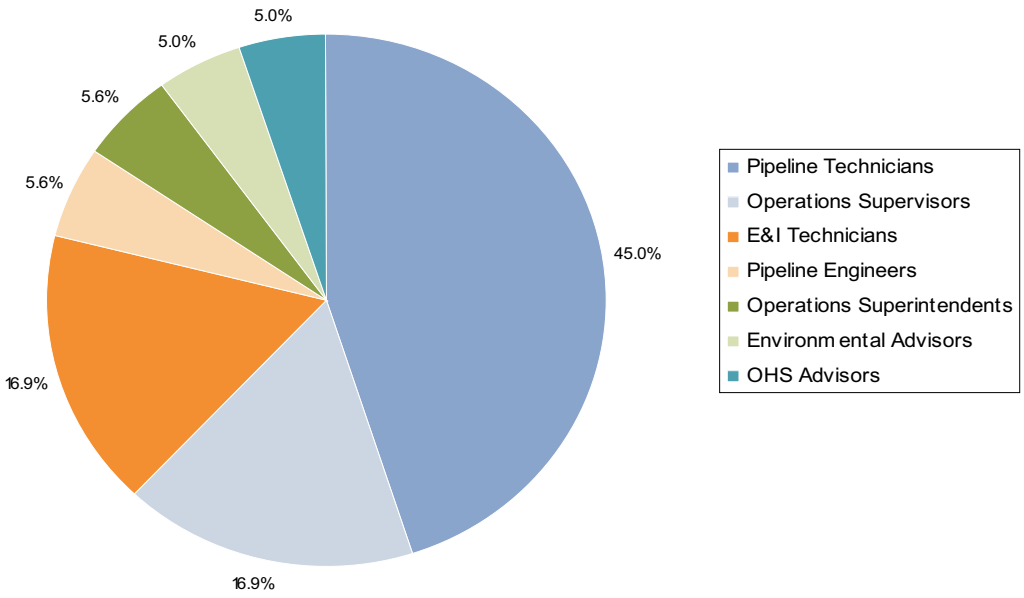
Chart 7.6 Workers required during the operation phase of the Gas Pipeline, by profession, share of total required 2009 to 2020



Source: Australia Pacific LNG

During the operation phase of the LNG plant component of the Project, the workforce will start at 100 workers, increasing with each train added, until the maximum workforce of 325 staff is reached when the fourth train comes online in 2020.

Energy Skills Queensland has also undertaken an audit and have identified a number of areas in which there are likely to be critical skill shortages due to the strong demand for workers stemming from the development of the LNG industry in Queensland.

The cumulative effect of multiple projects in the region is likely to increase the potential for skills shortages significantly. Indeed, KPMG Econtech modelling indicates that overall, the operation phase will require an additional 39,000 workers in the Darling Downs-South West Queensland region, and a further 15,000 in the Mackay-Fitzroy-Central West Queensland region. Table 5.7 shows the number and percentage cumulative increase in employment during the operation phase in both regions, by industry sector. The largest increase in employment is in the mining sector, with over 15,000 more workers required. In addition, the retail trade, education and health and community services sectors are also likely to see large increases in demand for employment.

Table 7.7: Industries experiencing a rise in employment due to the cumulative effects during the operation phase

Industry sector	Cumulative change in employment in Darling Downs-South West Queensland region	Cumulative change in employment in Mackay-Fitzroy-Central West Queensland region

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	Number*	Per cent	Number*	Per cent
Mining	13,000	526.9%	2,500	18.1%
Manufacturing	100	0.8%	2,100	11.3%
Electricity, gas and water	200	30.9%	300	7.8%
Construction	2,800	31.4%	1,300	8.2%
Wholesale trade	1,700	30.8%	700	7.7%
Retail trade	2,800	30.5%	1,000	7.5%
Accommodation, café's and restaurants	900	29.6%	400	6.8%
Transport	1,400	22.8%	900	8.5%
Communication services	500	30.1%	100	7.2%
Finance and insurance	700	30.6%	300	7.6%
Property and business services	1,000	15.9%	600	4.6%
Government administration and defence	1,600	30.7%	500	7.7%
Education	3,100	29.9%	1,100	7.0%
Health and community services	2,800	30.5%	900	7.5%
Cultural and recreational services	500	30.5%	100	7.5%
Personal and other services	700	30.8%	200	7.7%

* Rounded to the nearest one hundred employees

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to skill shortages during the operation phase, which include looking to:

- build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work together with the CSG/LNG industry through the CSG/LNG Skills Taskforce of Energy Skills Queensland to help address skill shortages by:
  - the creation of awareness in the communities for the CSG/LNG industry;
  - enhancing vocational training; and

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- facilitating career advice and work readiness programs for new entrants and mature entrants from related industries;

- participate in CSG/LNG gateway programs with high schools in the Project region in partnership with providers such as the Queensland Minerals and Energy Academy to implement programs that promote career opportunities and facilitate employment in the CSG/LNG industry;
- expand competency based training and skills development programs for Production and Process Plant Operators, including further development of the dedicated training facilities at the Peat gas processing plant near Wandoan; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

Improvements in labour force participation

Impact

The Australia Pacific LNG project is likely to provide an opportunity to increase labour force participation rates by encouraging workers not in the labour force (particularly disadvantaged workers including women, Indigenous Australians and disabled persons) to return to work, and increase local skills capacity.

It is important to note, however, that while the Project may offer the opportunity to increase labour force participation, the rates of participation are at present, relatively high in the gas field, gas pipeline and LNG plant regions and as such there may be an upper bound on the capacity to increase participation rates. Specifically, as at September 2009, the participation rate for the Mackay, Fitzroy and Central West region was 70.7%, while for the Darling Downs and South West region the participation rate was 67.8%.20

Chart 5.7 shows the participation rates for the gas field and gas pipeline regions in 2008 at a more disaggregated level. It highlights that some statistical local areas have much higher participation rates than the regional average, including:

- in the gas fields region, Millmerran and Wambo had participation rates at 92.1% and 76.0% in 2008, respectively, while the average for the region was 72.8%; and
- in the gas pipeline region, Taroom had the highest labour force participation rate in 2008, at 96.6%, while for the region overall the average participation rate was 89.9%.

Chart 7.7: Participation rates by region, 2008

[20] ABS (2009) Labour Force, Australia, Detailed - Electronic Delivery, Cat. No. 6291.0.55.001

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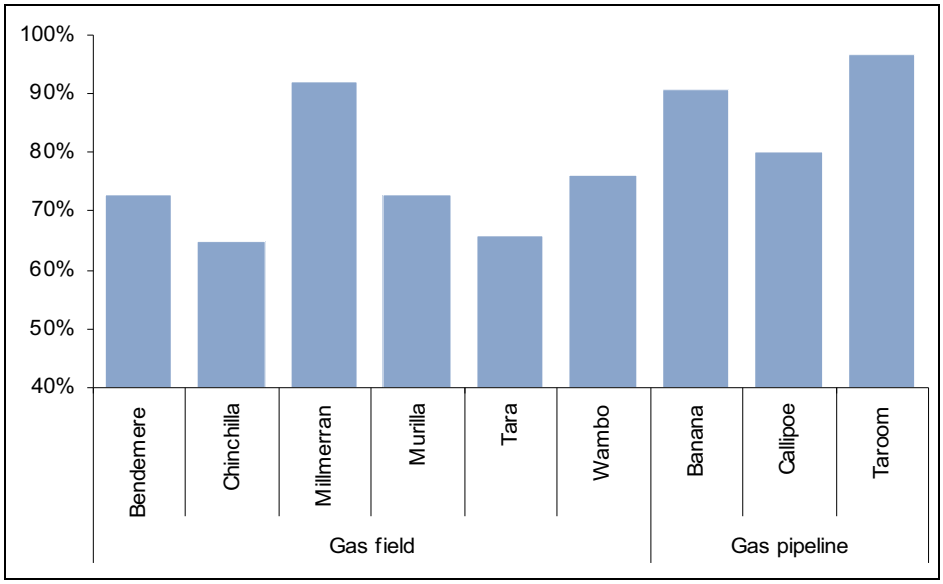

Source: Office of Economic and Statistical Research (2009)

The unemployment rates in the regions are also relatively low, at 5.6% for the Mackay, Fitzroy and Central West region as at September 2008, while for the Darling Downs and South West region the unemployment rate was 2.4%. Some areas had particularly low rates of unemployment, with Office of Economic and Statistical Research data showing that in the September quarter of 2008 the unemployment rate was for the gas fields region:

- 0.3% in Bendemere;
- between 1.0 and 1.5% in Chinchilla, Millmerran, Murilla and Wambo; and
- 1.5% for the region overall.
- For the gas pipeline area, the unemployment rate was 2.8% for the region overall, with Taroom showing the lowest rate at 0.5%.

This highlights that the low unemployment rates combined with high participation rates in some localities may mean that there could be some scope to increase participation in these areas, although the scope may not be as high as in other areas.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to maximise the opportunities to increase labour force participation, which include looking to:

- offer competitive remuneration that is on par with current industry levels, and consider offering non-financial benefits to staff including part-time work, job sharing, purchased annual leave, and off-site work where appropriate;
- continue to use and develop methods to attract people local to the region to the workforce;
- continue to use and develop methods to attract under-represented groups to the workforce;
- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;

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- work together with the CSG/LNG industry through the CSG/LNG Skills Taskforce of Energy Skills Queensland to help address skill shortages by:
  - the creation of awareness in the communities for the CSG/LNG industry;
  - enhancing vocational training; and
  - facilitating career advice and work readiness programs for new entrants and mature entrants from related industries;
- participate in CSG/LNG gateway programs with high schools in the Project region in partnership with providers such as the Queensland Minerals and Energy Academy to implement programs that promote career opportunities and facilitate employment in the CSG/LNG industry;
- expand competency based training and skills development programs for Production and Process Plant Operators, including further development of the dedicated training facilities at the Peat gas processing plant near Wandoan; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

Decline in workers entering traditional rural industries

Impact

The Australia Pacific LNG project may contribute to a possible fall in the number of students interested in entering traditional rural employment roles, partly due to the increased availability of jobs in other industry sectors, in particular mining, and partly due to potentially more attractive salaries available in other industry sectors.

KPMG Econtech estimates indicate that the agriculture, forestry and fishing industry sector may see a fall in employment of around 140 persons in the construction phase and around 180 persons in the operations phase, a small proportion of which will be due to changes in land use, whilst the majority will likely be due to structural adjustment. During the operation phase, the cumulative impact will likely be larger, with the effect to be to potentially reduce agriculture, forestry and fishing sector employment by around 490 workers in the Darling Downs-Central West Queensland region, and around 360 workers in the Mackay-Fitzroy-Central West Queensland region (in both cases a decline of 2.2%)

Australia Pacific LNG understands the key role that rural industries plays in the regional economy and is committed to helping to ensure the sustainability of these industries.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to a possible fall in the number of workers entering traditional rural industries which include looking to:

- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;

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- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs;
- continue to partner with agriculture colleges and tertiary institutions to identify opportunities on the use of Australia Pacific LNG-owned land;
- implement a Local Content Strategy whereby we participate in or establish programs which assist qualified local and regional businesses with the opportunity to tender for provision of goods and services for the Project; and
- ensure contracts with suppliers and contractors include provisions for sustainable growth of communities and are aligned with Australia Pacific LNG's sustainability principles and objectives.

7.1.3 Local facilities, infrastructure and services

Costs associated with traffic congestion

Impact

The Australia Pacific LNG project may contribute to increased congestion. Moreover, heavy vehicles and movement of equipment may lead to temporary, localised damage to road surfaces during the construction phase (see the Transport chapter for more detail). This may lead to an increase in travel times to work given the larger population, which may in turn increase the cost of living for households. In addition, this has the potential to have a negative impact on businesses by increasing travel times and costs. This is an additional impact (a risk associated with the Project which has not been included in the modelling), the possible scale of which is difficult to quantify with the available information.

Traffic will be generated by the transportation of personnel, and trucks carrying construction materials during the construction phase of the project. The impact of this will likely be largest in the gas pipeline region, as the construction activities will be relatively concentrated in a region and will be undertaken over an 18 month to two-year period. By contrast the gas fields construction will have less of an impact on traffic, given that the construction activities will be spread over a large area and over a more lengthy period.

Recommended mitigation strategies

The range of possible options available to Australia Pacific LNG to mitigate the impacts relating to congestion are described in detail in the Transport section of the EIS. Please refer to this section for more detail.

Cost pressure from infrastructure capacity constraints

Impact

The Australia Pacific LNG project has the potential to contribute to cost pressures in the region, as a result of increased demand for infrastructure and social services, which may in turn contribute to a fall in consumer welfare. In addition, this has the potential to have a negative impact on industry output, and may, as a result, put upward pressure on prices.

KPMG Econtech estimates indicate that the Australia Pacific LNG project will contribute to a 0.3% decline in the CPI relative to the base case, while the cumulative effect of the projects in the region will contribute a CPI growth rate that is 0.8% lower than in the base case. However, at a regional level it is likely that the Australia

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Pacific LNG project will contribute to an increase in prices, in the short to medium term, as the supply side in local areas adjust to the increase in demand associated with the Project.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to pressures on economic and social infrastructure, which include looking to:

- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- ensure contracts with suppliers and contractors include provisions for sustainable growth of communities and are aligned with Australia Pacific LNG's sustainability principles and objectives;
- continue to participate with government in local and regional planning processes and provide information about the Project to inform discussion and decision making in a timely manner;
- collaborate with government, industry and other providers to mitigate the impact on health services in local communities including providing the appropriate level of medical facilities for camps and operating plants; and
- implement a community investment program that supports sustainable community development.

7.2 Consumers

7.2.1 Income and affordability

House prices

Impact

The Australia Pacific LNG project has the potential to contribute to an increase in house prices, given that there may be higher demand for housing and a supply that is limited in the short to medium term (given the timeframes required to increase the housing stock). This could cause a decline in housing affordability as a result of higher house prices. This is particularly the case given the multiple projects in the region, which could cumulatively cause a larger rise in house prices.

It is important to note, however, that the impact during the construction phase will be less significant, particularly in the gas fields and gas pipeline component of the project, as a large share of the workers will be housed in TAFs. These accommodation facilities will be largely self contained, so there will be little direct interaction in the region's housing market from the construction workforce housed in the camps. However increased spending in the region by these workers will stimulate the local economies and contribute to upward pressure on housing prices.

However, for the LNG plant around 20% of the construction workforce will be sourced locally. The gas fields will attempt as far as possible to source labour locally, which may possibly help mitigate the overall impact on house prices in these regions.

During the operations phase, it is expected that initially most operational workers in the gas fields will be housed in permanent work camps and hence have little direct interaction with the region's housing market. However, Australia Pacific LNG will encourage these workers to move into private accommodation locally if desired. It is expected that while the operational workers of the gas pipeline will be housed in Miles and other towns along the

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pipeline route, the operation of the pipeline will require very few workers, so they will have relatively little impact on the local housing market.

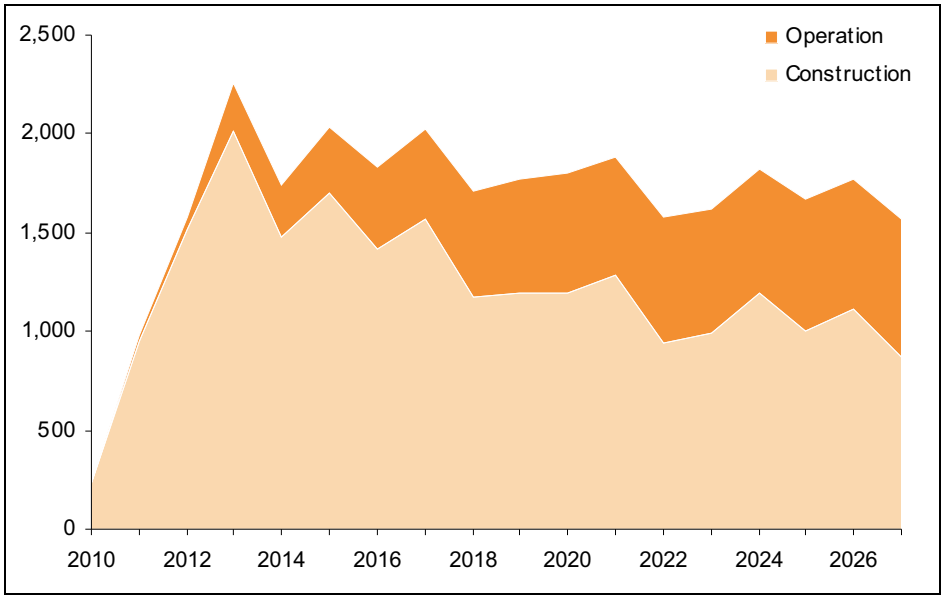
As the LNG facility will create a substantial increase in employment opportunities in Gladstone, it is expected this will increase demand for housing. A study of the Yarwun Alumina Refinery, which was identified as a similar major development in the area, was used to assess the impact that the Australia Pacific LNG project will have on the average house prices. It was found that the project's biggest impact will be in Gladstone.

The impact will be felt in Gladstone through the permanent job creation provided by the operation of the LNG facility. This impact will gradually build up as the LNG facility ramps up to full operation and employs more workers.

Gas field

Chart 5.9 shows the total gas fields workforce split by construction and operation phases. It is important to note that the construction will take place over the entire period up to 2027 as separate wells will need to be drilled for each phase of the Project. The maximum size of the construction workforce will be around 2,000 persons, in 2013. During the later phases of the Project, the combined construction and operations workforce will be around 1,700 persons.

Chart 5.8: Total gas fields workforce, split by operation and construction phases



Source: Australia Pacific LNG

Gas pipeline

Chart 5.10 shows the total gas pipeline workforce, highlighting that the main impact will be felt during 2012 and 2013, after which a very small operational workforce of 20 persons will be required. The pipeline construction workforce will consist of three main groups, these being the main workforce, fly groups (that is, groups that are situated ahead and behind of the main workforce group, of which there will be three) and commissioning. The main construction workforce and fly groups will work 12-hour shifts, with 28 days on and nine days off. The commissioning group of 60 workers, which will be required only for the two months following construction, will work 12-hour shifts with four weeks on and one week off. All of these construction crews will be located in the construction camps.

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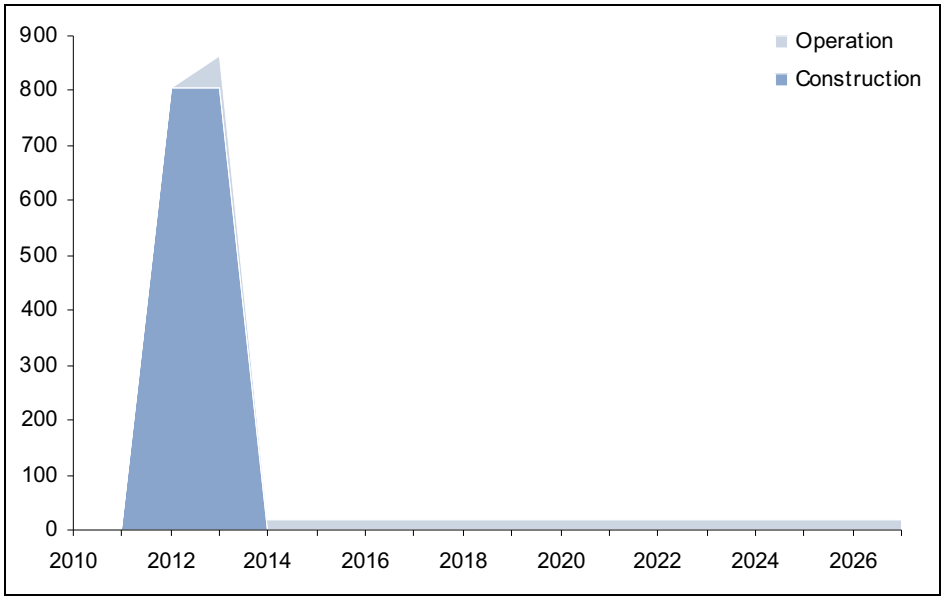
Chart 5.9 Total gas pipeline workforce, split by operation and construction phases



Source: Australia Pacific LNG

During operations, only 20 people will be required for the pipeline, and these workers will operate on 12 hour shifts, working two weeks on, one week off. The operations workforce will be located in private accommodation in towns adjacent to the pipeline route.

LNG facility

In regards to the LNG plant and ancillary infrastructure, construction is planned to occur in two stages. The first stage is from 2011 to 2015 and will peak in 2013 with 2,100 workers required during the construction of trains one and two. The second stage from 2016 to 2020 will peak in 2018, also with 2,100 workers required during the construction of the third and fourth trains.

The construction workforce will operate on two roster systems, one for employees who live locally, which is expected to comprise around 20 % of the total workforce, and one for those who do not live locally. Broadly, the rosters are anticipated being along the lines of the following:21

- **Local workforce**: Monday to Friday 10 hours per shift, with a total of 50 hours per week.
- **Non-local workforce**: Monday to Friday 10 hours per shift followed by Saturday eight hours per shift, with a total of 58 hours per week on a four weeks on followed by one week off roster.

The non-local workforce would work a fly-in/fly-out or drive-in/drive-out roster. Periodic night shift may be scheduled during peak periods of the Project.

During the operational phase, a workforce of around 100 people will be required to operate the first train. When the second train is operational, a total workforce of 175 people will be required. The operational workforce is expected to be 250 workers when three trains are operational and 325 people when all four trains are in operation. The operational workforce will be split between three rosters, with general staff working eight-hour

[21] For the purpose of this study 'locally' is defined as employees who live within 60km from the Gladstone General Post Office.

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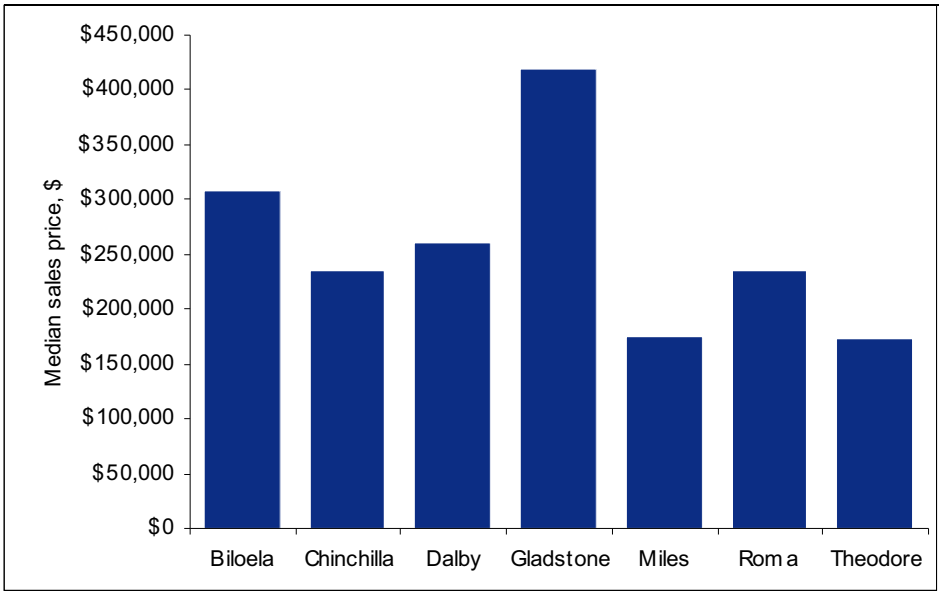
day shifts, and the maintenance, security and operational contractor staff working 12-hour shifts, either of a day or night.

House prices

Chart 5.10 shows the median sales price for the urban localities that are either within, or adjacent to the gas field and gas pipeline areas, as well as Gladstone, where the LNG plant is to be located. It shows that for all urban localities with the exception of Gladstone, the median sales price was $300,000 or lower in 2009, which compares with the median sales price for Brisbane of $421,000 in June 2009.22 The median Brisbane house price was broadly in line with the median sales price for Gladstone, which was $418,750.

Chart 5.10: Median sales prices in urban localities



Source: RP Data

Chart 5.13 shows the ratio of median monthly housing loan repayments to median gross household incomes for statistical local areas (SLAs) within the gas pipeline, gas fields and LNG plant regions, and within Queensland overall for 2006. In all of the regions the median housing loan repayment to income ratio was lower than for Queensland overall. In nominal terms, total housing loan repayments were between 20% and 60% lower than the Queensland average.

[22] See Australian Property Monitors (2009), *Official June 2009 Quarter Housing Data, Composition Adjusted Housing Price Series*, available from: http://www.homepriceguide.com.au/media_release/APM_HousePriceSeries_JuneQ09.pdf - Accessed 5 November 2009

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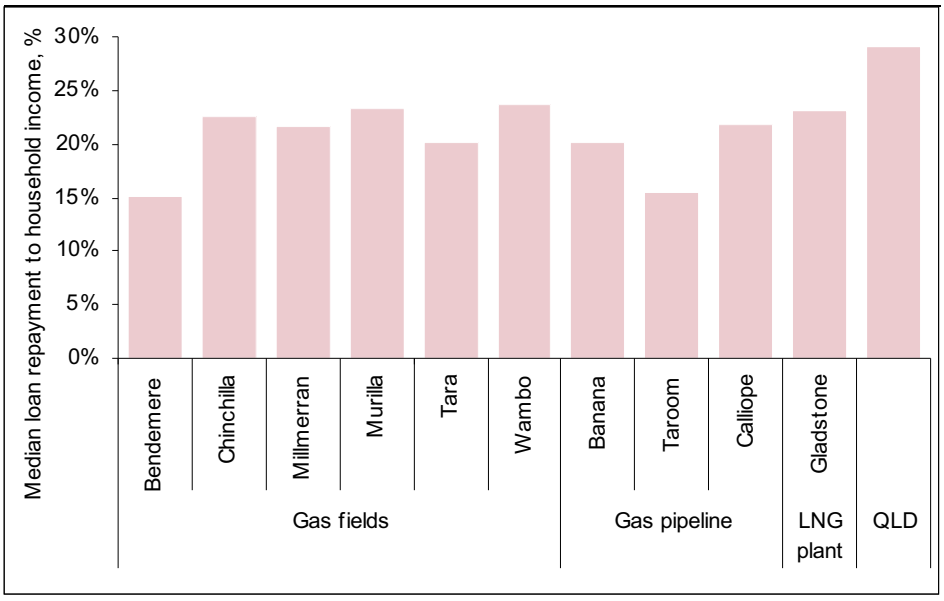
Chart 5.11: Median home loan repayments to median gross household income, by SLA, 2006



Source: ABS Census 2006

As discussed above, the construction phase of the project is likely to have little direct impact on house price growth in the gas pipeline region as workers will be housed in TAFs. However, the LNG facility and gas fields areas are likely to have a share of workers sourced locally. This is likely to have an impact on house prices, both directly and indirectly, as well as through the cumulative impact of multiple projects in the region.

During the operation phase, the Project is expected to have the effect of increasing house prices in the gas fields and LNG facility regions. However, the operation workforce in the gas pipeline region is unlikely to have a material impact on house prices due to the small scale.

KPMG Econtech estimates that the average house price is likely to increase during the operation phase in the Gas Fields region, particularly given that 30 % of the operational workforce, which will average around 1,000 workers, is expected to be sourced locally. The LNG facility is expected to increase average house prices in Gladstone by 8.9 % by 2020. However, spread over 7 years from when the first train becomes operational in 2014, to when the fourth train is operational in 2020, the impact will be roughly 1.3% per year. The Australia Pacific LNG recognises that as a major development, which is expected to create around 325 news jobs in Gladstone, the project is likely to have an impact on the local housing market. Moreover, when combined with the other projects flagged for the region, the cumulative impact on house prices in Gladstone could potentially be larger. The impact on house price growth is discussed in more detail in Section 5.2.1.1 above.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to house price pressures, which include looking to:

- provide housing for non-local construction staff and contractors in temporary accommodation facilities and consult with stakeholders including the local council as part of the site selection process for these facilities;
- during operations:

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- for the gas fields and gas pipeline: transition non local operations workforce from temporary accommodation facilities to live in the community only when housing stock becomes available; and
- for the LNG facility: look to placing 20 % of the Australia Pacific LNG workforce within the local community in the general housing pool;

- work through committees established under the Sustainable Resource Communities Policy to identify housing market issues, forecasts and possible responses; and
- develop community programs which involve working with Government and agencies that provide housing to people in distress.

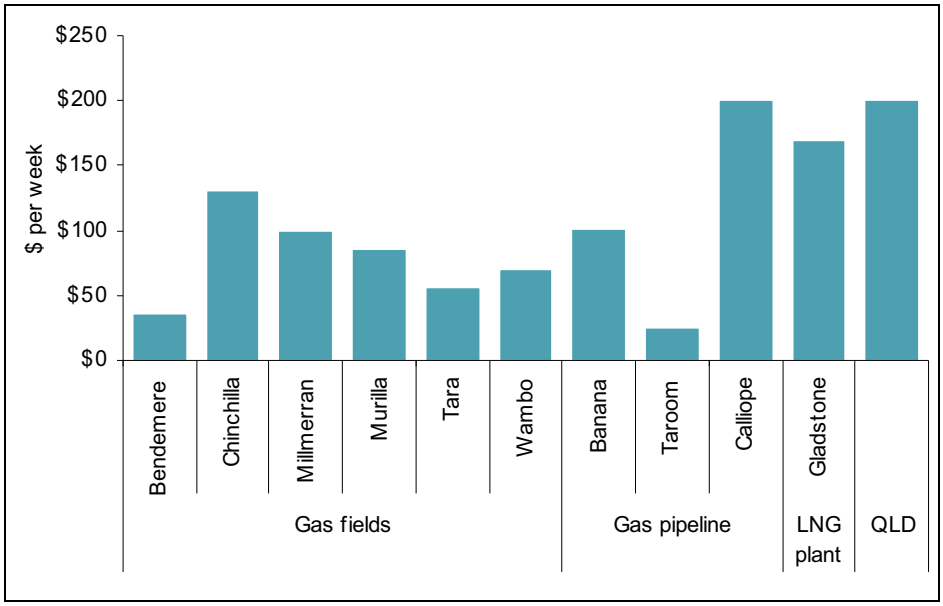
Rents

Impact

The Australia Pacific LNG project has the potential to contribute to an increase in demand for rental accommodation, given that there may be higher demand for housing and a supply that is limited in the short to medium term (given the timeframes required to increase the housing stock). This could force low income families out of the private rental market, and contribute to higher rates of housing stress. The impact during the construction phase will be less significant, particularly in the gas fields and gas pipeline component of the project, as a large share of the workers will be housed in construction camps. However, for the LNG plant around 20% of the construction workforce will be sourced locally. The gas fields will attempt as far as possible to source labour locally, which may possibly help mitigate the overall impact on house prices in these regions.

Chart 5.14 shows the median weekly rent payments in the SLAs within the gas field, gas pipeline and LNG plant regions, and compares this to the median rents in Queensland (based on 2006 Census data). Clearly the gas fields regions have much lower weekly rents than for the state, as do the Banana and Taroom SLAs in the gas pipeline region. However, for Gladstone and Calliope, rents are around the overall level for Queensland. When compared to household income, all SLAs are shown to have a lower ratio of rent to household income than that of Queensland, ranging from 5% to 15%, compared with 19% for Queensland overall.

Chart 7.12: Median rent payments, by SLA, 2006



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Source: ABS Census 2006

The size of this impact is difficult to quantify, though is likely to be broadly similar, in terms of direction and relative scale, to the impact on house prices as detailed in Section 5.2.1.1 above, and will likely occur be more significant in terms of the scale of the impact during the operation phase given that the majority of the workers during the construction phase will be housed in TAFs.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to rental accommodation pressures, which include looking to:

- provide housing for non-local construction staff and contractors in temporary accommodation facilities and will consult with stakeholders including the local council as part of the site selection process for these facilities;
- during operations:
  - for the gas fields and gas pipeline: transition non local operations workforce from temporary accommodation facilities to live in the community only when housing stock becomes available; and
  - for the LNG facility: look to placing 20 % of the Australia Pacific LNG workforce within the local community in the general housing pool.
- work through committees established under the Sustainable Resource Communities Policy to identify housing market issues, forecasts and possible responses; and
- develop community programs which involve working with Government and agencies that provide housing to people in distress.
-

7.2.2 Local facilities, infrastructure and services

Economic impact of change in access to economic and social infrastructure

Impact

The Australia Pacific LNG project may contribute to pressures on access to health services, recreational and cultural facilities and services, childcare places, educational places, and policing and emergency services from increased demand (given the expected influx of population into the region), which has the potential to have an economic impact, through having a negative effect on welfare and living standards.

The current infrastructure facilities and services available in the regions are detailed in the following Table 5.8:

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Table 7.8: Infrastructure facilities and services available

Type of infrastructure	Gas fields	Gas pipeline	LNG plant
Hospitals	Roma Hospital	Gladstone Hospital Biloela Hospital Theodore Hospital	Gladstone Hospital Mater Misericordiae Hospital
Health care services(a)	Chinchilla Health Services Dalby Health Services(b) Miles Health Services(b)	Taroom Health Services(c) Wandoan Outpatients Clinic(d)	Seven Regions Health Care Centre Gladstone Public Health Unit Third Crossing Manor Gladstone Community Health Services Centre Gladstone Care and Rehabilitation Centre Central Queensland Health and Rehabilitation
Childcare (Childcare places per 100 children aged 0-4)	Chinchilla – 1.7 Dalby – 0.8 Miles – 3.4 Roma – 0.8	Biloela – 0.7 Theodore – 3.0 Gladstone – 0.5	Gladstone – 0.5
Police	Six police stations within the region	Seven police stations within the region	Eight police stations within the Gladstone Regional Council region
Emergency services	Three ambulance service offices Six fire and rescue service facilities Six SES offices	Six ambulance service offices Five fire and rescue service facilities	Eight ambulance service offices Gladstone urban fire services, and Curtis Island rural fire brigade 28 additional rural fire services within Gladstone Regional Council region Seven SES offices, and Emergency Management Queensland office Two volunteer marine

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Type of infrastructure	Gas fields	Gas pipeline	LNG plant
			rescue services

Includes ambulance centre, community health services, dental, child health services, drug and alcohol services, mental health services, nursing home and long stay and respite care unless otherwise stated.

Does not provide drug and alcohol services

Does not provide drug and alcohol, mental health or nursing home services

Does not provide drug and alcohol, nursing home, or long stay and respite care services

One way to understand the scale of the economic impact is to look at the indicators of future demand, including the change in employment and industry value add within the region for the education, and health and community services sector. The KPMG Econtech estimates discussed earlier are shown in Table 5.9, which highlight there may be a sizeable increase in the demand for both health and education services particularly during the construction phase. The cumulative impacts on employment and industry value add are also shown for the operation phase. These estimates indicate that there will be a significant increase in the demand for employment in both the education and health and community services sectors due to the large number of projects in the region, which likely indicates sizeable pressure on current services.

Table 7.9: Indicators of increase in regional demand for education, health and community services with Australia Pacific LNG Project

Measure	Education	Health and community services
Change in employment (percent deviation from base case)		
Construction	4.2%	4.4%
Operation	3.1%	3.4%
Cumulative impact during operations	16.2%	17.6%
Change in industry value-add (percent deviation from base case)		
Construction	3.8%	4.0%
Operation	3.1%	3.4%
Cumulative impact during operations	16.2%	17.7%

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to impacts on economic and social infrastructure access, which include looking to:

- collaborate with government, industry and other providers to mitigate the impact on health services in local communities including providing the appropriate level of medical facilities for camps and operating plants;
- collaborate with government, industry and community partners on research programs to understand the social impacts and opportunities created by development in communities in which Australia Pacific LNG operates;
- develop community investment programs to support sustainable community development;

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- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the Project;
- continue to participate with government in local and regional planning processes and provide information about the Project to inform discussion and decision making in a timely manner; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

7.3 Industry

7.3.1 Costs and wages

Building materials

Impact

The Australia Pacific LNG project has the potential to contribute to an increase in price of building materials due to strong demand particularly in local areas, potentially reducing the willingness of developers to build new and upgrade existing residential, commercial and industrial developments in the area.

KPMG Econtech modelling shows that on a national level, the Australia Pacific LNG project will contribute to a 0.3% decline in the CPI relative to the base case, while the cumulative effect of the projects in the region will contribute a CPI growth rate that is 0.8% lower than in the base case. However, at a regional level it is likely that the Australia Pacific LNG project will contribute to an increase in prices of building materials in the short to medium term, as the supply side in local areas adjust to the increase in demand associated with the Project. This is particularly the case given the multiple projects in the region, which will further increase demand for building materials, and drive up prices.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to possible increases in the price of building materials, which include looking to:

- implement a Local Content Strategy whereby Australia Pacific LNG participates in or establishes programs which assist qualified local and regional businesses with the opportunity to tender for provision of goods and services for the Project;
- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- communicate anticipated demand for residential, commercial, and industrial development early to Local and State Government, developers, and local/regional building material suppliers so the supply can more adequately match the expected demand; and

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- encourage new building material suppliers to enter the market, and working with large national suppliers to establish operations and local outlets within the region.

Commercial and industrial property prices

Impact

The Australia Pacific LNG project has the potential to contribute to an increase in commercial and industrial property prices due to higher demand for commercial and industrial property. This demand is likely to come from new businesses being established in the Australia Pacific LNG project regions, in response to higher demand for goods and services associated with an increased workforce, and higher incomes. In addition, it is likely to come from established businesses expanding for the same reasons. When this is combined with a supply of new commercial and industrial properties that is limited in the short term (by the lead times required to obtain development approval and construct new commercial and industrial property developments), the effect is likely to be a decline in affordability for businesses of purchasing new commercial or industrial property, and hence dampen economic growth in the region. This is particularly the case given the multiple projects in the region, the likely effect of which is to put more upwards pressure on commercial and industrial property prices.

Data from Property Data Solutions indicate that the sales of commercial and industrial property in the gas fields, gas pipeline and LNG plant indicate that the number of sales and prices per square metre can be volatile. In particular:

- the median sales price of commercial property in the gas fields regions varied between $115 and $300 per square metre over the sample period (based on a total of 90 over the five years to 2008-09);
- the median prices for commercial property in the gas pipeline area varied between $225 per square metre and $409 per square metre (based on a total of 131 sales over the four years to 2008-09);
- in Gladstone, where the LNG plant is to be located, there were 37 commercial property sales between 2004-08 and 2007-08, and the median price varied between $340 per square metre, and $705 per square metre;
- median industrial property prices varied between $30 per square metre and $93 per square metre in the gas fields region;
- in the gas pipeline area, industrial property prices ranged from $68 per square metre and $170 per square metre over the five year period to 2008-09; and
- Gladstone saw 37 industrial property sales in the four years to 2007-08 (and no sales in 2008-09), with a median price between $156 per square metre and $194 per square metre.
- The likely impact on commercial and industrial property prices has not been quantified, partly due to the difficulties associated with doing so due to the volatility of prices for commercial and industrial property in the regions, and data constraints (given the lack of availability of information on commercial and industrial property vacancy rates).

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to possible increases in commercial and industrial property prices, which include looking to:

- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;

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- continue to participate with government in local and regional planning processes and provide information about the Project to inform discussion and decision making in a timely manner; and
- work through committees established under the Sustainable Resource Communities Policy to identify commercial and industrial property market issues, forecasts and possible responses.

Commercial and industrial rents

Impact

The Australia Pacific LNG project has the potential to contribute to an increase in commercial and industrial rental prices due to higher demand for commercial and industrial rental properties. This demand is likely to come from new businesses being established in the Australia Pacific LNG project regions, in response to higher demand for goods and services associated with an increased workforce, and higher incomes. In addition, it is likely to come from established businesses expanding for the same reasons. When this is combined with a supply of new commercial and industrial rental properties that is limited in the short term, the effect is likely to be an increase in rents on commercial or industrial property. This is particularly the case given the multiple projects in the region, the likely effect of which is to put more upwards pressure on commercial and industrial property rents.

The likely impact on commercial and industrial property rents has not been quantified, partly due to the difficulties associated with doing so due to the volatility of prices for commercial and industrial property rents in the regions.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG mitigate the impacts relating to possible increases in commercial and industrial rents, which include looking to:

- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- continue to participate with government in local and regional planning processes and provide information about the Project to inform discussion and decision making in a timely manner; and
- work through committees established under the Sustainable Resource Communities Policy to identify commercial and industrial property market issues, forecasts and possible responses.
-

Short term accommodation availability and tourism

Impact

The Australia Pacific LNG project has the potential to create an adverse effect on the availability of short-term accommodation, and by doing so negatively affect the tourism industry in the region (particularly given there is presently a high take up of temporary accommodation in the region). This is, however, offset by the use of accommodation camps during the construction phase.

The Queensland Department of Infrastructure and Planning undertook a survey of accommodation providers in June 2008. This survey showed that in some areas, the take up of hotel or motel beds by non-resident workers was up to 90%, though this varied significantly by region (Table 5.10). In the regions surveyed, there were a total of nearly 1,300 short-term accommodation beds, of which the occupancy rate was 30% in 2008.

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Table 7.10: Take up of motel and hotel beds, 2008

Location	Capacity of hotel and motel beds	Beds occupied by non-resident workers	Take-up of beds by non-resident workers (%)
Wandoan	20	18	90%
Chinchilla	190	101	53%
Dalby	400	130	33%
Taroom	79	18	23%
Roma	467	80	17%
Miles	113	40	12%
Total	1269	387	30%

Source: Department of Infrastructure and Planning (2008) *Surat Basin Population Report*

The ABS also publishes data on tourism accommodation at a small area level. The most recent data, from June 2009, shows that there were around 1,000 beds in short term accommodation in each Roma and Dalby in 2009, with around 2,000 in Gladstone (Table 5.11). If caravan parks are also included, the total capacity for short term accommodation in these areas is closer to 1,300 beds in Roma, 1,400 beds in Dalby, and 2,500 beds in Gladstone. The occupancy rates for short term accommodation (excluding caravan parks) in Roma and Dalby were relatively high, at 70% or more, whereas for Gladstone occupancy was lower at around 50%. This indicates that there may be more capacity in Gladstone than the other regions to accommodate workers if necessary without impacting negatively on the local tourism industry.

Table 7.11: Characteristics of short-term accommodation in Project regions

Characteristic	Roma	Dalby	Gladstone
Number of establishments (more than five beds)	17	21	24
Number of rooms	361	403	679
Number of beds	1,042	1,101	1,945
Average room occupancy rate June quarter 2009	76%	70%	52%
Average bed occupancy rate June quarter 2009	39%	35%	24%
Persons employed (number)	152	186	300
Average length of stay (days)	1.6	1.8	1.8
Average takings per night room occupied	$107	$100	$113

Source: ABS (2009) Tourist Accommodation, Small Area Data, Queensland, Jun 2009, Cat. No. 8635.3.55.001

Tourism Australia also publishes data on domestic and international travel to selected LGAs in Australia, including the number of visitors, visitor nights and expenditure. For the gas fields region Tourism Australia publishes information on the Roma, Murilla, Wambo and Dalby regions, with the latest data available from 2007. The figures show that a total of around 270,000 domestic visitors travelled to these areas, and stayed on average 2.3 nights per stay. The total expenditure was $46 million. This represented 0.4% of the total tourism

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expenditure for Queensland, and 0.8% of visitor nights. The gas fields region had no international visitors in the period, and there were over 800 tourism oriented businesses in the relevant local government areas (LGAs) as at June 2007.

For the pipeline area (including the Banana and Calliope LGAs), around 130,000 domestic visitors travelled to the region and stayed on average for 4.6 nights. Total spending by domestic visitors in the LGAs came to $25 million, which was equivalent to 0.1% of the state total. This region had around 10,000 international visitors in 2007, accounting for 0.8% of the total international visitors travelling to Queensland. The international visitors spent on average 5.7 nights in the Banana and/or Calliope LGAs, and spent a total of $4 million. There were over 600 tourism related businesses in the Banana and Calliope LGAs in 2007.

Gladstone saw around 140,000 domestic visitors in 2007, which was 0.8% of the state total. The visitors stayed on average for 4.3 nights and spent a total of $61 million in the Gladstone LGA, equivalent to 0.5% of the total tourism expenditure in Queensland. International visitor numbers were around 12,000 for Gladstone, and these visitors stayed around the same number of nights as domestic tourists in the region. Total spending by international tourists in Gladstone was $5 million in 2007, or around 0.2% of the state total. There were around 800 tourism related businesses in the Gladstone LGA in 2007.

It is important to note that the cumulative impact on the availability of short term accommodation is likely to be significantly larger, with multiple construction projects in the region all requiring accommodation for their workers.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG mitigate the impacts relating to pressures on short term accommodation and the tourism industry, which include looking to:

- provide housing for non-local construction staff and contractors in temporary accommodation facilities and consult with stakeholders including the local council as part of the site selection process for these facilities;
- work through committees established under the Sustainable Resource Communities Policy to identify short term accommodation issues, forecasts and possible responses; and
- provide local councils, industry bodies, and local accommodation providers with advance notice of substantive workforce movements that may create demand for short-term accommodation for those not using workers camps.

7.3.2 Employment and training

Pressures on local employment

Impact

The Australia Pacific LNG project may contribute to increased pressures on local employment particularly with unemployment rates in the region well below the rates in Queensland and Australia, and with the increased demand for workers. Indeed, Chart 5.13 shows that in some of the SLAs in both the gas fields and gas pipeline regions, unemployment rates in September 2008 were close to zero, and overall well below both the Australian and Queensland average. However, data for the Gladstone region from 2006 (the most recent data available) shows that the unemployment rate, at 4.3% as at September 2008, is higher than the state average.

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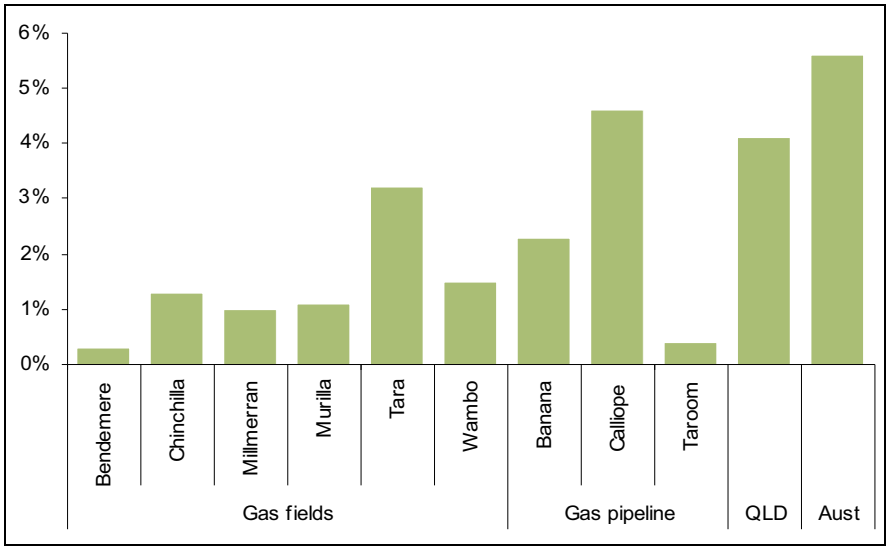
Chart 7.13: Unemployment rate in the gas fields and gas pipeline regions, September 2008



Source: OESR 2008

With particularly low unemployment rates in the region, there is some concern that the Australia Pacific LNG project may attract workers who are currently employed by local businesses, and as such may put pressure on local businesses to retain staff. However, one of the potential positive impacts is that the Australia Pacific LNG project is likely to have the effect of encouraging individuals not in the labour force to return to work. By doing so the Australia Pacific LNG project has the potential to increase labour force participation and increase employment (estimated to be an increase in total direct and indirect employment in the region of around 6,900 jobs during the construction phase and 9,000 jobs during operations).

By region, estimates indicate that the total direct and indirect employment in the Mackay-Fitzroy-Central West Queensland region will increase by around 4,100 jobs during the construction phase and 2,800 jobs during operations, and in the Darling Downs-South West Queensland region the increase will be around 2,900 jobs during the construction phase and 6,000 jobs during operations.

The pressures on local employment will be magnified by the fact that there will be a number of new projects in the region. KPMG Econtech estimates of the cumulative impact of the projects in the region during the operation phase indicate that the total increase in direct and indirect employment in the Darling Downs-South West Queensland region will be 39,000 above the baseline case, while in the Mackay-Fitzroy-Central West Queensland region the cumulative impact will be to add over 15,000 jobs. The pressures on employment arising from the cumulative impact of multiple projects in the region will be particularly strong due to the tight labour market conditions in the regions.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to potential pressures on local employment markets, which include looking to:

- continue to use and develop methods to attract people local to the region to the workforce;
- continue to use and develop methods to attract under-represented groups to the workforce;

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- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures;
- work together with the CSG/LNG industry through the CSG/LNG Skills Taskforce of Energy Skills Queensland to help address skill shortages by:
  - the creation of awareness in the communities for the CSG/LNG industry;
  - enhancing vocational training; and
  - facilitating career advice and work readiness programs for new entrants and mature entrants from related industries;
- participate in CSG/LNG gateway programs with high schools in the Project region in partnership with providers such as the Queensland Minerals and Energy Academy to implement programs that promote career opportunities and facilitate employment in the CSG/LNG industry;
- expand competency based training and skills development programs for Production and Process Plant Operators, including further development of the dedicated training facilities at the Peat gas processing plant near Wandoan; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

Capacity of local businesses to attract and retain workers

Impact

The Australia Pacific LNG project may have a negative impact on the capacity for local businesses to attract and retain workers, particularly as a result of upward pressure on wages (i.e. workers can obtain jobs with Australia Pacific LNG which may pay a higher rate than local businesses). KPMG Econtech estimates indicate that real after tax wages overall will increase by 0.1%. This is an overall increase, and may mask differences between different businesses and industry sectors.23

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to a possible reduction in the capacity of local businesses to attract and retain workers, which include looking to:

- offer competitive remuneration that is on par with current industry levels, and consider offering non-financial benefits to staff including part-time work, job sharing, purchased annual leave, and off-site work where appropriate;
- continue to use and develop methods to attract people local to the region to the workforce;
- continue to use and develop methods to attract under-represented groups to the workforce;

[23] Aside from an overall impact on wages, it is difficult to estimate the possible size of this impact.

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- aim to build collaborative partnerships with government and community organisations to enhance the capacity of employers to provide jobs and the capacity of locals to develop skills and secure jobs, for example through the Community Skills Scholarship program;
- work with government, the community and industry to plan for potential cumulative impacts and share information relating to potential impacts and mitigation measures; and
- continue to collaborate on programs with government, training and educational groups that build the local skills base both to meet the specific needs of the industry and other impacted sectors. This could include further development of apprenticeship, traineeship, scholarship and higher education programs.

7.3.3 Business and industry

Opportunities for local suppliers

Impact

The Australia Pacific LNG project is likely to provide the opportunity for local and regional businesses to supply goods and services to Australia Pacific LNG contractors, staff and families. Indeed, the Australia Pacific LNG project is likely to see an additional 6,900 jobs during the construction phase and 9,000 jobs during operations. The Project is also likely to contribute to an increase in the population in the regions, with the increase estimated to be as follows:

- gas fields, up to 1,674 people;
- gas pipeline, up to 54 people; and
- LNG plant, up to 877 people.

As such, the Australia Pacific LNG project is likely to contribute to increased demand for goods and services both directly (e.g. bread provided to construction camps, hairdressing services to Project staff) and indirectly (e.g. childcare places for families of Project staff). The overall effect is likely to be an increase in consumption of 0.1% (note that consumption data is only available at the national, not regional level). The largest impact will be in the gas, electricity and fuel sector which is projected to increase by 1.3%. As the Australia Pacific LNG project involves a direct increase in domestic gas supply, this will reduce domestic gas prices and increase consumption.

Table 7.12: Impact on national consumption (deviations from base case)

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Consumption groups	% deviations
Food	0.0%
Cigarettes and tobacco	0.0%
Alcoholic drinks	0.1%
Clothing, fabrics and footwear	0.1%
Household appliances	0.1%
Other household durables	0.1%
Health	0.0%
Dwelling rent	0.1%
Gas, electricity and fuel	1.3%
Fares	0.0%
Purchase of motor vehicles	0.2%
Operation of motor vehicles	0.0%
Postal and telephone services	0.1%
Entertainment and recreation	0.0%
Financial services	0.0%
Other goods	0.1%
Other services	0.0%
Personal Travel Imports	0.4%
Total	**0.1%**

The projected increase in consumption, by both consumers and businesses in the region, will create opportunities for local and regional businesses to supply goods and services to Australia Pacific LNG contractors, staff and families.

In addition, the demand for goods and services is projected to increase due to the cumulative effect of multiple projects in the region. KPMG Econtech forecasts indicate that the total employment in the region will likely rise by 39,000 in the Darling Downs-South West region and 15,000 in the Mackay-Fitzroy-Central West region. The direct and indirect effect of the cumulative projects is projected to increase real private consumption in Australia by 0.2%.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to maximise opportunities for local suppliers, which include looking to:

- implement a Local Content Strategy whereby Australia Pacific LNG participates in or establishes programs which assist qualified local and regional businesses with the opportunity to tender for provision of goods and services for the Project;
- ensure contracts with suppliers and contractors include provisions for sustainable growth of communities and are aligned with Australia Pacific LNG's sustainability principles and objectives; and
- continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the Project.

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Economic impact of changes in land use

Impact

The Australia Pacific LNG project has the potential to reduce the quantity of agricultural land available for production purposes. This will occur during both the construction phase, as land is taken out of production while the transmission pipeline is constructed and gas wells are drilled and gas facilities are being built, and during the operation phase though this will predominantly be in the gas fields region. The economic impact of this is a potential reduction in industry output.

KPMG Econtech forecasts indicate that the agriculture, forestry and fishing industry value add for the Mackay-Fitzroy-Central West Queensland region will be $2.8 million lower than the base case during the construction phase, which is equivalent to a 0.3% decline. During the operational phase, industry output is projected to be $7.3 million lower, or 0.5%.

In the Darling Downs-South West Queensland region, KPMG Econtech forecasts indicate that the regional agriculture, forestry and fishing industry value add will be $6.0 million lower than the base case during the construction phase, which is equivalent to a 0.4% decline. During the operational phase, industry output is projected to be $9.9 million lower, or 0.5%.

For the regions combined, the forecasts indicate that the regional agriculture, forestry and fishing industry value added will be 0.3% lower than the base case during the construction phase and 0.5% lower during the operation phase.

The total land for which the use will shift from agricultural production to uses associated with the Australia Pacific LNG project is as follows:

- **Gas fields:** the Project's CSG fields occupy what is predominantly agricultural and grazing land. The Project will require, in total, around 572,000 hectares for the development of CSG wells and associated infrastructure, and of this, around 58 % is good quality agricultural land (GQAL).24 This is comprised of around 112,000 hectares of Class A GQAL, 149,000 hectares of Class B GQAL, and 71,000 hectares of Class C GQAL. This land will be spread over the Combabula/Ramyard, Woleebee, Carinya, Condabri, Dalwogan, Talinga/Orana, Kainama and Gilbert Gully gas fields. It is estimated that the full development of the proposed gas field facilities may initially disturb some 23,726 hectares of GQAL as a result of initial construction activity. This equates to approximately 4.14% of the gas fields development area. Following the completion of construction and associated rehabilitation activities, it is estimated that the ultimate development of the gas fields will remove from potential agricultural production in the order of 4,319 hectares of GQAL for the operational life of the facilities concerned. This equates to approximately 0.76% of the total gas fields development area.
- **Gas pipeline:** the Project's pipeline, which will be over 400 kilometres in length with a 50m Right of Way (ROW) corridor, will link the CSG fields with the LNG Plant in Gladstone. The majority of the areas through which the pipeline will pass are rural, with extensive cattle grazing, arable farming and other mining and energy based uses. In the Project construction phase 2,209 hectares of land will

[24] Queensland's Department of Primary Industries identifies four classes of agricultural land, these being: Class A, which is crop land suitable for current and potential crops with no or moderate limitations to production; Class B, which is limited crop land, being marginal for current and potential crops due to severe limitation (engineering and/or agronomic improvements may be required before the land is suitable for cropping), and suitable for pastures; Class C, which is suitable for improved or native pastures due to limitations which preclude continuous cultivation for crop production, but some areas may tolerate a short period of ground disturbance for pasture establishment; and Class D, which is non-agricultural land and is not suitable for agricultural use due to extreme limitations.

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required. Of this, 125 hectares is classified as Class A GQAL, 725 hectares is Class B GQAL, and 115 hectares is Class C1 GQAL. The remaining 1,244 hectares (or 56%) is not used in agricultural production. Following the completion of construction and associated rehabilitation activities, it is estimated that the development of the pipeline will remove from potential agricultural production in the order of 31 hectares of GQAL for the operational life of the pipeline; and

- **LNG Facility:** the proposed LNG plant will be located on Curtis Island, within the Gladstone State Development Area. The site boundary is 233.5 ha and while some ad-hoc grazing occurs on parts of this area, the production value is negligible.
- The cumulative impact of multiple projects in the region would be to decrease the available agricultural land by somewhat more than the above estimates. This in turn would potentially have a larger negative impact on agricultural employment and production in the region. Indeed, KPMG Econtech forecasts indicate that during the operation phase, the cumulative impact of the projects is to reduce agriculture, forestry and fishing sector employment by 2.2% in both the Darling Downs-South West and Mackay-Fitzroy-Central West regions, and to reduce output by 2.1% in each of the regions.

The Australia Pacific LNG project also has the potential to impact on the agricultural land available not by changing its productive uses, but rather through the fragmentation of agricultural land, and disruption in farming activities and practices, which may occur through:

- increase in traffic movements on properties;
- interference with overland flow through the modification of runoff controls;
- an increase in soil compaction through heavy trafficking, reducing water infiltration pending correction during rehabilitation;
- spread of weeds;
- inefficient operating practices, for example if the irrigation and harvesting machinery needs to be reset to move around gas field or pipeline infrastructure;
- livestock escaping from paddocks;
- decreased fertility;
- increased erosion; and
- increased risk of fire.

The impact of the Project on farming activities will depend on the amount of land, the location of project infrastructure relative to farming activities, the area and duration of the disruption or disturbance, the capacity to modify farming practice to accommodate project infrastructure and the type of farming activities in the specific location. The land use planning chapter of the EIS provides more detail on these issues. However, it is possible to say that fragmentation of agricultural land is expected to be a short-term effect associated with the construction of the gas pipeline and gas fields. In the long term, the impacts on agricultural land will be minimal, particularly for the pipeline as it will be buried after construction and the landowners will be able to regain access to the corridor and resume most agricultural activities. It is important to note that there will be multiple projects in the region, so the likely cumulative impact on agricultural land will be larger.

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Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the economic impact relating to changes in land use which, along with following the standards set out in the Project Environmental Management Plan, and the measures identified in the land use and planning, and transport sections of the EIS, include looking to:

- continue to work to mitigate the project impacts on local landowners throughout the project life by:
  - engaging with each landowner within the project area in advance of any project activity on their land;
  - working where possible towards mutually beneficial outcomes;
  - assigning a dedicated liaison officer to each landowner in the Project Area; and
  - locating and scheduling Project activities to reduce impacts on landowner activities; and
- continue consultation and engagement programs with stakeholders to ensure their views are understood and considered throughout the life of the Project.

Removal of millable timber

Impact

The Australia Pacific LNG project may potentially contribute to unnecessary millable timber being removed during construction activities, which could result in a decline in timber industry output. The magnitude of this impact is potentially small, as the Australia Pacific LNG project is not in an area with a substantial forestry industry. Indeed, the forestry industry employed 2.2% of the labour force in the gas field region in 2006 (with the Millmerran Statistical Local Area (SLA) having the highest share at 4.9%), and 1.4% of the labour force in the gas pipeline region.25

As such, the scale of the impact is likely to be minor given the relatively small size of the industry, and the fact that the location for the gas fields and pipeline has been chosen to minimise disruption to farming and forestry activities. That said, with multiple projects in the region, the cumulative impact on millable timber and the forestry industry is likely to be larger than that directly associated with the Australia Pacific LNG project.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to unnecessary removal of millable timber which, along with following the standards set out in the Project Environmental Management Plan, and the measures identified in the land use and planning section of the EIS, include looking to:

- where possible, site pipeline infrastructure in the pipeline ROW so as to avoid forestry areas and minimise the need to clear millable timber;
- liaise with landowners regarding millable timber on private land to ensure that the impact is minimised and, where possible, mutually beneficial outcomes are achieved; and

[25] Based on data from the ABS Census, 2006. Includes people employed in the Logging, Log Sawmilling, Log Sawmilling and Timber Dressing (not further defined), and forestry support services industries, which together employed 218 people in the gas fields SLAs (these being Chinchilla, Murilla, Tara, Wambo, Bendemere and Millmerran), and 128 people in the gas pipeline SLAs (these being Banana, Taroom and Chinchilla Part B).

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- investigate the opportunity to incorporate a timber logging truck during the construction phase that takes logs deemed to be millable that are felled during the construction process and sells these logs to local millers.

Disruptions to commercial fisheries

Impact

The Australia Pacific LNG project may potentially have a negative impact on commercial fisheries during the construction of the wharf and jetty structures associated with the LNG Plant, and during the operational phase, with the movement of ships. This could have a negative effect on industry output.

However, the magnitude of this impact is potentially small, as the Australia Pacific LNG project is not in an area with a substantial Fishery industry. Indeed, the commercial fishing industry employed only 0.1% of the labour force in the gas pipeline region and 0.2% of the labour force in the LNG plant region. That said, with multiple projects in the region, the cumulative impact on fishing industry is likely to be larger than that directly associated with the Australia Pacific LNG project.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the impacts relating to possible disruptions to commercial fisheries, which, along with following the standards set out in the Project Environmental Management Plan, and the mitigation strategies identified in the surface water and watercourses section of the EIS, include looking to:

- notify commercial fisheries as to the construction timing and location, as early as practicable, and schedule works so as to minimise disturbance;
- ensure a high standard of environmental management and monitoring of the impact on waterways, including participative monitoring with community groups; and
- replenish fish stocks and rehabilitate any affected sea floors once work has been completed.

Impact of dust and noise on local businesses

Impact

The Australia Pacific LNG project could potentially impact on local businesses during the construction phase due to dust and noise produced. Indeed, site clearance, access road construction, Pipeline installation, CSG well and associated infrastructure and vehicle movements are likely to have a negative impact on both noise levels and air quality due to dust generation through the construction phase. In addition, high dust levels can reduce agricultural output and hence land productivity. Further, the increased levels of noise and dust may have a negative impact on tourism and retail businesses, as these factors may discourage people from visiting the region in which the construction activity is taking place either as a visitor or locals to shop. This is particularly the case given that there are likely to be multiple projects in the region, and hence the cumulative impact on local businesses from dust and noise will be larger.

Recommended mitigation strategies

There are a range of possible options available to Australia Pacific LNG to mitigate the to impact of dust and noise from the Project on local businesses which, along with following the standards set out in the Project

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Environmental Management Plan, and the mitigation strategies identified in the dust and noise section of the EIS, include looking to:

- notify businesses as to the construction timing and location, as early as practicable, and schedule works so as to minimise disturbance; and

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8. Appendix A Detailed Tables of Results

Table A1: Australia Pacific LNG Project's Average Employment impact during its Construction Phase

	National Economy		Queensland Economy		Regional Economies		Darling Downs Economy		Mackay-Fitzroy Economy	
Industry	(000s)	%	(000s)	%	(000s)	%	(000s)	%	(000s)	%
Agriculture, Forestry and Fishing	-0.1	0.0%	-0.1	-0.1%	-0.1	-0.5%	-0.1	-0.6%	0.0	-0.5%
Mining	0.0	0.0%	0.0	0.0%	0.0	-0.2%	0.0	-0.2%	0.0	-0.2%
Manufacturing	-0.5	0.0%	-0.2	-0.1%	-0.2	-0.6%	-0.1	-0.7%	-0.1	-0.6%
Electricity, Gas and Water Supply	0.2	0.2%	0.0	-0.1%	0.0	-0.3%	0.0	-0.4%	0.0	-0.3%
Construction	3.3	0.3%	3.3	1.3%	3.3	8.8%	1.1	8.8%	2.2	8.8%
Wholesale Trade	1.1	0.2%	0.9	0.8%	0.7	4.3%	0.3	4.8%	0.4	4.1%
Retail Trade	1.9	0.2%	1.7	0.9%	1.3	5.0%	0.5	5.3%	0.8	4.9%
Accommodation, Cafes and Restaurants	0.4	0.2%	0.4	0.8%	0.3	4.5%	0.1	4.9%	0.2	4.3%
Transport and Storage	-0.3	0.0%	-0.2	-0.1%	-0.2	-0.7%	0.0	-0.8%	-0.1	-0.7%
Communication Services	0.3	0.1%	0.2	0.5%	0.2	3.0%	0.1	3.2%	0.1	2.9%
Finance and Insurance	1.5	0.2%	0.8	0.9%	0.5	4.9%	0.4	5.5%	0.2	4.7%
Property and Business Services	-3.5	-0.2%	-2.1	-0.6%	-1.2	-3.2%	-0.5	-3.6%	-0.8	-3.1%
Government Administration	1.2	0.2%	-0.6	-0.4%	-0.4	-2.5%	-0.2	-2.7%	-0.2	-2.4%
Education	1.3	0.2%	1.1	0.8%	1.1	4.2%	0.6	4.7%	0.6	4.0%
Health and Community Services	2.0	0.2%	1.6	0.8%	1.1	4.4%	0.6	4.9%	0.5	4.2%
Cultural and Recreational Services	0.4	0.2%	0.3	0.9%	0.2	5.2%	0.1	5.9%	0.1	5.0%
Personal and Other Services	0.7	0.2%	0.5	0.8%	0.4	4.3%	0.2	4.8%	0.2	4.1%
Ownership of Dwellings	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Total	9.9	0.1%	7.6	0.4%	6.9	2.1%	2.9	2.3%	4.1	2.1%

Source: KPMG Econtech's MMR simulation.

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Table A2: Australia Pacific LNG Project's Average Value Added impact during its Construction Phase

	National Economy		Queensland Economy		Regional Economies		Darling Downs Economy		Mackay-Fitzroy Economy	
Industry	$m	%	$m	%	$m	%	$m	%	$m	%
Agriculture, Forestry and Fishing	-5.1	0.0%	-3.4	-0.1%	-8.3	-0.3%	-6.0	-0.4%	-2.8	-0.3%
Mining	-1.8	0.0%	-1.1	0.0%	-2.4	0.0%	-0.2	0.0%	-2.1	0.0%
Manufacturing	-31.2	0.0%	-12.7	-0.1%	-10.5	-0.4%	-5.6	-0.4%	-5.2	-0.4%
Electricity, Gas and Water Supply	14.1	0.1%	-0.8	0.0%	-0.8	-0.1%	-0.3	-0.1%	-0.6	-0.1%
Construction	1024.0	1.2%	1025.3	5.0%	1024.6	33.6%	331.0	33.6%	693.5	33.6%
Wholesale Trade	63.4	0.1%	52.3	0.7%	39.7	3.4%	15.9	3.8%	24.3	3.3%
Retail Trade	112.8	0.2%	102.6	0.8%	78.8	4.1%	32.7	4.4%	46.8	4.0%
Accommodation, Cafes and Restaurants	25.7	0.1%	22.7	0.5%	18.5	2.7%	5.7	2.9%	12.9	2.6%
Transport and Storage	-17.3	0.0%	-11.6	-0.1%	-10.4	-0.5%	-3.0	-0.5%	-7.3	-0.4%
Communication Services	19.5	0.1%	11.4	0.3%	9.4	1.7%	4.5	1.9%	5.1	1.7%
Finance and Insurance	90.5	0.1%	49.9	0.4%	30.0	2.1%	20.5	2.3%	10.9	2.0%
Property and Business Services	-211.6	-0.2%	-126.9	-0.5%	-72.9	-2.9%	-27.7	-3.2%	-45.7	-2.8%
Government Administration	73.7	0.2%	-34.2	-0.4%	-23.0	-2.1%	-11.3	-2.3%	-12.2	-2.0%
Education	78.6	0.2%	65.0	0.7%	65.5	3.8%	33.5	4.3%	33.8	3.6%
Health and Community Services	121.9	0.2%	95.2	0.8%	64.9	4.0%	36.3	4.5%	30.8	3.8%
Cultural and Recreational Services	22.4	0.1%	18.9	0.4%	12.9	2.0%	5.5	2.3%	7.6	1.9%
Personal and Other Services	44.1	0.2%	33.1	0.7%	22.8	3.8%	9.6	4.2%	13.6	3.6%
Ownership of Dwellings	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Total	1423.7	0.1%	1285.6	0.6%	1238.9	3.2%	441.1	3.5%	803.3	3.1%

Source: KPMG Econtech's MMR simulation.

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9. Appendix B Cumulative Project List

Project	Developer	Description	Location	Study Area	Output
Arrow Energy Gas Field Development	Arrow Energy Ltd	Expand operations in Queensland's Surat Basin with a major coal seam gas exploration, development and production project. The project includes existing coal seam gas projects in Kogan North (40 km west of Dalby), Tipton West (20 km south of Dalby), Daandine (40 km west of Dalby), Stratheden (20 km north west of Dalby).	Dalby	Gas Fields	1,500 production wells. The company's estimated gross resource in the Surat Basin is 12,400 PJ.
Australian Inland Rail Expressway - Toowoomba to Gladstone Railway - (see Surat Basin Rail Project)	Australian Transport & Energy Corridor Ltd is a 20% equity participant (PPP)	The SBR project is a rail project linking Toowoomba to the Port of Gladstone, via a 210km rail corridor estimated at approx $1.0bn. Main use will be coal transport.	Surat Basin	Gas Fields, LNG Facility	Initial capacity would be about 24 train movements a day, shifting up to 42 million tonnes of coal a year.
Boyne Smelters	Boyne Smelters Ltd / Rio Tinto	Build carbon bake furnace four (CBF4) with open bake technology to replace carbon bake furnaces one and two, which have been operating for 25 years	Boyne Island	LNG Facility	545,000 tonnes p/a
Cameby Downs (Coal) Expansion Project	Syntech Resources Pty Ltd	New open-cut mine to produce high-volatile thermal coal for export. The deposit is estimated to contain more than 300 Mt of resources within seams of the Juandah Coal Measures. Production is expected to start in 2010 at approximately 1.4Mt per year. Coal will be transported by rail approximately 380km to the Port of Brisbane for export to mostly Asian markets.	15km east of Miles (Darling Downs)	Gas Field	The project proposes to increase mining from 1.8 Mt/y to 25 Mt/y to produce 15-20 Mt/y of product coal for export.

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Project	Developer	Description	Location	Study Area	Output
Central Queensland Pipeline	Central Queensland Pipeline Ltd (CPQ) - Arrow Energy and AGL Energy (50:50 joint venture)	Construction of an underground, high pressure, 440km pipeline to transport coal seam methane (natural gas) from coal mining regions in northern Bowen Basin to customers in Gladstone and also to connect with South East Queensland's existing gas pipeline network	Moranbah to Gladstone, Central Queensland	Gas Pipeline, LNG Facility	20 PJ per annum initially, could be expanded to approx 50 PJ per annum
Darling Downs Power Station	Origin Energy	Development of 630 MW combined cycle gas turbine power station at Braemar, 40 km west of Dalby. 150-200 Mtpa water demand, air cooled, part of $1.38B investment in CSG operation, gas pipelines etc.	Braemar	Gas Fields	630 MW Base Load plant
Dawson Expansion Project	Anglo Coal Australia Pty Ltd and Mitsui Coal Holdings Pty Ltd	When completed, Dawson will combine three adjacent coal mining areas - Dawson Central, Dawson North and Dawson South mines - stretching almost 60 kilometres (the lease area is almost twice that length).	55km south-west of Biloela	Gas Pipeline	Will export up to 12.7Mt annually
East End No. 5 Mine	Cement Australia	Proposed expansion of existing mine west of Gladstone to 2.5 Mtpa that provides limestone to the cement kilns, commenced EIS process and will require additional workforce during expansion stage.	7 km SW of Mt Larcome, Gladstone	Gas Pipeline, LNG Facility	2.5 Mtpa
Fisherman's Landing Port Expansion	Central Queensland Ports Authority	A six-berth extension of 153 ha of reclamation adjacent to existing Fisherman's Landing Wharf facilities. The six berths would cater to panamax-sized vessels (80,000 DWT).	Gladstone	LNG Facility	Six wharves and associated transport, storage, loading and unloading facilities.

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Project	Developer	Description	Location	Study Area	Output
Gladstone LNG (GLNG)	Northern Energy Corporation Limited (Santos)	Developing the world's first large-scale coal seam gas to liquefied natural gas project. GLNG involves exploring and producing CSG in the Surat and Bowen Basins, a 425km pipeline from the gas fields to Gladstone, and a gas liquefaction and export facility on Curtis Island for up to 10 million tonnes of LNG per year	Gladstone	Gas Pipeline, LNG Facility	Initial production of 3-4 mtpa, of liquefied natural gas (LNG), with a maximum potential production of 10 mtpa.
Gladstone LNG Project—Fisherman's Landing	Gladstone LNG P/L	Proposed development of a mid–scale liquefied natural gas (LNG) plant at Fisherman's Landing Wharf (FLW) near Gladstone. The proposal has an expected life of 25 years and the first stage would produce up to 1.6 Mtpa of LNG per year. A proposed second stage to 3 Mtpa, CSG from Arrow CSG.	Gladstone	LNG Facility	Stage One output of up to 1.5 million tonnes. A proposed second stage would double the capacity
Gladstone Pacific Nickel Refinery	Gladstone Pacific Nickel Limited	The Gladstone Pacific Project is a greenfield project. The Gladstone refinery will process ore from Gladstone Pacific Nickel Limited's two mine sites located at Marlborough and New Caledonia. Stage 1 will produce 60,000 tonnes of nickel and 6,000 tonnes of cobalt per year. During the first few years of operation, rail will transport ore from Marlborough to Gladstone but, later, a dedicated 175km ore slurry pipeline will transport the ore	Gladstone	LNG Facility	60,000 tonnes of nickel per year (Stage 1); 126,000 tonnes a year of nickel metal and 10,400 tonnes a year of cobalt metal (Stage 2)
Gladstone Steel Making Facility	Boulder Steel Limited	Boulder Steel Limited (BGD) in joint venture with a Middle Eastern partner is proposing to construct and operate an integrated steelmaking plant at a site within the Aldoga Precinct of the Gladstone State Development Area (GSDA).	Gladstone	LNG Facility	Initial export capacity of 2.1 Mtpa of steel output, increasing to 5 Mtpa in the second stage.

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Project	Developer	Description	Location	Study Area	Output
Gladstone-Fitzroy Pipeline	Gladstone Area Water Board	This project involves developing a pipeline from the Fitzroy River to the Gladstone Region to provide a more reliable supply to meet demand growth. The Gladstone Area Water Board will undertake all the necessary studies and investigations, design, procurement and construction planning development of a business case	115km pipeline linking Fitzroy River to Gladstone	Gas Pipeline, LNG Facility	The project will be capable of extracting up to 30,000 ML of water each year from the Fitzroy River.
Linc Energy Underground Coal Gasification	Linc Energy	Linc Energy proposes to develop a commercial underground coal gasification and gas-to-liquids synthetic fuel project. Currently under-going pilot development of 20 bbl/day demonstration plant. Full scale production could be 20,000bbl/day of synthetic diesel and 200MW of power generation.	20km SW of Chinchilla	Gas Fields	Target production capacity of 20,000 barrels of diesel fuel per day (20,000 BPD)
Moura Link (Government Project)	Queensland Rail	Construction of a new rail maintenance and provisioning facilities in Aldoga in the Gladstone State Development Area. This will link the existing Moura coal rail line and upgrade the rail link to the new Wiggins Island Coal Terminal at the Port of Gladstone	Gladstone	Gas Pipeline, LNG Facility	The Moura Link Project will enable the Blackwater/Moura rail systems to handle up to 90 million tonnes per annum.
Nathan Dam and Associated Pipelines (Government Project)	SunWater	Construction of either a mass concrete or roller compacted concrete dam. There will be at least one water distribution pipeline from the storage south through the Surat Basin terminating at Dalby	Dawson River near Nathan Gorge about 35 km north-east of Taroom	Gas Pipeline	The dam will yield 70,000 megalitres per annum of high priority water.

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Project	Developer	Description	Location	Study Area	Output
Queensland Curtis LNG Project	BG International Limited and QLD Gas Company Limited	Expanding the Surat Basin gas fields and constructing a 12 million tonnes per year LNG production facility on Curtis Island, near Gladstone. The project includes a 380 km pipeline to connect the gas fields to Curtis Island, 400km of pipeline network in the gas fields, a three-train gas plant, and wharf facilities in Port Curtis to ship the product	Curtis Island, Gladstone and Surat Basin Coalfields	LNG Facility, Gas Pipeline, Gas Field	12 Mt/a or contribute $32 billion to Queensland's Gross State Product (GSP)
Queensland Gas Pipeline Expansion	Jemena Limited	Provide additional capacity through compression and looping for the existing QLD Gas Pipeline to meet the gas needs of Rio Tinto Aluminium's Yarwun expansion. Completed capacity of 49PJpa.	Yarwun	Gas Pipeline	The stage 1 expansion project will increase capacity to 49 PJ/a and is due for completion in early 2010.
Shell Australia LNG Project	Shell CSG (Australia) P/L	Development of 16 Mtpa LNG facility (4 trains)	Curtis Island	LNG Facility	The LNG facility is expected to produce up to 16 Mtpa.
Surat Basin Railway	Surat Basin Rail Pty Ltd	Development of the Surat Basin Railway as part of a new 700 km, export-focused rail corridor between Toowoomba and Gladstone. The new 210 km railway between Banana and Wandoan is an open-access, multi-user, investor-funded railway. It will open up the Surat Basin's 6.3 billion tonne of thermal coal resources for export via Gladstone. In December 2006, the QLD Government granted a conditional, exclusive mandate to the new consortium to progress a proposal for the Surat Basin Railway through to financial close.	Surat Basin	Gas Pipeline	42mtpa coal, 4 mtpa freight
Surat to Gladstone Pipeline	Surat Gladstone Pipeline Ltd (Arrow Energy Ltd)	470km x 660 mm diameter buried pipeline to deliver CSG from the Surat Basin near Dalby to the Fisherman's Landing LNG facility, Gladstone.	Dalby to Gladstone	Gas Pipeline, LNG Facility	1.5mpta first train (2012), additional 1.5mpta second train

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Project	Developer	Description	Location	Study Area	Output
					(2013)
Walloon Coal Seam Gas Field	Origin Energy Ltd	Develop the Walloon CSG fields in order to supply Rio Tinto Aluminium Yarwun refinery. Estimated gas production output is 22.8 PJ per year when fully operational	Walloon	Gas Field	The project will achieve production of up to 90 TJ/day of coal seam gas
Wallumbilla-Darling Downs Power Station Gas Pipeline	Origin Energy Walloons Transmissions Pty Ltd	Construction of a new 200km pipeline from the Wallumbilla gas hub to the proposed Darling Downs Power Station site. The pipeline will supply gas to the power station from both the Spring Fully CSG fields new Injune and the Walloon fields near Chinchilla	Wallumbilla - Darling Downs Power Station site, west of Dalby	Gas Field	The pipeline has capacity to transport up to 400 TJ of gas each day.
Wandoan Coal Project	Xstrata Coal QLD Pty Ltd	The Wandoan project comprises several shallow deposits that contain large resources of high-volatile thermal coal within the Walloon Subgroup. Feasibility studies are underway for a large, open-cut mine to supply export and possibly domestic markets. Associated with the project is the development of the Surat Basin Railway to transport the product coal approximately 390 km to the Port of Gladstone for export. The coal deposits are large enough to also sustain a domestic power plant or other coal-based domestic industries	Near Wandoan, 60km north of Miles	Gas Fields, Gas Pipeline	The mine will produce around 30 million tonnes of coal per year.
Western Basin Dredging	Gladstone Ports Corporation	Undertake dredging and land reclamation activities associated with the development of port infrastructure for LNG industry and other port industry.	Gladstone	Gas Pipeline, LNG Facility	TBA

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Project	Developer	Description	Location	Study Area	Output
Wiggins Island Coal Terminal	Gladstone Ports Corporation and Queensland Rail	Develop a 25Mtpa coal terminal on the western side of the Calliope River. Construct and operate an electrified rail access from the north and west and supporting infrastructure. Stage 1 25Mtpa, ultimate proposed capacity 70Mtpa.	North-west of Gladstone	LNG Facility	Once complete, the Terminal will have an export capacity of 70 million tonnes per year.
Woori Coal Project	Surat Coal Pty Ltd (Cockatoo Coal Limited)	3-6 Mtpa open cut thermal coal mine, 15 year mine life. Stage 1 is the development of the 3Mtpa Woori mine, coal handling preparation plant (CHPP) and train loading facility with first coal railing in 2012. Stage 2 is the expansion of production to 5Mtpa to 6Mtpa coal.	15 km south of Wandoan	Gas Fields	Export coal production is planned to total 4.0 mtpa upon completion of the project.
Yarwun Alumina Refinery	Rio Tinto Aluminium Limited	Stage 2 of the Alumina Production Facility project is located within the Gladstone State Development Area at Yarwun precinct and involves the construction of a gas-fired cogeneration facility. Estimated production output is expected to increase to 2 Mt per year from 1.4 Mt per year in Stage 1.	Yarwun	LNG Facility	The expansion will double annual production, increasing output by two million tonnes to 3.4 million tonnes by 2011.

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10. Appendix C MMR Model

Development

In 2000, KPMG Econtech developed the Murphy Model Regional (MMR) as a tool for analysing the effects of policies that are not national in scope, but rather are state or region specific. MMR is a multi-region, multi-industry model of Australia. It is in the CGE family of economic models.

MMR is used in some of KPMG Econtech's policy consulting projects. Similar to MM600+, KPMG Econtech undertakes any required MMR modelling in-house and provides the results to clients, rather than clients purchasing copies of the model.

Features

MMR divides Australia into 33 regions spread across the eight states and territories. Each of these regions, outlined below, is modelled individually but following a consistent approach. MMR is calibrated using the latest annual regional data from ABS.

In MMR, each region contains 18 industries corresponding to the ANZSIC industry divisions used by the ABS. These industry divisions are also outlined below.

Other main features of MMR, which are discussed in more detail below, are as follows:

- it models a medium-term equilibrium for each regional economy, which would be broadly achieved over a period of about three years; and
- it distinguishes between industries that produce tradeables and industries that produce non-tradeables.

Key Assumptions

The medium-term equilibrium in MMR is based on specific economic assumptions.

On the one hand, this medium-term equilibrium of about three years is far enough into the future for equilibrium to be obtained in product markets. Also, consumer spending is at a sustainable level so that the trade account for each region, taking into account both international and inter-regional trade, is in balance.

On the other hand, this medium-term equilibrium is not far enough into the future for labour markets to attain equilibrium; rather industry wage rates are taken as given. Three years is also not far enough into the future for businesses in each region to adjust their capital stocks.

In MMR, the distinction between industries that produce tradeables and industries that produce non-tradeables is also based on specific economic assumptions.

Industries that produce tradeables have a national or international focus, and production levels of these industries are driven by prices prevailing on national or world markets. In contrast, industries that produce non-tradeables focus on their own region and production levels of these industries depend on local demand.

MMR is flexibly configured so that individual industries can be treated as either producing tradeables or non-tradeables, depending on what makes more economic sense in the context of the particular regional policy.

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Regional Detail

As discussed above, MMR divides Australia into 33 regions. MMR estimates the effects of policies that are state or region specific in each of the following 33 regions, which match the 33 ABS statistical regions.

Sydney	North Western Sydney
Hunter	Illawarra
South Eastern NSW	Richmond-Tweed and Mid-North Coast
Northern-Central-Far Western NSW	Murray-Murrumbidgee
Melbourne	Barwon-Western District
Central Highlands-Wimmera	Loddon-Mallee
Goulburn-Ovens-Murray	All Gippsland
Brisbane	South and East Moreton
North and West Moreton	Wide Bay-Burnett
Darling Downs-South West	Mackay-Fitzroy-Central Qld
Northern-North West	Far North
Adelaide	North and West SA
South and East SA	Perth
Higher Western WA	Remainder WA
Greater Hobart-Southern	Northern Tasmania
Mersey-Lyell	Northern Territory
Australian Capital Territory	

Industry Detail

As explained above, each region in MMR contains 18 industries corresponding to the ANZSIC industry divisions used by the ABS. MMR estimates the effects of policies that are state or region specific in each of the following 18 industries.

A. Agriculture, Forestry and Fishing	B. Mining
C. Manufacturing	D. Electricity, Gas & Water
E. Construction	F. Wholesale Trade
G. Retail Trade	H. Accommodation, Cafes & Restaurants
I. Transport	J. Communication Services
K. Finance & Insurance	L. Property & Business Services
M. Government Administration and Defence	N. Education
O. Health & Community Services	P. Cultural & Recreational Services

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Q. Personal & Other Services R. Ownership of Dwellings

MMR Model Outputs

For each region and industry, MMR produces estimates of the effects of regional or state policy changes on:

- employment;
- turnover;
- value added;
- consumption; and
- wages and salaries.

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11. Appendix D MM600+ Model

MM600+ is a long-term CGE model of the Australian economy. MM600+ covers industry costs and prices as well as industry production and employment, and models market-clearing, long-term outcomes under optimising behaviour.

MM600+ is used in some of KPMG Econtech's policy consulting projects. KPMG Econtech undertakes any required simulations in-house and provides the client with the results of the modelling and commentary of these results in a written report.

Development

In 1997 KPMG Econtech developed the Murphy Model 303 (MM303) under contract to a state government to estimate the effects of indirect tax reform on industries and businesses. MM303 modelled the production of over 300 product groups by 107 industries.

In 2000, the more detailed MM600+ model was developed from our original MM303 model under contract to the ACCC. That is MM600+ is a direct descendant of MM303. MM600+ has significantly more product detail than MM303. Specifically, MM600+ has 108 industries that produce 672 products, making it six times more detailed than any comparable model. It also has greater tax detail for each of product, which is discussed in more detail below.

The high level of product detail has many advantages, which was recognised by the ACCC. In commissioning MM600+, the ACCC requested the high level of product detail so that estimates of the model could serve as a more useful point of comparison in its price monitoring work. This high level of detail is crucial for pinpointing the effects of the NTS on business costs, consumer prices and economic activity.

This level of product detail also means that policy changes that are not related to the NTS can be analysed. For example, the product detail means that the gains from some micro-economic reforms can be more fully captured. For example, a finer level of disaggregation better reveals the diversity in rates of customs duty, leading to more reliable estimates of the gains from tariff reforms that produce benefits by reducing this diversity.

Features

MM600+ distinguishes 672 products, making it six times more detailed than any other model. It achieves this high level of detail using unpublished input-output data obtained in an electronic format from the Australian Bureau of Statistics (ABS).

MM600+ is well suited for use in a wide range of projects. Its main features are as follows:

- it fully incorporates the New Tax System (NTS), making it unique among Australian CGE models. It models the GST treatment of each of its 672 products, and 24 other indirect taxes, including excises on petrol and diesel;
- within the 672 products, it has high level of detail of petroleum products. MM600+ distinguishes between petrol, diesel, aviation gasoline, aviation turbine fuel and kerosene, while some other models treat petroleum products as one category;
- it incorporates all changes to the NTS since 1 July 2000 that affect business costs, including the changes to petrol and beer excises;

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- it allows for the substitution effects triggered by changes in the prices of goods and services. Specifically, MM600+ allows substitution between:
- labour and capital;
- different types of capital inputs such as motor vehicles, computers, buildings etc;
- different forms of primary energy, including black coal, brown coal, LPG and natural gas; and
- road and rail freight transport.
- it allows for CO2 emissions from all sources of energy, including black coal, brown coal, natural gas, LPG, petrol, diesel, aviation gasoline and aviation turbine fuel;
- it incorporates the relative energy content of each type of fuel;
- it is set up to achieve budget neutrality in alternative ways. The default swing fiscal instrument is income tax and the alternative swing fiscal instrument is GST;
- it generates results for specific regions within Australia. Specifically, MM600+ produces estimates of changes in production and employment across 32 regions; and
- it provides valid measures of changes in consumer welfare based on compensating variations so that policy reforms can be correctly evaluated in terms of being in the public interest.

These features make MM600+ well suited to projects that require an economy-wide analysis of policy changes. For example, MM600+ has been used extensively in analysing the impact of the NTS on costs and prices throughout the economy. It can also be used to consider the impact of other policy changes such as introducing a CO2 tax on the economy or increasing competition in a particular industry.

Not all of the above features are standard in detailed economy-wide models because of the modelling complexities involved. Unlike MM600+, which has all of these features, no other Australian CGE model has even a majority of these features.

Key Assumptions

MM600+ models a long-run equilibrium. In the long run, economic agents optimise, all markets are in equilibrium, and assets and liabilities follow sustainable paths. Some of the key assumptions involved are as follows.

Labour market equilibrium: local employment in MM600+ is fixed, which means that in the long run the labour market is assumed to attain equilibrium, so that an economic shock has no lasting effect on total employment. This assumption is implemented by fixing the level of total employment. This means that direct job losses in a particular industry or region from each emissions tax will be exactly balanced by job gains in other industries or regions.

External balance: in MM600+, the balance of trade is at a sustainable level. Specifically, a trade surplus is run equal to the amount required to service foreign-owned capital. The real exchange rate needed to achieve this trade surplus is determined by MM600+. Thus shocks to international trade affect the real exchange rate, not the trade surplus.

Budget balance: the government budget is also assumed to be at a sustainable level. Specifically, it is assumed to be in balance. A lump sum tax/transfer is used as the swing fiscal instrument to balance out the effects on the

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government budget of increase taxation revenue. Thus a tax increase is associated with a balancing cut in labour income tax.

Private saving: the level of private sector saving and associated asset accumulation is sustainable in the long run. Private saving is held constant in MM600+ by fixing the quantity of capital that is owned locally, and changes in capital are only in the foreign-owned portion.

Documentation

Further details for MM600+ are available from the MM600+ documentation on our web-site (www.Econtech.com.au).

MM600+ Model Outputs

MM600+ produces results at three different levels. Specifically results are provided at the product, industry and national level.

Results are produced for the following measures for each of the 672 products and 18 industries in the economy.

- production volume, production value and employment;
- value added;
- export volumes and prices; and
- imports volumes and prices.

At the national level, MM600+ produces results for the following broad economic aggregates.

- gross domestic product (GDP);
- investment;
- the exchange rate;
- the consumer price index (CPI); and
- valid measures of changes in consumer welfare based on compensating variations.

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MM600+ Regional module

MM600+ includes a regional module, which provides results at the regional level. Results can be provided for the following 32 regions, which match the 32 ABS statistical regions.

Sydney

Hunter

South Eastern NSW

Northern-Central-Far Western NSW

Melbourne

Central Highlands-Wimmera

Goulburn-Ovens-Murray

Brisbane

North and West Moreton

Darling Downs-South West

Northern-North West

Adelaide

South and East SA

Higher Western WA

Greater Hobart-Southern

Mersey-Lyell

Australian Capital Territory

North Western Sydney

Illawarra

Richmond-Tweed and Mid-North Coast

Murray-Murrumbidgee

Barwon-Western District

Loddon-Mallee

All Gippsland

South and East Moreton

Wide Bay-Burnett

Mackay-Fitzroy-Central Qld

Far North

North and West SA

Perth

Remainder WA

Northern Tasmania

Northern Territory

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