27. ECONOMICS

This chapter provides a summary of the existing Gladstone economy and the eastern Australian domestic gas market. Potential project impacts on regional, state and national economies, along with the domestic gas market, are identified and discussed. The chapter provides an assessment of residual impacts following application of avoidance, mitigation and management strategies designed to minimise adverse impacts on the economy and the eastern Australian domestic gas market.

This chapter is based on the economic impact assessment completed by AEC Group (Appendix 21, Economic Impact Assessment) and the report on the implications for domestic gas markets completed by ACIL Tasman (Appendix 22, Implications for Domestic Gas Markets).

Economic objectives have been developed with the aim of minimising adverse economic and gas market impacts and maximising economic benefits generated by the project. The objectives are provided in Box 27.1.

Box 27.1 Objectives: economics

- Identify and mitigate project impacts on property and labour markets and local industry.
- Maximise opportunities for local businesses arising from the project.
- Promote the development of skills at the local and regional level to support the coal seam gas industry.

27.1 Legislative Context and Standards

The following legislation and policies are relevant to assessment of the economic impacts of the project:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cwth). The EPBC Act aims to balance the protection of environmental and cultural values with Australian society's economic and social needs by creating a legal framework and decision-making process based on the guiding principles of ecologically sustainable development. Controlling provisions are s. 18 and 18A (listed threatened species and communities). The Arrow LNG Plant has been deemed as constituting a 'controlled action' pursuant to the EPBC Act.
- *State Development and Public Works Organisation Act 1971* (Qld). Pursuant to s. 26 of the act, the Arrow LNG Plant was declared a 'significant project' for which an environmental impact statement (EIS) is required. As part of the EIS, an assessment of the project's impact on the local, state and national economic environment is required.
- Social Impact Assessment: Fact Sheet (DIP, 2011). There is no specific Queensland Government legislation or policy outlining the requirements of an economic impact assessment. However, this fact sheet provides an outline for conducting social impact assessment, which identifies the economy as one of five potential sensitive areas for consideration. The framework for analysis is consistent with that outlined in the terms of reference for this EIS.
- Prosperity 2030: Gladstone Region Economic Development Strategy (SGS, 2010). Completed in 2010, the strategy includes objectives to improve the region's economy. These include diversifying the regional economic base, expanding tourism, local business and industry sectors and observing key values. The strategy also identifies the need to enhance regional

lifestyle attributes such as quality education, environmental values, recreational facilities and community services. The strategy recognises the important role that the LNG industry will play in strengthening industrial growth in the region.

27.2 Assessment Method

This section describes the method used for the economic impact assessment. The study area is defined as the Gladstone Regional Council geographic area, incorporating the pre-2008 amalgamation of the local government areas of Gladstone, Calliope and Miriam Vale (see Figure 26.1).

27.2.1 Existing Economic Environment

Baseline characterisation of the existing economic environment of the study area and of the broader economic context was developed through:

- Review of data sourced from the Australian Bureau of Statistics, Office of the Government Statistician, regional councils and other public sector agencies.
- Review of available government policies, economic development strategies and research papers of relevance.
- Consultation with local businesses and peak industry bodies.
- Review of private sector data and AEC Group's and ACIL Tasman's own economic data and proprietary models.

The existing economic environment reflects the current economic environment based on available data. To facilitate an assessment of impacts upon the domestic gas market, a base case was derived from existing and committed gas loads and LNG developments in the region that, by the end January 2011, had taken final investment decision to proceed (thereby excluding the project itself under this scenario).

27.2.2 Impact Assessment

The assessment analysed beneficial and adverse impacts on economic values (both within the study area and across Queensland) associated with the construction and operation of the Arrow LNG Plant.

The assessment of impacts was informed by computable General Equilibrium economic modelling techniques, which represent the workings of the economy through a system of interdependent behavioural and accounting equations linked to an input-output database. Modelling outputs were interpreted and other non-quantified changes to the economic environment were analysed.

The assessment identifies the economic impacts specific to the Arrow LNG Plant compared to what would be anticipated if the project does not proceed (i.e., compared to a baseline scenario). The baseline scenario is not simply the existing economic environment; rather, the baseline scenario accounts for future anticipated economic growth in the local, regional, state and national economies based on available projections of future economic activity from relevant government bodies (see Appendix 21, Economic Impact Assessment for more details on these assumptions). Additionally, the baseline scenario includes the anticipated future effects on economic growth and activity resulting from development and operation of the Yarwun Alumina Refinery Expansion, the Gladstone LNG (GLNG) Project (including all three trains) and the Queensland Curtis LNG (QCLNG) Project (including all three trains).

In addition, an assessment of impacts was carried out on the eastern Australian gas market utilising the Gas Mark Global Australia gas market model. Details of the method employed for this component of the assessment are outlined in Section 27.4.7.

Business and industry organisations were consulted to obtain their views on potential economic impacts. The significance of adverse impacts was then evaluated using a risk assessment framework adapted from the Australian and New Zealand Standard 3100:2009 Risk Management: Principles and Guidelines. The assessment examined the likelihood of an effect occurring and the potential consequences (i.e., a measure of severity of economic effect) should the effect occur. The framework identifies and ranks risks into relevant levels, which then inform key issues and impacts for the development of avoidance, mitigation and management measures. Economic impacts were analysed and quantified where possible, and re-assessed for significance after application of proposed mitigation and management measures.

27.2.3 Cumulative Impact Assessment

The cumulative economic impact assessment involved consultation with business, industry and key industry organisations, a desktop review of various development projects and their identified impacts, modelling impacts on the gas market in eastern Australia, and the application of the risk assessment framework to rate potential impacts. Projects meeting the criteria for inclusion in the cumulative impact assessment are defined in Chapter 32, Cumulative Impacts.

27.3 Existing Environment and Economic Values

This section describes the existing economic conditions within the Gladstone region and recent trends within the eastern Australian domestic gas market.

Gladstone has become a focal point for much of the burgeoning Australian LNG industry due to its geographic location relative to Queensland's gas fields, existing port facilities and availability of industrial land. The Gladstone region has well-developed road, rail, airport and port infrastructure, and surplus capacity in utilities and information and telecommunications technology infrastructure. Accordingly, several major projects are proposed and in development within the Gladstone region.

27.3.1 Local Economy and Gross Regional and State Product

The economy of the Gladstone region is export-oriented and prone to fluctuations in global economic factors such as global demand, exchange rates and commodity prices. Gross regional product for the study area was approximately $4 billion for the financial year 2009/10, about 1.6% of the total gross state product (GSP). Gross regional product is estimated to have increased at an average rate of 3.6% per annum between the 2006/07 and 2009/10 financial years, compared to the average annual economic growth rate of 5% for Queensland's GSP. Below average growth in Gladstone for these periods was driven by global economic factors, including the global financial crisis, and extreme weather events in Queensland which impacted on the supply of some goods that are processed and exported from Gladstone.

27.3.2 Key Industries and Business

The regional economy in Gladstone is dominated by heavy industry, supported by a secondary service sector. Manufacturing contributed approximately 40% ($1.5 billion) of total gross value added activity (being gross regional product less taxes and subsidies) in 2009/10, compared to 8.4% across Queensland. Manufacturing is the dominant industry in the region. The transport, postal and warehousing, and mining and construction industry sectors provided a further 25% of

gross value added activity over the same period. Aside from mining, these four sectors constitute a larger proportion of the Gladstone regional economy than the Queensland average.

There were 3,865 businesses in the study area in June 2009, of which 22.6% were in the construction industry, 15.5% in agriculture, forestry and fisheries, and 5.3% in manufacturing. These sectors all represent a greater proportion of local businesses in Gladstone than in Queensland as a whole. Financial and insurance, scientific and technical, health care and social assistance, and professional services are proportionally underrepresented in Gladstone.

27.3.3 Population

The Gladstone region is one of Queensland's fastest growing areas, with population growth projected to rise approximately 50% faster than the Queensland average over the next 20 years. The estimated resident population of the study area was 60,300 people in 2010 (ABS, 2011), some 1.3% of Queensland's population.

Key statistics on population growth in the Gladstone region include:

- An average annual population growth rate of 2.8%, recorded between 2006 and 2010.
- A forecast average annual growth rate of 3.2% from 2010 to 2015, resulting in a projected population of 70,570 people in 2015.
- An average population growth rate of 2.8% per annum anticipated from 2015 to 2030.

The average Queensland population growth rate is not expected to exceed 2% per annum between 2010 and 2015, and it is forecast to grow at 1.8% per annum to 2030. These projections are based on forecasted high levels of economic activity in the region through to 2030.

In addition to permanent population growth, the Gladstone region supports a sizeable transient population. A number of major infrastructure projects such as the Yarwun Alumina Refinery Expansion, the GLNG Project and the QCLNG Project utilise a fly-in, fly-out (FIFO) workforce, additions to which are anticipated to be accommodated in worker construction camps. These FIFO workers comprise part of the transient population of the region, which is estimated to grow substantially during the peak construction periods of the LNG projects currently being advanced on Curtis Island.

27.3.4 Employment, Industry and Income

The Gladstone unemployment rate recently fell below the Queensland average following a two year period of higher unemployment than the Queensland average, which coincided with the global economic downturn.

In the September quarter of 2010, Gladstone had a labour force of 31,634 people and an unemployment rate of 5.4%, compared to an unemployment rate recorded for Queensland of 5.6%. Between 2007 and 2010, the unemployment rate for Gladstone increased by 1.7%, while over the same period, the unemployment rate for Queensland increased by 2.2%.

Manufacturing is the dominant employer in the region, accounting for an estimated 27.2% of jobs in 2009/10. This is more than three times the representation of manufacturing in the Queensland labour market. The manufacturing industry is supported by a strong construction industry (14% of jobs in the region in 2009/10) and transport, postal and warehousing sector (8.7% of total jobs in 2009/10). Collectively these three industries accounted for 50% of jobs in the region.

Gladstone holds a lower proportion of jobs in most public and household service industries than Queensland as a whole including retail trade, health care and social assistance, public administration and safety, education and training, and financial and professional services.

Technicians and trade workers were the largest occupational grouping in the study area in 2009/10, accounting for an estimated 23.9% of total employment, which is considerably higher than the Queensland average of 16.4%. The Gladstone region also had a considerably higher proportion of labourers (14.7% compared to 11.5%) and machinery operators and drivers (14.1% compared to 7.4%). This is consistent with a region that is highly skewed towards heavy industry, transport and distribution.

Average weekly incomes in Gladstone were an estimated $1,125 in 2010, which is approximately 14% higher than the Queensland average of $987 per week. Employees in the manufacturing and transport, and postal and warehousing industries were paid considerably higher incomes in Gladstone than for similar jobs elsewhere in Queensland, reflecting the high regional demand for employees in these industry sectors. The opposite was recorded for the mining industry, where incomes in the Gladstone region were lower than the Queensland average.

Skills Shortages

The following key occupational skills shortages are being experienced by the coal seam gas and LNG industries in Queensland, not all of which are anticipated to be required for the project:

- Various engineering disciplines.
- Engineering and production managers.
- Process plant operators.
- Transport (including marine) and logistics tradespersons.
- General and specialist electricians.

The construction industry is also experiencing state-wide skills shortages, notably in regional areas, and in particular skill sets required for construction of the LNG plant (i.e., welders, mechanical and pipe fitters and electricians).

27.3.5 Property Market

This section describes key aspects of the regional housing, property and land markets relevant to the study area.

Households and Building Approvals

Since 2006, there were between 530 and 650 new residential building approvals per annum in the Gladstone region, with the exception of 2009 when residential building approvals fell to 237 (likely due to the global economic downturn). Since 2009, the region has recovered strongly, with 567 residential building approvals in 2010, which is proportionally higher than the Queensland average.

Key features of the housing market of the study area for the year to December 2010 include:

- A median house price of $385,000. This was a 7.2% gain over the previous year; higher than that recorded for the adjacent regions of Rockhampton and Bundaberg, but lower than that recorded in Mackay.
- A 13.2% rise in the total number of house sales (755) compared to 2009. This increase was in contrast to the decline in total house sales in Rockhampton, Bundaberg and Mackay.

- A median unit/townhouse price of $340,000. This was an increase of 13.3% above 2009 and 106.1% above 2005 prices.
- A 60% rise in the total number of unit/townhouse sales (155) compared to 2009, which is higher than that recorded for comparable regions.

The total value of non-residential building approvals in the Gladstone region in 2010 was $86.8 million, 34% more than in 2009 ($64.8 million). Values declined sharply between 2006 and 2007, but have since increased steadily.

Rentals

There were 1,687 new rental bonds lodged for houses in the study area in 2010, 5.4% more than in 2009 and 8.9% more than in 2006. Average weekly rental prices in the region were $332 for houses and $240 for flats/units for the year ending December 2010; an increase of 31.4% for houses and 34.6% for flats/units from 2006 to 2010.

Consultation with real estate agents and economic development organisations suggests that the rental market has tightened appreciably in 2011 as major projects in the region began construction. Some local real estate agents indicated that vacancy rates were less than 1%, with pressure being exerted on the existing rental market. This was attributed to factors such as workers from outside the region seeking local rental accommodation (to qualify under local content employment policies of major projects currently under development). Additionally, the time taken to develop construction camps for proposed major projects had resulted in members of project workforces requiring rental accommodation within the local community.

Land Values

The median vacant land price in the Gladstone region in December 2010 was $180,000, which is 74.8% higher than for the year ending December 2005 and more than double the rate of increase recorded for comparable regions.

Over the same period, rural land sale prices increased by 66.7%, which is a lower rate of increase than that experienced in Rockhampton (122.8%) and Bundaberg (74.4%).

The average unimproved capital value of residential land in the study area was approximately $142,000 in 2008/09; some $30,000 higher than Rockhampton, $32,000 lower than Mackay and $36,000 below the state average.

The Gladstone region recorded a higher average industrial/commercial unimproved land value than Rockhampton ($372,000 compared to $324,000), but below that of Mackay ($479,000) and the Queensland average of $587,000.

27.3.6 Infrastructure and Services

Gladstone is well serviced by key infrastructure including major road, rail, air and port facilities. Infrastructure is orientated to support the Port of Gladstone which is Queensland's largest multi-commodity port, servicing 83.4 million tonnes of cargo in 2009/10.

27.3.7 Eastern Australian Gas Market

ACIL Tasman has estimated a total recoverable resource base of 110,000 PJ for Queensland coal seam gas production capability over a period of 25 years to support a full cumulative scenario. The majority of identified coal seam gas reserves in Queensland are controlled by the proponents of current and proposed LNG projects. These parties are focused on establishing reserves necessary to supply the export of LNG.

The current eastern Australian domestic gas market produces in the order of 730 PJ per year of gas. Production costs have generally influenced, but not determined, what have historically been low gas prices (by international standards) where the prevalence of long-term contracts has helped ensure price stability. Wholesale domestic gas prices throughout eastern Australia were low during the early 2000s, while in southern Australia they tended to move in line with inflation.

During 2007 and early 2008, various factors had the net result of causing increases in the domestic gas price. These included:

- Persistent upward pressure on exploration and development costs.
- A focus on establishing reserves and production capability to underpin proposed LNG developments in Queensland.
- Drought conditions, affecting hydroelectric and coal fired power station production costs that caused electricity (followed by gas) prices to rise steeply.
- Increased interest in gas as a commodity due to the development of a national emissions trading scheme.
- Sharp rises in mining costs driving domestic coal prices higher.

Additional factors that have influenced gas prices and tempered the rising pressure on capital costs since mid-2008 include lower prices in the Victorian spot market due to additional supply, the impacts of the global economic downturn and the fall of world oil prices, and the rapid development of shale gas production in the United States.

The expected increase in the value of gas as a result of carbon pricing has not occurred due to delays associated with the introduction of the carbon pricing scheme. However, anticipation of amplified gas demand and value is routinely factored into the pricing of long-term gas supply contracts.

27.4 Issues and Potential Impacts

This section describes the issues and potential economic impacts arising from project construction and operation, including impacts on the domestic gas market. The project will result in a range of beneficial (both direct and indirect) and adverse economic impacts. These impacts primarily affect the Gladstone region and, to a lesser extent, Queensland as a whole. Certain impacts extend more broadly into the eastern Australian and Australian economies.

27.4.1 Gross Domestic, Regional and State Product

The project is anticipated to increase economic output and value-added activity. This will occur directly, via construction activities and the production of LNG, and indirectly, via increased household consumption from greater incomes and economic throughput, additional government fees and taxation revenues, government expenditure and increased demand for project-related goods.

Key beneficial impacts on the gross domestic, regional and state product include:

- Increase in GSP and gross domestic product above the economic baseline scenario by approximately $200 to $300 million, on average, over the construction phase of the Arrow LNG Plant stage 1 (trains 1 and 2). This represents a 0.1% to 0.2% rise in GSP, although only a slight increase in gross domestic product.

- Increase in GSP and gross domestic product of $2.5 billion annually (denoted by years 2018/19 to 2021/22), which equates to a GSP increase of 0.8% to 0.9% above the baseline over this period and a gross domestic product increase of 0.15%, once LNG trains 1 and 2 are operational.
- Increase in GSP by $5.3 billion annually between 2026/27 and 2029/30 (ranging between 1.15% and 1.3% over the baseline), once LNG trains 3 and 4 are operational.

27.4.2 Industry Output

Development of the project is expected to result in an average annual increase of approximately $356 million (above the baseline) in construction industry activity in Queensland during the construction phase of trains 1 and 2. A further average annual increase of approximately $284 million to this output will be generated by the construction of trains 3 and 4. Construction of the Arrow LNG Plant is also expected to increase economic activity across a variety of other industry sectors including public administration, household, trade, defence, utilities, health and education.

Queensland's manufacturing output is expected to yield a net increase of approximately $5.1 billion between 2018/19 and 2021/22 (approximately 3.3% above the baseline scenario) once trains 1 and 2 are operational. Manufacturing output is then estimated to rise from $4.8 billion in 2022/23 and 2024/25 to $10.3 billion in 2026/27 and 2029/30(above the baseline scenario). Household and business related services (including construction) are expected to experience flow on benefits through greater household and government incomes and expenditure.

The manufacturing industry in Queensland, and Australia more broadly, is likely to experience some adverse impacts from a draw of labour between manufacturing subsectors and the potential for the export of LNG to place upward pressure on Australia's exchange rate potentially reducing the global competitiveness of manufacturing goods produced in Australia.

27.4.3 Business and Labour Markets

The project will generate increased opportunities for business to enhance sales revenue and overall viability through the procurement of goods and services. While some primary components of the project, such as the modular LNG trains, will need to be sourced from overseas, associated goods and services will, to the extent practicable, be procured from within Australia. Arrow Energy will develop a Local Industry Participation Plan to assist local businesses secure such supply contracts.

Stage 1 construction is expected to commence in 2014, with a peak workforce of 3,000 construction workers in 2016. An additional 350 engineering, procurement and construction (EPC) management workers and 150 Arrow Energy employees are also expected. In addition to the main construction workforce, it is expected there will be an additional FIFO workforce of up to 215 people present during the construction phase of the project, working on the tunnel, feed gas pipeline and dredging.

The project will use local labour and supply chains where applicable. Between 5% and 20% of the initial construction labour force may be sourced from the Gladstone labour market. The remainder of workers will be sourced from the wider Queensland region and any additional labour from within Australia or overseas where specific skill sets are unavailable or in short supply within Australia. The initial construction period demand for labour is anticipated to be considerably higher than would otherwise be expected to occur in the occupations of:

- Labourers (27.1% above baseline scenario employment in this occupation).
- Machinery operators and drivers (11.4% above baseline scenario).
- Technicians and trade workers (11.0% above baseline scenario).

Specific occupations expected to be in highest demand during the construction period of the Arrow LNG Plant are:

- Building and engineering technicians.
- Fabrication engineering trades workers.
- Mechanical engineering trades workers.
- Electricians.
- Electronics and telecommunications trade workers.
- Wood trades workers.
- Logistics clerks.
- Stationary and mobile plant operators.
- Truck drivers.
- Construction labourers.

During operation, local labour will be utilised to the maximum extent possible. Approximately 30% of operational staff and 40% of contractors may be residents of the Gladstone region, which will provide employment for approximately 155 local workers during operation of LNG trains 1 and 2; increasing to a total of 200 locals for the operation of LNG trains 3 and 4.

The operation workforce requirements of the Arrow LNG Plant will generate a mild increase in demand for labour across a wide range of occupational groups. Key occupations that will be in highest demand during operation (including both direct and flow on labour demand) include:

- Distribution and production managers.
- Sales and marketing managers.
- Marketing and public relations professionals.
- Engineering professionals.
- Natural and physical science professionals.
- Science technicians.
- Miscellaneous plant technicians and trades workers.
- Logistics clerks.
- Insurance agents and sales representatives.
- Machine operators.
- Store persons.
- Product assemblers.
- Factory and plant process workers.

Households across Australia and particularly in the Gladstone region will benefit from increases in real wages through income earning opportunities generated by the project. Increased productivity through economic rationalisation is also forecast, resulting in an increase in factor incomes. A reduction in the rate of unemployment in the region is possible; however, this is likely to be minimal as current unemployment rates are low.

The project is likely to generate some adverse impacts on business and industry in the Gladstone region and Queensland as a whole. Competition for, and draw of, labour to the Arrow LNG Plant and its supply chain will deepen regional skills shortages (for both construction and energy related skills) and place upward pressure on the cost for local businesses to attract and retain labour.

Strong project demand for these skill sets will result in a further tightening of the already competitive labour market and reduce the availability of such skills in the Gladstone region. Skills shortages will place pressure on businesses to increase wages and salaries needed to attract and retain labour.

Escalating costs of labour and other inputs to production will reduce profits and viability for some businesses and industries in the region. Increased exports generated by the project may place upward pressure on the value of the Australian dollar, impacting industries that sell their products and services overseas because the products and services will become more expensive to foreign buyers.

27.4.4 Household Income

The project will have a positive effect on household income and wealth by stimulating strong growth in real wages. The increase in real wages is expected to be most substantial in Gladstone, but will also extend throughout Queensland and Australia. Between 2013/14 and 2029/30, total household incomes in Gladstone are estimated to increase by approximately $100 million or 4.3% per annum on average (above the baseline scenario).

Additional benefits to households in terms of wealth generation from the project include:

- Direct and indirect employment opportunities and a corresponding reduction in unemployment in the Gladstone region, Queensland and Australia.
- Increased economic activity, spending and employment throughout Australia, primarily driven by increased government taxation revenues and subsequent expenditure.
- Opportunities for wealth redistribution to investors (i.e., shareholders) of the project and higher returns to property owners through increased rents.
- Increased household consumptive capacity, stimulating further economic activity at regional, state and national levels.

The project may have adverse impacts on households in the study area. These relate to:

- A large proportion of the financial benefits generated by the project being distributed outside the Gladstone region due to wages paid to the FIFO construction workforce.
- The inequitable distribution of wealth from the project, which has the potential to create a 'wealth divide' within the region.
- Increased living costs, particularly for low-income households and those not benefiting from project activities.
- A reduction in productivity and subsequently household incomes of self-employed residents of the Gladstone region due to traffic congestion and increased travel times.

27.4.5 Property and Housing Market

Residential property demand from the project's construction and operational workforce will place additional pressure on the regional property market and impact on property values and housing costs. The 3,000 construction workers will either be accommodated within construction worker camps developed specifically for the project or they will already live locally. Of the 500 EPC management and Arrow Energy workers, approximately 30 to 35 are assumed to already live locally, while approximately 380 are expected to be accommodated in company facilitated communal housing developed specifically for the Arrow LNG Plant.

Given the use of construction camps and communal housing and a reasonable assumption that some of the EPC and Arrow Energy workers may already reside in Gladstone, in a worst case scenario, the net additional demand for accommodation during construction is estimated to be 90 dwellings. The greatest cumulative impact on the Gladstone residential property market is anticipated to occur in 2012 to 2014, due to construction workforce demands of multiple major projects. The demands of these projects are expected to ease before construction of the Arrow LNG Plant commences. To accommodate the anticipated increase in residents and transient workers in the region, Gladstone Regional Council has approved the release of up to 4,000 residential lots. While this is expected to encourage the development of residential accommodation over the medium term, there may be delays in bringing additional housing to market due to a shortage of construction skills in the region.

The impact on property and rental prices from demand for up to 90 residences during construction of the project is considered relatively small. However, given existing housing shortages, it is possible this demand could place some upward pressure on prices and sustain housing costs growth driven by development of other projects in Gladstone prior to commencement of the Arrow LNG Plant.

Impacts from construction of trains 3 and 4 (concurrent with operation of stage 1) are likely to be smaller than for LNG trains 1 and 2, with the construction workforce to be accommodated in the construction camp, as is the case for trains 1 and 2. Residential development over the next few years to meet anticipated population loads in Gladstone is highly likely to increase supply considerably in the region before construction commences on LNG trains 3 and 4.

The operational workforce is estimated to result in additional demand in Gladstone for up to 225 beds (to accommodate FIFO or single workers) and 130 dwellings (to accommodate the families of operational employees permanently relocating to the Gladstone area).

The full 225-bed demand is expected to be met through the use of company facilitated housing. This housing demand will be met directly by the project, either through the development of purpose built housing or through agreements with third party providers. This housing is expected to be provided outside the existing stock of dwellings to minimise any impact on the local housing market.

Demand for housing in the local community will therefore be up to 130 dwellings to accommodate operational employees and their families that permanently migrate to the region. On a net basis, this reflects an increase in housing demand of 40 dwellings compared to the construction phase. This demand is not anticipated to result in any tangible impacts on property prices.

The Arrow LNG Plant is not expected to have any noticeable impacts on industrial land values in the region. There is considerable availability of industrial land in Gladstone, particularly in the Gladstone State Development Area, and industrial land values have not increased notably in recent years despite the development activity in the region.

Similarly, flow on impacts of the project are not expected to result in any significant changes in industry or materially affect demand or prices above normal fluctuations for industrial or commercial property.

27.4.6 Local Infrastructure and Service Capacity

Through the creation of employment opportunities and stimulation of economic activity, the project will generate direct and indirect population growth in the region, which will increase the demands on existing infrastructure and services.

Types of infrastructure provided by government or government-owned corporations, including water, wastewater, waste disposal, telecommunications, electricity, airport, rail and marine infrastructure, have sufficient existing and future planned capacity in Gladstone to cater for increased demand generated by the project. An increase is likely in the demand for social, community and recreational infrastructure and services during construction and operation. The overall impact is likely to be small, given the provision of a range of services in the worker camps during construction and the relatively small operational workforce.

The local road network is likely to require additional investment over the next 10 to 20 years, with upgrades and maintenance works needed to accommodate additional traffic flows generated by population growth and the requirements of major projects being developed in the region. The Arrow LNG Plant will exacerbate demands on the local road network (see Chapter 28, Traffic and Transport).

Increased demands on infrastructure and services could be offset by the substantial revenues that the project will contribute across all levels of government. To 2030, the project is estimated to contribute approximately $13 billion to governments through taxation and rates charges. A proportion of this funding is expected to be directed to the provision of required regional infrastructure.

27.4.7 Gas Market Impacts

Potential project impacts on the eastern Australian gas market have been assessed under four scenarios:

- Baseline scenario: Includes LNG developments in the region that had reached final investment decision by end January 2011, including the QCLNG project for 8.5 Mtpa and the GLNG project for 7.8 Mtpa, plus the inclusion of a new gas load for stage 2 expansion of the Yarwun Alumina Refinery.
- Scenario 1: Impact against the base case of stage 1 of the Arrow LNG Plant, being two LNG trains being fully operational by 2018 with total capacity of 8 Mtpa.
- Scenario 2: Impact of full capacity for the QCLNG and GLNG projects contemplated under their respective environmental approvals, together with the full development of the Arrow LNG Plant, with an additional two LNG trains being fully operational by 2025, for a total capacity of 16 Mtpa.
- Cumulative scenario: The cumulative scenario represents a case under which all current LNG proposals in the Gladstone and industrial gas-producing projects proceed to full development at the maximum scale envisioned under the relevant EIS studies

The assessment was informed by modelling utilising ACIL Tasman's Gas Mark Global Australia gas market model. An implicit assumption of the modelling is that coal seam gas supply capability in Queensland is at overall levels sufficient to support expansion of LNG production up to the full extent of the cumulative scenario. With lower levels of LNG production, the actual call on these reserves is greatly reduced, with only those resources in the lower parts of the cost curve brought into production. This reflects an assumption that the underlying coal seam gas supply capability at any point in time is determined by geological fundamentals and by the then-current state of drilling and production technology. While actual levels of coal seam gas production will depend critically on the scale of LNG developments, the presumption in the assessment is that the underlying resource endowment does not change as a result of the scale of development. Rather, increasing levels of LNG production drive the coal seam gas feed requirements further up the cost curve,

thereby impacting on the availability and price of gas for the domestic market. These and other limitations and assumptions associated with modelling mean that it provides an estimate only, rather than precise outcomes.

The assessment indicated that the Arrow Energy LNG plant by itself (operating at 8 Mtpa under scenario 1 and 16 Mtpa under scenario 2), in addition to the QCLNG and GLNG projects operating at 8.5 Mpta and 7.8 Mtpa respectively (i.e. the baseline scenario), would have a relatively minor effect on eastern Australian gas prices. Effects would be largely felt in Queensland where it was estimated that wholesale gas prices could rise between 8% and 14% over the period 2020 to 2030.

Over this ten year period, the following impacts on wholesale gas prices (adjusted to 2010 dollar terms) were predicted:

- Under scenario 1, a wholesale price increase of 9%, (up to $0.44/GJ), with an average price increase of 8%.
- Under scenario 2, a wholesale price increase of 18%, (up to $0.87/GJ), with an average price increase of 14%.
- In New South Wales, Victoria and South Australia, price increases ranging from 0.5% under scenario 1 to 2.2% under scenario 2.

Gas consumption is affected by both price sensitivity and availability of supply. Modelling indicated that the Arrow LNG Plant under scenario 1 and scenario 2 would have a relatively minor impact on gas consumption levels, with a predicted reduction in total gas consumption of up to 21 PJ/a (1.6%) and 30 PJ/a (2.3%) respectively expected to occur between 2020 and 2030. Most of the impacts on gas consumption were predicted to be limited to Queensland, primarily the electricity sector (i.e., gas-fired power stations) and to lesser degree industrial sectors (including chemical production and mineral processing activities).

In the event that gas reserves dedicated to LNG production are less productive than expected and performance fails to meet expectations and projections, alternative sources of gas are likely to be required to sustain rates of LNG production. This may occur in circumstances where LNG expansion exceeds actual coal seam gas production capacity.

The risk to domestic gas availability and price is likely to have some relationship to the aggregate scale of coal seam gas and LNG production due to the relative sizes of the two market sectors and influence that any disruption in supply to the LNG plants would exert on the domestic market. Should this occur, gas prices could potentially rise sharply, and a shortage of domestic supply will result. The risk of this situation occurring is low due to the normal commercial market mechanisms in place and current Queensland Government policy relating to gas supply security under which the government will establish a capacity for future fields proposed for exploration to be reserved for domestic gas supply, should it be determined that domestic gas supply is constrained.

27.4.8 Future Development in the Area

Gladstone has been identified by industry and government as a highly suitable location for the export of LNG to international markets due to its existing industry mix, availability of suitable industrial land, proximity to export port facilities, and accessibility to gas fields in the Surat and Bowen basins.

Key potential beneficial implications of the Arrow LNG Plant on future development include:

- The Arrow LNG Plant will provide access to the high-value international gas market for coal seam gas resources within the Surat and Bowen basins, and has the potential to unlock otherwise uneconomic gas deposits as an economically attractive alternative.
- Development of the Arrow LNG Plant will contribute to the development of industry clusters and supply chain linkages, in particular where other proposed LNG projects are also developed. For example, co-location with other proposed LNG plants may provide potential benefits in terms of shared infrastructure costs, development of integrated supply networks and stimulating a critical mass of demand for regional provision of goods and services.

Gladstone has significant tracts of available industrial land, in particular in the Gladstone State Development Area, and already supports substantial industrial activities. Manufacturing is estimated to have contributed 27.2% of total employment and 40.2% of Gladstone's total gross value added activity in 2009/10, with a number of large manufacturing businesses operating in the region.

The project is unlikely to constrain future development in Gladstone from a land access perspective.

The project could have some adverse implications for future development through short term competition for construction labour, impacting on the availability of skilled workers for other projects and placing upward pressure on prices. Resource constraints resulting from the development of the Arrow LNG Plant may result in some other projects being delayed or postponed.

27.4.9 Summary of Impacts

Potential beneficial impacts arising from the project are summarised below:

- Significant increases in industry output, gross regional product, employment and incomes throughout the project life through both direct and indirect impacts.
- Opportunities for local business to secure new contracts and increase sales to supply and service the needs of both the project and the workforce. This will support the viability of some local small businesses in the study area.
- Increased competition for resources will see an economy wide increase in productivity through economic rationalisation, resulting in an increase in factor incomes per unit of factor input, in particular for labour, and ultimately a higher value economy.
- Households will benefit from the project through increased job and income earning opportunities and through a moderate increase in real wages (i.e., above inflation).
- Provide a lift in local, Queensland and Australian government taxation revenues through a variety of taxes and duties. These additional revenues may then be used to provide additional infrastructure and services to support business and households throughout Australia.
- Support the value of the Australian dollar through production and export of high value LNG. The impacts of a strong domestic currency can be both positive and negative, with a key beneficial impact being lower comparative prices for foreign goods and services.

The potential adverse economic impacts of the project have been assessed using a risk assessment framework to allow a comparison of impacts following application of appropriate mitigation measures. Table 27.1 provides a summary of the key adverse impacts identified and

their impact rating. Only those adverse impacts that have an impact rating of medium, high or very high are included in the risk assessment framework.

Table 27.1 Assessment of key adverse impacts of the Arrow LNG Plant

Impact	Likelihood	Consequence	Impact Rating
Impacts on local business, particularly increased competition for labour, causing skill shortages and escalating labour prices, reducing the viability of businesses in the study area.	Almost certain	Moderate	High
Impact on housing prices and the availability of affordable housing in the region.	Likely	Minor	Medium
Impacts on local infrastructure and service capacity, particularly road infrastructure.	Likely	Minor	Medium

The following adverse impacts have an impact rating of low:

- Financial benefits generated by the project being distributed outside the Gladstone region due to wages paid to the FIFO construction workforce.
- The creation of a wealth divide through the inequitable distribution of wealth from the project.
- Increased living costs, particularly for low-income households and those not benefiting from project activities.
- A marginal increase in the wholesale gas price and a small reduction in gas availability in Queensland.

Note that the impact rating of low applies to the effect of the Arrow LNG Plant only, and not the potential cumulative impact.

Chapter 26, Social, explores the social impacts of inequitable wealth distribution and increased living costs.

27.5 Avoidance, Mitigation and Management Measures

This section describes measures to address identified adverse economic impacts associated with the project.

The primary impacts on local infrastructure relate to increased road, marine and air traffic generated by the project. Details of proposed mitigation measures for these impacts are provided in Chapter 28, Traffic and Transport.

27.5.1 Local Business

To address skills shortages and escalating labour costs, the project will:

- Identify the range of skills required for the labour force and undertake a gap analysis against existing skills availability. Where gaps exist, in consultation with the Department of Education and Training, identify the method or strategy through which these skills will be filled, e.g., FIFO/DIDO or training. [C26.34]
- Determine how to maximise local employment opportunities and develop a recruitment plan to identify what positions will be targeted without negatively impacting on the availability of local services. [C26.35]

- Engage and collaborate with Construction Skills Queensland to identify potential strategies for increasing the capacity of local job seekers to develop appropriate skills for construction. [C27.01]
- Arrow Energy will work with Skills Queensland to deliver work readiness and skills development training programs for vulnerable local people such as the long term unemployed or under skilled, in order to assist them to gain employment. [C26.43]
- Where appropriate, identify opportunities where training provided by the project or other training providers will be able to meet skills gaps in the community for the project to assist in maximising local employment opportunities. [C26.37]
- Develop a policy identifying training pathways for students and school leavers to assist students in gaining employment upon graduation. This will be done in consultation with the Schools and Industry Network, Education Queensland Industry Partnership and the Queensland Minerals and Energy Academy. Where relevant training programs have been initiated by other proponents, Arrow Energy will consider coordinating support with these where appropriate. [C26.38]

The following key activities will be undertaken in collaboration with local business, local council, state government, the Industry Capability Network and economic development groups to assist local businesses in securing supply contracts for the project:

- Inform and advise stakeholders of project goods and services requirements, and of opportunities and requirements for securing service provision and supply contracts. This will include implementation of a Local Content Strategy to aid suitable businesses in the tender process. [C27.02]
- Inform council and economic development organisations of goods and services required by the project that are not currently available or are under-serviced from within Gladstone to attract investment and develop the supply chain. [C27.03]
- Investigate options to develop relevant networks to connect local business and enable collaboration in meeting service supply requirements of the LNG industry. [C27.04]

27.5.2 Local Housing Market

To assist in minimising impacts on the local property market, the following key activities will be undertaken:

- Develop a detailed worker accommodation plan during the period between final investment decision and commissioning of the construction camps. This will include continuing to liaise with the other proponents, housing providers and state and local government to determine the cumulative housing demand and cooperative strategies that address this demand. [C27.05]
- Identify viable housing options for housing the non local construction workforce likely to reside outside of the construction camps, minimising sourcing housing in the private rental market for non permanent staff unless vacancy rates increase to 3% or higher. Possible options could include:
  - Provide rental guarantees or other incentives to private investors to encourage the construction of new housing stock, which can be used by project staff and remain available for the wider community following the end of the construction phase.

  - Encourage all non local employees to live in company facilitated housing or TWAFs unless they have families or other circumstances that make this impractical.
  - Provide direct and indirect investment in the housing market.
  - Provide accommodation advice services for workers and their families. [C26.02]

- Identify preferred approach for facilitation of 380 beds in company facilitated accommodation for construction management (Arrow Energy and contractor) single status workers and 225 beds for operational workers (at stage 1) through the project accommodation strategy. [C26.07]
- Develop construction worker camps as soon as practical following final investment decision. [C27.06]
- Collect data on where workers are residing and whether they have a family with them. Determine the level of local employment and the likely number of non local workers and their families seeking accommodation in the study area. [C26.04]
- Make the local residential development market aware of the scale and timing of project accommodation requirements and construction and operations activities. [C27.07]
- Identify preferred approach for facilitation of up to 90 houses during the construction phase and increasing up to 130 houses for long term housing for the non local operational workforce (at stage 1) through the project accommodation strategy. The strategy should assess the state of the market to meet this project generated demand and make the required market interventions to minimise adverse impacts upon the community. [C26.06]
- Identify opportunities to bring forward facilitation of housing intended for the operations workforce that can be used for the construction workforce. [C26.08]
- Provide information on the Arrow Energy website on actions taken to meet project housing needs and key data on workforce numbers and approximate numbers housed within the community. [C26.09]
- Collaborate with other proponents in the region and identify opportunities to share temporary accommodation where possible for the construction and maintenance workforces. [C26.10]
- Inform the tourist industry and other peak business bodies of anticipated time frames for peak temporary accommodation demand. [C26.11]
- Work with the urban land development authority to identify opportunities in the study area to bring additional affordable housing to market for existing residents. [C26.12]
- Work with the state government, the Gladstone Regional Council and the Indigenous community to identify opportunities to provide assistance to not for profit housing providers to support the Indigenous community. [C26.13]
- Provide $6.5 million or in kind support of the same value to other non-government providers of social housing. [C26.14]
- Provide information on the Arrow Energy website on actions taken to support affordable housing initiatives to offset housing impact. [C26.15]
- Provide $1 million in financial assistance to the Gladstone Regional Council for emergency rental assistance. [C26.16]

27.6 Residual Impacts

Table 27.2 summarises key residual adverse economic impacts associated with the project. Impacts on business and infrastructure and service capacity will be reduced with the proposed mitigation measures in place. Impacts on housing prices and availability of affordable housing retain an impact rating of medium. While key management measures (such as the establishment of a construction camp for workers) are part of the project, it is likely that the project will have a minor impact on housing prices and availability.

Table 27.2 Assessment of adverse economic impacts following mitigation

Impact	Original Impact	Relevant Mitigation Measures	Residual Likelihood	Residual Consequence	Residual Impact
Impacts on local business.	High	Address skills shortages. Support local business to secure supply contracts.	Almost Certain	Minor	Medium
Impact on housing prices and the availability of affordable housing.	Medium	Minimise impacts on local property demand.	Likely	Minor	Medium
Impacts on local infrastructure and service capacity, particularly road infrastructure.	Medium	Minimise impacts of increased traffic.	Possible	Insignificant	Low

27.7 Inspection and Monitoring

Monitoring and inspection measures will be implemented throughout construction and operation of the project to enhance regional economic values and minimise adverse economic impacts. A social impact management plan has been developed for the project (Attachment 7, Social Impact Management Plan). The social impact management plant articulates action plans, which include requirements for monitoring and evaluation of the effectiveness of these plans in managing adverse impacts. Specific action plans which address key economic impact areas are the:

- Workforce and Training Action Plan.
- Local Content and Investment Action Plan.
- Housing and Accommodation Action Plan.

27.8 Commitments

The measures (commitments) that Arrow Energy will implement to manage impacts on economics are set out in Table 27.3.

Table 27.3 Commitments: Economics

No.	Commitment
C26.02	Identify viable housing options for housing the non local construction workforce likely to reside outside of the construction camps, minimising sourcing housing in the private rental market for non permanent staff unless vacancy rates increase to 3% or higher. Possible options could include: • Provide rental guarantees or other incentives to private investors to encourage the construction of new housing stock, which can be used by project staff and remain available for the wider community following the end of the construction phase. • Encourage all non local employees to live in company facilitated housing or TWAFs unless they have families or other circumstances that make this impractical. • Provide direct and indirect investment in the housing market. • Provide accommodation advice services for workers and their families. Common with Chapter 26, Social.
C26.04	Collect data on where workers are residing and whether they have a family with them. Determine the level of local employment and the likely number of non local workers and their families seeking accommodation in the study area. Common with Chapter 26, Social.
C26.06	Identify preferred approach for facilitation of up to 90 houses during the construction phase and increasing up to 130 houses for long-term housing for the non-local operational workforce (at Stage 1) through the project accommodation strategy. The strategy should assess the state of the market to meet this project generated demand and make the required market interventions to minimise adverse impacts upon the community. Common with Chapter 26, Social.
C26.07	Identify preferred approach for facilitation of 380 beds in company-facilitated accommodation for construction management (Arrow Energy and contractor) single-status workers and 225 beds for operational workers at Stage 1) through the project accommodation strategy. Common with Chapter 26, Social.
C26.08	Identify opportunities to bring forward facilitation of housing intended for the operations workforce that can be used for the construction workforce. Common with Chapter 26, Social.
C26.09	Provide information on the Arrow Energy website on actions taken to meet project housing needs and key data on workforce numbers and approximate numbers housed within the community. Common with Chapter 26, Social.
C26.10	Collaborate with other proponents in the region and identify opportunities to share temporary accommodation where possible for the construction and maintenance workforces. Common with Chapter 26, Social.
C26.11	Inform the tourist industry and other peak business bodies of anticipated time frames for peak temporary accommodation demand. Common with Chapter 26, Social.
C26.12	Work with the urban land development authority to identify opportunities in the study area to bring additional affordable housing to market for existing residents. Common with Chapter 26, Social.
C26.13	Work with the state government, the Gladstone Regional Council and the Indigenous community to identify opportunities to provide assistance to not-for-profit housing providers to support the Indigenous community. Common with Chapter 26, Social.
C26.14	Provide $6.5 million or in kind support of the same value to other non government providers of social housing. Common with Chapter 26, Social.
C26.15	Provide information on the Arrow Energy website on actions taken to support affordable housing initiatives to offset housing impact. Common with Chapter 26, Social.
C26.16	Provide $1 million in financial assistance to the Gladstone Regional Council for emergency rental assistance. Common with Chapter 26, Social.
C26.34	Identify the range of skills required for the labour force and undertake a gap analysis against existing skills availability. Where gaps exist, in consultation with the Department of Education and Training, identify the method or strategy through which these skills will be filled, e.g., FIFO/DIDO or training. Common with Chapter 26, Social.
C26.35	Determine how to maximise local employment opportunities and develop a recruitment plan to identify what positions will be targeted without negatively impacting on the availability of local services. Common with Chapter 26, Social.

Table 27.3 Commitments: Economics (cont'd)

No.	Commitment
C26.37	Where appropriate, identify opportunities where training provided by the project or other training providers will be able to meet skills gaps in the community for the project to assist in maximising local employment opportunities. Common with Chapter 26, Social.
C26.38	Develop a policy identifying training pathways for students and school leavers to assist students in gaining employment upon graduation. This will be done in consultation with the Schools and Industry Network, Education Queensland Industry Partnership and the Queensland Minerals and Energy Academy. Where relevant training programs have been initiated by other proponents, Arrow Energy will consider coordinating support with these where appropriate. Common with Chapter 26, Social.
C26.43	Arrow Energy will work with Skills Queensland to deliver work readiness and skills development training programs for vulnerable local people such as the long term unemployed or under skilled, in order to assist them to gain employment. Common with Chapter 26, Social.
C27.01	Engage and collaborate with Construction Skills Queensland to identify potential strategies for increasing the capacity of local job seekers to develop appropriate skills for construction.
C27.02	Inform and advise stakeholders of project goods and services requirements, and of opportunities and requirements for securing service provision and supply contracts. This will include implementation of a Local Content Strategy to aid suitable businesses in the tender process.
C27.03	Inform council and economic development organisations of goods and services required by the Arrow LNG Plant that are not currently available or are under-serviced from within Gladstone to attract investment and develop the supply chain.
C27.04	Investigate options to develop relevant networks to connect local business and enable collaboration in meeting service supply requirements of the LNG industry.
C27.05	Develop a detailed worker accommodation plan to accommodate workers during the period between final investment decision and commissioning of the construction camps. This will include continuing to liaise with the other proponents, housing providers and state and local government to determine the cumulative housing demand and cooperative strategies which address this demand.
C27.06	Develop construction worker camps as soon as practical following final investment decision.
C27.07	Make the local residential development market aware of the scale and timing of project accommodation requirements and construction and operations activities.