Port of Gladstone Western Basin Dredging and Disposal Project: Economic Assessment

Final Report

October 2009

ECONOMIC ASSOCIATES

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Final Report

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EXECUTIVE SUMMARY

The Port of Gladstone Western Basin Strategic Dredging and Disposal Project aims to accommodate the long term dredging and dredged material disposal that is required to provide safe and efficient access to the existing and proposed Port facilities in the harbour over the foreseeable future.

The rate of development will be controlled by the demands of industry locating in the Gladstone region and requiring access to port facilities.

The development of the Western Basin incorporates dredging associated with the deepening and widening of existing channels and swing basins, and the creation of new channels, swing basins and berth pockets. Material dredged during the Western Basin development is proposed to be placed into a reclamation area. The proposed expansion of the Fisherman's Landing Reclamation is 10 km north of Gladstone City immediately adjacent to the existing Fisherman's Landing.

Economic Associates was commissioned to provide the economic assessment for the proposed Port of Gladstone Western Basin Strategic Dredging and Disposal Project.

The report provides the identification and assessment of regional economic values, including:

- Regional and sub-regional population analysis (historic and projected);
- Regional and sub-regional employment and labour force analysis (by industry, occupation, participation rate and unemployment), skills and training;
- Demographic profile (age, family structure, income);
- Analysis of industrial activity and significance (e.g. number of employing and non-employing businesses by industry);
- Enterprise activity (business type and number). This would include a description of large scale industrial projects and their effects in the region;
- Analysis of local and regional residential, commercial and industrial property markets; and
- Availability and capacity of commercial accommodation within Gladstone to meet the accommodation needs of the construction and operational workforce.

The report also provides an economic assessment of the project comprising a cost benefit analysis and an economic impact assessment. The cost-benefit analysis was prepared consistent with Queensland Treasury's Cost Benefit Analysis Guidelines.

Economic Overview

The population of Gladstone Regional Council is projected to increase from 59,274 persons in 2009 to 98,041 persons in 2031 or by approximately 2.3% per annum. The working age population in Gladstone Regional Council is projected to increase from 2009 to 2031 by 2.3% per annum. However, the working age population as a proportion of the total population is anticipated to decrease. The rate of population growth in Gladstone Regional Council is anticipated to exceed the Fitzroy SD and Queensland averages.

In the 1996 to 2006 period, Gladstone Regional Council recorded a high labour force participation rate relative to Fitzroy SD and Queensland. Gladstone Regional Council has traditionally had a high proportion of employment in the construction industry relative to Fitzroy SD and Queensland. It is anticipated that the Western Basin Dredging and Disposal Project combined with significant working age population growth would contribute to continued growth in construction industry employment in Gladstone Regional Council.

In 2008, there were approximately 70 major projects in Gladstone Regional Council with a combined estimated cost of $42.6 billion. There are three major projects directly related to the port and a number of mining projects within the area with an estimated cost of $1.0 and $4.7 billion respectively.

The Port of Gladstone Western Basin Master Plan (2009) prepared by the Coordinator General identifies a diverse range of existing and proposed industries within the Port of Gladstone's Western Basin that would contribute to the demand for future shipping and port capacity, including cement, coal and chemicals (Refer to Figure 2.5). Development of Queensland's LNG industry represents the most immediate need for land and shipping capacity in the Western Basin.

The Port of Gladstone Western Basin Master Plan (2009) was developed assuming a LNG industry size of about 40 to 50 million tonnes per annum (Mtpa). This was determined based on the size and number of announced LNG projects within the Gladstone area (see Table 2.4). It is possible that an industry of greater or lesser size could develop dependent on future market conditions with the size also dependent on physical, regulatory, environmental and commercial factors. Commercial factors are subject to detailed consideration via each project's EIS, as well as commercial considerations by proponents.

Employment and Enterprise Activity within the Gladstone Regional Economy

Between 2001-02 and 2007-08, in Gladstone Regional Council the size of the labour force increased at the same rate as Queensland while the unemployment rate decreased at a marginally slower rate than Queensland. The unemployment rate was in higher in Gladstone Regional Council than Queensland in 2007-08. The average labour force participation rate in Gladstone Regional Council between 2001-02 and 2007-08 was 74.2%, below the Queensland average of 76.2%.

There were an estimated 4,023 businesses in Gladstone Regional Council as of June 2007 with the top sectors in terms of the number of enterprises being construction, property & business and agriculture, forestry & fishing.

Fitzroy SD is a major cropping area in Queensland accounting for approximately 20% of land under cropping in Queensland. Major commodities within Fitzroy SD as a percentage of Queensland production include wheat for grain, sorghum for grain, sweet potatoes, herbs, grapes and meat cattle.

Availability of Accommodation and Housing within Gladstone Regional Council

An analysis of the availability of commercial accommodation in Gladstone Regional Council (see Table 5.3) throughout the year indicates that over the last two years the average number of vacant rooms / beds per night in Gladstone Regional Council ranged between:

- 306-510 hotel / motel rooms and serviced apartments; and
- 256-457 caravan sites.

The median weekly rent for a two bedroom unit in the former Gladstone LGA was $220 in the June Quarter 2008, significantly lower than the Queensland median ($290). The median weekly rent for a three bedroom house in the former Gladstone LGA was $300 in the June Quarter 2008, marginally lower than the Queensland average of $310.

In the 1991 to 2008 period there were 17,675 houses, 3,014 units and townhouses and 11,470 vacant land allotments sold in Gladstone Regional Council including:

- 714 houses sold in 2008 with a median sales price of $385,000;
- 101 units and townhouses sold in 2008 with a median sales price of $287,500; and
- 310 vacant land allotments in 2008 with a median sales price of $192,418.

Results of Cost Benefit Analysis

In preparing the cost benefit analysis of the Western Basin Strategic Dredging and Disposal project it was considered appropriate to include the Fisherman's Landing bund within the assessment, given that the Fisherman's Landing area is to be directly serviced by channels and basins created by the project.

The costs benefit analysis included:

- Project costs:
  - Capital costs including bund construction, filling and capping and capital dredging works;
  - Maintenance costs, including bund and earthworks maintenance and regular maintenance dredging of channels and basins;
- Project benefits, including:
  - Major LNG project related benefits, such as the willingness to pay for Western Basin harbour services and for land made accessible as a result of the works;
  - Dredge spoil disposal savings related to the Fisherman's Landing bund; and
  - Environmental disbenefits, including direct disbenefits resulting from permanent loss of habitat areas and indirect disbenefits resulting from turbidity.

The assumptions made with regard to calculation of costs and benefits are provided in more detail in section 5.1 of this report.

The results of the cost benefit analysis (summarised in Table E.1) indicate that the project would be economically viable (as indicated by the positive net present value) at the target discount rate of 6%. The project's internal rate of return (i.e. the rate of return at which net present value equals zero) is 12.33%.

TableE.1: Cost Benefit analysis results for Western Basin Dredging and Disposal Project at 6% discount rate

	Present Value
Costs	
Bund construction & maintenance costs	$245,681,074
Dredging costs	$640,658,708
Fisherman's landing costs	$176,341,210
Total	$1,062,680,992
Benefits	
Value of harbour services	$1,855,013,409
Land use benefits	$1,728,481,484
Fisherman's Landing dredge spoil disposal cost saving	$61,678,633
Environmental disbenefits	-$1,367,770,401
Total	$2,277,403,124
NPV of net benefit	$1,214,722,132
BCR	2.14
IRR	12.33%

Two sensitivity tests of the cost benefit analysis were undertaken, the first of which related to environmental disbenefits. The main case only values areas of known seagrass at the higher parameter value for seagrass (i.e. $47,360/ha/yr). Seagrass meadows move year to year. In some years these meadows can be very large and in others, very small. The area impacted by the project both directly and indirectly that could support a seagrass meadow is difficult to accurately define. As such it is appropriate to undertake sensitivity testing based on an area of potential seagrass meadow as opposed to only the known areas of seagrass. For the purposes of this sensitivity test, it is assumed that the area of potential seagrass meadow is equal to the known areas of seagrass plus approximately half of the remaining benthic areas impacted. The assumed area of potential seagrass meadow impact is indicative. The purpose of this sensitivity test is to provide an indication of the sensitivity of the analysis to the variation of analytical assumptions.

The second sensitivity test related to the willingness to pay for harbour services facilitated by the project. The main case analysis assumes that the users of the Western Basin would have a willingness to pay for harbour services provided by the project of approximately $2.75/tonne. This rate is based on the spread of existing harbour dues paid by harbour users within the Port of Gladstone. This sensitivity test assumes that the willingness to pay for the harbour services provided by the project was only $1/tonne.

Table E.2 below summarises the results of the above sensitivity tests of the project cost benefit analysis and shows that the project remains economically positive at the test discount rate of 6%.

Table E.2: Costs benefit analysis results for sensitivity tests

	Sensitivity Test: Increased Environmental Disbenefits	Sensitivity Test: Reduced willingness to pay for Western Basin harbor services
Costs		
Bund construction & maintenance costs	$245,681,074	$245,681,074
Dredging costs	$640,658,708	$640,658,708
Fisherman's landing costs	$176,341,210	$176,341,210
Total	$1,062,680,992	$1,062,680,992
Benefits		
Value of harbour services	$1,855,013,409	$674,550,330
Land use benefits	$1,728,481,484	$1,728,481,484
Fisherman's Landing dredge spoil disposal cost saving	$61,678,633	$61,678,633
Environmental disbenefits	-$2,435,166,164	-$1,367,770,401
Total	$1,210,007,361	$1,096,940,046
NPV of net benefit	$147,326,369	$34,259,054
BCR	1.14	1.03
IRR	6.61%	6.19%

Economic Impact of Constructing the Fisherman's Landing Bund

The economic impact analysis is confined to capital dredging and bund construction works relating to the Fisherman's Landing bund and Western Basin bund expansion. The economic impact analysis is also limited to the first ten years of project works (2010 to 2019). This section outlines the approach used to estimate the economic impact of the project.

The economic impact analysis contained in this report presents results which are indicative of the scale of the economic impact resulting from the proposed project.

Table E.3 below summarises the aggregated cost of capital and dredging works associated with the Western Basin Dredging and Disposal Project incurred between 2010 and 2019. This initial ten year period represents the period of most significant economic impacts resulting from the project.

Table E.3: Capital and dredging costs of the Western Basin Dredging and Disposal Project, 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Western Basin expansion bund construction & maintenance costs	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1
Fisherman's landing bund construction & maintenance	$41.3	$41.3	$16.8	$51.1	$18.7	$18.7	$1.8	$1.8	$1.8	$1.8
Dredging costs	$59.0	$59.0	$109.0	$109.0	$109.0	$109.0	$59.0	$59.0	$59.0	$59.0
Total	$130.3	$130.3	$155.9	$190.2	$157.8	$157.8	$90.9	$90.9	$90.9	$90.9

Source: GHD Pty Ltd

Table E.4 below reports the annual economic impact of the Western Basin Dredging and Disposal Project between 2010 and 2019. Economic impacts are anticipated to be most significant in 2013, representing:

- $534.4 million in output (or consumption) impacts, including $344.2 million in indirect impacts;
- $93.4 million in household income impacts, including $80.2 million in indirect impacts;
- 1,867 full time equivalent positions, including 1,497 indirect full time equivalent positions; and
- $183.2 million in value added impacts, including $142.5 million in indirect impacts.

Table E.4: Annual economic impact of the Western Basin Dredging and Disposal Project between 2010 and 2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Output ($M)										
Direct	$130.3	$130.3	$155.9	$190.2	$157.8	$157.8	$90.9	$90.9	$90.9	$90.9
Indirect	$235.9	$235.9	$282.2	$344.2	$285.5	$285.5	$164.6	$164.6	$164.6	$164.6
Total	$366.2	$366.2	$438.1	$534.4	$443.3	$443.3	$255.5	$255.5	$255.5	$255.5
Household Income ($M)										
Direct	$9.1	$9.1	$10.9	$13.3	$11.0	$11.0	$6.3	$6.3	$6.3	$6.3
Indirect	$54.9	$54.9	$65.7	$80.2	$66.5	$66.5	$38.3	$38.3	$38.3	$38.3
Total	$64.0	$64.0	$76.6	$93.4	$77.5	$77.5	$44.7	$44.7	$44.7	$44.7
Employment (FTEs)										
Direct	254	254	304	371	307	307	177	177	177	177
Indirect	1,026	1,026	1,227	1,497	1,241	1,241	716	716	716	716
Total	1,280	1,280	1,531	1,867	1,549	1,549	893	893	893	893
Value Added ($M)										
Direct	$27.9	$27.9	$33.3	$40.6	$33.7	$33.7	$19.4	$19.4	$19.4	$19.4
Indirect	$97.7	$97.7	$116.8	$142.5	$118.2	$118.2	$68.1	$68.1	$68.1	$68.1
Total	$125.5	$125.5	$150.1	$183.2	$151.9	$151.9	$87.6	$87.6	$87.6	$87.6

Summary

Gladstone is an expanding region with strong population growth, high labour force participation and low unemployment, albeit marginally higher than the Queensland average. There are also a number of projects underway, committed or under investigation within the region. The Western Basin Dredging and Disposal Project will further extend the development pipeline within the region and facilitate a range of major industrial projects within the Port of Gladstone.

The Western Basin Dredging and Disposal Project is anticipated to support between approximately 890 and 1,500 full time equivalent positions annually throughout the first ten years of project works. The labour market has slackened over the past few months resulting in the availability of qualified employees. For positions that are unable to be filled by workers within the region, the existing commercial accommodation appears to have sufficient capacity to accommodate the new workers. In the housing and rental market, housing costs have increased, but no more than in Queensland generally. The median weekly rents for two bedroom units and three bedroom houses are traditionally below the state average. As such, the project is unlikely to place significant pressure on the housing market.

At the target discount rate of 6%, the project has a positive net present value and is economically viable. For the main case of the cost benefit analysis, the project remains economically viable across a spread of discount rates, having an internal rate of return of 12.33%. The project remains economically viable at the test discount rate of 6% in both sensitivity tests. In the first test, the extent of environmental disbenefits is assumed to significantly increase, and in the second test the willingness to pay for Western Basin harbour services is assumed to fall from $2.75/tonne to only $1.00/tonne.

The project aims to increase the efficiency and expand the capacity of the Port of Gladstone, which is one of the region's most significant pieces of transport infrastructure. Although the Western Basin Dredging and Disposal Project will be a significant project within the region, the change to the Gladstone economy would be marginal, rather than general.

1 INTRODUCTION

The Port of Gladstone Western Basin Strategic Dredging and Disposal Project aims to accommodate the long term dredging and dredged material disposal that is required to provide safe and efficient access to the existing and proposed Port facilities in the harbour over the foreseeable future.

The rate of development will be controlled by the demands of industry locating in the Gladstone region and requiring access to port facilities.

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- Analysis of local and regional residential, commercial and industrial property markets; and
- Availability and capacity of commercial accommodation within Gladstone to meet the accommodation needs of the construction and operational workforce.

The report also provides an economic assessment of the project comprising a cost benefit analysis and an economic impact assessment. The cost-benefit analysis was prepared consistent with Queensland Treasury's Cost Benefit Analysis Guidelines.

1.1 Disclaimer

Data contained in this report was drawn from publicly available sourced and from specialist advice from GHD Pty Ltd and Gladstone Port Corporation. While all due care has been taken is applying this data, Economic Associates Pty Ltd accepts no responsibility for the accuracy of data provided or sourced from third parties.

2 SOCIO-ECONOMIC PROFILE

A socio-economic profile of Gladstone Regional Council as at the 1996, 2001 and 2006 Census of Population and Housing, benchmarked against Fitzroy SD and Queensland is provided in Table 2.1. A number of key points can be drawn from this profile, these points being:

- At the time of the last Census, there was a relatively low incidence of persons aged 65 and over in Gladstone Regional Council (9.2%) when compared with Fitzroy SD (11.7%) and Queensland (13.0%). In the 1996 to 2006 period, Gladstone Regional Council recorded a high proportion of persons aged 0 to 14 years relative to Fitzroy SD and Queensland. Between 1996 and 2006, all regions recorded an increase in the proportion of persons aged 45 years and over;
- The average age of residents in 2006 was lowest in Gladstone Regional Council at 35.4 years, compared to 36.4 years in Fitzroy SD and 37.6 years in Queensland. Between 1996 and 2006, all regions recorded an increase in the average age of residents, with Gladstone Regional Council and Fitzroy SD recording a higher increase in the average age (both 2.5 years) than Queensland (2.1 years);
- In 2006, couple families with children were the most common household type in Gladstone Regional Council (34.1% of all households), exceeding the Fitzroy SD (31.4%) and Queensland (29.4%) averages. Gladstone Regional Council also recorded the highest proportion of couple families without children (26.7%), and the lowest incidence of lone person households (18.1%);
- The average household size decreased in all regions between 1996 and 2006. In 2006, Gladstone Regional Council recorded an average household size of 2.7 persons per household, which was consistent with the Fitzroy SD average and marginally above the Queensland average (2.6 persons per household);
- Gladstone Regional Council recorded a relatively high incidence of households purchasing their home in 2006 (36.8%) when compared with Fitzroy SD (30.3%) and Queensland (30.0%). Between 2001 and 2006, there was a significant decline in the proportion of fully owned households in all regions;
- At the time of the last Census, average household incomes were highest in Gladstone Regional Council at $1,314 per week. The average household income in Fitzroy SD ($1,248 per week) was also above the Queensland average of $1,202 per week;
- Average monthly housing loan repayments and average weekly rent payments in Gladstone Regional Council were above those recorded in Fitzroy SD but below the Queensland averages. All regions recorded a larger increase in both average monthly housing loan repayments and average weekly rent payments in the 2001 to 2006 period relative to the 1996 to 2001 period;
- Gladstone Regional Council recorded the highest unemployment rate in 2006 at 5.4%, and the highest participation rate at 64.2%. Unemployment rates declined significantly in all areas between 2001 and 2006;
- In 2006, the proportion of workers employed on a full time basis in both Gladstone Regional Council (64.3%) and Fitzroy SD (64.9%) was above the state average (61.4%). Despite

declining between 1996 and 2001, the incidence of full time employment increased in all regions between 2001 and 2006;

- In 2006, the incidence of residents with a post school qualification in both Gladstone Regional Council (36.1%) and Fitzroy SD (33.4%) was below the Queensland average (37.5%);
- In 1996, 2001 and 2006, Gladstone Regional Council recorded the highest proportion of certificate holders relative to Fitzroy SD and Queensland;
- At the time of the last Census, there was a relatively low incidence of both upper and lower white collar workers in Gladstone Regional Council when compared with Fitzroy SD and Queensland; and
- In 2006, the top three industries of employment in Gladstone Regional Council were manufacturing (19.8%), construction (12.4%) and accommodation & food services (10.3%). Gladstone Regional Council recorded a higher proportion of employment in manufacturing and construction at the last three Censuses relative to Fitzroy SD and Queensland.

Table 2.1: Socio-Economic Profile, Gladstone Regional Council, Fitzroy SD & Queensland, 1996-2006

	Gladstone RC			Fitzroy SD			Queensland		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
Age Distribution									
0-14 years	25.1%	24.5%	23.4%	24.3%	23.3%	22.2%	21.9%	21.3%	20.4%
15-24 years	13.7%	12.8%	12.7%	14.7%	13.9%	13.6%	14.8%	13.8%	13.6%
25-34 years	15.7%	13.6%	13.1%	15.3%	13.6%	13.0%	15.2%	14.2%	13.3%
35-44 years	16.9%	16.6%	15.7%	15.5%	15.3%	14.7%	15.0%	14.9%	14.6%
45-54 years	13.0%	14.2%	14.6%	12.0%	13.3%	14.0%	12.7%	13.7%	13.7%
55-64 years	8.0%	9.6%	11.2%	8.3%	9.5%	10.8%	8.4%	9.7%	11.4%
65+ years	7.6%	8.7%	9.2%	10.0%	11.1%	11.7%	12.0%	12.4%	13.0%
Average age (years)	32.9	34.4	35.4	33.9	35.4	36.4	35.5	36.6	37.6
Household Type (% of dwellings)									
Couple families with children	38.7%	35.5%	34.1%	36.6%	32.9%	31.4%	33.7%	30.7%	29.4%
Couple families without children	24.4%	25.7%	26.7%	24.0%	24.9%	25.8%	25.0%	25.3%	26.0%
Single parent family	8.4%	9.7%	9.2%	9.2%	10.2%	9.8%	9.9%	10.8%	10.5%
Lone person households	16.9%	18.9%	18.1%	19.4%	21.2%	20.4%	20.6%	21.8%	21.0%
Average Household size	2.8	2.7	2.7	2.9	2.7	2.7	2.8	2.6	2.6
Household Finances									
% of households fully owning home	35.6%	35.2%	28.7%	38.0%	37.5%	31.3%	38.7%	36.6%	30.4%
% of households purchasing home	27.1%	29.3%	36.8%	22.7%	24.7%	30.7%	24.8%	25.8%	31.4%
% of households renting	32.8%	30.0%	27.6%	34.9%	32.4%	30.3%	31.8%	31.6%	30.0%
Average weekly household income	-	$940	$1,314	-	$912	$1,248	-	$902	$1,202
Average weekly family income	$961	$1,217	$1,664	$936	$1,193	$1,572	$918	$1,175	$1,499
Average monthly housing loan repayment	$830	$905	$1,352	$787	$852	$1,280	$870	$977	$1,475
Average weekly rent payment	$113	$128	$183	$99	$117	$160	$130	$154	$218
Labour Market									
Full-time employment (% labour force)	64.1%	59.9%	64.3%	64.0%	60.9%	64.9%	61.2%	58.6%	61.4%
Part-time employment (% labour force)	20.6%	24.2%	23.7%	21.9%	24.5%	24.1%	24.2%	26.6%	27.7%
Total employment (% labour force)	89.8%	90.6%	94.6%	90.9%	92.0%	95.5%	90.4%	91.8%	95.3%
Unemployment rate (% labour force)	10.2%	9.4%	5.4%	9.1%	8.0%	4.5%	9.6%	8.2%	4.7%
Participation rate (% of population > 15 years)	64.4%	62.9%	64.2%	61.5%	61.3%	62.1%	60.7%	60.6%	61.1%

	Gladstone RC			Fitzroy SD			Queensland		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
Qualifications									
% of persons with a non-school qualification	28.1%	31.4%	36.1%	25.5%	28.7%	33.4%	27.6%	32.3%	37.5%
% of persons with Bachelor or higher	6.2%	7.5%	8.6%	6.6%	8.0%	9.2%	8.6%	10.8%	13.1%
% of persons with Diploma	4.2%	4.2%	4.8%	4.5%	4.1%	4.7%	5.4%	5.5%	6.6%
% of persons with Certificate	17.7%	19.7%	22.7%	14.4%	16.6%	19.5%	13.6%	16.0%	17.8%
Occupation									
Upper White Collar									
Managers	10.8%	11.1%	10.0%	13.5%	13.2%	11.7%	13.3%	12.9%	12.4%
Professionals	11.8%	12.3%	12.7%	12.7%	13.2%	13.3%	15.3%	16.4%	17.2%
Subtotal	22.7%	23.4%	22.7%	26.2%	26.4%	25.1%	28.6%	29.3%	29.6%
Lower White Collar									
Community & Personal Service Workers	6.0%	7.1%	7.0%	7.4%	8.1%	7.8%	8.1%	8.9%	9.1%
Clerical and Admin Workers	11.8%	12.1%	11.7%	12.7%	12.7%	12.4%	15.3%	15.0%	14.8%
Sales Workers	8.0%	8.8%	8.4%	8.5%	9.0%	8.6%	10.2%	10.7%	10.3%
Subtotal	25.9%	28.0%	27.2%	28.6%	29.8%	28.9%	33.6%	34.7%	34.2%
Upper Blue Collar									
Technicians & Trades Workers	22.9%	20.5%	21.7%	18.2%	17.0%	18.8%	15.6%	14.7%	15.3%
Subtotal	22.9%	20.5%	21.7%	18.2%	17.0%	18.8%	15.6%	14.7%	15.3%
Lower Blue Collar									
Machinery Operators & Drivers	12.5%	13.5%	12.8%	11.6%	11.2%	12.0%	8.3%	7.8%	7.2%
Labourers	13.4%	12.7%	13.5%	12.8%	13.8%	13.4%	11.4%	11.5%	11.9%
Subtotal	25.9%	26.1%	26.3%	24.4%	25.0%	25.4%	19.7%	19.3%	19.1%
Employment by Industry (% of employees)									
Agriculture, forestry & fishing	4.2%	3.9%	2.4%	7.3%	7.7%	5.2%	5.2%	4.9%	3.4%
Mining	0.8%	1.0%	1.5%	6.4%	4.7%	7.0%	1.6%	1.2%	1.7%
Manufacturing	18.2%	19.5%	19.8%	9.9%	10.6%	10.7%	10.1%	10.5%	9.9%
Electricity, gas, water & waste services	3.5%	2.4%	2.3%	2.2%	2.2%	2.3%	0.9%	1.0%	1.0%
Construction	12.1%	8.6%	12.4%	7.4%	6.8%	9.7%	7.0%	6.9%	9.0%
Wholesale trade	3.7%	4.5%	2.5%	4.2%	5.0%	3.1%	5.3%	4.9%	3.9%
Retail trade	9.5%	11.0%	10.3%	10.1%	10.6%	10.3%	10.6%	11.5%	11.6%
Accommodation & food services	5.7%	6.8%	6.7%	6.7%	7.1%	6.7%	7.2%	7.4%	7.0%
Transport, postal & warehousing	8.4%	7.4%	7.2%	6.2%	6.2%	5.8%	5.1%	5.2%	5.1%
Information media & telecommunications	0.8%	0.8%	0.7%	1.5%	1.1%	0.8%	2.1%	1.9%	1.4%
Financial & insurance services	1.5%	1.5%	1.3%	2.0%	1.7%	1.6%	3.0%	2.8%	2.9%
Rental, hiring & real estate services	1.8%	1.6%	1.8%	1.5%	1.4%	1.6%	2.0%	2.0%	2.1%
Professional, scientific & technical services	4.4%	4.3%	4.9%	3.7%	3.5%	3.6%	5.5%	5.4%	5.6%
Administrative & support services	2.5%	3.1%	2.5%	2.1%	2.6%	2.3%	2.7%	3.2%	3.0%
Public administration & safety	3.8%	4.0%	4.1%	5.1%	4.9%	5.5%	6.3%	6.2%	6.7%
Education & training	6.0%	7.5%	6.9%	8.1%	8.8%	8.2%	7.5%	8.0%	7.6%
Health care & social assistance	5.1%	6.1%	6.3%	8.1%	8.2%	8.6%	9.2%	9.5%	10.2%
Arts & recreation services	0.8%	0.7%	0.7%	0.8%	0.8%	0.6%	1.5%	1.5%	1.4%
Other services	3.0%	3.2%	2.9%	3.7%	3.9%	3.7%	4.3%	4.0%	3.7%

Source: Australian Bureau of Statistics (2007a)

2.1 Population Projections

The population of Gladstone Regional Council is projected to increase from 59,274 persons in 2009 to 98,041 persons in 2031 or by approximately 2.3% per annum. The working age population (persons aged 15 to 64 years) in Gladstone Regional Council is anticipated to increase by 2.0% per annum from 40,376 persons in 2009 to 62,767 persons in 2031.

The rate of both total population growth and working population growth in Gladstone Regional Council is anticipated to exceed growth rates in Fitzroy SD and Queensland.

Table 2.2 shows the population projections for the total and 15 to 64 populations in Gladstone Regional Council between 2009 and 2031.

Table 2.2: Population Projections, Gladstone Regional Council, 2009-2031

	2009	2011	2016	2021	2026	2031	Ave. Ann Growth 2009-31
Total Population							
Gladstone RC	59,274	63,120	70,927	79,102	88,265	98,041	2.3%
Fitzroy SD	221,145	231,656	251,426	271,702	293,706	316,393	1.6%
Queensland	4,370,661	4,567,713	5,040,325	5,478,715	5,884,439	6,273,885	1.7%
15-64 Population							
Gladstone RC	40,376	43,058	47,649	52,391	57,390	62,767	2.0%
Fitzroy SD	143,765	150,335	160,447	169,796	179,575	189,420	1.3%
Queensland	2,953,030	3,072,544	3,326,612	3,540,104	3,721,030	3,889,397	1.3%

Source: Department of Infrastructure and Planning (2008b)

2.2 Major Projects

In 2008, there were approximately 70 major projects in Gladstone Regional Council including $2.6 billion of completed projects, $6.3 billion of under construction projects, $3.9 billion of committed projects and $29.7 billion of under investigation projects. Of the projects in the Gladstone area, a significant proportion were energy (34.8%), mining (20.3%) and rail (14.5%) projects.

There are a number of major Liquefied Natural Gas projects under investigation and planning within the Western Basin. These are discussed in more detail in section 2.3.

There were a number of mining projects within Gladstone Regional Council including:

- Dawson Expansion Project, under construction with an estimated cost of $1 billion;
- Elimatta, under investigation with an estimated cost of $500 million;
- Fairview Power Project, under investigation with an estimated cost of $445 million;
- Wandoan Coal Project, under investigation with an estimated cost of over $1 billion; and
- Yamala, under investigation with an estimated cost of $400 million.

Table 2.3 outlines the major projects in Gladstone Regional Council as of 2008.

Table 2.3: Major Projects within Gladstone Regional Council, 2008

Project	Location	Est. Cost	Developer	Timetable	Details
Completed Projects					
Kogan Creek Power Station and Coal Mine Project	Kogan Creek, about 30 km south-east of Chinchilla	$1.2B	CS Energy Limited	Site works started in 2004 the commercial generation started in late 2007	Kogan creek power project is a 750 MW dry-cooled, coal-fired power station with an adjacent captive 2.8 Mt per year coal mine and a 25 km transmission line linking it to the QLD-NSW transmission link. Water is sourced from underground supplies, and coal is transported via a 4 km overland conveyor.
Lilyvale to Blackwater 132 kV Transmission Line	Central Queensland	$43.9M	Powerlink Queensland	Completed in October 2007	Construction of a new 132 kV transmission line between Powerlink's existing Lilyvale and Blackwater Substations to reinforce the high voltage electricity supply to inland Central Queensland, where electricity demand is increasing due to the significant expansion of coal mining in the region.
LINK Program	Rockhampton / Townsville	$58M	Ergon Energy	Completed June 2007	The project included improvement to electricity network monitoring and response capability and the construction of two new control centres to operate a new state-of-the-art network control system.
Yarwun Precinct - Sodium Cyanide Plant Expansion	Yarwun	$35M	Orica Australia Pty Ltd	Completed July 2007	Expansion of the sodium cyanide plant to increase production from 60 ktpa to 100 ktpa .
Blackwater Mine Coal Handling and Processing Plant Project	24 km south-west of Blackwater	$234M	BHP Billiton Mitsubishi Alliance	Started in 2004 with the practical completion in mid 2007	Construction of a state-of-the-art plant to process the entire production from Blackwater Mine which produces about 14 Mt per year of saleable coal.
RG Tanna Coal Terminal	Gladstone	$780M	Central Queensland Ports Authority	Started early 2005 and completed in early 2008	This project includes expansion of the RG Tanna and Barney Point coal terminals to boost the port's capacity to 75 Mt per year. The expansion includes a third rail in-loading station (completed November 2006), a third ship loader, a forth berth and five new stockpiles and the speeding up of the out-loading belts from 4,000 to 6,000 tonnes per hour.
Mantra Pavillions	Agnes Water	$162M	CKG Properties	Completed July 2007	The construction of a luxury beachfront complex with 78 apartments. Includes a shopping village with two restaurants.
Dawson Highway (Gladstone to Biloela)	Two sections 48.8-84.9 km west of Gladstone and 9.8km west of Biloela to Banana	$79M	Department of Main Roads	Started June 2006 and completed in December 2007	The project includes the rehabilitation of pavement and replacement of 11 bridges.
Projects Under Construction					
12 and 16 Cylinder Loco Overhauls (Queensland Government Project)	Rockhampton	$102M	Queensland Rail	Started October 2007 for completion in 2009-10	The projects involves overhauls of Queensland Rail's 12 and 16 Cylinder Loco Fleets.

Project	Location	Est. Cost	Developer	Timetable	Details
Aroona to Duaringa Duplication (Queensland Government Project)	Blackwater System	$35M	Queensland Rail	Started in January 2005 for completion in 2008-09	The project includes the duplication of track between Aroona and Duaringa in the Blackwater System.
Blackwater to Burngrove Duplication (Queensland Government Project)	Blackwater System	$43M	Queensland Rail	Started in March 2005 for completion in 2008-09	The project involves the duplication of track between Blackwater and Burngrove.
Bluff to Blackwater Duplication (Queensland Government Project)	Blackwater System	$59M	Queensland Rail	Started in May 2004 for completion in 2008-09	The project involves the duplication of track between Bluff and Blackwater.
Callemondah Third Spur (Queensland Government Project)	Gladstone	$41M	Queensland Rail	Started in May 2006 for completion in 2008-09	Construct a third spur line between Callemondah and RG Tanna Coal Terminal, and associated works
Electric Loco Upgrade Program (Queensland Government Project)	Maryborough and Rockhampton	$172M	Queensland Rail	Started in September 2006 for completion in 2010-11	The projects involves an overhaul of 18 x 3,900 electro locos, 50 x 3,500/3,600 electro locos and 11 x 3,900 class freight locomotives, as well as distributed power systems for all coal electro locos.
Stanwell to Wycarbah Duplication (Gracemere to Wycarbah Duplication) (Queensland Government Project)	Blackwater System	$72M	Queensland Rail	Started in March 2005 for completion in 2009-10	The project includes the duplication of track between Stanwell and Wycarbah.
Westwood to Wycarbah Duplication (Queensland Government Project)	Blackwater System	$32M	Queensland Rail	Started in December 2004 for completion in 2008-09	The project includes the duplication of track between Westwood and Wycarbah in the Blackwater System.
Roma to Taroom Road (Queensland Government Project)	Roma to Dalby	$30M	Department of Main Roads	Started September 2006 for completion in March 2010	The project involves widening the narrow sealed sections in the Roma Regional Council area, and paving and sealing the unsealed sections in Roma, Dalby and Banana Council areas.
Agnes Water (Agnes Water Substation)-Reinforcement of Supply	Agnes Water	$51M	Ergon Energy	Started December 2006 with the expected completion in September 2008	Construction of a new zone substation at Agnes Water.
Bouldercombe to Pandoin 132 kV Transmission Line and Pandoin 132/66 kV Substation	Central Queensland	$44.1M	Powerlink Queensland	To be completed by summer 2009-10	Construction of a new 132 kV transmission line between the existing Bouldercombe Substation and a new substation at Pandoin to help reinforce high voltage electricity supply to the Rockhampton area.
Braemar 2 Gas Pipeline	Near Dalby	$60M	NewGen Braemar	To be completed February	Construction of a 400 mm diameter, 100 km long, high-pressure gas pipeline

Project	Location	Est. Cost	Developer	Timetable	Details
Project			2 Partnership	2009	from the Condamine region to the proposed Braemar 2 gas-fired power station located approximately 40 km west of Dalby.
Dalby (T2 Dalby Transmission Substation)-Reinforcement of Supply	Dalby-Chinchilla	$37M	Ergon Energy	To be completed in September 2009	Augmentation of transmission the substation at Dalby.
Kogan (Arrow Energy Powerstation)-Electricity Infrastructure	Dalby-Chinchilla	$35M	Ergon Energy	To be completed in February 2010	Connection of gas fired powerstation near Dalby.
North Rockhampton (Berserker Substation) - Reinforcement of Supply	Rockhampton	$35M	Ergon Energy	To be completed in June 2009	Construction of a new zone substation in north Rockhampton.
Queensland Gas Company - Miles Generator	Miles	$38M	Ergon Energy	To be completed in April 2009	Connection of gas fired powerstation near Miles.
RG Tanna Coal Terminal - Upgrade Supply	Gladstone	$39M	Ergon Energy	To be completed in March 2009	New infrastructure associated with RG Tanna Coal expansion at the Gladstone Port.
Cement Mill	Gladstone	$50.6M	Cement Australia	Started early 2008	New cement mill that will duplicate the existing ball mill and milling circuit and be fed by existing feed systems. Estimated production output of cement will increase by a further 720,000 tonnes per year from the existing output of 750,000 tonnes per year.
Rio Tinto Alcan Expansion	Yarwun	$1.8B	Rio Tinto Alcan	Started in the third quarter 2007 to be completed in the third quarter 2010	Expansion to existing refinery. The expansion known as Yarwun 2 will more than double the annual production, increasing alumina production to 2.4 million tonnes by 2011.
Yarwun Alumina Refinery	Yarwun	$2.1B	Rio Tinto Aluminium Limited	Started in the third quarter 2007 with first shipments in the second half of 2010	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.
Callide Oxyfuel Project (Queensland Government Owned)	Biloela	$206M	CS Energy, Australian Coal Association, Xstrata, Schlumberger, Japanese Partnership and the Australian Government	Start refurbishment and construction work in September 2008, start operation in air-firing mode in the first quarter 2009 and start operation in oxyfiring mode second quarter 2011	The Callide Oxyfuel project aims to demonstrate how 'oxyfiring' technology can be successfully retrofitted to an existing coal fired power station to produce near zero-emissions power generation.

Project	Location	Est. Cost	Developer	Timetable	Details
Dawson Expansion Project	55km south-west of Biloela	$1B	Anglo Coal Australia Pty Ltd and Mitsui Coal Holdings Pty Ltd	Plan to increase saleable coal production to about 12.7 Mt per year by late 2008	The project includes three mining areas along the strike of the coal deposits
Ensham Central Coal Project	40 km north-east of Emerald	$140M	Ensham Joint Venture	Started in 2007 for completion in 2009	Ensham Resources Pty Ltd is proposing a staged expansion of the Ensham open-cut mine to increase saleable coal production from its present level of approximately 7 Mt per year to 12 Mt per year. The company is also investigating the potential for developing new underground mining operations in the longer term.
Seaspray					Staged, master-planned community
Fitzroy River to Capricorn Coast Water Supply Pipeline	Rockhampton to Yeppoon	$50M	Rockhampton Regional Council	To be completed in November 2009	Construction of a 36 km pipeline to supply water from the Fitzroy River to the Capricorn Coast. The project includes the construction of two reservoirs and two pump stations.
Yeppoon Pipeline	Fitzroy River Barrage to Capricorn Coast	$50M	Rockhampton Regional Council	Started in early 2008 for completion in December 2009	Construction of a pipeline to extract water from the Fitzroy River and pipe it to the Capricorn Coast to help meet water demand in the region. Rockhampton Regional Council is responsible for the construction of the 33 km water pipeline to supply water to urban users on the Capricorn Coast. Construction of the pipeline will also have significant environmental benefits as it will remove the need to extract water supplies from the Sandy Creek coastal dune system.
Committed Projects					
Moura Link (Queensland Government Project)	Gladstone	$500M	Queensland Rail	May start in 2009 for completion by mid 2012 to service the new Wiggins Island Coal Terminal	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
Dawson Highway (Queensland Government Project)	Calliope Range	$70M	Department of Main Roads	Start in May 2009 for completion in March 2011	Construct a deviation at the Calliope Range to a sealed standard
Larcom Creek 275/132kV Substation Establishment	Central QLD	$74.3M	Powerlink Queensland	Expected completion in 2009-10	Project to construct a new 275/132 kV substation at Larcom Creek in the Gladstone State Development Area
Queensland Gas Pipeline Expansion	Yarwun	$112M	Singapore Power International	Gas Delivery 2010	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
Boyne Smelters	Boyne Island	$385M	Boyne Smelters Ltd	Start fourth quarter 2009 for completion in second quarter 2011	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

Project	Location	Est. Cost	Developer	Timetable	Details
Walloon Coal Seam Gas Field	Walloon	$260M	Origin Energy Ltd	Gas supplies start first half of 2010	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
Wiggins Island Coal Terminal	North-west of Gladstone	$2.5-4B	Central Queensland Ports Authority and Queensland Rail	Stage 1 construction targeted for first quarter 2009 start. Completion in third quarter 2012	Develop a 25Mt per year 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
Projects Under Investigation					
Nathan Dam and Associated Pipelines (Queensland Government Project)	Dawson River near Nathan Gorge about 35 km north-east of Taroom	$400M	SunWater	Declared a significant project May 2008 with the target completion date (feasibility) in 2011, construction start in 2012 and commissioning in 2014	Construction of either a mass concrete or roller compacted concrete dam
Rookwood Weir and Eden Bann Weir (Queensland Government Projects)	Near Rockhampton	$143.33M	Lower Fitzroy Water Joint Venture	Target completion (feasibility) in 2009-11 with the possible completion (construction) in 2010-12	The proposed Lower Fitzroy Water Joint Jenture has reposibility for investigating the Rookwood Weir and Eden Bann Weir raising projects.
Berwyndale to Wallumbilla Gas Pipeline	8.5 km east of Miles	$70M	AGL Pipelines Investments Pty Limited	Operational in January 2009	The project consists of building a 1,150m long, 40m high, pressure gas pipeline to link QLD Gas Company's coal seam gas areas with the Wallumbilla gas hub. The pipeline will increase the capacity to transport QGC's gas into western QLD and the southern states. Under the agreement, AGL pipelines Investments is fully responsible for developing the project and commits to completing the pipeline by January 2009. QGC will have an option to buy back into the pipeline, following which the pipeline would be owned by both QGC and AGL under a 50-50 joint venture.
Central Queensland Gas Pipeline	Moranbah to Gladstone, Central Queensland	$400M	Arrow Energy and AGL Energy (joint venture)	Environment impact statement with conditions approved 15 January 2008. Possible construction 2009.	Construction of an underground, high pressure, 400km 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.
Gladstone LNG (GLNG)	Gladstone	$7.7B	Santos Limited	Declared significant 16 July 2007 Construction Start 2010 with the first LNG cargos in 2014	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 LNG Project - Fisherman's Landing	Fisherman's Landing near Gladstone	$400M	Gladstone LNG Pty Ltd	At environmental impact statement stage	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 million tonnes of LNG per year. A proposed second stage would double the capacity within three years of Stage 1. A natural gas liquefaction plant and

Project	Location	Est. Cost	Developer	Timetable	Details
					associated infrastructure and facilities would be built at FLW. Wharf loading facilities at FLW No. 5 would be upgraded. Coal Seam Gas (CSG) would be sourced from gas fields operated by Arrow Energy NL via the proposed Central Queensland Gas Pipeline. The CSG will be liquefied, stored and loaded into vessels for export.
IsaLink	Central Queensland to Mount Isa	$900M	IsaLink Pty Ltd	Construction start 2011 Completion 2012	Construction of a 1.1 km, 500 kV HVDC transmission line to connect the north-west Queensland region to the electricity network
Queensland Curtis LNG Project (BG-QGC)	Curtis Island, Gladstone and Surat Basin Coalfields	$8B	BG International Limited and QLD Gas Company Limited	First LNG production in the third quarter 2013	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
Queensland Hunter Gas Pipeline Project	Wallumbilla QLD to Newcastle NSW	$850M	Hunter Gas Pipeline Pty Ltd	Construction of the pipeline in late 2009 with the start of the first gas flow early 2011	The QLD Government granted the project Pipeline Licence number 124 for the QLD section. The pipeline is currently proceeding through the NSW environmental approval process and has been declared a 'critical infrastructure' project in NSW. The pipeline is mainly in NSW, but will source gas from the Wallumbilla gas hub in South East QLD for markets in NSW. Approximately 200km of the 850km pipeline is in QLD. one of the proposal's major drivers is to provide the missing link in the east Australian network and provide additional security of gas supply to Sydney and Newcastle
Sun LNG Project	Fisherman's Landing near Gladstone	$450M	Sojitz Corporation and Sunshine Gas Ltd Joint Venture	The final terms of reference for the environmental impact statement were issued on 28 May 2008 to the proponent, who will now prepare the draft EIS. The EPA's chief executive will invite written submissions from any person in relation to the draft EIS in due course	Development of a LNG plant at Fisherman's Landing Wharf near Gladstone. The first stage would produce half a million tonnes per year of LNG. Stage 2 would increase the capacity of the LNG plant to one million tonnes per year. A natural gas liquefaction plant and associated infrastructure and facilities would be built at FLW. Wharf loading facilities at FLW berth five would be upgraded. a 5km lateral gas pipeline would be constructed to deliver natural gas from the Gladstone City Gas Gate to the plant.
Wallumbilla-Darling Downs Power Station Gas Pipeline	Wallumbilla -Darling Downs Power Station site, west of Dalby	$90M	Origin Energy Walloons Transmissions Pty Ltd	To be completed by 2010	Constructing 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
Wandoan Coal - Electricity Infrastructure	Wandoan	More than $100M	Ergon Energy	Expected completion December 2012	Supplying infrastructure associated with power supply to a new coal mine near Wandoan
ZeroGen Clean Coal Power	Stanwell and Emerald-	Stage 1	ZeroGen Pty Ltd	The environmental impact	The ZeroGen project will lead the development of integrated gasification

Project	Location	Est. Cost	Developer	Timetable	Details
Station Project	Springsure, Central Queensland	approximately $1.7-$1.9B		statement will be available for public comment in early 2009 with construction to start in 2010 and commissioning in 2012	combined cycle (IGCC) with carbon capture and storage (CCS) in Australia. It will provide deep cuts in greenhouse gas emissions from base-load, coal-fired power generation and ensure the future of Queensland's coal industry in a carbon-strained world. The ZeroGen project has been reconfigured to a two-stage project. Stage 1 involves an 80-MW net IGCC with CCS power plant demonstrating up to 75% capture of carbon. Stage 1 of the project will capture and store up to 500,000 tonnes per year of carbon dioxide, and demonstrate safe and secure storage in geological formations in the Northern Denison Trough. Stage 2 includes a commercial-scale IGCC with CCS power plant (approaching 300 MW net) demonstrating up to 90% capture of carbon. Stage 2 of the project will capture and store approximately 2 million tonnes per year of carbon dioxide. The location of Stage 2 will depend on a commercial project development process.
Gladstone Pacific Nickel Refinery	Gladstone	$4B	Gladstone Pacific Nickel Limited	Construction Stage 1 mid 2009 to be operational in 2012 (stage 1) and 2015 (stage 2)	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
Cameby Downs Coal Project	15km east of Miles	Less than $100M	Syntech Resources Pty Ltd	Expected to start operations in 2010	This project will develop a new open-cut mine to produce high-volatile thermal coal for the export market. 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, and the product coal will be transported by rail approximately 380km to the Port of Brisbane for export to mostly Asian markets
Elimatta	About 35 km west of Wandoan	$500M	Northern Energy Corporation Limited	Construction 2010 for completion in 2012	This project involves the development of an open-cut, export coal mine to produce up to 5 Mt per year of high volatile thermal coal
Fairview Power Project	Injune	$445M	Santos Limited and General Electric	Construction started in 2007 to be operational in 2009	This project involves construction of a new 100 MW, gas-fired power station. One-third of the power station's carbon dioxide emissions will be captured and injected into an unmineable coal seam. The carbon dioxide will be locked in the coal seam but, in the process will release methane gas that can be extracted and used to run the power station
Gladstone-Fitzroy Pipeline Project	Gladstone to Fitzroy	$320M	Gladstone Area Water Board	Construction from 2009 to 2011	The Gladstone Area Water Board has started technical investigations into its Gladstone-Fitzroy Pipeline project. The pipeline will run underground from the Fitzroy River via an easement and through the proposed Stanwell-Gladstone Infrastructure Corridor.
Galilee Coal Project	Galilee Coal Basin,	Not	Hancock	Not available	Establishment of a mine in the Galilee Coal Basin, Central Queensland, to

Project	Location	Est. Cost	Developer	Timetable	Details
(Hancock)	Central Queensland	available	Prospecting Pty Ltd		provide thermal coal to international export markets. A new rail connection will be required to deliver the product to the coast for export.
Galilee Coal Project (Waratah)	38 km north-west of Alpha	Not available	Waratah Coal Inc.	Construction would start in 2010 with coal exported from 2012	Construction of a coal mine near Alpha, a new coal export terminal and a 500km, interconnecting rail line. The initial export target is 25 Mt per year.
Lacerta Coal Seam Gas Project	40km north of Roma	$67 million	Sushine Gas Limited	The company is aiming for a production target of up to 8PJ/year by the second quarter of 2009.	The Lacerta CSG Project is located in QLD's southern Bowen and Surat basins, adjacent to existing pipeline infrastructure. The project is currently at an advanced appraisal stage. It will become the source of feed gas for the proposed Sunshine/Sojitz LNG project in Gladstone. In March 2008, Sunshine Gas Limited announced the start of the Front End Engineering and Design for development of the project. The first phase of Lacerta's development includes the construction of a 30PJ/year gas processing and dehydration plant, 8PJ/year compression capacity and an additional 40 production wells. Certified proved and probable (2P) reserves stand at 469 Petajoules as at 1 June 2008.
Wandoan Coal Project	Near Wandoan, 60km north of Miles	Greater than $1B	Xstrata Coal QLD Pty Ltd	Mining to start in late 2011	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
Yamala	40 km west of Emerald	$400 million	Northern Energy Corporation Limited on behalf of the Yamala Coal Joint Venture	Construction to start in 2010 with commissioning in 2012	The project involves an open-cut and underground export coal mine to produce thermal coal for the export market. Production is planned to reach 2 Mt per year in 2012 and then be expanded to 4 Mt per year in 2014.
Fisherman's Landing Port Expansion	Calliope	$161 million	Central Queensland Ports Authority	Start of Environmental Impact Statement May 2008	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).
Surat Basin Railway	Surat Basin	$1.2 billion	Surat Basin Rail Pty Ltd	Total Completion 2010-13	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.
Gladstone-Fitzroy Pipeline	115km pipeline linking	$345	Gladstone Area	Target completion	This project involves developing a pipeline from the Fitzroy River to the

Project	Location	Est. Cost	Developer	Timetable	Details
	Fitzroy River to Gladstone	million	Water Board	(feasibility) in 2009-11 with the possible completion (construction) in 2011-12	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

Source: Department of Infrastructure and Planning (2008a)

2.3 Western Basin Projects

The Port of Gladstone Western Basin Master Plan (2009) prepared by the Coordinator General identifies a diverse range of existing and proposed industries within the Port of Gladstone's Western Basin that would contribute to the demand for future shipping and port capacity, including cement, coal and chemicals (Refer to Figure 2.5). Development of Queensland's LNG industry represents the most immediate need for land and shipping capacity in the Western Basin. The Port of Gladstone Western Basin Master Plan (2009) was developed assuming a LNG industry size of about 40 to 50 million tonnes per annum (Mtpa). This estimate was determined based on the size and number of announced LNG projects within the Gladstone area (see Table 2.4). It is possible that an industry of greater or lesser size could develop depending on future market conditions and also on physical, regulatory, environmental and commercial factors. Commercial factors are subject to detailed consideration via each project's EIS, as well as commercial considerations by proponents.

Table 2.4: Major LNG projects proposed within the Port of Gladstone Western Basin

Proponent	No. of trains[1]	Production (Mtpa)	Start date	Status of EIS
Arrow Energy	3	10	2014	Liquefied Natural Gas Ltd (LNGL) received the final Assessment Report on the EIS from the Queensland Government Department of Environmental and Resources Management. The plant will now progress to the development approvals stage. The EIS process has been completed and assessment conditions and recommendations are to be immediately implemented to obtain five specific approvals. Arrow Energy is actively working with the Gladstone Ports Corporation to obtain access to the site so that early site preparations works can commence in October this year.
QGC	3-4	12	2014	QGC Limited, a BG Group business, has released its EIS for the Queensland Curtis LNG Project (QCLNG). The document will be exhibited for public comment for seven weeks as part of a review under Queensland and Commonwealth environmental legislation.
Impel LNG	2	1.5	TBC	IAS has not been submitted.
LNG Limited	2	3	2012	Gladstone LNG Pty Ltd received its EIS assessment report advising that its report is of sufficient standard to allow it to proceed to the final stage. All recommendations, conditions and development approvals contained in the EIS assessment report were as expected and capable of being achieved in 2009.
Origin Energy	4	14	2015	Lodged application seeking significant project status, decision expected mid-Aril 2009.
Santos	3-4	10	2014	Draft EIS lodged 30 March 2009, formal EIS to be lodged in May for consideration.
Shell	3-4	14	TBC	February media release announcing interest in developing a project. IAS has not been submitted

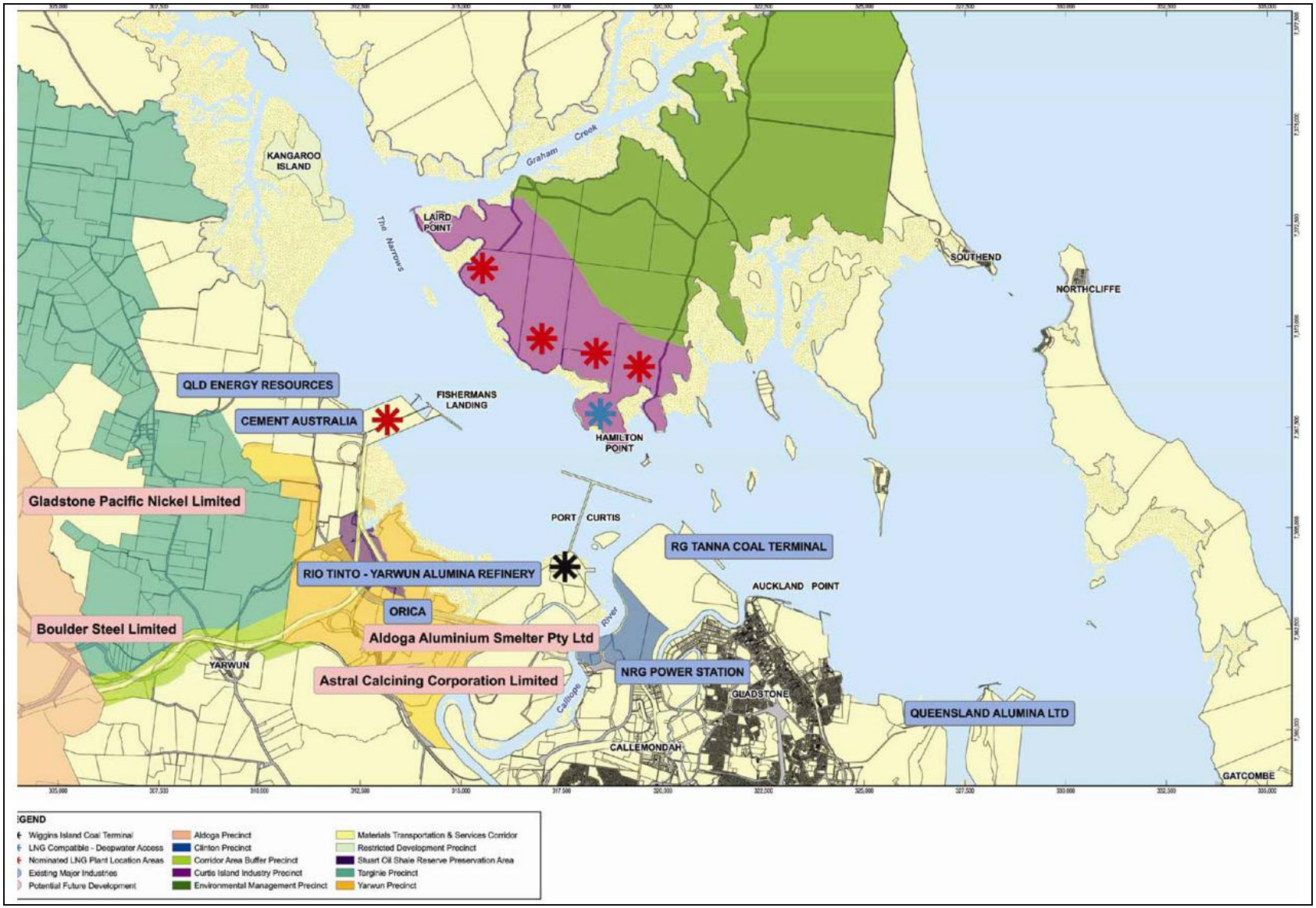
Note 1: a train is the term used to describe a processing plant that converts CSG to LNG
Source: Coordinator General (2009)

Other potential industries that may develop in the Western Basin and/or GSDA, include:

- Fertiliser – production and export of urea and phosphate;
- Various import/export liquid operations; and
- Shale oil.

Currently there is a moratorium placed on shale oil, restricting the current proponent to a three year demonstration plant prior to full scale commercial operation. It is possible that within the life of the master plan a proponent could seek to mine and refine the shale oil, therefore it is important to consider the location of any development and infrastructure in the resource area in relation to the deposit.

Figure 2.5: Existing and proposed industrial development



2.4 Summary

The population of Gladstone Regional Council is projected to increase from 59,274 persons in 2009 to 98,041 persons in 2031 or by approximately 2.3% per annum. The working age population in Gladstone Regional Council is projected to increase from 2009 to 2031 at a rate of 2.3% per annum. However, the working age population as a proportion of the total population is anticipated to decrease. The rate of population growth in Gladstone Regional Council is anticipated to exceed the Fitzroy SD and Queensland averages.

In the 1996 to 2006 period, Gladstone Regional Council recorded a high labour force participation rate relative to Fitzroy SD and Queensland. Gladstone Regional Council has traditionally had a high proportion of employment in the construction industry relative to Fitzroy SD and Queensland. It is anticipated that the Western Basin Dredging and Disposal Project combined with significant working age population growth would contribute to continued growth in construction industry employment in Gladstone Regional Council.

In 2008, there were approximately 70 major projects in Gladstone Regional Council with a combined estimated cost of $42.6 billion. There are three major projects directly related to the port and a number of mining projects within the area with an estimated cost of $1.0 and $4.7 billion respectively.

The Port of Gladstone Western Basin Master Plan (2009) prepared by the Coordinator General identifies a diverse range of existing and proposed industries within the Port of Gladstone's Western Basin that would contribute to the demand for future shipping and port capacity, including cement, coal and chemicals (Refer to Figure 2.5). Development of Queensland's LNG industry represents the most immediate need for land and shipping capacity in the Western Basin.

The Port of Gladstone Western Basin Master Plan (2009) was developed assuming a LNG industry size of about 40 to 50 million tonnes per annum (Mtpa). This estimate was determined based on the size and number of announced LNG projects within the Gladstone area (see Table 2.4). It is possible that an industry of greater or lesser size could develop depending on future market conditions and also on physical, regulatory, environmental and commercial factors. Commercial factors are subject to detailed consideration via each project's EIS, as well as commercial considerations by proponents.

3 EMPLOYMENT AND ENTERPRISE ACTIVITY WITHIN THE GLADSTONE REGIONAL ECONOMY

3.1 Workforce Size

The size of the labour force in Gladstone Regional Council increased from 23,786 persons in 2001-02 to 28,466 persons in 2007-08, or by approximately 3.0% per annum. Over the past seven years average annual growth in the size of the labour force in Gladstone Regional Council has been consistent with Queensland. However, in the most recent year (2007-08), the average annual growth in the size of the labour force in Gladstone Regional Council (4.2%) was significantly higher than Queensland (2.4%).

Table 3.1 provides a summary of the labour force size in Gladstone Regional Council between 2001-02 and 2007-08.

Table 3.1: Labour Force Size, Gladstone Regional Council, 2001-02 to 2007-08

	Gladstone Regional Council	Queensland
2001-02	23,786	1,875,400
2002-03	24,453	1,922,297
2003-04	24,961	1,967,824
2004-05	26,466	2,048,774
2005-06	27,240	2,109,754
2006-07	27,323	2,189,074
2007-08	28,466	2,240,974
Ave. Ann. Chg, 2001-02 to 2007-08	3.0%	3.0%
Ave. Ann. Chg, 2006-07 to 2007-08	4.2%	2.4%

Source: Department of Employment and Workplace Relations (various years)

3.2 Unemployment Rate

The unemployment rate within Gladstone Regional Council decreased from 7.9% in 2001-02 to 4.3% in 2007-08. In 2001-02, the unemployment rate in Gladstone Regional Council was consistent with the unemployment rate in Queensland (7.9%). Over the seven year period (2001-02 to 2007-08), the unemployment rate in Queensland decreased at the faster rate of 0.7% points per annum to 3.7% in 2007-08. However, the unemployment rate in Gladstone Regional Council was below the state average in both 2005-06 and 2006-07. In the most recent year (2007-08), Gladstone Regional Council recorded an increase in the unemployment rate whereas Queensland recorded a decrease in the unemployment rate.

Table 3.2 summarises the unemployment rate in Gladstone Regional Council between 2001-02 and 2007-08.

Table 3.2: Unemployment Rate, Gladstone Regional Council, 2001-02 to 2007-08

	Gladstone Regional Council	Queensland
2001-02	7.9%	7.9%
2002-03	7.2%	7.1%
2003-04	6.2%	6.3%
2004-05	5.0%	5.0%
2005-06	4.3%	5.0%
2006-07	3.5%	4.0%
2007-08	4.3%	3.7%
Ave. Ann. Chg, 2001-02 to 2007-08	-0.6%	-0.7%
Ave. Ann. Chg, 2006-07 to 2007-08	0.7%	-0.3%

Note: The average annual change figures in this table represent the average annual percentage point change in the unemployment rate.
Source: Department of Employment and Workplace Relations (various years)

3.3 Labour Force Participation Rate

The average labour force participation rate in Gladstone Regional Council between 2001-02 and 2007-08 was 74.2%, below the Queensland average of 76.2%. Over the 2001-02 to 2007-08 period the labour force participation rate fluctuated between 72.3% (2006-07) and 76.8% (2004-05). In Queensland, the labour force participation rate was highest in 2007-08 (77.7%), some four percentage points higher than in Gladstone Regional Council.

Table 3.3 summarises the labour force participation rate in Gladstone Regional Council between 2001-02 and 2007-08.

Table 3.3: Labour Force Participation Rate, Gladstone Regional Council, 2001-02 to 2007-08

	Gladstone Regional Council	Queensland
2001-02	74.5%	75.3%
2002-03	74.5%	75.2%
2003-04	73.8%	75.1%
2004-05	76.8%	76.5%
2005-06	74.2%	76.3%
2006-07	72.3%	77.5%
2007-08	73.0%	77.7%
Average	74.2%	76.2%

Source: Department of Employment and Workplace Relations (various years)

3.4 Enterprise Activity

3.4.1 Number of Businesses

Within Gladstone Regional Council there were an estimated 4,023 businesses as at June 2007, comprising of 1,746 employing businesses and 2,277 businesses operating as sole traders. In June 2007, the most significant industries in Gladstone Regional Council in terms of the number of businesses were construction (783 businesses), property & business services (774 businesses)

and agriculture, forestry & fishing (699 businesses). The majority of employing businesses had less than 20 employees (1,536 business), with 12 businesses employing over 200 staff.

Table 3.4 summarises the number of businesses by size in Gladstone Regional Council as at June 2007[1].

Table 3.4: Number of Businesses, Gladstone Regional Council, June 2007

	Number of Employees					
	1-19	20-199	200+	Total Employing Businesses	Non Employing Businesses	Total Businesses
Agriculture, Forestry and Fishing	129	3	0	132	567	699
Mining	9	0	0	9	9	18
Manufacturing	90	39	0	129	96	225
Electricity, Gas & Water Supply	0	0	0	0	3	3
Construction	342	21	3	366	417	783
Wholesale Trade	42	3	3	48	69	117
Retail Trade	345	39	3	387	156	543
Accom, Cafes & Restaurants	78	39	0	117	33	150
Transport & Storage	90	3	0	93	141	234
Communications Services	6	0	0	6	15	21
Finance & Insurance	36	0	0	36	123	159
Property & Business Services	252	45	3	300	474	774
Education	9	0	0	9	9	18
Health & Community Services	48	0	0	48	54	102
Cultural & Recreational Services	12	6	0	18	36	54
Personal & Other Services	48	0	0	48	75	123
Total	1,536	198	12	1,746	2,277	4,023

Source: Australian Bureau of Statistics (2007b), Economic Associates estimates

In Gladstone Regional Council, the top three businesses in terms of the number of enterprises were construction, property & businesses services and agriculture, forestry & fishing. Compared to Queensland, the incidence of enterprises in Gladstone Regional Council was relatively high in agriculture, forestry & fishing and retail trade. The incidence of businesses within property & business services was lower in Gladstone Regional Council (19.2%) than Queensland (24.2%).

Table 3.5 summarises the number of businesses in Gladstone Regional Council and Queensland as at June 2007.

[1] 2007 ABS Business Register data is the most recent data available.

Table 3.5: Number of Businesses, Gladstone Regional Council and Queensland, June 2007

	Gladstone Regional Council	Queensland
Agriculture, Forestry and Fishing	17.4%	12.1%
Mining	0.4%	0.4%
Manufacturing	5.6%	5.2%
Electricity, Gas & Water Supply	0.1%	0.1%
Construction	19.5%	17.6%
Wholesale Trade	2.9%	3.9%
Retail Trade	13.5%	10.9%
Accom, Cafes & Restaurants	3.7%	2.7%
Transport & Storage	5.8%	5.9%
Communications Services	0.5%	1.1%
Finance & Insurance	4.0%	5.7%
Property & Business Services	19.2%	24.2%
Education	0.4%	0.8%
Health & Community Services	2.5%	4.3%
Cultural & Recreational Services	1.3%	2.2%
Personal & Other Services	3.1%	3.0%
Total	4,023	404,457

Source: Australian Bureau of Statistics (2007b), Economic Associates estimates

3.4.2 Agricultural Activity

In 2006-07, Fitzroy SD recorded a total crop area (excluding pastures and grasses) of 422,786 hectares accounting for 19.1% of the total crop area in Queensland. Cereal broadacre crops accounted for the largest land area usage (380,315 hectares) in Fitzroy SD followed by non-cereal broadacre crops (39,267 hectares). The majority of businesses in the Fitzroy SD grew cereal broadacre crops (692 businesses).

Table 3.6 summarises the land ownership and use in Fitzroy SD in 2006-07.

Table 3.6: Land ownership and use, Fitzroy SD, 2006-07

	Estimate (ha)			Number of Businesses		
	Fitzroy SD	QLD	Fitzroy as %of QLD	Fitzroy SD	QLD	Fitzroy as %of QLD
Total crops (excluding pastures and grasses)	422,786	2,214,534	19.1%	893	13,550	6.6%
Cereal broadacre crops - cereals for all purposes	380,315	1,509,334	25.2%	692	5,080	13.6%
Non-cereal broadacre crops	39,267	612,054	6.4%	174	5,073	3.4%
Horticultural crops	3,203	93,147	3.4%	193	5,038	3.8%
Nurseries, cut flowers and cultivated turf	175	4,358	4.0%	13	719	1.8%
Vegetables for seed	5	419	1.2%	1	82	1.2%
Vegetables for human consumption	537	35,131	1.5%	43	1,756	2.4%
Fruit and nuts - fruit (excluding grapes)	2,307	51,934	4.4%	135	2,946	4.6%
Orchard fruit and nut trees (excluding plantation and berry fruit)	1,186	33,711	3.5%	101	2,221	4.5%

Source: Australian Bureau of Statistics (2008)

In 2006-07, wheat for grain produced the highest volume of pastures and broadacre crop production in Fitzroy SD (349,461 tonnes) followed by sorghum for grain (231,787 tonnes) and hay – pasture, cereal and other crops cut for hay (75,166 tonnes). Wheat for grain, sorghum for grain and hay – pasture, cereal and other crops cut for hay were also major pasture and broadacre crops in 2000-01 and 2005-06. In 2000-01 and 2005-06, cotton – total seed cotton was also a major pasture and broadacre crop in the Fitzroy SD, however the yield of these crops fell significantly in 2006-07.

In 2006-07, wheat for grain, chickpeas and legumes for grain production in Fitzroy SD accounted for a significant proportion of production of those crops in Queensland (45.0%, 44.1% and 43.1% respectively).

Table 3.7 shows the top ten pasture and broadacre crops in terms of production in Fitzroy SD for 2000-01 and 2006-07.

Table 3.7: Top 10 Pasture and Broadacre Crops (t), Fitzroy SD, 2000-01 to 2006-07

	Fitzroy SD			Queensland			Fitzroy SD as % of Queensland		
	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07
Wheat for grain	373,771	234,435	349,461	1,156,973	1,217,587	776,720	32.3%	19.3%	45.0%
Sorghum for grain	351,219	115,978	231,787	1,155,860	1,038,439	896,405	30.4%	11.2%	25.9%
Hay - pasture, cereal and other crops cut for hay	59,909	65,794	75,166	454,738	559,641	494,658	13.2%	11.8%	15.2%
Hay sold during year ended 30 June	29,997	45,312	54,507	230,955	306,504	328,981	13.0%	14.8%	16.6%
Silage made during year ended 30 June	66,492	42,420	54,341	442,994	671,637	662,275	15.0%	6.3%	8.2%
Cotton - total seed cotton	113,497	105,070	42,115	530,211	547,935	176,193	21.4%	19.2%	23.9%
Legumes for grain	32,372	19,891	31,563	96,728	54,375	73,172	33.5%	36.6%	43.1%
Chickpeas	19,365	16,263	26,700	55,999	39,681	60,595	34.6%	41.0%	44.1%
Maize for grain	24,658	9,331	16,881	159,061	129,124	92,417	15.5%	7.2%	18.3%
Barley for grain	2,961	10,333	14,352	114,985	165,984	78,960	2.6%	6.2%	18.2%

Note: Commodities were ranked according to the volume of production in Fitzroy SD in 2006-07
Source: Australian Bureau of Statistics (2008)

In 2006-07, the most significant vegetable crops for human consumption in the Fitzroy SD (in tonnes) were sweet potatoes (3,670 tonnes), melons – watermelons (3,542 tonnes) and pumpkins (including butternut) (1,410 tonnes). Production of the aforementioned commodities decreased in 2006-07, particularly the production of watermelons. Production in terms of regional production as a percentage of state crop production was highest for herbs. The Fitzroy SD produced 27.3% of state-wide herb production in 2006-07, having recorded significant increases in production. Herb production increased from seven tonnes in 2000-01 to 908 tonnes in 2006-07.

Table 3.8 shows the top ten vegetables for human consumption in terms of production in Fitzroy SD in 2000-01, 2005-06 and 2006-07.

Table 3.8: Top Ten Vegetables for Human Consumption (t), Fitzroy SD, 2000-01 to 2006-07

	Fitzroy SD			Queensland			Fitzroy as % of Queensland		
	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07
Sweet potatoes	n.a.	3,902	3,670	n.a.	34,823	38,389	n.a.	11.2%	9.6%
Melons – watermelons	6,459	7,206	3,542	61,834	73,446	61,432	10.4%	9.8%	5.8%
Pumpkins (including butternut)	2,374	2,411	1,410	50,166	47,161	39,847	4.7%	5.1%	3.5%
Herbs	7	341	908	335	1,466	3,330	2.2%	23.2%	27.3%
Potatoes - processing and fresh market	211	188	354	115,817	93,589	88,083	0.2%	0.2%	0.4%
Cucumbers - outdoor and undercover	326	200	156	4,817	10,196	16,869	6.8%	2.0%	0.9%
Capsicums, chillies and peppers - outdoor and undercover	71	51	76	36,853	52,352	48,872	0.2%	0.1%	0.2%
Carrots	101	84	71	23,866	22,148	28,970	0.4%	0.4%	0.2%
Zucchini and button squash	269	183	63	13,140	16,827	16,301	2.0%	1.1%	0.4%
Beetroot	n.a.	1	7	36,057	31,475	35,417	n.a.	0.0%	0.0%

Note: Commodities were ranked according to the volume of production in Fitzroy SD in 2006-07
Source: Australian Bureau of Statistics (2008)

In Fitzroy SD, pineapples were the most significant fruit and nut commodity in terms of production in 2000-01, 2005-06 and 2006-07. The volume of grapes (fresh weight) produced increased significantly between 2000-01 and 2006-07 increasing from 1,159 tonnes to 7,739 tonnes. The volume of mangoes and lemons and limes produced decreased significantly over the same period. In 2006-07, the volume of grapes (fresh weight) accounted for 46.1% of Queensland's grape production.

Table 3.9 summarises the top ten fruit and nuts in terms of production in Fitzroy SD in 2000-01, 2005-06 and 2006-07.

Table 3.9: Top Ten Fruit and Nuts (t), Fitzroy SD, 2000-01 to 2006-07

	Fitzroy SD			Queensland			Fitzroy SD as % of Queensland		
	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07
Pineapples	13,000	16,378	14,847	119,606	152,944	164,691	10.9%	10.7%	9.0%
Grapes (fresh weight)	1,159	3,538	7,739	7,504	15,064	16,795	15.4%	23.5%	46.1%
Mangoes	1,484	1,058	1,025	28,233	25,125	41,478	5.3%	4.2%	2.5%
Oranges	64	64	51	15,671	11,084	7,183	0.4%	0.6%	0.7%
Mandarins	6,022	111	46	49,487	60,355	68,873	12.2%	0.2%	0.1%
Nuts – macadamia	40	55	22	8,511	11,891	7,884	0.5%	0.5%	0.3%
Strawberries	0	5	13	5,275	12,929	17,363	0.0%	0.0%	0.1%
Lemons and limes	1,010	17	1	9,401	12,459	20,731	10.7%	0.1%	0.0%
Avocados	45	26	1	20,689	22,165	33,596	0.2%	0.1%	0.0%
Grapefruit	5	13	0	966	2,163	4,419	0.6%	0.6%	0.0%

Note: Commodities were ranked according to the volume of production in Fitzroy SD in 2006-07
Source: Australian Bureau of Statistics (2008)

In 2006-07, meat cattle production was the most significant livestock commodity in Fitzroy SD producing 2,219,630 cows. Other major livestock commodities were poultry and eggs – layers (64,220 chickens) and pigs (29,286 pigs). The number of livestock in Fitzroy SD has decreased over the 2000-01 to 2006-07 period with the exception of meat cattle and poultry and eggs – poultry n.e.c..

Table 3.10 below provides a summary of the top ten livestock commodities in Fitzroy SD for 2000-01, 2005-06 and 2006-07.

Table 3.10: Top Ten Livestock (n0), Fitzroy SD, 2000-01 to 2006-07

	Fitzroy SD			Queensland			Fitzroy SD as % of Queensland		
	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07	2000-01	2005-06	2006-07
Cattle - meat cattle	1,998,853	1,901,503	2,219,630	11,087,566	11,353,920	11,494,873	18.0%	16.7%	19.3%
Poultry and eggs – layers	121,034	66,984	64,220	3,225,788	3,463,913	4,199,798	3.8%	1.9%	1.5%
Pigs	46,967	23,410	29,286	596,808	691,054	695,045	7.9%	3.4%	4.2%
Horses	14,533	13,178	12,978	86,014	91,400	85,821	16.9%	14.4%	15.1%
Poultry and eggs - poultry n.e.c.	220	19,500	6,163	33,004	47,676	6,197	0.7%	40.9%	99.5%
Cattle - milk cattle	11,067	3,932	3,560	288,276	193,601	188,743	3.8%	2.0%	1.9%
Sheep	45,645	19,632	1,980	8,660,071	4,465,713	4,378,429	0.5%	0.4%	0.0%
Goats (domesticated)	n.a.	6,974	1,865	n.a.	176,325	113,700	n.a.	4.0%	1.6%
All other livestock	4,717	2,476	1,646	190,854	20,581	26,561	2.5%	12.0%	6.2%
Deer	3,389	272	9	15,477	9,270	12,464	21.9%	2.9%	0.1%

Note: Commodities were ranked according to the volume of production in Fitzroy SD in 2006-07
Source: Australian Bureau of Statistics (2008)

3.5 Summary

Between 2001-02 and 2007-08, in Gladstone Regional Council the size of the labour force increased at the same rate as Queensland while the unemployment rate decreased at a marginally slower rate than Queensland. The unemployment rate was in higher in Gladstone Regional Council than Queensland in 2007-08. The average labour force participation rate in Gladstone Regional Council between 2001-02 and 2007-08 was 74.2%, below the Queensland average of 76.2%.

There were an estimated 4,023 businesses in Gladstone Regional Council as of June 2007 with the top sectors in terms of the number of enterprises being construction, property & business and agriculture, forestry & fishing.

Fitzroy SD is a major cropping area in Queensland accounting for approximately 20% of land under cropping in Queensland. Major commodities within Fitzroy SD as a percentage of Queensland production include wheat for grain, sorghum for grain, sweet potatoes, herbs, grapes and meat cattle.

4 AVAILABILITY OF ACCOMMODATION AND HOUSING WITHIN GLADSTONE REGIONAL COUNCIL

The following assessment of the Gladstone Regional Council accommodation and housing markets relates to:

- Stock and availability of commercial accommodation, including:
  - Hotel and motel rooms and serviced apartments;
  - Caravan park sites;
  - Holiday flats, units and houses; and
  - Hostels;
- Median rents for two bedroom units and three bedroom houses; and
- Sales of houses, units, townhouses and vacant urban land.

4.1 Commercial Accommodation in Gladstone Regional Council

As of the June Quarter 2008, there were 44 hotels, motels & services apartments with five or more rooms, nine caravan parks, one hostel and no holiday flats, units and houses within Gladstone Regional Council.

Table 4.1 below provides a summary of the tourism establishments in Gladstone Regional Council in the June Quarter 2008.

Table 4.1: Summary of Tourism Establishments, Gladstone Regional Council, June Quarter 2008

	Hotels, Motels & Serviced Apartments[1]		Caravan Parks	
	No.	Rooms	No.	Total Capacity
Gladstone Regional Council	44	598	9	247
Queensland	1,543	64,663	366	39,512

Note: Data is not available for hostels as there is only one establishment
Note 1: Establishments with five or more rooms
Source: Australian Bureau of Statistics (various years)

The room occupancy rate of hotels, motels & serviced apartments with five or more rooms in Gladstone Regional Council fluctuated between 53.6% (June Quarter 2007) and 70.3% (September Quarter 2006). Over the past two years room occupancy rates for hotels, motels, & serviced apartments in Gladstone Regional Council were typically lower than the Queensland average.

The site occupancy rate[2] of caravans was highest in the June Quarter 2007 in Gladstone Regional Council (66.3%) and the September Quarter 2007 in Queensland (67.9%). The average site occupancy rate between September Quarter 2006 and June Quarter 2008 was 56.2% in Gladstone Regional Council, marginally lower than the Queensland average of 56.9%.

Table 4.2 shows the occupancy rates in Gladstone Regional Council from the September Quarter 2006 to the June Quarter 2008.

Table 4.2: Occupancy Rate Trends, Gladstone Regional Council and Queensland, Sep Q 06 to June Q 08

	Gladstone Regional Council		Queensland	
	Hotels, Motels & Serviced Apartments[1] (room occupancy)	Caravan Parks (site occupancy)	Hotels, Motels & Serviced Apartments[1] (room occupancy)	Caravan Parks (site occupancy)
Sep Q 06	70.3%	59.6%	82.9%	65.1%
Dec Q 06	61.9%	56.1%	67.8%	51.7%
Mar Q 07	57.4%	55.2%	70.9%	49.4%
Jun Q 07	53.6%	66.3%	83.5%	58.8%
Sep Q 07	59.0%	59.5%	77.3%	67.9%
Dec Q 07	61.2%	47.4%	61.2%	54.7%
Mar Q 08	55.6%	46.8%	65.3%	49.4%
Jun Q 08	59.2%	58.7%	79.0%	58.3%
Ave. Sep Q 06 to Jun Q 08	59.8%	56.2%	66.0%	56.9%

Note: The occupancy rate for caravan parks represents the site occupancy rate.
Note 1: Establishments with five or more rooms
Source: Australian Bureau of Statistics (various years)

Over the September Quarter 2006 to the June Quarter 2008 period the average number of vacant rooms / beds per night in Gladstone Regional Council ranged between:

- 306-510 vacant hotel / motel rooms and serviced apartments; and
- 256-457 vacancies at caravan sites.

Vacancy data indicates accommodation demand for hotels, motels and serviced apartments with five or more rooms in Gladstone Regional Council was particularly high in the June Quarter 2008 and the December Quarter 2006.

Table 4.3 below provides a summary of the average number of vacant rooms / beds per night Gladstone Regional Council between September Quarter 2006 and June Quarter 2008.

[2] The site occupancy rate for Gladstone Regional Council does not include the former Miriam Vale LGA because no information was available due to the small number of establishments.

Table 4.3: Average Number of Vacancies per Night, Gladstone Regional Council, Sep Q 06 to Jun Q 08

	Hotels, Motels & Serviced Apartments[1] (vacant rooms)	Caravan Parks (vacant sites)
Sep Q 06	306	346
Dec Q 06	436	331
Mar Q 07	478	338
Jun Q 07	510	256
Sep Q 07	455	342
Dec Q 07	432	454
Mar Q 08	499	457
Jun Q 08	460	330
Average, Sep Q 06 to Jun Q 08	447	357

Note 1: Establishments with five or more rooms
Source: Australian Bureau of Statistics (various years)

4.1.1 Gladstone Rental Market

Within Gladstone Regional Council, median weekly rent prices are only available for the former Gladstone LGA. No data was available for the other components of Gladstone Regional Council (Miriam Vale LGA and Calliope LGA) due to the relatively low number of rental bonds collected in these regions.

The median weekly rent for a two bedroom unit in the former Gladstone LGA decreased from $170 in the December Quarter 2003 to $145 in the June Quarter 2005 before increasing to $220 in the June Quarter 2008. In the December Quarter 2003 to June Quarter 2008 period, the median weekly rent for a two bedroom unit was consistently lower in the former Gladstone LGA than in Queensland. The median weekly rent for a three bedroom house in the former Gladstone LGA was $300 in the June Quarter 2008, marginally lower than the Queensland average of $310.

Table 4.4 summarises the median weekly rents for a two bedroom unit and a three bedroom house in the former Gladstone LGA between December Quarter 2003 and June Quarter 2008.

Table 4.4: Median Weekly Rents, Dec Q 2003 to Jun Q 2008

	Former Gladstone LGA		Queensland		Ratio	
	2 bed unit	3 bed house	2 bed unit	3 bed house	2 bed unit	3 bed house
Dec-03	$170	$220	$180	$210	0.94	1.05
Mar-04	$160	$220	$190	$220	0.84	1.00
Jun-04	$165	$220	$190	$220	0.87	1.00
Sep-04	$155	$210	$200	$225	0.78	0.93
Dec-04	$150	$200	$200	$230	0.75	0.87
Mar-05	$150	$200	$210	$235	0.71	0.85
Jun-05	$145	$200	$210	$240	0.69	0.83
Sep-05	$150	$190	$220	$240	0.68	0.79
Dec-05	$155	$210	$220	$250	0.70	0.84
Mar-06	$160	$220	$230	$250	0.70	0.88
Jun-06	$165	$225	$230	$255	0.72	0.88
Sep-06	$170	$240	$250	$260	0.68	0.92
Dec-06	$190	$260	$250	$270	0.76	0.96
Mar-07	$180	$270	$260	$280	0.69	0.96
Jun-07	$190	$280	$260	$285	0.73	0.98
Sep-07	$220	$280	$270	$295	0.81	0.95
Dec-07	$220	$300	$275	$300	0.80	1.00
Mar-08	$220	$300	$290	$310	0.76	0.97
Jun-08	$220	$300	$290	$310	0.76	0.97

Note: A ratio of more (less) than one indicates the median weekly rent Gladstone LGA is higher (lower) than the Queensland average.
Source: Residential Tenancies Authority of Queensland (2009)

4.2 Gladstone Regional Council Housing Market

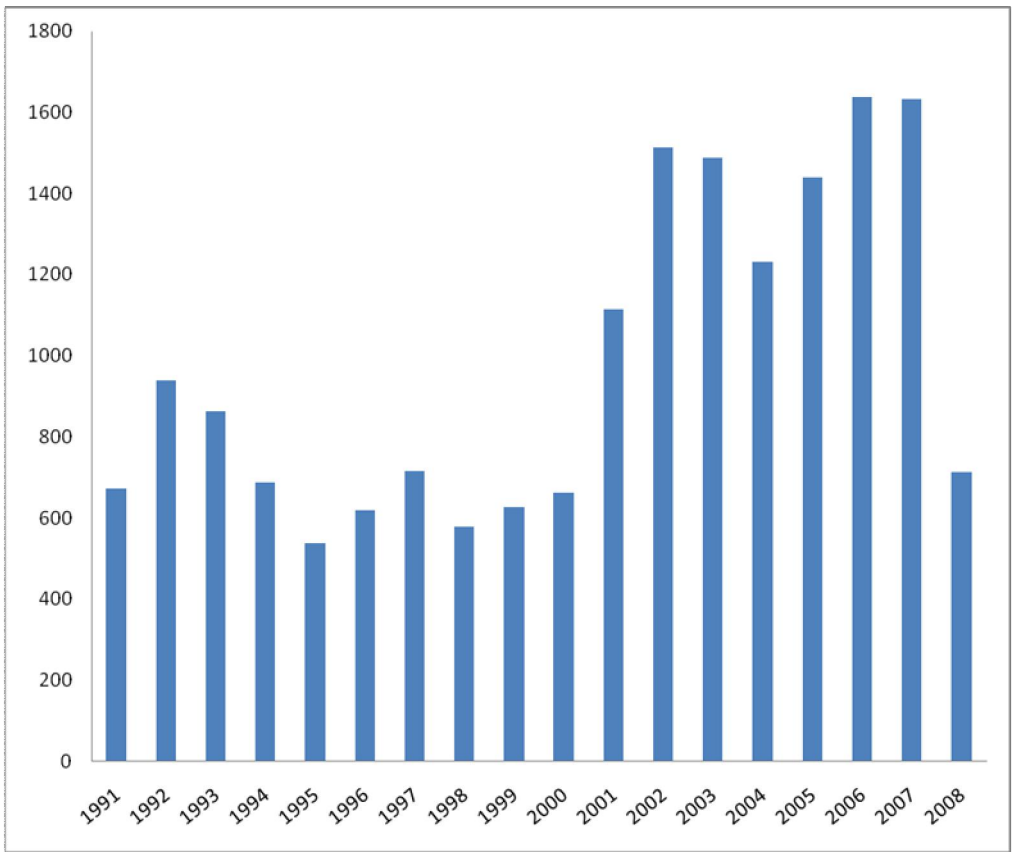
4.2.1 Houses

Volume of Sales

Within Gladstone Regional Council, the volume of house sales fluctuated significantly between 1991 and 2008, peaking in 2006 at 1,638 sales. The number of house sales was consistently higher in the 2001 to 2007 period than in the 1991 to 2002 period.

Figure 4.1 below shows the volume of house sales in Gladstone Regional Council between 1991 and 2008.

Figure 4.1: Volume of House Sales, Gladstone Regional Council, 1991 to 2008



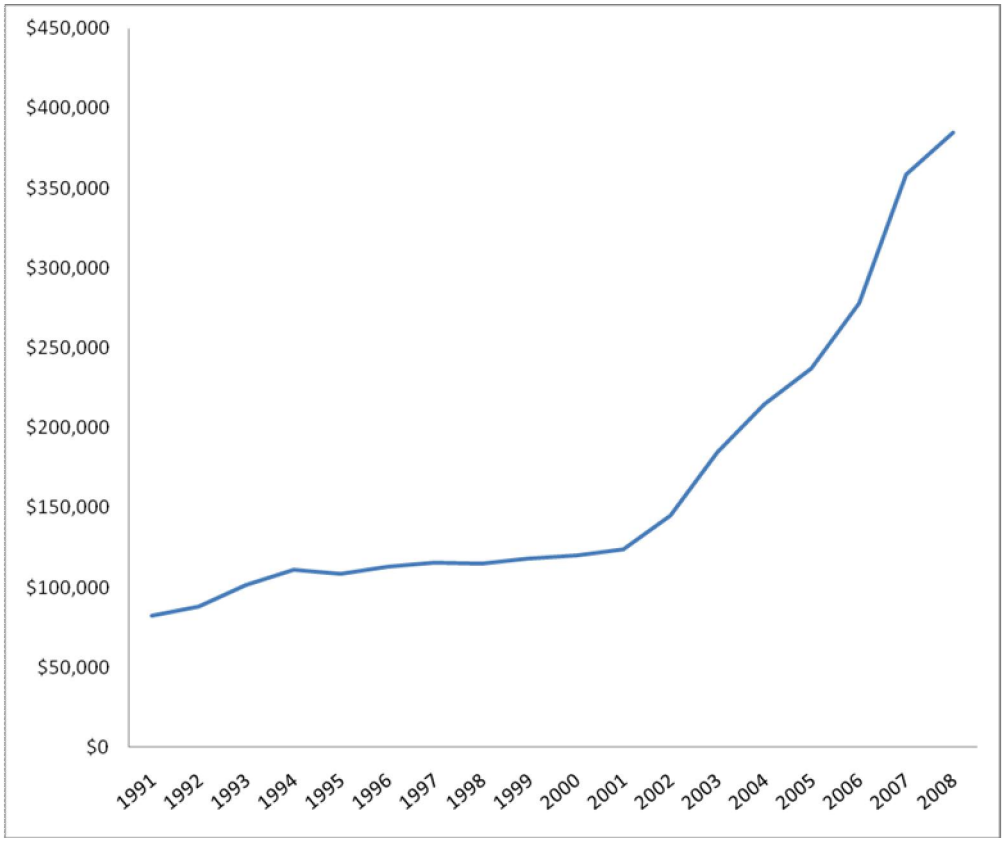
Note: The data was collected on 18th February 2009
Note: Data is for the year ended 31st December of each year
Source: Property Data Solutions (2009)

Median Sale Price

The median sale price of houses in Gladstone Regional Council increased from $82,500 in 1991 to $385,000 in 2008. The average annual growth rate of the median sale price of houses was significantly higher between 2001 and 2008 (17.6% per annum) than between 1991 and 2008 (9.5% per annum). From 2006 to 2007 there was a substantial increase in the median sales price of houses (approximately 30%). Modest decreases in the median sales price were recorded in 1995 and 1998.

Figure 4.2 shows the median sale price for houses in Gladstone Regional Council between 1991 and 2008.

Figure 4.2: Median Sale Price, Houses, 1991-2008



Note: The data was collected on 18th February 2009
Note: Data is for the year ended 31st December of each year
Source: Property Data Solutions (2009)

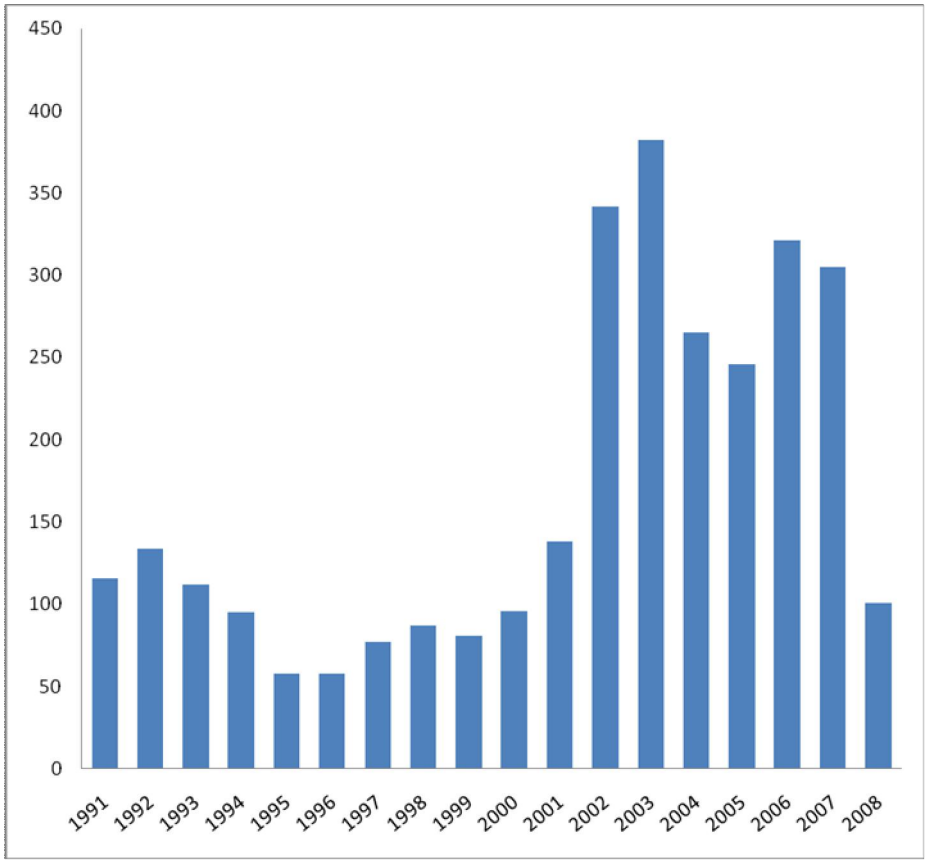
4.2.2 Units and Townhouses

Volume of Sales

The volume of unit and townhouse sales within Gladstone Regional Council was significantly lower than the volume of house sales in the 1991 to 2008 period. In Gladstone Regional Council the volume of unit and townhouse sales ranged from 58 sales in 1996 to 382 sales in 2003. In 2002 and 2006, the volume of unit and townhouse sales was also particularly strong relative to the long term average of 167 sales (342 and 321 sales respectively).

Figure 4.3 shows the volume of unit and townhouse sales in Gladstone Regional Council between 1991 and 2008.

Figure 4.3: Volume of Unit and Townhouse Sales, Gladstone Regional Council, 1991 to 2008



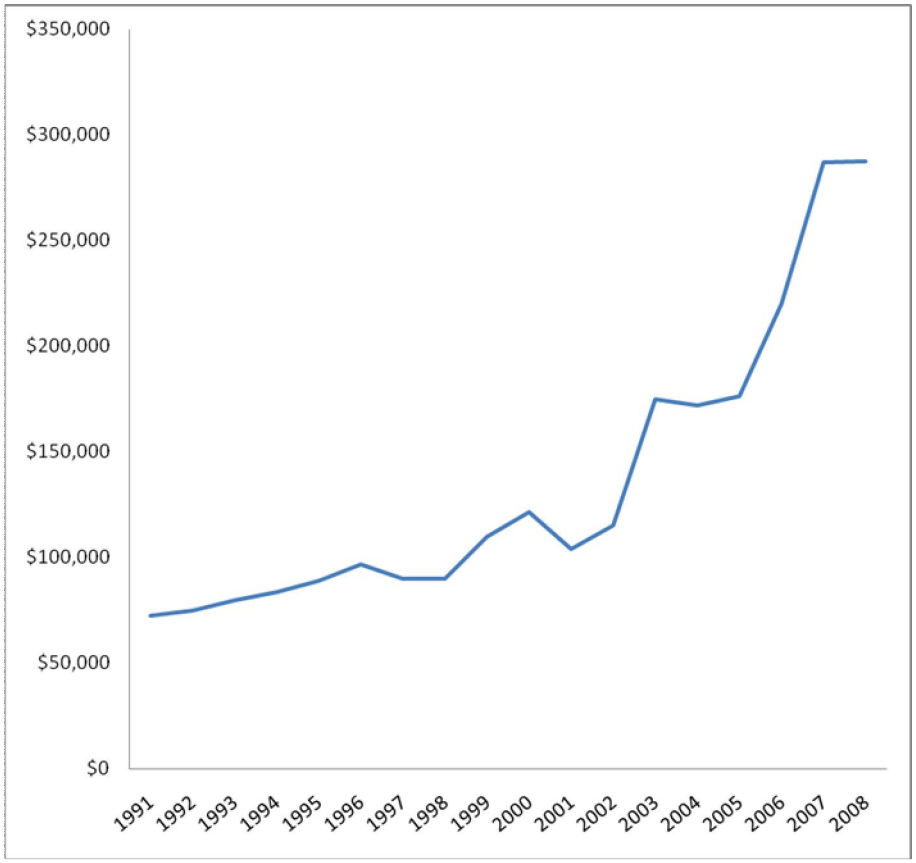
Note: The data was collected on 18th February 2009
Note: Data is for the year ended 31st December of each year
Source: Property Data Solutions (2009)

Median Sale Price

The median sale price of units and townhouses increased from $72,500 in 1991 to $287,500 in 2008. There was a significant increase in the median sale price of units and townhouses in 2003, 2006 and 2007. Price decreases were recorded in 1997, 2001 and 2004.

Figure 4.4 shows the median sale price of units and townhouses in Gladstone Regional Council between 1991 and 2008.

Figure 4.4: Median Sale Price, Units and Townhouses, 1991-2008



Note: The data was collected on 18th February 2009
Note: Data is for the year ended 31st December of each year
Source: Property Data Solutions (2009)

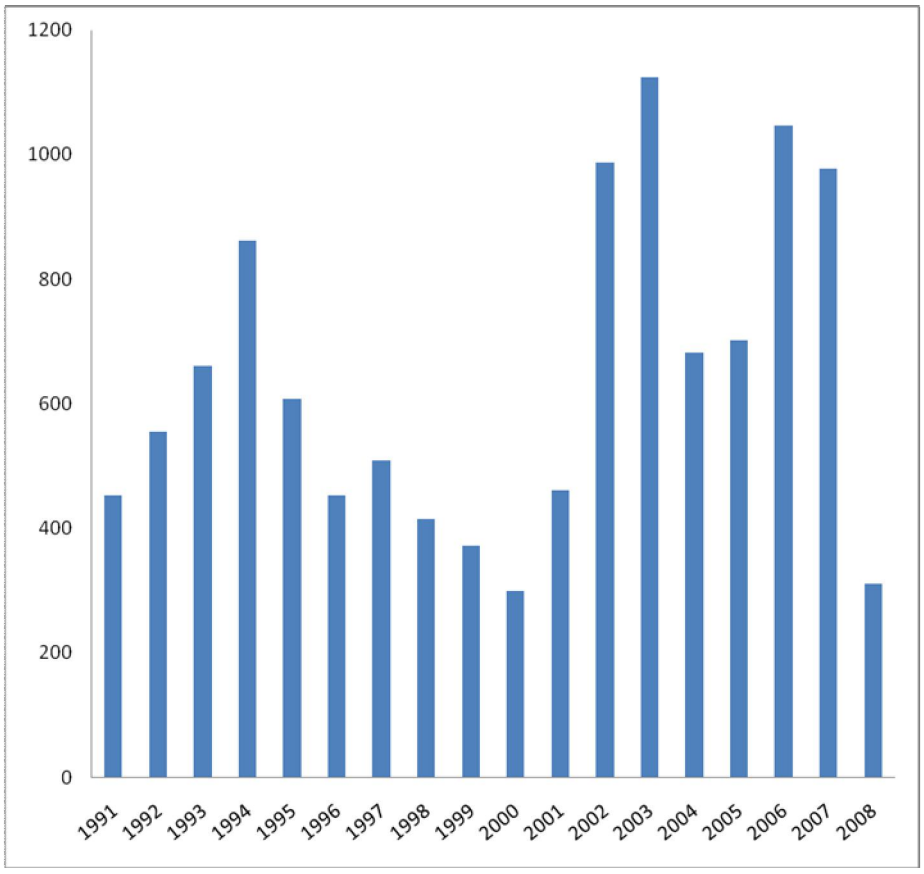
4.2.3 Vacant Land

Volume of Sales

In Gladstone Regional Council the volume of vacant land sales ranged from 298 sales (2000) to 1,124 sales (2003). The volume of vacant land sales was also particularly high relative to the long term average (637 sales) in 2002 (987 sales), 2006 (1,046 sales) and 2007 (977 sales).

Figure 4.5 shows the volume of vacant land sales in Gladstone Regional Council between 1991 and 2008.

Figure 4.5: Volume of Vacant Land Sales, Gladstone Regional Council, 1991 to 2008



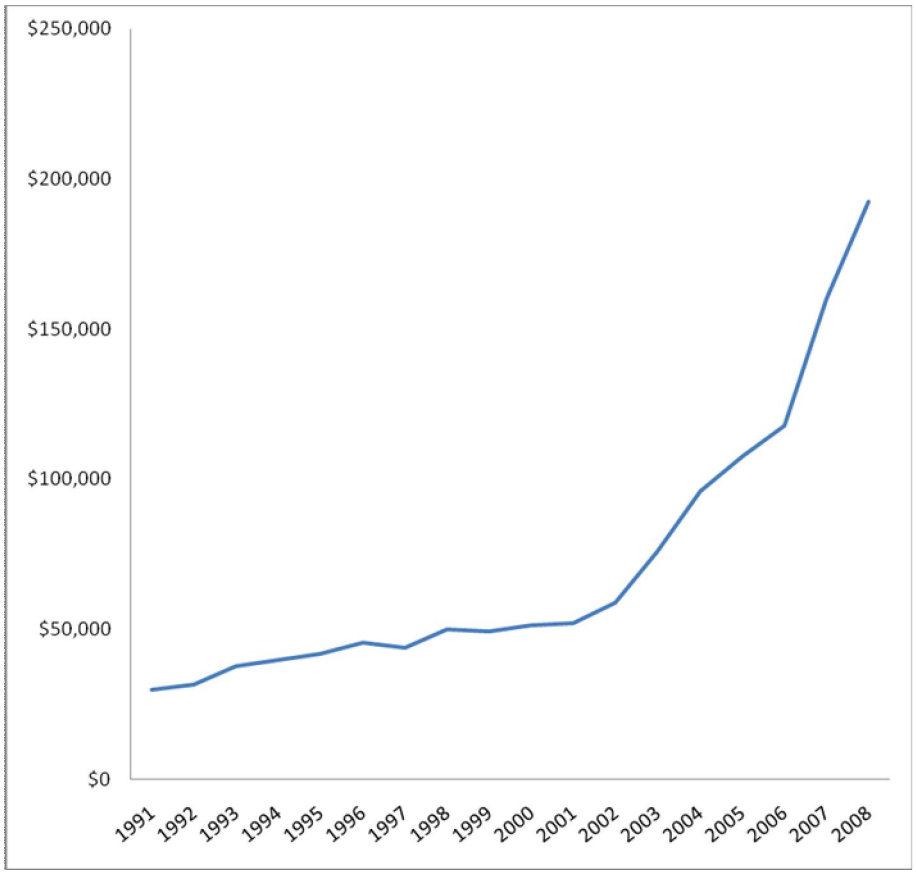
Note: The data was collected on 18th February 2009
Note: Data is for the year ended 31st December of each year
Source: Property Data Solutions (2009)

Median Sale Price

The median sale price of vacant land in Gladstone Regional Council increased from $30,000 in 1991 to $192,418 in 2008. Gladstone Regional Council recorded a decrease in the median sale price of vacant land in 1997 and 1999, with significant growth recorded from 2006 to 2008.

Figure 4.6 shows the median sale price of vacant land in Gladstone Regional Council between 1991 and 2008.

Figure 4.6: Median Sale Price, Vacant Land, 1991-2008



Note: The data was collected on 18th February 2009
Note: Data is for the year ended 31st December of each year
Source: Property Data Solutions (2009)

4.3 Summary

An analysis of the availability of commercial accommodation in Gladstone Regional Council (see Table 5.3) throughout the year indicates that over the last two years the average number of vacant rooms / beds per night in Gladstone Regional Council ranged between:

- 306-510 hotel / motel rooms and serviced apartments; and
- 256-457 caravan sites.

The median weekly rent for a two bedroom unit in the former Gladstone LGA was $220 in the June Quarter 2008, significantly lower than the Queensland median ($290). The median weekly

rent for a three bedroom house in the former Gladstone LGA was $300 in the June Quarter 2008, marginally lower than the Queensland average of $310.

In the 1991 to 2008 period there were 17,675 houses, 3,014 units and townhouses and 11,470 vacant land allotments sold in Gladstone Regional Council including:

- 714 houses sold in 2008 with a median sales price of $385,000;
- 101 units and townhouses sold in 2008 with a median sales price of $287,500; and
- 310 vacant land allotments in 2008 with a median sales price of $192,418.

5 ECONOMIC ASSESSMENT

The economic assessment of the proposed project comprises a cost benefit analysis and economic impact analysis. The cost benefit analysis estimates the effect that Western Basin Strategic Dredging and Disposal Project will have on the economic welfare of the Australian community, as measured by the project's net present value. The project will generate a range of benefits including:

- Value of additional harbour services: this benefit relates to the increase in port capacity resulting from the project and the consequent market value of these additional services;
- Land use benefits: these benefits pertain to the increased accessibility of land adjacent to the western basin for strategic port uses, in particular these benefits relate to the value of land to be utilised by the various LNG projects proposed within the western basin;
- Dredge material disposal savings: the cost of terrestrial dredge material disposal is significantly lower than at-sea disposal in the inner harbour of the Port of Gladstone. Therefore, the creation of the Fisherman's Landing bund area for use as strategic port land will yield significant dredge material disposal cost savings; and
- Environmental disbenefits: these disbenefits result from the loss of marine habitat areas under or adjacent to the footprint of the proposed bund.

The impact analysis estimates the level of economic impact to be generated by the project. Activity measures are direct and indirect employment and value added.

5.1 Cost Benefit Analysis

5.1.1 Project Costs

Western Basin Reclamation Area Costs

The cost of filling and capping of the Western Basin Reclamation Area is estimated at $389,504,604. The most significant component of this cost is the construction of the mound bund which would be the principal dredge material storage for the Western Basin dredging. The costs of constructing, filling and capping the Western Basin Reclamation Area and the staging of those costs are summarised in Table 5.1 below. Within each staging period (e.g. 2010-2019, 2020-2029, etc) costs are assumed to be evenly distributed.

Table 5.1: Direct capital costs associated with the Western Basin Dredging & Disposal Project

	2010-2019	2020-2029	2030-2039	2040-2049	Total
External bund construction*	$86,500,204				$86,500,204
Mound bund	$116,740,469	$31,672,684	$14,575,041	$8,829,111	$171,817,305
Grading & contouring external of mound	$10,418,382				$10,418,382
Capping of reclaimed area	$42,485,010			$14,927,166	$57,412,176
Acid sulphate soil treatment	$39,481,869	$5,284,157	$4,803,779	$4,803,779	$54,373,584
Drainage works	$2,759,723				$2,759,723
Maintenance earthworks	$2,451,870	$1,257,120	$1,257,120	$1,257,120	$6,223,230
Total	$300,837,527	$38,213,961	$20,635,940	$29,817,176	$389,504,604

* includes cost of materials (e.g. hard rock & aggregates)
Source: GHD Pty Ltd

Dredging Costs

The project is anticipated to dredge approximately 55 million tonnes of material throughout the project life. Between 2010 and 2019 approximately 39.5 million tonnes of material will be dredged as part of the capital dredging program, including approximately 10 million tonnes of material to be deposited within the Fisherman's Landing bund and approximately 29.5 million tonnes of material to be deposited within the expanded Western Basin reclamation area. The remaining 15.5 million tonnes is associated with maintenance dredging of the channel and basin. For the purposes of this analysis, capital dredging material to be deposited within the Fisherman's Landing bund is assumed to occur between 2012 and 2015. The remaining 29.5 million tonnes of capital dredging material is assumed to be extracted at a rate of approximately 2.95 million tonnes per annum throughout the 2010-2019 period. Dredging maintenance events are assumed to occur every ten years (e.g. 2029, 2039 and 2049). Table 5.2 below summarises the anticipated volume and timing of dredge material to be extracted from the Western Basin and its channels.

Table 5.2: Volume and timing of dredge material to be extracted from the Western Basin (tonnes)

Placement Area	2010-2019	2020-2029	2030-2039	2040-2049	Total
Fisherman's Landing bund	10,000,000				
Western Basin reclamation area	29,500,000				
Maintenance dredging		5,500,000	5,000,000	5,000,000	
Total	39,500,000	5,500,000	5,000,000	5,000,000	55,000,000

Source: GHD Pty Ltd
Note: Dredge material estimates include capital dredging for Western Basin

Fisherman's Landing Construction Costs

The Fisherman's Landing project is subject to its own Environmental Impact Statement, but is intrinsically tied to the Western Basin Dredging & Disposal Project. The Fisherman's Landing bund is anticipated to yield approximately 153 hectares of developable land once filled and capped. Deep water access to and from this newly created land would be via the channels and basins created by the Western Basin Dredging & Disposal Project. Hence, for the purposes of the economic assessment the Fisherman's Landing bund has been included within the analytical framework of this analysis. Table 5.3 below summarises the staging of capital costs associated with the Fisherman's Landing bund construction.

The analysis also includes an ongoing maintenance cost associated with the Fisherman's Landing bund of approximately $1.84 million per annum commencing in 2014. Maintenance costs are over and above the capital costs reported in Table 5.3 below.

Table 5.3: Fisherman's Landing capital costs and staging

	2010	2011	2012	2013	2014	2015	Total
Bund construction*	$41,250,000	$41,250,000	-	-	-	-	$82,500,000
Road construction	-	-	-	$19,200,000	-	-	$19,200,000
Water supply	-	-	-	$3,000,000	-	-	$3,000,000
Waste water infrastructure	-	-	-	$330,000	-	-	$330,000
Telecommunications infrastructure	-	-	-	$480,000	-	-	$480,000
Electricity transmission infrastructure	-	-	-	$2,880,000	-	-	$2,880,000
Substation	-	-	-	$7,200,000	-	-	$7,200,000
Electricity redistribution infrastructure	-	-	-	$1,200,000	-	-	$1,200,000
Capping costs	-	-	$16,830,000	$16,830,000	$16,830,000	$16,830,000	$67,320,000
Total	$41,250,000	$41,250,000	$16,830,000	$51,120,000	$16,830,000	$16,830,000	$184,110,000

Source: GHD Pty Ltd
* includes cost of materials (e.g. hard rock & aggregates)
Note: Dredging costs associated with filling the Fisherman's Landing Bund is included in Table 5.2

5.1.2 Project Benefits

The principal benefit resulting from the proposed project is the increase in port capacity to accommodate a number of major Liquefied Natural Gas (LNG) projects. The Coordinator General (2009) identifies seven major LNG projects that are anticipated to utilise the port capacity created by the Western Basin Dredging and Disposal Project. In total, these LNG projects are expected to generate approximately 64.5 million tonnes annually of LNG exports from the Port of Gladstone.

Other benefits resulting from the project include dredge spoil disposal savings associated with the Fisherman's Landing bund and environmental disbenefits resulting from dredging.

Major LNG Project Related Benefits

The seven LNG projects identified by the Coordinator General (2009) includes projects proposed by Origin Energy, Shell, LNG Limited, Queensland Gas Corporation, Santos and Arrow Energy; each with an anticipated annual production of 10 million tonnes or greater.

Each of the LNG projects listed in Table 5.4 below is anticipated to generate significant export revenues for Australia. The gross margin of those exports, part of which would be attributable as a benefit to the proposed project, is commercial in confidence. However, it is reasonable to assume that should an LNG project proceed it would result in a net benefit to the proponent. In lieu of a gross margin measure this analysis takes as a benefit attributable to the project the willingness to pay of LNG proponents for harbour services to and from their respective processing facilities and the willingness to pay for land that would become accessible via the harbour as a result of the Western Basin Dredging and Disposal Project.

The analysis takes the current market prices for harbour services set by GPC in the form of harbour dues as the measure of willingness of the LNG proponents to pay for harbour services.

Harbour dues are paid to GPC for use of harbour channels and basins. At this stage the funding arrangements for the proposed project have not been finalised. However, regardless of which entity (or entities) fund the project, channel and basin users would place some value on the services provided by the channels and basins created by the project. Existing harbour dues are taken here as a proxy for that value. Harbour dues for bulk commodities exported and imported through the Port of Gladstone range from $1.88/tonne (grain & oil seeds) to $4.25/tonne (petroleum). This analysis assumes a value of harbour services by Western Basin users of $2.75/tonne, which is slightly below the midpoint of the range of existing harbour due charges. The benefit stream for the value of harbour services attributable to the project is estimated by applying the tonnage value of harbour services to the rates of production summarised in Table 5.4. Benefit streams for each project are assumed to commence based on the commencement date reported in Table 5.4.

The second major benefit considered attributable to this project is the value of land made accessible to and from the harbour by the project. The assumed land areas to be used by the respective projects is summarised in Table 5.4 below. The market value for this land is anticipated to be similar to the unserviced lease rate for strategic port land within the Port of Gladstone, that is $12/m^2.

Table 5.4: LNG projects proposed within the Western Basin, indicative timing and annual production

LNG Project	Commencement	Annual Production (tonnes)	Land Area (ha)
Arrow Energy	2014	10,000,000	200
QGC	2014	12,000,000	200
Impel LNG	2015	1,500,000	25
LNG Limited	2012	3,000,000	50
Origin Energy	2015	14,000,000	200
Santos	2014	10,000,000	190
Shell	2015	14,000,000	200
Total	-	64,500,000	1,065

Source: Coordinator General (2009) Port of Gladstone Western Basin Master Plan

Dredge Material Disposal Cost Savings

The construction of the Fisherman's Landing bund will create the capacity for disposal of approximately 10,000,000m^3 of dredge material to be disposed of within a terrestrial dredge material facility. GPC estimates the cost of disposing of dredge material using a terrestrial site, such as the Fisherman's Landing bund to be approximately $20/m^3, compared with a cost of $28/m^3 for disposal at sea[3]. The resulting saving of $8/m^3 is one of the principal benefits attributable to the project. Dredge material disposal savings are included within this analysis because dredge material associated with the Fisherman's Landing bund is being used to establish approximately 153 hectares of useable port land. However, the Western Basin bund is simply a dredge material storage facility and is not anticipated to be used for port purposes.

It is anticipated that the Fisherman's Landing bund will be used over the 2012-2015 inclusive four year period. It is assumed that approximately 2,500,000m^3 per annum of dredge material

[3] Dredge material disposal costs provided by Gladstone Port Corporation.

will be disposed of within the Fisherman's Landing bund between 2012 and 2015 inclusive. The annual dredge material costs saving across this period equates to approximately $20,000,000.

Environmental Disbenefits

The Western Basin Dredging and Disposal Project and the Fisherman's Landing bund will negatively impact marine habitat within the Port of Gladstone. The two key communities to be affected are mangrove and seagrass communities. The principal marine habitat to be impacted is seagrass. Table 5.5 below reports the total benthic area directly and indirectly impacted by the project. Direct impacts are those where the marine habitat is completely removed, such is the case with dredging the channel and basins. Indirect impacts are those attributed to turbidity caused by the dredging. Dredging creates a significant dredge plume which can settle on habitat areas and reduce their productivity or in some cases temporarily eliminate those habitat areas. GHD Pty Ltd advises that indirect impacts would only last for approximately two to five years after capital dredging works are completed. This analysis assumes that indirect impacts attributable to the capital dredging will occur throughout the capital dredging works and for five years after those works have been completed (total of 15 years of indirect impacts associated with capital dredging works). It is assumed that the full extent of indirect impacts will be felt throughout this period. This represents a conservative assumption since the dredging and disposal works will be staged, meaning that only parts of the total impacted area will sustain impacts at various times throughout the capital dredging program.

Indirect impacts attributable to maintenance dredging (events assumed to occur every ten years) would last for only one year.

In addition to identifying the total benthic (or sea floor) area impacted by the project, Table 5.5 summarises the areas of known seagrass likely to be impacted. The size of seagrass meadows varies from year to year. The main case of this analysis assumes that the seagrass meadows impacted are limited to the known extent of seagrass habitat. Sensitivity analysis provided later in this report assumes a case in which a greater area is impacted.

Table 5.5: Direct and indirect impacts of the Western Basin Dredging and Disposal Project

Nature & location of impacts	Total Benthic Area (ha)	Known Seagrass Area (ha)
Direct impacts		
Western Basin reclamation area	235.9	39.9
Fisherman's landing	153.0	76.0
Channel	666.4	37.2
Total	1,055.3	153.1
Indirect impacts		
Channel	8.7	3.3
Western Basin residual area[1]	299.1	34.4
All other areas potentially impacted by dredging plume	5,108.0	1,303.0
Total	5,415.8	1,340.7

Source: GHD Pty Ltd
Note 1: Area to the north of the Western Basin reclamation area.

The loss of habitat areas can be categorised as non-market benefits (or disbenefits). Guidelines prepared by the Queensland Government[4] set out a range of tools for estimating the value of such non-market benefits as follows:

- Methods based on market prices, for example taking the value of an externality (such as the loss of habitat areas) as equal to the cost of its prevention, its effect on economic production or its effect on loss of individual income via negative health impacts or the costs of activities necessary to avert a negative impact such as purchasing bottled water or boiling water for drinking;
- Surrogate or proxy market methods, for example, valuing noise impacts by reference to variations in house prices (hedonic pricing), or valuing a wilderness area by inference from the costs individuals incur in travelling to it; and
- Survey-based methods which seek to obtain individuals' valuations of impacts using question and answer and related data modelling techniques. Examples include contingent valuation and choice modelling.

Each of these methods has advantages and disadvantages in terms of simplicity, reliability, cost and certainty. Contingent valuation for example is adaptable to a range of impact scenarios in terms of type and extent, but the process is expensive and the results can be subject to conjecture if respondents are unable to comprehend the impact under investigation or the nature of the questioning. Similarly, proxy methods can be expensive and may be constrained by the explanatory power of the available data (such as data reflecting variations in house prices according to environmental attributes). At the other end of the spectrum, some of the methods based on market prices are simple and inexpensive and may be appropriate where the range of potential mitigation strategies is limited or the necessity to avoid a negative impact is not in dispute[5].

This study uses the 'benefit transfer' technique in which valuations obtained from primary research conducted for other projects is applied to the project in question.

Environmental values for habitats affected by development can be categorised as being either:

- Use values, being those values derived from physical use of the environmental resource, including commercial activities, such as commercial fishing or tourism, and non-commercial activities, such as recreation; and
- Non-use values, which refer to:
  - Ecological function values: the value of the ecological services or functions provided by an environmental resource, such as provision of fish habitats and biodiversity;
  - Option values: the benefit derived from maintaining the right to use the resource without necessarily doing so;

[4] IDC-EEC 2003).

[5] A contingent valuation study that places a low value on reliably potable drinking water is of little use if the law and community expectations mandate potable water. In a case such as this, the valuation of the negative impact of a project on drinking water supplies would best be taken as the cost of mitigating the impact or of taking actions to avert the impact such as using bottled water.

- Quasi-option values: the benefit derived from delaying a decision to develop an environmental resource to obtain better information regarding the impacts of that development on the resource;
- Vicarious use values: the value derived by individuals in knowing that others are using the environmental resource;
- Bequest values: the value of maintaining environmental values for the benefit of future generations; and
- Existence values: the value derived by members of the community from the knowledge that areas of environmental value exist.

This study relies on values estimated by Costanza et al (1997). These values have also historically been used by the former Department of Primary Industries and Fisheries to estimate the value of environmental impacts on various marine habitat areas. Table 5.6 below summarises the habitat areas of direct and indirect impact and the parameter value applied to estimate the total impact. Total direct impacts are estimated at approximately $7.25 million per annum for seagrass meadows and approximately $9.1 million per annum for the remaining bare substrate habitats impacted by the project. Indirect impacts are estimated at approximately $63.5 million per annum for seagrass meadows and approximately $41.2 million per annumfor bare substrate habitats. As stated above, indirect impacts relating to the capital dredging are anticipated to occur throughout the capital dredging program and five years after its completion.

Table 5.6: Areas of direct and indirect impact and value of those areas (2009 dollars)

	Area (ha)	$/ha/yr
Direct		
Seagrass	153.1	$47,360
Bare substrate	902.2	$10,100
Indirect		
Seagrass	1,340.7	$47,360
Bare substrate	4,075.1	$10,100

Source: GHD Pty Ltd & Costanza et al (1997)

5.1.3 Discount Rate

Because the benefit and cost streams in the cost benefit are estimated in real terms (2008 values) it is appropriate that a real discount rate be used.

The discount rates used in cost benefit analysis of Queensland Government projects normally represent the return on investment in the economy which is displaced by a marginal government project. As such the discount rates contained in these analyses would represent the social opportunity cost rate (SOC).

The test discount rate previously used by the Queensland Government for major projects was 6%[6]. The Department of Finance[7], on the other hand, recommends a social opportunity cost discount rate of 8% for major projects.

[6] Queensland Treasury (1999)

[7] Department of Finance (1991)

In the United Kingdom, *The Green Book*[8] recommends using a social time preference rate (STPR), which represents society's preference for present as opposed to future consumption. The STPR is generally lower than the SOC rate. The STPR recommended in *The Green Book* is 3.5%, however in Australia the SOC approach is preferred by government agencies, and accordingly a social opportunity cost rate is used in this analysis.

This analysis uses a test discount rate of 6%, comprising the real risk free rate of 4% plus a 2% risk premium. A range of discount rates are utilised for the purpose of sensitivity analysis. The range of discount rates used for the sensitivity analysis is 4% to 10%.

5.1.4 Project Life

This assessment assumes an analysis period of forty (40) years plus a two year construction period for the initial phase of works. The residual value at the end of the analysis period is assumed to be zero. Given the effect of discounting, the inclusion of a positive residual would be unlikely to materially alter the results of the analysis.

5.1.5 Results

The results of the cost benefit analysis (summarised in Table 5.7) indicate that the project would be economically viable (as indicated by the positive net present value) at the target discount rate of 6%. The project's internal rate of return (i.e. the rate of return at which net present value equals zero) is 12.33%.

Table 5.7: Cost Benefit analysis results for Western Basin Dredging and Disposal Project at 6% discount rate

	Present Value
Costs	
Western Basin bund construction & maintenance costs	$245,681,074
Dredging costs	$640,658,708
Fisherman's landing construction & maintenance costs	$176,341,210
Total	$1,062,680,992
Benefits	
Value of harbour services	$1,855,013,409
Land use benefits	$1,728,481,484
Fisherman's Landing dredge spoil disposal cost saving	$61,678,633
Environmental disbenefits	-$1,367,770,401
Total	$2,277,403,124
Net Present Value	$1,214,722,132
Benefit Cost Ratio	2.14
Internal Rate of Return	12.33%

5.1.6 Sensitivity Testing

A means of determining the robustness of the project in economic terms is to subject the cost benefit analysis to various sensitivity tests. The analysis contained in this report includes three sensitivity tests, including:

- Alternative discount rates: the project is tested as discount rates ranging from 4% to 10%;

[8] HM Treasury (2005)

- Increased environmental disbenefits: the quantum of seagrass area impacted is increased over and above the known areas of seagrass meadow; and
- Decreased value of harbour services: the willingness to pay for harbour services within the Western Basin is decreased from $2.75/tonne to $1.00/tonne.

Alternative Discount Rates

The results of the sensitivity test of the main case across a range of discount rates indicates that the project is economically viable across the range of discount rates (i.e. 4%-10%). Table 5.8 below summarises the results of the sensitivity tests.

Table 5.8: Sensitivity test of cost benefit analysis using alternative discount rates

	Discount Rates			
	4%	6%	8%	10%
Costs				
Western Basin bund construction & maintenance costs	$280,040,580	$245,681,074	$218,700,704	$196,839,268
Dredging costs	$732,928,795	$640,658,708	$570,295,508	$514,163,110
Fisherman's landing construction & maintenance costs	$194,075,588	$176,341,210	$162,562,140	$151,340,158
Total	$1,207,044,963	$1,062,680,992	$951,558,352	$862,342,536
Benefits				
Value of harbour services	$2,509,284,264	$1,855,013,409	$1,408,207,251	$1,094,385,776
Land use benefits	$2,417,988,736	$1,728,481,484	$1,286,164,689	$989,965,192
Fisherman's Landing dredge spoil disposal cost saving	$67,120,844	$61,678,633	$56,792,298	$52,394,470
Environmental disbenefits	-$1,651,586,047	-$1,367,770,401	-$1,160,468,686	-$1,003,291,371
Total	$3,342,807,797	$2,277,403,124	$1,590,695,553	$1,133,454,067
Net Present Value	$2,135,762,834	$1,214,722,132	$639,137,201	$271,111,531
Benefit Cost Ratio	2.77	2.14	1.67	1.31
Internal Rate of Return	12.33%			

Increased Environmental Disbenefits

The main case only values areas of known seagrass at the higher parameter value for seagrass (i.e. $47,360/ha/yr). Seagrass meadows move year to year. In some years these meadows can be very large and in others, very small. The area impacted by the project both directly and indirectly that could support a seagrass meadow is difficult to accurately define. As such it is appropriate to undertake sensitivity testing based on an area of potential seagrass meadow as opposed to only the known areas of seagrass. For the purposes of this sensitivity test, it is assumed that the area of potential seagrass meadow is equal to the known areas of seagrass plus approximately half of the remaining benthic areas impacted. The assumed area of potential seagrass meadow impact is indicative. The purpose of this sensitivity test is to provide an indication of the sensitivity of the analysis to the variation of analytical assumptions. The results of the sensitivity analysis are reported in Table 5.9 below and indicate that the project is economically viable at the test discount rate of 6% and has a internal rate of return of 6.61%.

Table 5.9: Sensitivity test of cost benefit analysis assuming increased environmental disbenefits

	Present Value
Costs	
Western Basin bund construction & maintenance costs	$245,681,074
Dredging costs	$640,658,708
Fisherman's landing construction & maintenance costs	$176,341,210
Total	$1,062,680,992
Benefits	
Value of harbour services	$1,855,013,409
Land use benefits	$1,728,481,484
Fisherman's Landing dredge spoil disposal cost saving	$61,678,633
Environmental disbenefits	-$2,435,166,164
Total	$1,210,007,361
Net Present Value	$147,326,369
Benefit Cost Ratio	1.14
Internal Rate of Return	6.61%

Decrease in Value of Harbour Services

The main case analysis assumes that the users of the Western Basin would have a willingness to pay for harbour services provided by the project of approximately $2.75/tonne. This rate is based on the spread of existing harbour dues paid by harbour users within the Port of Gladstone. This sensitivity test assumes that the willingness to pay for the harbour services provided by the project was only $1/tonne.

The results of the sensitivity analysis are reported in Table 5.9 below and indicate that the project is economically viable at the test discount rate of 6% and has an internal rate of return of 6.19%.

Table 5.10: Sensitivity test of cost benefit analysis assuming a decrease in willingness to pay for harbour services

	Present Value
Costs	
Western Basin bund construction & maintenance costs	$245,681,074
Dredging costs	$640,658,708
Fisherman's landing construction & maintenance costs	$176,341,210
Total	$1,062,680,992
Benefits	
Value of harbour services	$674,550,330
Land use benefits	$1,728,481,484
Fisherman's Landing dredge spoil disposal cost saving	$61,678,633
Environmental disbenefits	-$1,367,770,401
Total	$1,096,940,046
Net Present Value	$34,259,054
Benefit Cost Ratio	1.03
Internal Rate of Return	6.19%

5.2 Economic Impact Assessment

The economic impact analysis is confined to capital dredging and bund construction works relating to the Fisherman's Landing bund and Western Basin bund expansion. The economic impact analysis is also limited to the first ten years of project works (2010 to 2019). This section outlines the approach used to estimate the economic impact of the project.

Economic impact assessment is used to estimate the direct and indirect impacts of a particular economic stimulus or activity. The total economic impact of a particular stimulus or activity comprises the following effects:

- Direct or initial effect: being the stimulus for the economic impact, typically described as the change in sales or contribution to final demand by the stimulus or activity;
- Flow on effects, comprising production-induced effects and consumption-induced effects, these being:
  - First-round production effects: being those purchases of inputs required from other industry sectors in the economy to produce the additional output generated by the stimulus or activity;
  - Industrial support production effects: being those second, third and subsequent-round industrial flow on effects stimulated by the purchases made in the first round; and
  - Consumption induced effects: being those purchases made by households upon receiving additional income from labour payments stemming from the production of additional output generated by the stimulus or activity under assessment.

The extent of these impacts can be represented by multipliers calculated in aggregate for various regional, state or national economies. There are commonly four multipliers used to measure impact - output, income, employment and value added.

Two sets of the above multipliers can be generated, namely:

- Type 1 Multipliers, which estimate the direct and production induced impacts of a stimulus or activity; and
- Type 2 Multipliers, which estimate the direct, production induced and consumption induced impacts of a stimulus or activity.

Type 1 Multipliers are used in this analysis. Queensland Treasury's preference is for use of only Type 1 Multipliers, given that Type 2 Multipliers typically overstate the extent of consumption-induced impacts of any given stimulus or activity.

It is also important to note that value added is the measure of economic impact resulting from a stimulus that is preferred by economists.

The economic impact analysis contained in this report presents results which are indicative of the scale of the economic impact resulting from the project.

Table 5.11 below describes the various impact measures used in economic impact assessment.

Table 5.11: Measures of Economic Impact

Impact Measure	Description
Output	The output impact measures the increase in gross sales throughout the entire economy by aggregating all individual transactions (direct and indirect) resulting from the economic stimulus. The output impact provides an indication of the degree of structural dependence between sectors of the economy. However, output impacts are regarded as overstating the impact on the economy as they count all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.
Household income	The household income impact measures the additional wages, salaries and supplements paid to households associated with the industry under consideration and with other industries benefiting from the stimulus to the economy. It is important to note that the input-output tables on which this analysis is based relate to 2004-05. The input-output tables represent the structural dependence of industry sectors within the regional economy. Since 2004-05 there may have been significant changes in the real wages of construction workers within the subject relative to other regions. While the input-output tables have been augmented to reflect changes in relative incomes between industries, they have not been augmented such that they reflect relative differences between regions on an inter-industry basis.
Employment	The employment impact measures the number of full time equivalent (FTE) positions for one year created directly and indirectly by the stimulus[9]. However, the short-term response to increased demand may be that existing employees work overtime. Consequently, actual levels of employment generated (in terms of persons employed) will tend to be lower than those estimated by the input-output analysis. This short-term employment response (of working additional overtime) will be more prevalent where the demand stimulus is likely to be temporary and short lived, or where there is limited spare capacity in the economy (that is, when the economy is at or near full employment).
Value added	The value added or Gross Regional Product (GRP) impact measures only the net activity at each stage of production resulting from a stimulus. GRP is defined as the addition of consumption, investment and government expenditure, plus net exports (exports minus imports) from a region. The value added (or GRP) impact is the preferred measure for the assessment of contribution to the economy from a stimulus or impact, and as such should be used to describe the net impact of the event.

Source: Jensen, R. & West, G. (2001) Community Economic Analysis, Department of Primary Industries: Brisbane, Qld

5.2.1 Limitations of the Input-Output Approach

The input-output approach has a number of limitations, which may result in overestimation of impacts. Some of the limitations of the input-output approach include:

- The absence of capacity constraints such that the supply of each good is perfectly elastic, implying that each industry can supply whatever quantity is demanded of it and there are no budget constraints;
- The assumed linearity and homogeneity of the input function, which implies constant returns to scale and no substitution between inputs. This occurs because the approach assumes inputs purchased by each industry are a function only of the level of output of that industry;
- Each commodity, or type of commodity, is supplied by a single industry sector, implying there is only one method used to produce each commodity and each sector has only a single primary output;

[9] Therefore, if impacts are to be spread over a number of years, the FTE estimate (which relates to the annual equivalent) should be divided by the number of years over which the impact will be spread (in the absence of a clearly defined staging program) to provide an indicative ongoing employment estimate over the life of the impact.

- Multipliers are derived from the 2004-05 Input Output tables and reflect the structural dependence of the economy at that time. These tables have been augmented to reflect broad level structural change across the national economy by industry sector. The regional tables prepared for this analysis reflect regional variation as at 2001 and industry variation as at 2007. As such, the tables do not reflect any intensification or deterioration in regional competitive advantage in specific industry sector that may have occurred since 2004-05;
- The assumption that the economy is in equilibrium at given prices and that the economy is not subject to other external influences; and
- The additivity assumption suggests the total effect of carrying on several types of production is the sum of the separate effects, which is not a true reflection of economic systems.

The economic impact analysis contained in this report presents results which are indicative of the scale of the economic impact resulting from the proposed project.

5.2.2 Economic Impact of Western Basin Project Works 2010-2019

Table 5.12 below summarises the aggregated cost of capital and dredging works associated with the Western Basin Dredging and Disposal Project incurred between 2010 and 2019. This initial ten year period represents the period of most significant economic impacts resulting from the project.

Table 5.12: Capital and dredging costs of the Western Basin Dredging and Disposal Project, 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Western Basin expansion bund construction & maintenance costs	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1	$30.1
Fisherman's landing bund construction & maintenance	$41.3	$41.3	$16.8	$51.1	$18.7	$18.7	$1.8	$1.8	$1.8	$1.8
Dredging costs	$59.0	$59.0	$109.0	$109.0	$109.0	$109.0	$59.0	$59.0	$59.0	$59.0
Total	$130.3	$130.3	$155.9	$190.2	$157.8	$157.8	$90.9	$90.9	$90.9	$90.9

Source: GHD Pty Ltd

Table 5.13 below reports the annual economic impact of the Western Basin Dredging and Disposal Project between 2010 and 2019. Economic impacts are anticipated to be most significant in 2013, representing:

- $534.4 million in output (or consumption) impacts, including $344.2 million in indirect impacts;
- $93.4 million in household income impacts, including $80.2 million in indirect impacts;
- 1,867 full time equivalent positions, including 1,497 indirect full time equivalent positions; and
- $183.2 million in value added impacts, including $142.5 million in indirect impacts.

Table 5.13: Annual economic impact of the Western Basin Dredging and Disposal Project between 2010 and 2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Output ($M)										
Direct	$130.3	$130.3	$155.9	$190.2	$157.8	$157.8	$90.9	$90.9	$90.9	$90.9
Indirect	$235.9	$235.9	$282.2	$344.2	$285.5	$285.5	$164.6	$164.6	$164.6	$164.6
Total	$366.2	$366.2	$438.1	$534.4	$443.3	$443.3	$255.5	$255.5	$255.5	$255.5
Household Income ($M)										
Direct	$9.1	$9.1	$10.9	$13.3	$11.0	$11.0	$6.3	$6.3	$6.3	$6.3
Indirect	$54.9	$54.9	$65.7	$80.2	$66.5	$66.5	$38.3	$38.3	$38.3	$38.3
Total	$64.0	$64.0	$76.6	$93.4	$77.5	$77.5	$44.7	$44.7	$44.7	$44.7
Employment (FTEs)										
Direct	254	254	304	371	307	307	177	177	177	177
Indirect	1,026	1,026	1,227	1,497	1,241	1,241	716	716	716	716
Total	1,280	1,280	1,531	1,867	1,549	1,549	893	893	893	893
Value Added ($M)										
Direct	$27.9	$27.9	$33.3	$40.6	$33.7	$33.7	$19.4	$19.4	$19.4	$19.4
Indirect	$97.7	$97.7	$116.8	$142.5	$118.2	$118.2	$68.1	$68.1	$68.1	$68.1
Total	$125.5	$125.5	$150.1	$183.2	$151.9	$151.9	$87.6	$87.6	$87.6	$87.6

6 SUMMARY

Gladstone is an expanding region with strong population growth, high labour force participation and low unemployment, albeit marginally higher than the Queensland average. There are also a number of projects underway, committed or under investigation within the region. The Western Basin Dredging and Disposal Project will further extend the development pipeline within the region and facilitate a range of major industrial projects within the Port of Gladstone.

The Western Basin Dredging and Disposal Project is anticipated to support between approximately 890 and 1,500 full time equivalent positions annually throughout the first ten years of project works. The labour market has slackened over the past few months resulting in the availability of qualified employees. For positions that are unable to be filled by workers within the region, the existing commercial accommodation appears to have sufficient capacity to accommodate the new workers. In the housing and rental market, housing costs have increased, but no more than in Queensland generally. The median weekly rents for two bedroom units and three bedroom houses are traditionally below the state average. As such, the project is unlikely to place significant pressure on the housing market.

At the target discount rate of 6%, the project has a positive net present value and is economically viable. For the main case of the cost benefit analysis, the project remains economically viable across a spread of discount rates, having an internal rate of return of 12.33%. The project remains economically viable at the test discount rate of 6% in both sensitivity tests. In the first test, the extent of environmental disbenefits is assumed to significantly increase, and in the second test the willingness to pay for Western Basin harbour services is assumed to fall from $2.75/tonne to only $1.00/tonne.

The project aims to increase the efficiency and expand the capacity of the Port of Gladstone, which is one of the region's most significant pieces of transport infrastructure. Although the Western Basin Dredging and Disposal Project will be a significant project within the region, the change to the Gladstone economy would be marginal, rather than general.

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