

10 | Economic Factors



10.0 Economic factors

10.1 Introduction

The purpose of this section of the report is to provide background material of an economic nature which will assist in the preparation of the Master Plan for the Port of Gladstone.

It focuses on the factors which impact on the port of Gladstone and collects data from numerous sources which are mostly in the public domain. Ports are about trade and the factors influencing the movement of imports and exports are key to the report. Gladstone has a significant industrial capacity which is supported by port activity – for example, bauxite is imported and converted into alumina and aluminium which are then exported. Fuel is imported to support industrial, agricultural and mining activity in Central Queensland for the production and export of coal, grain etc.

The continued attraction of industry with import and/or export requirements is recognised as a strong growth opportunity for the Port of Gladstone. Future production industries are able to be located close to port export/import facilities.

10.1.1 Context for the Port of Gladstone

The Port of Gladstone is Queensland's largest multi-cargo Port and is the fifth largest coal export terminal in the world (by throughput). The Port of Gladstone is a major centre for the import and export of products for the manufacturing, mining and process industries. Handling more than 1800 vessels annually, it is one of the busiest ports in Australia and plays a vital role in the local, state and national economies.

The Port's major functions are to facilitate the export of resources from the Central Queensland region and to handle the import of raw material and the export of finished products from major industry established in Gladstone. The Port is a convenient point for the worldwide distribution of the resources of central and southern Queensland with rail links to the rich hinterland to the west of the city providing access to coal and other minerals, timber, agricultural and pastoral areas of the Callide/Dawson Valleys, Central Highlands and Bowen Basin. A new rail link would facilitate the export of a variety of natural resources from the Galilee and Surat Basins through Gladstone.

The relationship between Gladstone Port's marine infrastructure and the supply chain to industry is a critical consideration in the context of the efficient operations and future growth of the port. For the efficiency of the port and the maximisation of infrastructure use, the shorter the loading/discharge time, the better the utilisation of the overall infrastructure, including channels and berths. For the vessel, the demurrage and costs are similarly reduced due to the lower time at a port.

Some products can be immediately transferred significant distances from the wharf while others cannot. Bulk liquids present the greatest opportunity for storage being located remote from the wharf. The transport distance is related to the viscosity of the product handled and therefore the power of the installed pumping capacity. Low viscosity products such as ULP may be pumped considerable distance with the installed capacity of the tanker. Crude oils may require additional pump installations to achieve the same distance.

In comparison, cryogenic bulk liquids need to have the distance between the plant/storage minimised due to the temperature losses that may result from the overall pumping, etc. For example, pumping LNG distances of up to a kilometre is considered to be optimal, however two kilometres of pumping has been used at some sites.

Bulk solids can be conveyed over a considerable distance but the capital and operating costs increase as a consequence of the distance. A balance is required between the provision of storage in close proximity to the berth with high conveying rates followed by trickle feed between the storage and the plant, versus a reduced discharge rate from the berth to a distant storage facility, resulting in increased marine interface costs.

Break bulk and container trades are best served through the product being stored adjacent to the berth and short transfer distances during the loading/discharge cycle. For efficiency, land backed facilities are preferable. The logistics supply chain also needs to reduce the need for double handling with a rail interface being available at a storage yard, particularly for container trades.

The Port of Gladstone lies within and adjacent to the Gladstone Regional Council area. Industries within the harbour catchment area include pastoral, agricultural, processing and manufacturing. Major processing and manufacturing industries located in the Gladstone Region include an aluminium smelter, two alumina refineries, an electricity generator, a manufacturer of sodium cyanide, ammonium nitrate, chlorine and a cement manufacturer. Three LNG plants have been recently commissioned on Curtis Island. Wiggins Island Coal Terminal (WICT) has commenced operations with the first shipment having been exported in May 2015. A large capital dredging project, the Western Basin Dredging and Disposal Project (WBDDP) was completed in 2013 in association with these new industries.

10.2 Current port trade activity

Over 30 products are currently handled through the Port of Gladstone and shipped to more than 30 countries. By far the largest traded commodity is coal, which represented 69 per cent of total cargo throughput in 2014-15¹⁷¹ when total trade through Gladstone was 99.29 million tonnes.

In 2014-2015 coal, bauxite, alumina, petroleum products and cement products represented the largest throughput volumes:

- coal – 68,564,790 tonnes (export)
- bauxite – 17,128,958 tonnes (import)
- alumina – 5,641,425 tonnes (export)
- petroleum products – 1,511,579 tonnes (import)
- cement products – 1,697,551 tonnes (export).

All other products are handled in volumes of less than 1Mt. However, as the identified Liquid Natural Gas (LNG) export facilities come online LNG exports will become a significant commodity with up to 25mtpa.

¹⁷¹ Gladstone Ports Corporation Annual Report 2014/15.

10.2.1 Exports

Table 41 illustrates time series data for export activity over the six financial years from 2008/09 to 2013/14. Grain includes wheat, chick peas and sorghum. Some other minor and/or intermittent products were exported e.g. burner fuel oil. The total volume of exports for the Port of Gladstone has averaged around 64mtpa. The leap in coal exports in 2013/14 of about 10mtpa substantially lifted exports for that year.

Table 41 Port of Gladstone Export activity by product from 2008-09 to 2013-14 (tonnes pa)

Financial year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-2014
Alumina	4,094,263	4,214,205	3,794,339	3,909,386	4,891,708	5,082,561
Aluminium	368,535	322,675	334,661	373,726	334,883	385,448
Ammonium nitrate	0	0	2,000	0	0	0
Bunker coal	182,305	161,385	162,282	102,411	6,631	0
Calcite	113,778	136,820	103,794	137,477	141,078	136,973
Caustic soda	0	43,582	75,533	57,986	25,898	13,016
Cement/clinker	1,131,896	1,278,273	1,197,842	1,185,476	1,101,711	1,238,573
Coal - Barney Point	3,803,285	4,787,636	3,956,642	4,115,675	2,934,912	4,642,069
Coal- RG Tanna	52,396,680	55,602,406	49,232,706	55,638,013	54,378,793	64,980,430
Containers	9,303	237	3,929	37,905	69,704	85,719
Cotton seed	0	14,128	0	0	0	0
Electrofused magnesia	0	6,576	6,095	19,485	11,684	8,019
Fly ash	99,443	98,021	129,945	153,309	139,045	125,755
General cargo	36,934	5,053	10,688	27,369	42,044	20,800
Grain	446,449	240,762	260,218	338,245	386,879	149,387
Ilmenite	6,100	0	0	0	46,357	0
Limestone	44,540	22,321	29,301	39,119	28,527	45,694
Magnesia	46,628	57,000	84,670	70,240	58,412	53,732
Military eq./Vehicles	2,130	5,011	0	0	0	0
Scrap metal	22,345	32,229	49,310	38	44,685	74,454
Total exports	62,804,614	67,028,320	59,433,955	66,243,652	64,642,951	77,042,630

Source: TMR Trade Statistics for Queensland Ports For the five years ending 30 June 2014¹⁷²

¹⁷² Department of Transport and Main Roads, (DTMR), April 2013, *Trade Statistics for Queensland Ports, For the 5 years ending 30 June 2013*

Export coal dominates the volumes accounting for about 90 per cent of the total in most years (Table 42). The leading three commodities alumina, cement/clinker and coal account for about 98 per cent of the total tonnage (Table 43). Gladstone is one of the highest volume coal ports in the world. The high volume of coal in some ways overshadows significant volumes of other products such as grain or aluminium which have an annual average of over 300,000 tonnes per year.

Table 42 Leading Commodities Export Activity - Proportions from 2008-09 to 2013-14

Financial year	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Alumina	7%	6%	6%	6%	7%	7%
Cement/clinker	2%	2%	2%	2%	2%	2%
Coal	89%	90%	90%	90%	89%	90%
All other	2%	2%	2%	2%	2%	1%
Total	100%	100%	100%	100%	100%	100%

The main commodities exported can be classified into three groups:

- coal and mining products
- agricultural produce – grains, lupins, seeds
- manufactured products – cement, alumina.

This reflects the focus of the regional economy. Gladstone is one of the few Queensland cities with a significant secondary industry presence. Combined with its role as a major regional port, Gladstone has a more diverse economic base than many other Queensland coastal centres which are single sector (e.g. sugar) or only one or two sectors (e.g. sugar and tourism).

Coal

Export coal is easily the biggest commodity handled by the port of Gladstone. Most is handled through the RG Tanna Coal Terminal (RGCT) with a lesser amount through Barney Point Terminal (BPT). The new Wiggins Island Coal Terminal (WICT) will play a significant role in the future having exported its first shipment in May 2015. Stage one of WICT provides an additional coal handling capacity of 27mtpa¹⁷³.

Coal exports have shown consistent growth over the past 19 years, tripling from 1995 to 2014 with some minor fluctuations reflecting market variations (Figure 31). Except for 2010-2011 when there was catastrophic flooding at some coal mines, the port has consistently handled between about 53 and 59 mtpa in recent years (Table 41 and Figure 31). In 2013-14 there was a significant jump in volume to just under 70 million tonnes. While both metallurgical (coking) coal and thermal coal is exported from Gladstone, 75 per cent of total coal export is metallurgical and 25 per cent is thermal coal. The majority of coking coal is

¹⁷³ Wiggins Island Coal Terminal Environmental Impact Statement 2011

exported to Japan, South Korea, Taiwan, India, Italy and France for high quality steel manufacturing. Thermal coal is exported to Japan, Hong Kong, Taiwan, South Korea and Israel for power generation.

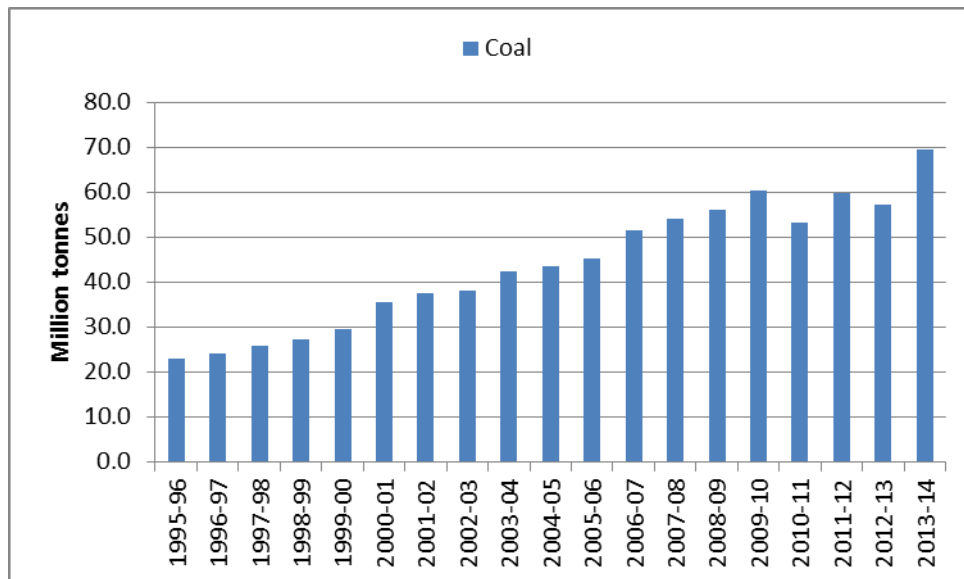


Figure 31 Coal Exports 1995 – 2014

Alumina

Alumina is produced at Queensland Alumina Limited's (QAL) 3.95mtpa rated refinery south east of Gladstone and at the Rio Tinto Alcan Yarwun refinery which is rated at 3.4mtpa. The bauxite feedstock is shipped in from Weipa in the Gulf of Carpentaria via South Trees (for QAL) and Fisherman's Landing (for Rio Tinto Alcan). The processed material is then exported or consumed locally and converted to aluminium at Boyne Smelters Limited at Boyne Island. In the long term export volumes have been stable averaging about 4.2mtpa (Table 41). However there was substantial growth from 2012/13 and 2013/14 when over 5mtpa was exported.

Alumina exports have grown steadily over the past 19 years, doubling from 1995 to 2013 (Figure 32). The two significant growth periods in 2005 and 2012 coincided with the commencement of operations in stage 1 and stage 2 of Rio Tinto's Yarwun Alumina Refinery (RTYAR). Growth within process industries such as alumina refining tend to be lumpy in nature, coinciding with operational expansions of facilities.

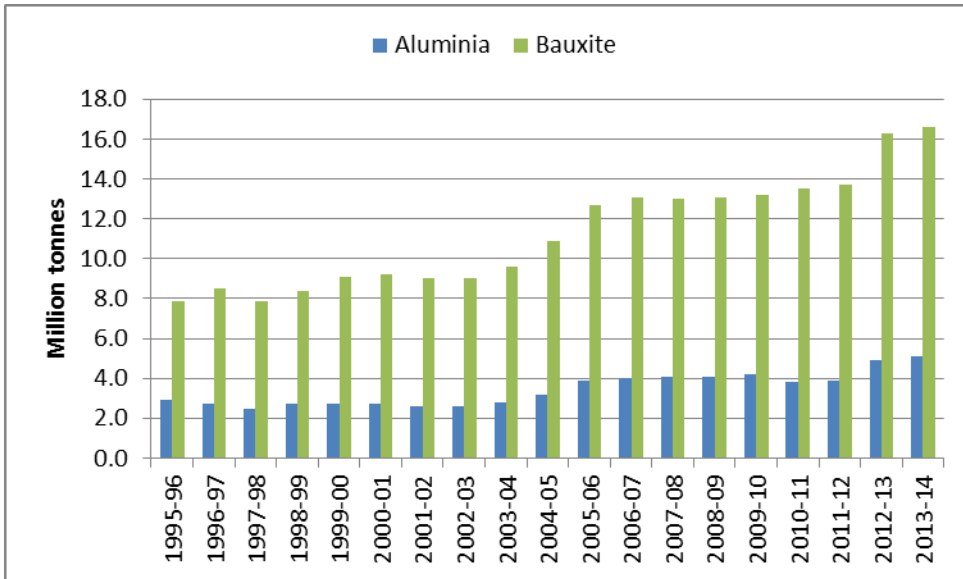


Figure 32 Alumina and Bauxite Trade

Cement/clinker

There has been considerable rationalisation of cement manufacturing in Australia over the last 20 years with many plants now closed and supply concentrated into a small number of very large plants. The Cement Australia facility at Gladstone is now Australia’s largest with a 1.7mtpa capacity. The plant supplies the silo at the Port of Townsville by sea. Smaller markets e.g. Rockhampton and Mackay are supplied by a mix of road and rail. Shipments of cement/clinker and flyash are currently approaching 1.4mtpa (Table 43). Cement and clinker exports combined increased significantly at the end of the 1990’s and again in the mid 2000’s only to have declined slightly over the past seven years (Figure 33).

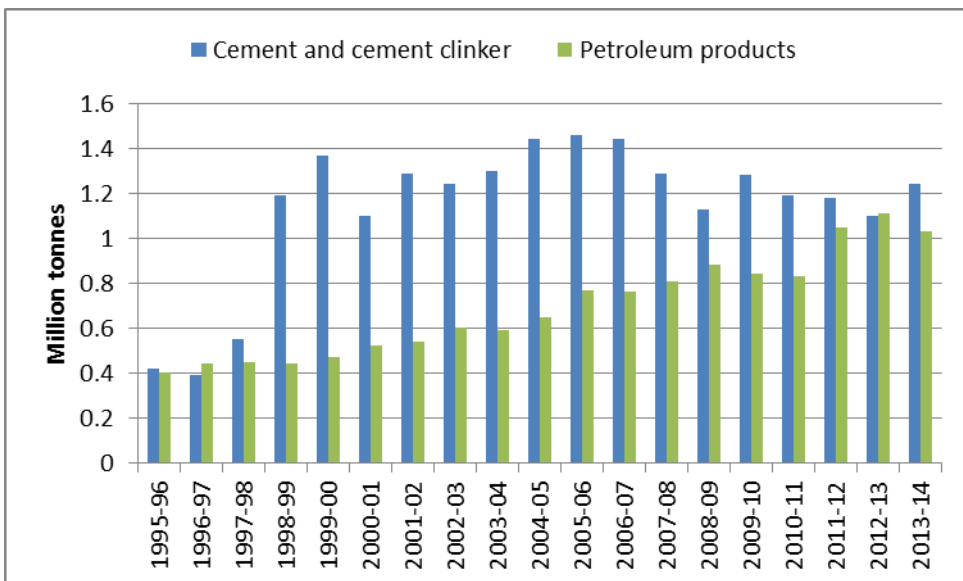


Figure 33 Cement, clinker and petroleum products

Liquefied Natural Gas

There has been extensive investment in LNG export facilities at the Port on Curtis Island. Three LNG export facilities are under construction in Gladstone, two of which have

commenced exports (QCLNG December 2014 and GLNG September 2015). It is expected that LNG exports will represent a major commodity for the Port. Initially, the three LNG facilities will have a combined export capacity of 25mtpa with an ultimate volume of LNG export estimated to be 40mtpa¹⁷⁴.

10.2.2 Imports

Table 43 shows six years of time series data for the majority of import activity from 2008/09 to 2013/14^{175&176}. Bauxite dominates the volumes accounting for about 80 per cent of the total in the sample years. Similar to the leading three export commodities accounting for about 98 per cent of the total tonnage, the three leading imports (bauxite, caustic soda and petroleum) account for 94 per cent of the total (Table 44). Minor and/or intermittent imports not included in Table 43 or Table 44 include LP gas, gypsum, copper slag etc.

The imports strongly reflect the industrial focus of the city. Bauxite is a key input for the two alumina refineries and caustic soda is crucial in the Bayer process of alumina production. The combined output of the two Gladstone alumina plants is amongst the largest alumina production in the world. Another import which is crucial to alumina/aluminium production is petroleum coke which is also one of the major commodities imported averaging 210,000tpa. Petroleum is a key input into the mining sector as is magnetite.

Table 43 Import Activity 2008-09 to 2013-14 (tonnes pa)

Import tonnes	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Bauxite	13,106,900	13,195,900	13,549,380	13,671,250	16,321,662	16,610,286
Bunker coal	0	0	64,885	0	0	0
Caustic soda	1,481,785	1,440,717	1,500,702	1,687,585	1,889,707	1,854,233
Cement gypsum	44,320	34,069	59,161	49,231	75,622	57,745
Containers	316	0	317	1,635	3,837	3,910
Fuel oil bunker	162,798	175,432	171,510	158,043	0	156,752
General cargo	76,690	35,661	142,825	246,527	419,722	176,914
Liquefied petroleum gas	11,151	11,801	10,390	12,027	11,518	8,598
Liquid ammonia	233,864	263,354	244,940	273,827	233,071	255,250

¹⁷⁴ QGC 2015, www.qgc.com.au, Santos GLNG 2015, www.santosglng.com, APLNG 2015, www.aplng.com.au

¹⁷⁵ Trade Statistics for Queensland Ports – for the five years ending 30 June 2013

¹⁷⁶ Trade Statistics for Queensland Ports – for the five years ending 30 June 2014

Import tonnes	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Liquid pitch	45,528	45,572	47,786	50,603	43,088	49,831
Magnetite	74,382	84,270	74,638	82,151	98,312	127,590
Military Vehicles	2,167	3,396	0	0	0	0
Petroleum coke	209,439	203,603	217,971	203,369	207,949	216,629
Petroleum product	881,405	843,576	830,432	1,048,074	1,292,214	1,028,389
Scrap metal	8,695	0	0	0	0	0
Sulphuric acid	0	0	55,793	61,619	54,107	40,409
Total imports	16,341,644	16,337,351	16,970,730	17,545,941	20,650,809	20,586,536

Table 44 Major Commodities Import Activity - Proportions from 2008-09 to 2013-14

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Bauxite	81%	81%	80%	78%	79%	81%
Caustic soda	9%	9%	9%	10%	9%	9%
Petroleum product	5%	5%	5%	6%	6%	5%
General cargo	0%	0%	1%	1%	2%	1%
Liquid ammonia	1%	2%	1%	2%	1%	1%
Petroleum coke	1%	1%	1%	1%	1%	1%
All Other	3%	2%	3%	2%	2%	2%
Total	100%	100%	100%	100%	100%	100%

Bauxite

The six year Bauxite import average was just over 14mtpa showing substantially higher exports in 2012/13 and 2013/14 at over 16mtpa (Table 43). Bauxite imports have grown steadily over the past 19 years, doubling from 1995 to 2013 (Figure 32). Output levels of alumina and the finished aluminium product is broadly in line with the amount of bauxite imported.

Petroleum Product

Petroleum is imported through Auckland Point Berth 3. BP and Shell are co-located as are Mobil and Caltex terminals. Petroleum product imports have grown steadily over the past 19 years, more than doubling from 1995 to 2013 (Figure 33).

10.2.3 Vessel Statistics

A detailed summary of vessel statistics for five years from 2009/10 to 2013/14 is provided in Table 45. This data indicates that the number of vessels increased by approximately 12 per cent between 2009-10 and 2013-14. Whilst the number of vessels within the 50,000 – 100,000 deadweight tonnage (DWT) category decreased over the five year period, there has been a significant increase in the number of vessels greater than 180,000 DWT (rising from 30 vessels in 2009-10 to 102 vessels in 2013-14). This has also translated to a marked increase in the number of vessels with drafts greater than 15m operating within the port (increasing from 147 vessels in 2009-10 to 261 vessels in 2013-14).

Similarly the number of vessels greater than 230m in length increased 34 per cent over the five year period. The increase in the number of largest vessels corresponds with the increase in coal throughput at the Port of Gladstone over the same period.

Table 45 Vessel statistics^{177 178}

Financial Year	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
By Deadweight tonnage (DWT)					
>180,000	30	34	54	60	102
100,000-180,000	145	171	200	217	199
50,000-100,000	791	669	655	625	715
>50,000	466	471	543	609	585
Total Vessels	1432	1345	1452	1511	1601
By Length (m)					
<185	354	346	398	426	512
185-230	678	611	601	535	553
>230	400	388	453	550	536
Total Vessels	1432	1345	1452	1511	1601
By Draft (m)					
>15.00	147	158	200	221	261

¹⁷⁷ Department of Transport and Main Roads 2014, Trade Statistics for Queensland Ports for the five years ending 30 June 2014

¹⁷⁸ Department of Transport and Main Roads 2014, Trade Statistics for Queensland Ports for the five years ending 30 June 2012

Financial Year	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
13.00-15.00	339	249	280	232	316
11.00-13.00	260	244	209	181	165
<11.00	686	694	763	877	859
Total Vessels	1432	1345	1452	1511	1601

10.3 Future prospects for Gladstone

The following section considers the future growth prospects for Gladstone over the master planning timeframe (up to 2050). It identifies potential economic growth drivers in both the global and local context as well as labour and workforce trends.

10.3.1 Drivers for Port Activity

The volume of throughput at the Port of Gladstone is influenced by the two main functions of the port i.e. the export of resources from the Central Queensland region and the import of raw material and the export of finished products associated with major industries in Gladstone. Both of these functions are driven by global and local economic factors.

Global Economic Drivers

The recent slowdown in the global economy is not as widespread as previous years. On a dollar basis, global output grew by around US\$1.3 trillion in 2014 - more than in 2012 and 2013. Although Japan and Italy are in recession, other economies such as the UK, the US and Canada, are performing better than expected. Therefore Wood Mackenzie's growth forecast for global GDP growth remains at 2.4 per cent for 2015. Wood Mackenzie expects global GDP growth to accelerate over the next few years, averaging a little over three per cent per annum between 2015 and 2020. This is because the US story remains robust and their China forecast is unchanged. These two economies are projected to contribute around a quarter of global GDP growth this year, next year and to 2020¹⁷⁹.

More information regarding the predicted trade volumes based upon global economic factors including demand is provided in the following sections.

Local Economic Drivers

As an economic unit Gladstone city represents:

- a major coastal population centre
- an industrial city and economic powerhouse with a heavy port focus
- a major logistics hub for central and central western Queensland including the Central Highlands and coal fields

¹⁷⁹ Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

- a regional service centre for the surrounding areas such as Calliope, Dawson and Callide Valleys.

A future local economic driver is that of cruise ship stop-overs at the port which has the potential to create economic flow on benefits for the Gladstone tourist industry. P&O Cruises has announced that a new Southern Barrier Reef discovery cruise will commence in March 2016 which will include a stop-over in Gladstone.

Labour and Workforce Trends

Table 46 summarises June 2015 workforce data. It shows unemployment in the region 1.6 per cent below the Queensland average and despite the recent downturn in coal, which impacts on the three LGAs, the June 2015 data reflects how strongly the local economies continue to perform.

Table 46 Estimated Unemployment and Labour Force (June quarter 2015)¹⁸⁰

	Unemployed	Labour force	Unemployment rate
	Number		%
Banana	328	8,315	3.9
Central Highlands	823	18,593	4.4
Gladstone	1,944	35,879	5.4
Subtotal	3,095	62,787	4.9
Queensland	162,154	2,494,162	6.5

10.4 Potential growth in current export commodities

This section provides information regarding the potential growth of existing major commodities exported through the Port of Gladstone.

10.4.1 Coal

Product sources of supply

A port's catchment area typically corresponds to the area that can be served on a lowest cost basis by the port. Distance and connectivity to the hinterland define the boundaries of the catchment. The Port of Gladstone catchment area comprises areas from two major coal basins (the southern and central parts of the Bowen basin and the northern parts of the Surat basin), as well as two smaller basins (the Callide and Mulgildie basins) and is serviced by the Moura and Blackwater rail systems. The other small basin in the catchment is Maryborough

¹⁸⁰ Australian Government Department of Employment, Small Area Labour Markets Australia, various editions and Queensland Treasury and Trade estimates.

which is serviced by Queensland Rail's North Coast Line. Currently 17 mines export through the Port of Gladstone¹⁸¹.

As mines in the catchment area for Gladstone fall largely within the Bowen basin, and the Bowen basin has largely metallurgical coals, about 75 per cent of total coal exported through Gladstone is metallurgical coal.

Conversely, thermal coal exports volumes are proportionately much less than metallurgical coal, accounting for only around 25 per cent of total coal exports through Gladstone. Thermal coal is mainly consumed in power generation and metallurgical coal is used for making steel.

International and National Macroeconomic effects

Global demand for energy and steel product are major drivers of the proposed Galilee Basin mines north-west of Gladstone.

There are many competitors in the international coal market including Brazil, Indonesia, South Africa, USA and potential new comers such as Mongolia. Russia, China and India all have major domestic reserves which have the potential to displace Australian sourced supplies. However, in the case of China, it is the difficulty and complexity of supply chains competing with efficient seaborne material from Australia. In India there is a very complex legal situation and government policy which favours preserving strategic domestic materials and direct importation.

Product demand/substitutes

Changing consumption patterns in favour of less polluting energy sources, and a reduction in energy-intensity in heavy industry will also have a downside effect on growing demand for coal over the longer term. Although coal continues to be the favoured fuel supply option due to its cost competitiveness, public pressure is mounting in various countries to strike a balance between generation economics and environmental protection. LNG and other gases have already been identified as potential fuel substitutes. Nuclear and alternative energies are also active in the main markets in which Gladstone export coal competes.

Thermal coal demand in the Pacific basin is forecast to remain strong over the next twenty years. Higher economic growth, strong rates of electricity generation growth stimulated by an emphasis on electrification, industrialisation and infrastructure build, coupled with a lack of suitable alternative, abundant, and competitively priced fuel sources, will create a growing need for seaborne coal. Global thermal markets are currently facing extraordinary challenges and uncertainties driven by weakening global economic growth, substantial overhang in mine and export capacity, low oil prices, volatile currencies in key supplier countries, and ever-tightening environmental policies¹⁸². However, over the longer term, continued growth in demand for energy worldwide, will provide a platform for the continuation of strong demand for thermal coal over the next several decades.

China and India will be the engines of thermal coal demand as they develop additional coal-fired capacity of 841GW and 285GW respectively between 2014 and 2035. At the same

¹⁸¹ Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

¹⁸² Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

time, Japan, South Korea and Taiwan will remain large consumers of thermal coal. Global seaborne thermal coal imports are forecast to increase from 936Mt in 2014 to 1,860Mt by 2035. China's demand for Australia's high energy coal is expected to increase slowly through 2026 followed by a faster rate of increase through 2033 driven by Indian demand.

Metallurgical coal which is used for making steel is a much smaller and more specific market with arguably a less predictable long term trend. The easy recyclability of steel, apparently endless availability of low cost scrap feedstock and low cost Electric Arc Furnace (EAF) plants contribute to the large demand. Demand for metallurgical coal is predicted to remain positive in the long term from countries such as China and India.

Wood Mackenzie (unpublished) forecast that the expansion of Chinese steel and hot metal production as well as India's urbanisation will drive strong demand for hot metal, coke and coking coal in these countries. In the long term, growth in metallurgical coal demand will be largely driven by the increase in steel demand in the rapidly industrialising and urbanising development economies of Asia, most of which lack sufficient domestic reserves of metallurgical coal to satisfy their steel production needs. Therefore, global demand for/supply of metallurgical coal from countries such as Australia will continue to expand through to 2035 from approximately 280Mt in 2014 to 410 Mt in 2035.

Local factors

While 17 mines currently export through Gladstone, a further 23 projects are forecast to ship through the port by 2065. Coal export volumes through Gladstone are expected to grow strongly over the short to medium term out to 2020/21. To accommodate this growth, construction of Stage one of the Wiggins Island Coal Terminal commenced in 2011. Stage one of the project will deliver an additional coal handling capacity at Gladstone of 27mtpa. The first coal export from the new terminal occurred in May 2015. Future stages of the Wiggins Island Coal Terminal will see up to 84 mtpa of coal export capacity.¹⁸³

Existing mines in the Bowen and Callide basins have a total of 1,766Mt of export marketable reserves for export through the Port of Gladstone. A further 23 potential projects earmarked for export through the Port of Gladstone have marketable reserves totalling 2,485Mt.

Coal throughput at the Port of Gladstone is forecast to increase by 60Mt from 72Mt in 2015 to a peak of 132Mt by 2030. While some mines and projects will start to decline from 2031, Wood Mackenzie estimates there will be additional supply to offset this decline. Further expansion potential beyond 2035 will depend upon development of greenfield projects that have been delayed due to low coal prices.

Outlook

The majority of Australian thermal coal export growth is forecast to occur in Queensland with thermal exports expected to reach 184Mt by 2027. Subsequent to the development of the Galilee and Surat Basin, Queensland could provide approximately 75 per cent of Australia's thermal coal exports by 2035.

¹⁸³ Wiggins Island Coal Terminal Supplementary EIS

Supply of metallurgical coal is concentrated between Australia, the USA, Canada and Russia, currently accounting for 87 per cent of the seaborne market. Australia accounts for over half of the global supply.

The outlook for coal exports through the Port of Gladstone is favourable but potentially improved with the Surat Basin and WICT being fully developed. The demand for coal is growing and the high quality of the Gladstone product combined with efficient and economic logistics chains, provides a strong defence of the existing status quo with a solid platform for future growth. The majority of Galilee Basin coal seems to be destined to be exported via Abbott Point due to proximity, with a smaller volume potentially exported through Gladstone.

10.4.2 Export Grain and Broad acre Crops

Grains include sorghum, chick peas, and wheat and broad acre crops include lupins, pulses, oilseeds, cotton fibre and seed.

Product sources of supply

Biloela and Emerald areas currently export through the Port of Gladstone and are part of the Fitzroy region for which data is available. Around 20 per cent of Queensland wheat is grown in the Fitzroy region. Approximately 164,000ha in the Fitzroy region is planted with wheat compared to 52,000ha of chickpeas. Chickpea exports have grown marginally due to wheat growers gaining better wheat crops when rotated with chickpeas¹⁸⁴.

Due to the fact that wheat is a winter crop, farmers of the Fitzroy region also often produce sorghum during the summer which is interchanged by cotton farmers around the Emerald region when the price of cotton is not sufficient. Because of this flexibility, Queensland is the largest producer of sorghum nationwide. Sorghum is mostly used as a feed grain for livestock, and any excess that is not consumed locally is exported¹⁸⁵. Sixty-five percent of Australia's sorghum is produced in Queensland with 20 per cent grown in the Fitzroy region which is serviced by the Port of Gladstone.

International and National Macroeconomic effects

People in the Asian boom economies are increasingly adopting western influenced lifestyles and dietary patterns away from the traditional rice and mainly vegetable/fish diet, at least on a minimum scale. The rate of consumption seems related to increased wealth, and the associated western accoutrements. This provides favourable market conditions for the future particularly if the product quality is good and reputation is important in the market. More countries than ever are attempting to join this market and the existence of multinational commodities traders and logistics companies complicate matters. For example it may be possible to substitute Australian grain with Russian or Argentinian grain.

Gladstone wheat is currently exported to Fiji, Vietnam, Malaysia and New Zealand. Sorghum is currently traded to New Zealand and China and the bulk of chick peas were exported to India and Bangladesh in 2013/14¹⁸⁶.

¹⁸⁴ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

¹⁸⁵ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

¹⁸⁶ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

From a national perspective Australia only exports the grain surplus to local consumption. In some cases such as small crops and rapidly escalating local demand for grain not only for human consumption but more recently in commercial uses e.g. production of industrial starches and esters, there may be nothing to export. Potential bio-fuel use will also consume local production. In central Queensland the growth of feedlots has taken a considerable amount of the formerly exported grain out of the system.

Product demand/substitutes

Grain exports through Gladstone in 2013/14 was 33kt of wheat, 71kt of sorghum and 46kt of chick peas. Both Sorghum and chick peas exports were down significantly from 2012/13.

There has been significant growth in recent years for containerised grain. Increasingly customers are Asian based and have container handling capacity at ports but many do not have food-grade bulk handling equipment, contamination - free secure storage and the associated logistics chains to support bulk movements. These latter movements are the traditional trades for Gladstone.

Containerisation represents a significant challenge to Gladstone which relates to the whole logistics chain part of which is beyond the control of the Gladstone port. In 2014, AECOM noted¹⁸⁷ there were 10ktpa of cottonseed and cotton fibre exported from the Central highlands via Brisbane in containers and approximately 20kt of containerised grains, lupins etc. from the Central highlands were exported through Brisbane. Structural changes in marketing and distribution of grain have led to a relative decline in the importance of the traditional silo based handling system giving the option of alternative supply chains. On-farm storage in containers is one means to bypass the silo system and use trucks to port for export. There may be an opportunity to expand export of containerised grains through Gladstone.

Local factors

There have been significant changes in the industry with a rise of local and regional feed-lotting since the 2000's which is consuming locally produced grain, particularly sorghum which traditionally has been exported through Gladstone. There is therefore a potentially smaller pool to draw from. The industry is still very volatile due to changes in climate and particularly water supply. There does not seem to be a way to reduce this volatility in the long term on a year by year basis. There has also been a shift away from traditional grains in favour of lupins and pulses, especially crops such as chickpeas. Based on the existing logistics chain, exports through the port of Gladstone are based on the traditional bulk supply by rail direct from inland silos.

Outlook

It is forecast that chick pea area planted will increase by two per cent per annum, sorghum yields will grow by 1.6 per cent per annum and wheat exports are likely to remain constant¹⁸⁸.

The outlook of grain production will depend on several factors including growing conditions. It is however, expected that prices and production volumes through Gladstone are projected to

¹⁸⁷ AECOM 2014a, Central Queensland Transport Supply Chain Study.

¹⁸⁸ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

remain steady (wheat) with slow steady increases of chick peas and sorghum. The outlook could be more favourable with an improved logistics chain.

10.4.3 Horticultural and Other Agriculture Products

Product sources of supply

Central Queensland has a valuable agricultural sector primarily comprised of beef and cereal grains production, irrigated cropping including cotton, horticulture, forestry and commercial fishing (Central Queensland – Economic and Infrastructure Framework, 2013). The region's growing horticulture industry supplies a significant proportion of Queensland's tomatoes, capsicum, green beans and sweet corn, as well as high-quality mangoes¹⁸⁹.

Statistics for locally produced products are indistinguishable in the market. Meat products are produced throughout Queensland and the horticultural products are produced from the Atherton Tableland and coastal areas south to the NSW border. However, there are three abattoirs located in Central Queensland. JBS Australia in Rockhampton which has a daily processing capacity of 676 head of beef; Teys Australia in Rockhampton which has a daily processing capacity of 1,731 head of beef; and Teys Australia in Biloela which has a daily processing capacity of 703 head of beef.

The Central Queensland region had a total of 3,642 agricultural businesses in June 2011, of which beef cattle farming accounted for 2,634 businesses or 72 per cent of the total number of agricultural businesses in the region.

International and National Macroeconomic effects

The real cost of freight has declined to the point where even low value commodities can be transported to distant markets. In this global economy out of season products can be obtained freely from other parts of the world.

Increasing affluence combined with western media penetration is changing tastes and demands in many traditional societies in Asia, Africa and Eastern Europe. Foreign products are seen as better, more prestigious and more desirable and this attitude is becoming entrenched.

There is a growing movement which promotes a "consume local not global" to reduce transport greenhouse gas emissions and carbon footprint. It is debatable whether this can reduce the consumer demand for anything at any time anywhere.

Australian agri-marketers have been as active in foreign countries promoting Australian produce just as hard as competitors from other countries are. This is encouraged and supported by all levels of government, growers and supply chain providers.

Product demand/substitutes

Central Queensland is a major producer of:

- beef via two abattoirs in Rockhampton and one in Biloela

¹⁸⁹ GHD 2014, *Economic Development Queensland Regional Queensland Industrial Land Supply Study*, Central Queensland Region.

- pineapples and tropical fruit in the coastal strip particularly from Yeppoon to Yarwun.

Very little of this is exported through Gladstone. The meat is sold in the domestic (Queensland and southern) markets or containerised and exported via the port of Brisbane. The tropical fruit is sold in Brisbane and southern markets. Most of this material is easily containerised but at the moment Gladstone is not well equipped to handle this or other refrigerated cargo in the same way Brisbane can. However, there are two shore harbour cranes now available at Auckland Point and many handy size gear vessels which could address this issue.

Local factors

According to GHD¹⁹⁰: *The profitability of the industry is being strongly driven across the agribusiness supply chain through adoption of the latest technology and better responding to national and international markets (Central Queensland – Economic and Infrastructure Framework, 2013).*

Outlook

As noted earlier, it is supply chains rather than ports which compete with each other and unless Gladstone can attract greater frequency of container ship calls, it will be difficult to capture the containerised grain business from Brisbane. However on the flip side, ships will not call unless there is a container exchange sufficient to justify the cost of a day's shipping time lost, along with extra port costs. The future potential for the shipment of agricultural products is dependent on the nature of the market being served. Containers bound for South East Asia can be accommodated on feeder lot services whereas trade to the West Coast of America and further afield require liner services to optimise the transit times. The number of container exchanges has a major influence on the desirability for a port of call.

10.4.4 Alumina and Aluminium

Product sources of supply

Located within the Port of Gladstone catchment area are the Rio Tinto Alcan (RTA) and Queensland Alumina Limited (QAL) alumina refineries and the Boyne Island aluminium smelter (Pacific Aluminium). Both refineries are dependent on imported bauxite shipped from Rio Tinto's Weipa mine in north Queensland. Bauxite is a relatively common element and mined in many countries. Current bauxite supplies in Weipa are expected to deplete in 10-15 years; however, further development is proposed to the south of Weipa with bauxite production expected to reach 50 mtpa¹⁹¹. The goods logistics chain to Gladstone with deep water ports, good supply of electricity, workforce and other resources ensure it has a competitive edge. The two refineries in Gladstone produce a reliable supply of alumina which is used locally at Boyne Island and exported.

¹⁹⁰ GHD 2014, Economic Development Queensland Regional Queensland Industrial Land Supply Study, Central Queensland Region.

¹⁹¹ Rio Tinto Alcan 2011, South of Embley Environmental Impact Statement, http://www.riotintoalcan.com/ENG/ourproducts/1818_environmental_impact_statement.asp.

RTA started production of alumina in 2004 (capacity of 1.2mtpa) and upon completion of an expansion by 2018 plant capacity is anticipated to be 3.5mtpa. QAL started in 1967 with a capacity of 2,740ktpa, however expansions have led to a current plant capacity of 3.3mtpa¹⁹².

Pacific Aluminium is Australia's largest aluminium smelter with a capacity of 570ktpa. The smelter utilises alumina from QAL to produce aluminium, some of which is consumed domestically, however the majority of aluminium is exported through the Port of Gladstone.

International and National Macroeconomic effects

Aluminium is a highly traded metal in much demand around the world. Increasing incomes allow people to trade up in terms of housing and transportation and this trend can be observed around the world. This increasing wealth underwrites the future of construction and manufacturing and therefore of the materials used in these processes such as aluminium.

Asia is the fastest growing aluminium consumption region with China accounting for nearly 80 per cent of Asian and 50 per cent of the world's aluminium consumption in 2014.

Aluminium global capacity is forecast to grow from 59mtpa in 2013 and plateau at around 78mtpa in 2020 while demand growth continues. However, new global aluminium projects waiting on price appreciation and to ensure capacity meets demand through to 2035.

Product demand/substitutes

Aluminium has been used in a wide variety of applications for many years. It offers a strong, light-weight, non-rusting alternative to traditional material such as steel. As fuel becomes more expensive and car manufacturers attempt to reduce mass to provide better performing cars increased use of aluminium and alloys is expected. Away from industrial applications, aluminium is widely used in the packaging industry and there are few substitutes with the versatility of aluminium. For example, for food and beverage packing, few materials can match the quality and durability of aluminium cans.

On the horizon there is the threat of new materials for specific applications. Most noteworthy is the Boeing 787 Dreamliner which has substituted high tech composite materials where formerly aluminium would have been used. Already the Airbus 350 (the B787's direct competitor) has adopted some composite features and all manufacturers are examining weight saving options which could result in reduced demand for aluminium.

However, Wood Mackenzie expect global alumina demand to grow about six per cent per annum to 2020 and thereafter 3.1 per cent per annum to 2035. Global demand is forecast to increase from 133mtpa in 2013 to 158mtpa in 2020 which would result in an increase to capacity utilisation from 79 per cent to 95 per cent. Further increases in utilisation up to 98 per cent by 2022 indicates there will be an urgent need for additional capacity in the short to medium term.

Global aluminium demand is anticipated to grow by an average of 5.2 per cent over the 2013-2017 period driven by firm demand growth in emerging markets and by the increasing penetration of aluminium in end-use sectors such as automotive, transportation and power. Beyond 2017, global consumption growth is expected to gradually decelerate with an average of 3.3 per cent growth per annum from 2013 to 2035.

¹⁹² Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

Local factors

The QAL alumina refinery has a life to at least 2041 and Yarwun has an expected life to 2052. Beyond these terms, significant capital investment would be required, however increasing demand in Asia leads Woods Mackenzie (unpubl.) to believe both refineries will still be operating in 2065. The RTA refinery employs modern technology and both refineries are within the lowest half of the global alumina cost curve and favourably located to Asian markets so both plants are competitive in world terms.

Alumina exports from the Port of Gladstone are forecast to increase from approximately 5mtpa in 2014 to approximately 6.4mtpa in 2019 where exports are predicted to remain until 2035.

There is the potential for RTA to undertake a Stage 3 expansion and for QAL to undertake a possible 400ktpa brownfield expansion in favourable economic circumstances. In the long term (out to 2050) the volume of alumina exported out of Gladstone is forecast to increase to 10mt as reported by GHD¹⁹³.

The Pacific Aluminium Smelter is expected to remain operational until at least 2060. Exports are predicted to increase from approximately 364kt in 2013 to 371ktpa by 2016 where export volumes will remain until 2035.

Outlook

The outlook for future alumina and aluminium exports through the Port of Gladstone is favourable. The global industry's aluminium utilisation rate could reach 90 per cent by 2021 and quickly surge to 95 per cent in 2024 reflecting a tightening of the capacity/demand situation. Gladstone aluminium exports are forecast to increase approximately two per cent by 2016 and remain stable until 2035. In conjunction, Pacific Aluminium has shown considerable faith in the Boyne Island smelter with significant investment for future aluminium production.

Similarly, Gladstone alumina exports are expected to increase approximately 28 per cent by 2019 and then remain relatively stable until 2035. QAL has invested in process improvements and efficiency while RTA is in the process of doubling its capacity. The growth in Alumina trade is unlikely to be linear and will more likely be reflected in block jumps as new sites become operational.

10.4.5 LNG

Product sources of supply

Coal Seam Gas (CSG) and natural gas are found in many countries, but unless there is the infrastructure and logistics chains in place to extract, process, store, transport and distribute it, it will remain an untapped resource. In this aspect Gladstone is very well served by pipeline connection to the Surat Basin and other potential sources. The construction of processing plants, port infrastructure etc. at Gladstone gives it a significant advantage over other sources of supply.

¹⁹³ GHD 2014, Economic Development Queensland Regional Queensland Industrial Land Supply Study, Central Queensland Region.

The LNG facilities on Curtis Island in the Port of Gladstone are the world's first dedicated CSG to LNG supply projects i.e. Australia Pacific LNG (APLNG), Santos' Gladstone LNG (GLNG) and Queensland Curtis LNG (QCLNG).

Significant CSG reserves are located primarily in Queensland in the Surat and Bowen basins. As the operators develop the gas reserves further and understand the performance of the wells better, the true extent of the reserves can be determined with greater confidence. Current estimates of gas-initially-in-place for the Bowen Basin and Surat Basin is 142 trillion cubic feet (tcf) and 252 tcf respectively. The existing projects have agreements with credible energy companies for a duration of 20 years.

Potential exists for additional gas resources in under-explored areas, such as tight gas and shale gas however, technical issues create higher cost challenges if they were to compete with other LNG projects globally.

International and National Macroeconomic effects

As noted above, the world has a growing appetite for energy and there are a number of fuels which can support that. The ease of extraction, portability via pipelines, economical transport and other factors have led to its relatively recent surge in popularity. In the USA a number of coal fired power plants have been converted or replaced by gas. Currently there is a seemingly inexhaustible demand in China for this cheap reliable fuel. Gas has other important industrial applications in the production of chemicals, fertilisers and acids.

The demand for rapid industrialisation and economic growth particularly in Asia has resulted in pollution and environmental concerns. The chief culprit is coal fired powerhouses and this has created a demand for cleaner energy. New gas fired powerhouses provide a good alternative to old technology based on inefficient processes using low grade coal. In the long term the drive to transform economies ensures the future demand for the product and if Gladstone can stay at the cutting edge, it will have a dominant presence.

The three LNG companies in Gladstone have significant long term supply agreements with power generators and gas distributors e.g. in Japan and Korea. Another key buyer group are national oil companies e.g. in Malaysia and China who look to resell the LNG to other buyers.

Product demand/substitutes

Gas has been used as fuel for many years but it is currently experiencing a surge in demand. While there are substitute products e.g. coal, petrol, they do not provide a direct economical alternative for a number of applications.

Local factors

LNG exports have commenced from two of the three Gladstone LNG facilities and are expected to grow. The third facility is expected to commence exports by the end of 2015. LNG outputs are expected to ramp up from 2015 and reach peak capacity in 2019. The three facilities are expected to produce approximately their plant capacities (up to 25mtpa combined) for 20 years. Extension of the life of the projects beyond 20 years is expected given the significant infrastructure in place but will be subject to availability of reserves in terms of volume, cost and location. Many other LNG projects world-wide have demonstrated operational lives of 30 to 45 years.

Wood Mackenzie¹⁹⁴ believe that APLNG and QCLNG will expand by one train each around 2025. The Arrow LNG project is not expected to go ahead in its current format as a greenfield development but could be developed as supply of gas or as part of an expansion of one or more of the existing facilities.

Outlook

The contributions from the LNG projects are likely to extend out to the year 2050. In 2020/21, it is estimated that the industry has capacity to export over 33 million tonnes of LNG through Gladstone Port. Whilst final output will be influenced by market factors, this export volume is estimated to be valued at over \$13.6 billion (undiscounted).

10.4.6 Cement

Product sources of supply

All cement clinker and cement exported through the Port of Gladstone is produced by Cement Australia's plant at Fisherman's Landing, which is Australia's largest cement plant and produces over 1.666mtpa of cement clinker. The plant produces clinker, most of which is ground into cement at the site, and a range of other products including flyash and lime. Limestone for the production of cement clinker is sourced from the East End mine (24 km from Gladstone)¹⁹⁵.

International and National Macroeconomic effects

The range of products includes relatively crude semi processed materials to fully manufactured finished goods in the case of cement.

Extensive infrastructure damage resulting from floods has necessitated a larger infrastructure rehabilitation and restoration program since 2011. As some of these works finish, demand will inevitably decline however the potential development of the Galilee Basin mines will result in high levels of demand during the construction phase, normally estimated at between 2-3 years, depending on the size and complexity of the mine. Apart from the mines there is significant civil infrastructure e.g. upgraded or new rail lines and roads to service the industry, housing and amenities for the workforce.

Cement is critical to all sectors in the economy ranging from consumption in domestic housing applications to commercial retail centres, from civil infrastructure to public and private works.

Product demand/substitutes

It is difficult to find a product which could be used as substitute for cement. Its future demand remains positive. Sunstate Cement based in Brisbane is a competitor but has little presence in the markets which are targeted by Cement Australia in Gladstone. Cement is freely traded in international markets and it would be possible for foreign sourced material to be directly imported through Townsville or Cairns (or Mackay) if there was demand which could potentially displace material shipped out of Gladstone.

¹⁹⁴ Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

¹⁹⁵ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

Cement clinker and cement produced at Fisherman's Landing is either consumed in the Gladstone area or is transported through Gladstone Port to other Cement Australia facilities throughout Australia e.g. Bulwer Island grinding plant and Townsville and Cairns terminals which lack their own mill facilities. No cement or clinker is currently exported overseas from Gladstone.

Currently coal mining accounts for almost 80 per cent of local demand for cement. The construction of the Galilee Basin mines and associated infrastructure will consume additional material which might otherwise be directed from Gladstone to markets in North Queensland. After the mine construction phase, it is normal for demand to decrease in line with the operation/production phase.

Local factors

With growing populations and demand for expanded urban and industrial infrastructure, there will be continued high demand potentially for decades. The Department of Transport and Main Roads (TMR) has significant works planned in central Queensland and concrete is integral to many of these projects. DSD is also examining infrastructure opportunities and regional economic development throughout the region. Given that the Gladstone plant is near capacity at present future expansion will be required to maintain shipments through the port given the number of potential new domestic regional customers. Otherwise as local demand rises, there will be less surplus for shipping through the port.

The major generators/consumers are mining companies, private developers, consumers, and civil infrastructure providers such as commonwealth, state and local government.

Outlook

The outlook is mixed. There is the potential for new coal mine development to increase local demand and therefore decrease surplus exports. The possibility of direct imports into Townsville from another source provides another significant threat to trade through Gladstone. However, there is also the potential for historical circumstances that have contributed to the recent closure of cement plants in the last five years to result in the plant altering its production from producing clinker to grinding imported clinker which would increase port imports.

10.5 Potential growth in current import commodities

Imports are dominated by two groups of products:

- bauxite and materials used in alumina/aluminium production
- petroleum and materials used in the mining, agricultural and transport sectors.

Only the major commodities are covered here in detail.

10.5.1 Bauxite

Product sources of supply

All bauxite utilised at Gladstone is currently sourced from Weipa with the mine being owned by Rio Tinto Alcan which also owns the RTA at Yarwun in Gladstone and is part owner of QAL in Gladstone. The deposit and adjoining sites in Weipa are extensive with current reserves expected to deplete in 10-15 years. The only risks to supply are when significant

climatic events such as cyclones disrupt shipping patterns or damage equipment at ports or plants.

International and National Macroeconomic effects

Over 85 per cent of bauxite mined globally is converted to alumina for the production of aluminium metal. An additional 10 per cent goes to non-metal uses in various forms of specialty alumina and the remainder is used for non-metallurgical bauxite applications e.g. commercial applications as abrasives and refractories¹⁹⁶.

All bauxite used to produce alumina and aluminium in Australia is sourced from Australia. Australia is the largest bauxite producer in the world with 74.9Mt produced in 2011. Bauxite production in Australia is estimated to reach 82 million tonnes in 2014-15¹⁹⁷. There are currently five Australian bauxite mines providing feedstock for the seven alumina refineries, which in turn supply alumina to the six Australian aluminium smelters and the export market. The bauxite is generally exported from one port via coastal shipping to another Australian port which results in a high volume of bauxite imports for Gladstone where two of Australia's five refineries are located.

From Gladstone's perspective, it is trade in the finished product alumina or aluminium rather than the raw product which is important. Thus the trends in the bauxite market tend to reflect the dynamics on the downstream products and how they are in demand during periods of economic boom or slowdown.

Product demand/substitutes

There are no other products from which alumina and therefore aluminium can be produced.

The expansion of Australian bauxite, alumina and aluminium production over the past few years reflects high demand for the commodities and significant investments are being undertaken in prospective projects. Along with well-developed production areas around Weipa, Gove and the Darling Range, bauxite occurrences in Western Australia, Cape York in Queensland and in central New South Wales and Queensland have maintained commercial exploration and development interest¹⁹⁸.

Local factors

GHD report a relatively favourable future for the Alumina/Aluminium production at Gladstone¹⁹⁹: *The volume of bauxite, alumina and aluminium handled at Gladstone is forecast to grow at a steady rate over the short to medium term and the long term. In the short to medium term, the volume of bauxite produced in Weipa is forecast to increase from 23 million tonnes in 2011/12 to just over 38 million tonnes in 2020/21. This represents an average annual increase of just over 7.1 per cent. The value of this production is forecast to increase from \$699 million in 2011/12 to just over \$1.1 billion in 2020/21 (undiscounted)*

¹⁹⁶ Australian Bauxite Limited 2012, ASX announcements 29/06/12, 03/12/12, www.australianbauxite.com.au

¹⁹⁷ IBIS World 2015, Bauxite Mining in Australia: Market Research Report, <http://www.ibisworld.com.au/industry/default.aspx?id=66>

¹⁹⁸ Geosciences Australia 2010, *Bauxite*, www.ga.gov.au

¹⁹⁹ GHD 2014, Economic Development Queensland Regional Queensland Industrial Land Supply Study, Central Queensland Region.

(QRC, 2013). The volume of alumina produced in Gladstone is forecast to increase from 5.3*** million tonnes in 2011/12 to 7.4 million tonnes in 2020/21. The value of this production is forecast to increase from \$1.5 billion in 2011/12 to just over \$2.0 billion in 2020/21 (undiscounted) (QRC, 2013).

In the long term (out to 2050), the volume of bauxite produced in Weipa is forecast to increase to 50 million tonnes. The value of this production is forecast to increase to just over \$2.1 billion in 2050 (undiscounted). In the long term (out to 2050), the volume of alumina exported out of Gladstone is forecast to increase to 10 million tonnes. The value of this production is forecast to increase to just over \$2.75 billion in 2050 (undiscounted).

Outlook

The outlook for bauxite demand is very favourable according to most sources due to the continued strong demand for aluminium.

10.5.2 Petroleum Products

Product sources of supply

There are currently two bulk petroleum product terminals (excluding fuel oil bunkers) based in Gladstone. Annual petroleum imports have increased from approximately 880kt in 2009 to 1mt in 2014²⁰⁰. The countries from which fuel is sourced varies from year to year but always includes Australia. Other source countries can include Japan, Taiwan, and Korea. Bunker fuel is usually sourced from Singapore²⁰¹.

International and National Macroeconomic effects

Currently (early 2015), the price of crude oil has dropped to its lowest level in nine years at under \$US 48 per barrel. The main reason for this is several OPEC members have flooded the market with cheap oil to preserve volumes if not market share in a sluggish world market. It is unknown how long the state will prevail but it is placing pressure on other sources of fuel – e.g. CSG.

Product demand/substitutes

Few commodities are as widely traded and as useful as fuel. In the long term bio fuels and LNG/LPG may offer some alternatives to fossil fuels.

The Australian Institute of petroleum estimates that over the past decade, Australian use of petroleum products has increased by two per cent per day. Approximately 40 per cent of petroleum products consumed in Australia were imported. Unleaded, diesel and jet fuel account for 89 per cent of the total petroleum demand in Australia. Diesel demand has increased due to mining industry growth and to a lesser extent, growth in sales of vehicles with new diesel technology and jet fuel has increased due to increased demand for air travel.

²⁰⁰ Gladstone Ports Corporation 2014, Invitation for Expressions of Interest November 2014 – An opportunity to develop and operate a petroleum products import facility at the Port of Gladstone Central Queensland.

²⁰¹ Gladstone Ports Corporation 2015, Trade Statistics 2015, www.gppl.com.au

However unleaded fuel demand has slightly declined and is expected to continue to decline slowly due to the development of higher efficiency vehicles²⁰².

For the applications of fuel imported through Gladstone there are no short and few medium term alternatives. An increased demand for fuel, particularly diesel is expected due to:

- the mining sector diesel requirements for power generation, fuel for equipment and trucks and for use as a component in explosives
- the agriculture sector requirement for diesel for farm equipment, plant and power
- the transport sector requirements for diesel for locomotives and trucks
- the aviation sector requirements for jet fuel, aviation gas and other products
- the growing urban and rural population's requirement for petrol for their cars.

BIS forecast that petroleum product imports at Gladstone will increase from 1mt in 2015 to 2mt in 2037 and over 4mt by 2060²⁰³.

Local factors

In terms of economic drivers, the consumption of petrol is tied to population patterns and domestic demand. The population is growing in the region, although at different rates in different towns. This air of confidence is supported by PSA who claim²⁰⁴: *Over the last decade, the Gladstone area has experienced a high level of economic and residential growth, driven by an increasing level of industrial development and exports. This growth is forecast to not only continue, but also intensify over the medium to long term horizon.*

These demographic trends are supported by SGS Economics and Planning SGS E&P who report²⁰⁵: *Office of Economic and Statistical Research (OESR) projects Gladstone Region's current population of about 63,000 people will grow to approximately 111,670 by 2031.*

Diesel consumption is driven by industrial demand particularly relating to the mining and agricultural sectors which have growth ambitions therefore it is expected demand will continue to increase. Recent volatility in the mining sector makes long term predictions difficult; however, the long term trend identified by multiple sources indicates an upward pattern.

The major unknown is when the proposed mines in Galilee Basin will come on line and whether they will be supplied out of Gladstone or Mackay. These proposed mega mines are many times larger than even the largest existing mines in the Bowen Basin and have the potential to demand input commodities such as fuel, explosives etc. in unprecedented quantities.

²⁰² BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

²⁰³ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft – Unpublished.

²⁰⁴ PSA Consulting 2011, Gladstone Area Transport Study – Preliminary Draft Transport Strategy report, for TMR.

²⁰⁵ SGS Economics & Planning 2012a, Planning Scheme Analysis: 2012 Update, prepared on behalf of Gladstone Regional Council.

Outlook

The outlook for petroleum product imports is positive with import volumes forecast to double in 20 years. However, the potential exists for significant growth in imports should new large mines be developed in the Galilee Basin. It is noted that with the imminent closure of Australian refineries, there is potential for the import of petroleum products direct from South East Asia. The economies of direct import within LR1 and LR2 tankers increases the potential coverage of the supply network into the Surat and Galilee basins.

10.6 Summary of Potential Growth in Existing Commodities

In assembling data of future predications it is important to understand that linear growth does not apply in many industries. For example, a cement plant is built to a nameplate capacity and the aim is to ramp up to that volume as quickly as possible. However, capacity enhancements are usually very irregular with major steps in capacity following capital development rather than incremental one per cent per year increases. Forecasting is also an imprecise science and it should be noted the forecast throughput estimates below are based on multiple and sometimes inconsistent sources therefore caution should be exercised with these indicative numbers.

The throughput estimates for the Port of Gladstone below consider a long term time horizon to 2050 and are based on information currently available.

In relation to exports, overall even with a minimal growth projection it is expected there will be larger export volumes mainly driven by the dominant commodity, coal (Table 47) as well as LNG as facilities commence exporting. For medium and high growth projections a more favourable trend is anticipated (Table 47).

LNG exports, which weren't included in the above analysis, have commenced from two of the three Gladstone LNG facilities and are expected to grow. The third facility is expected to commence exports by the end of 2015. Within the next 30 years both QCLNG and APLNG are expected to expand from two trains each to three trains each²⁰⁶, potentially increasing LNG exports by one third.

Table 47 Summary of Estimated Export Trends for next 30 years

Export Commodity	Minimal	Medium	High	Comments
Alumina/Aluminium	Stable	1% pa	2-4% pa	Limited by scale of production, irregularity of expansion and size of markets
Cement/clinker/flyash	Stable	1% pa	2-4% pa	Limited by scale of production, irregularity of expansion and size of

²⁰⁶ Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

Export Commodity	Minimal	Medium	High	Comments
				markets
Coal	1-2% pa	2-4% pa	5%+ pa	Depends on Surat Basin development
Containers	Stable	1% pa	2-3% pa	Could expand in place of breakbulk
Grain	Stable	Stable	1%	Depends on markets, marketing arrangements and logistics chains and weather
Magnesia	1-2% pa	2-4% pa	5%+ pa	Limited by scale of production, irregularity of expansion
Scrap metal	Stable	1% pa	2-3% pa	Depends on markets and logistics chains

In relation to imports, overall even with a minimal growth projection it is also expected that there will be larger volumes (Table 48). This is because bauxite consumption will increase in line with the anticipated expansion of Yarwun and petroleum consumption will increase mainly driven by mining demand and also transport sector demand.

Table 48 Summary of Estimated Import Trends for next 30 years

Import Commodity	Minimal	Medium	High	Comments
Bauxite	Stable	1%	2-4% pa	Limited by scale of production, irregularity of expansion and size of markets
Caustic soda	1-2% pa	2-4% pa	5%+	Used in mining, chemical and alumina industries
General cargo	Stable	1%	2-3% pa	Multiple drivers – population, mining, agriculture and transport industries
Liquefied petroleum gas	Stable	Stable	Stable	Separate supply chain from export material
Liquid ammonia	Stable	2-4%	5%+	Used in chemical industry
Magnetite	1-2% pa	2-4% pa	5%+	Used in mining industry

Import Commodity	Minimal	Medium	High	Comments
Petroleum coke	Stable	1%	2-4% pa	Used alumina industries
Petroleum products	1-2% pa	2-4% pa	5%+	Multiple drivers – population, mining, agriculture and transport industries

10.7 Potential new port commodities

Gladstone Port is equipped as a major multi-cargo import and export port, with significant potential for expansion and substantial rail and supporting infrastructure. Gladstone is the location of bulk material handling facilities for coal, bauxite, calcite, magnetite, magnesia, grain, limestone, and intermittently a number of smaller products for example cottonseed and magnesite.

There is significant potential to expand upon existing bulk materials handling at Gladstone Port, particularly at Port Central and Fisherman's Landing. In addition, Gladstone is in a position to facilitate new exports or imports of new or temporary commodities at short notice at Port Central due to the winding down of the construction phase of the LNG facilities on Curtis Island. Fisherman's Landing also provides the potential for new portside storage/handling facilities and the development of new bulk material loading facilities.

10.7.1 Mineral Mining Prospects

A great variety of existing and potential mines are located within the Central Queensland region around Gladstone. A number of small mineral mines are in operation or development/exploration in the Central Queensland region south west of Gladstone providing potential new commodities for export at the Port of Gladstone. Development of regional transport solutions would assist the successful development of new mines through to exports from Gladstone.

Ilmenite and Associated Minerals

Ilmenite is a raw material used in the manufacturing of titanium pigments and metals. The Goondicum mine in the Monto area was commissioned in April 2015 after a \$7.6 million refurbishment and produced 18,000 tonnes of ilmenite before a weak prevailing market resulted in the mine being placed into care and maintenance in October 2015.

Exports of ilmenite may also potentially occur from the Wateranga Project near Mt Perry (approximately 215km from Gladstone). The Wateranga Project has identified a resource of 204Mt including five per cent ilmenite. Exploration to date has also identified a 20 per cent concentration of high alumina feldspar, a mineral composed of silica, aluminium and alkali elements mainly used in glass manufacturing and ceramic products, Corundum, with the exception of diamonds, the hardest mineral known and used as a high quality abrasive, occurs in the deposit at up to 1.8 per cent²⁰⁷.

²⁰⁷ Bonzle Digital Atlas of Australia 2015, www.Bonzle.com

The Wateranga Project ores also contain 0.8 per cent apatite, 0.2 per cent zircon 0.2 per cent, 0.1 per cent rutile and 30ppm scandium with an indication of magnetite as well. The project has the potential for export volumes reaching up to 600,000tpa by 2018.

The same region of Central Queensland provides a number of potential new exports including magnetite iron ore from Hawkwood, bauxite from Gayndah, copper/molybdenum from Merlin or Monto, limestone from Taragooola, kaolin from Duaringa, pyrite/copper/molybdenum from Mt Morgan area and nickel from Marlborough. There are several other minerals in the region that could be mined such as feldspar, silver and zinc. There are also a number of new coal deposits e.g. near Tiaro, Maryborough and Monto that have been identified for mining. These mines and mineral deposits are in various stages of investigation, exploration, development or maintenance. Tonnage potential from prospective mines varies from as little at 100,000tpa up to 5Mtpa.

Magnetite Iron Ore

Eastern Iron is investigating the potential for the development of magnetite iron ore deposits at two major locations, Eulogie (80km west of Gladstone) and Hawkwood (200km southwest of Gladstone) in proximity to existing rail and Gladstone Port infrastructure. The Hawkwood Iron Project is 250km by rail from the Port of Gladstone. Eastern Iron Limited announced a maiden inferred resource at Hawkwood of 100Mt at 13.8 per cent iron in May 2012. The ore contained high quality magnetite with concentrate grade of 54.6 per cent iron with notably lower concentrations of titanium than comparable deposits²⁰⁸.

Copper/Molybdenum

More than half the copper consumed is used in electrical generators and motors, electrical power and lighting fixtures, electrical wiring, radio and television sets, computers and almost everything electrical. Copper is also used where heat needs to be conducted well and where corrosion resistance is required²⁰⁹. Copper could potentially be mined at a variety of locations within Central Queensland and is generally found in conjunction with gold (see Gold and Pyrite below).

Most of the world's molybdenum is mined as a by-product of copper mining and this is the case in Central Queensland. This means the supply of molybdenum is closely related to the economics of copper mining. A drop in the price of copper could lead to a shortage of molybdenum. There are currently no molybdenum mines in Queensland, however, the world's highest grade deposit which occurs at Merlin, south of Cloncurry is undergoing development. The closest project to Gladstone is the Greater Whitewash mine near Monto south west of Gladstone. The deposits have an indicated resource of 185Mt grading 1189ppm copper, 263ppm molybdenum and 1.55ppm silver with a contained 48.5kt of molybdenum²¹⁰.

About two thirds of molybdenum is used for the production of alloy steels (stainless steel and superalloys e.g. the high strength steel in skyscrapers. Because of its strength and ability to

²⁰⁸ Eastern Iron Limited 2013, Hawkwood, www.easterniron.com.au

²⁰⁹ Australian atlas of minerals resources, mines and processing centres 2014, Copper, <http://www.australianminesatlas.gov.au/aimr/commodity/copper.html>.

²¹⁰ DNRM 2014, *Molybdenum opportunities in Queensland*, Geological Survey of Queensland, www.dnrm.qld.gov.au

withstand extreme temperature without softening or expanding it is also used in armour, aircraft parts and industrial motors.

Gold and Pyrite

The project entitlements at the Mount Morgan mine include copper and molybdenum as well as silver, gold, zinc and pyrite. Pyrite is a brass-yellow mineral, is composed of iron and sulphur and has a chemical composition of iron disulphide. Pyrite can be used in the production of sulphur and sulphuric acid. Gold and pyrite form together so that pyrite can contain small deposits of gold. Although the gold by weight is a tiny fraction of the ore, the value of gold is so high that pyrite might become a worthwhile mining target if the gold can be recovered in a cost efficient manner. It may be possible to export the pyrite for cost effective extractive methods elsewhere²¹¹.

Carbine Resources Limited are currently assessing the feasibility of recovering minerals such as gold, copper and pyrite from Mt Morgan again by reprocessing mine tailing and waste rock material. It is proposed to recover gold by using innovative treatment and extraction technology that will treat the acid water and remove the copper that causes high cyanide consumption. In addition the tailings will be subject to gravity and flotation treatment so that the pyrite is removed and the concentrate treated to remove the sulphur. It is proposed that these methods will reduce costs and improve gold recoveries²¹².

There are several other potential mines surrounding the Mt Morgan mine and elsewhere is Central Queensland e.g. Many Peaks which have similar resources²¹³.

Limestone

Cement Australia currently sources its limestone from the East End Mine approximately 25 km west of Gladstone where there is a resource of 120Mt²¹⁴. Marmor Mine 55km NE of Gladstone with a total limestone product of 5.2Mt currently export calcite through the Port of Gladstone. There are potential sources of limestone for export from other operating mines of Marule Lime 155km SSE of Gladstone near Childers (total limestone of 400kt) and Taragoola Mine near Calliope²¹⁵. While the limestone products of these two mines are currently consumed locally (i.e. within Queensland) it is possible that future markets for limestone products could precipitate the need for new exports. Other limestone product sources are known to occur near Raglan, Mt Perry, Mt Etna and Silica Hill which has a total limestone resource of 1.99Mt.

Kaolin

Duaringa Kaolin is located 155km WNW of Gladstone. The proved ore reserve at Duaringa is 1Mt. The raw material is crushed, screened, dried, and classified into a range of kaolin

²¹¹ Geology.com 2015, Pyrite, www.geology.com/minerals/pyrite

²¹² Norton Gold Fields Limited 2014, *Mount Morgan Mine* Project, www.nortongoldfields.com.au

²¹³ Bonzle Digital Atlas of Australia 2015, www.Bonzle.com.

²¹⁴ Queensland Minerals 2014, *Appendix 3 – Total contained metal in Queensland's major mineral deposits* calculated from reported resource/reserve figures, www.qdexquest.deedi.qld.gov.au, Appendix 3.

²¹⁵ Vizmap 2015, Limestone, www.vizmap.com.au

products for absorption applications which include pet litter, oil absorption, potting mix components and hydroponics as well as a range of industrial applications.

Nickel

Nickel is a base metal with physical and chemical properties that make it suitable for use in a wide variety of products across the commercial, industrial, construction and transport sectors. Key properties include its high strength and ductility, low thermal conductivity, resistance to corrosion and oxidation, ferromagnetism, and catalytic properties. Nickel also alloys readily with many other metals and can also be deposited by electroplating, thus imparting its favourable properties to the resulting alloy or plated product²¹⁶.

Around the world, about 68 per cent of primary nickel is consumed in the stainless steel production. It is also used in other forms of alloy steel for tools or superalloys for high stress applications e.g. aircraft engines, gas turbines, chemical processing plants etc. Plating is the other major first use for primary nickel. Carbon steel can be plated with both nickel and chromium to impact corrosion resistance for use in cars and household appliances. Nickel is also used in foundry applications while nickel and nickel chemicals are used in catalysts (primarily hydrogenation of fats and oils) and in batteries, particularly in hybrid vehicles.

Nickel is abundant in the earth's crust but is mostly at too small concentrations to make it economical to mine. Two different processes result in the two main types of nickel ore, sulphides and laterites. The processes used to recover refined nickel depend upon the ore type. Nickel reserves in Central Queensland consist of nickel laterites which require either i) ammonia leaching, (ii) ferronickel smelting or (iii) pressure acid leaching.

While there is currently no nickel trade throughput at Gladstone Port, it is possible that two projects could utilise the port over the next 50 years: the export of nickel ore from the proposed Marlborough nickel mine; and the possible development of a nickel/cobalt refinery in the Gladstone State Development Area (GSDA). The Marlborough deposits form about 13 discrete nickel laterites over 22 km. Five of the deposits contain proved and probable reserves of 48.65Mt at 0.94 per cent Ni and 0.06 per cent Co within a total resource of 70.9Mt. Nickel ore could be exported through Gladstone, Port Alma or Townsville.

There has been a proposal to process ores from the Marlborough mine at a nickel/cobalt refinery in Gladstone. The project has not proceeded however there remains a future opportunity for such a development.

10.7.2 Agricultural/Forestry Prospects

Grain is currently exported through the Port of Gladstone, a Graincorp facility being established at Auckland Point. However, there is the potential for other agricultural products grown in Central and South West Queensland to be exported via Gladstone such as cotton. Cotton seed is intermittently exported via Gladstone.

GPC has recently been able to facilitate the establishment of storage and handling facilities of logs and woodchips following the destruction of a local pine plantation by Cyclone Marcia.

²¹⁶ Wood Mackenzie for the Queensland Treasury Corporation 2015, Draft - unpublished

The new products represent 2-4 years of exports totalling up to 2 million tonnes. There is the potential for forestry product exports to be expanded to a permanent port commodity.

Gladstone is located within the Fitzroy and Central West region of the Regional Development Australia (RDA) network, a national network of 55 committees made up of local leaders who work with all levels of government, business and community groups to support the development of their regions²¹⁷. A focus of this RDA is to enhance the profitability, productivity and competitiveness of the agricultural sector in Central Queensland. The RDA's Growing Central Queensland Review April 2015 identified Gladstone as "the logistical capital of Northern Australia and the ideal setting to locate a hub looking exclusively at the value-adding field of agricultural transport and logistics"²¹⁸.

The report identified a number of potential agricultural export opportunities including:

- an inland port concept including agriculture containerisation and the coordinating of 100-200 agricultural containers with new cold storage facilities at the GSDA with container exchange matching to making shipping viable at Gladstone Port.
- new abattoirs in the region
- live cattle exports through Gladstone
- new oil seed processing industry
- horticulture and feedlots in the region.

10.7.3 Petroleum Prospects

Imports

In 2013-14 bulk fuel was imported into Gladstone from other ports in Australia (approx. 45 per cent), Korea (approx. 30 per cent) and Japan (approx. 25 per cent) by two Gladstone terminals. Gladstone fuel imports are expected to grow similarly to that forecast for Queensland i.e. a steady annual growth culminating in more than double current imports by 2044²¹⁹.

GPC anticipates an increased requirement for diesel over the next 5-10 years based upon a number of coal mining, mineral and energy developments investigating expansion or new developments within the Central Queensland Region. Current population projections for these regions provide a further economic fundamental for increased petroleum product consumption. There are a number of coal mining developments awaiting various stages of government approvals and financial investment decisions located in the Galilee Basin which may provide additional drivers for further increases in petroleum products.

Therefore, GPC has recently sought expressions of interest from the petroleum industry regarding a new petroleum import terminal in Gladstone. To date there is considerable interest in establishing a new terminal at Port Central where costs can be minimised e.g. through maximising utilisation of existing infrastructure. In the event that proposed coal

²¹⁷ Regional Development Australia 2015a, www.rda.gov.au

²¹⁸ Regional Development Australia 2015b, *Fitzroy and Central West Inc*, www.rdafcw.com.au

²¹⁹ BIS Shrapnel 2015 for Gladstone Ports Corporation – Non-Commodity Trade – Due Diligence Report – Draft - Unpublished

mines in the Galilee Basin proceed, there is the potential for a significant increase in petroleum imports being required to meet demand.

Exports

There are a number of potential new fuel export opportunities for Gladstone, most likely in the medium to long term.

The Northern Oil Refinery is situated in Yarwun near the port precinct of Fisherman's Landing. The refinery is able to process approximately 100 million litres per annum (mlpa) of waste lube oil to produce base lube oil. Most of the product is sold in Australia (transported by road); however, depending on the global prices, opportunistic international shipments via the Port of Gladstone could occur. Estimates of up to 9mlpa or 10 per cent of the plant's capacity have been forecast although any exports would be volatile/opportunistic.

The Queensland Energy Resources (QER) project, linked to the Stuart Oil Shale Deposit, represents a market opportunity to produce fuel for Australia's heavy transport sector²²⁰ and potentially for exports at the Port of Gladstone. When operating, the demonstration plant produced approximately 40 barrels per day of synthetic crude oil and high quality fuels for transport. Whilst this project has been proven and is in the financing phase for a commercial operation, future stages are described as having the potential to provide a commercial scale plant producing around 8000 barrels per day of finished fuels with a long term objective of producing 50-70,000 barrels a day of high quality transport fuel. It is understood stage 1 would provide fuel supply to the domestic market (i.e. not export) so exports are considered to be a medium to long term prospect. The timing for the delivery of this project remains unconfirmed.

In May 2015, the United States based Eagle Ford Oil and Gas Corporation and Australia's Casper Energy announced they are investigating developing a new \$700 million oil refinery project near Gladstone. They predict the refinery would initially produce 43,500 barrels a day, turning crude oil into high quality diesel and premium gasoline. However, the approvals process for the proposal has yet to commence.

²²⁰ Queensland Energy Resources 2013, www.qer.com.au

10.7.4 Gladstone Industry Prospects

Existing industrial project proposals in the Gladstone region include a steel plant and a commercial scale oils shale production plant.

Euroa Steel Plant Project Pty Ltd

Euroa Steel, formerly known as Boulder Steel is a potential new industry proposed near Aldoga within the GSDA. The plant is designed to produce 5mtpa of high quality steel in bloom and round billet form (i.e. semi-finished steel) for export to overseas finishing plants. The EIS process for the project has commenced, however financial security for the project has yet to be obtained²²¹.

QER Commercial Scale Oil Shale Plant

QER is advancing the design of a commercial facility at its Stuart resource. The next stage of QER's program involves scaling up the technology and processes with construction and operation of the plant, designed to produce approximately 8,000 barrels a day of products (predominantly ultra-low sulphur diesel for road transport to local markets.²²²

Other industry prospects

In addition, there are a number of potential industrial prospects that have either previously commenced an EIS process or have been approved in the vicinity of Gladstone that may be developed in the future. These include the following potential activities:

- LNG facility on Curtis Island
- nickel refinery
- coal terminal at Yarwun
- Gladstone Fitzroy Water Pipeline
- oil refinery
- gas fired power stations
- fertiliser plant.

10.8 Supporting Infrastructure

According to the Gladstone Regional Industrial Land Study 2012 the Gladstone Region has existing infrastructure that provides a competitive advantage to the region in attracting a range of industry sectors. This infrastructure includes essential utilities such as water (Awoonga Dam) and electricity (Gladstone Power Station), the Port of Gladstone and access to rail infrastructure. Appropriate infrastructure promotes private sector investment and demand for industrial land. Another competitive advantage that Gladstone Port has is its deep draught capacities. Gladstone is the only port in Queensland that can accommodate Capesize vessels for commodities other than coal. All levels of Government have recognized the strategic importance of Gladstone to the industrial sector and significant government

²²¹ Boulder Steel Limited 2014, *Gladstone Steel Project*, www.bouldersteel.com.au

²²² Queensland Energy Resources 2013, <http://www.qer.com.au/our-projects/stuart-commercial-project-1>

investment is currently underway or proposed to maximize the industrial opportunities of the Region²²³.

10.8.1 Gladstone State Development Area (GSDA)

The Queensland Government has established a broad hectare GSDA to facilitate the establishment of new industries with direct links to port facilities on the Gladstone Harbour. All development within the GSDA is regulated in accordance with the GSDA development scheme.

10.8.2 Transport Infrastructure Projects

Transport infrastructure projects that have the potential to result in port trade growth include:

- GPC Fisherman's Landing Expansion Project
- Gladstone Main Channel Duplication
- Moura Link Aldoga Rail Project.

Fisherman's Landing Expansion Project

GPC has approval to expand port lands at Fisherman's Landing through reclamation and has commenced these works. This project will result in the precinct increasing in size by 264 hectares with the potential for an additional six wharves significantly increasing the potential for trade growth.

Gladstone Port Gatcombe and Golding Cutting Channel Duplication Project

GPC has commenced the development approval process for the duplication of a section of the outer harbour shipping channel into the Port of Gladstone. This project will facilitate the potential increase in port throughput into the future and mitigate the risks resulting from additional vessel movements within the port's shipping channel. It is proposed that a duplicate channel would be developed adjacent to the existing channel thereby providing a two-way passage from the outer harbour, to the western side of Facing Island where it would connect with the existing inner harbour channel.

GPC is also investigating the possibility of modifying existing port infrastructure to accommodate larger vessels including long range vessels that would be approximately double the size of most vessels that currently visit the port.

Moura Link Rail Project

Aurizon has been granted approval for a major rail network expansion project in the Gladstone region which will facilitate increased exports at the Port of Gladstone. The project includes improving rail access for existing and potential coal mines in the Surat Basin to the south west of Gladstone. The proposal includes a new rail line to carry Moura/Surat traffic arriving via the Moura Short Line (MSL) in the south to the North Coast Line (NCL) southeast

²²³ SGS Economics and Planning 2012b, Gladstone Region Industrial Land Strategy Final Report – Update July 2012, Gladstone Regional Council.

of Mount Larcom. It is intended that the Moura Link will connect the MSL to the NCL, via the East End Mine Branch Line²²⁴.

The existing Moura rail system is a non-electrified line that connects the Moura, Callide and Boundary Hill mines to the RG Tanna and Barney Point export terminals at Gladstone. It also links the three mines with domestic coal users such as QAL and the Gladstone Power Station.

The Surat Basin Rail Joint Venture, of which Aurizon is a member, is also currently investigating a possible rail link from the southern end of the Moura System, south to the Surat Basin i.e. Southern Missing Link (SML). This link would serve existing and proposed mines in this region, and provide a direct link to Gladstone's coal port facilities for major new coal tonnages from the Surat Basin. Currently, mines in the Surat Basin are served only by the main western line from Brisbane.

Other Rail Projects

Port of Gladstone is serviced by the Blackwater and Moura rail systems which have respective nominal capacities of around 68mtpa and 18mtpa. Both the Blackwater and Moura systems will require upgrades in order to meet the increase in exports from WICT. Aurizon is undertaking the Wiggins Island Rail Project at a cost of A\$900 million to upgrade the two main rail systems plus the North Coast rail line and Bauhinia rail line that services the Rolleston mine. Further upgrades in the Moura and Blackwater rail systems are currently being investigated by Aurizon.

10.8.3 Transport Infrastructure Required to Grow Central Queensland

The Growing Central Queensland Review April 2015 identified a variety of transport and logistics impediments to and opportunities for growth in the Central Queensland agricultural export sector²²⁵. Transport infrastructure that would benefit agricultural exports included:

- Port Access Road Stage 2 and 3
- second bridge constructed across the Calliope River
- specific road construction as identified around grain transport and management areas and around potential water infrastructure
- linking some existing regional roads
- sealing some existing regional roads
- increasing road train access to specific areas.

10.9 Queensland and Australian Ports

The Port of Gladstone has been identified as one of 17 nationally significant ports by the Bureau of Infrastructure, Transport and Regional Economics. In 2012/13 Gladstone Port handled the fifth largest volume of cargo in Australia²²⁶.

²²⁴ www.dsdip.qld.gov.au, Moura Link-Aldoga Rail Project Initial Advice Statement 2007

²²⁵ www.rdafcw.com.au

10.9.1 Australian Ports

There are 47 ports in Australia including the Port of Gladstone (Table 49). Table 49 also shows the ports with the greatest throughput by mass tonnage for each state. In 2012/13 Australian ports handled a total of 1.13 billion tonnes of cargo made up of 0.99 billion tonnes of exports and 0.14 billion tonnes of imports. Western Australia handled the most cargo (550 million tonnes) followed by Queensland (287 million tonnes) (Table 49). These states also handled the most exports (530 and 239 million tonnes respectively). Queensland however imported the greatest volume of cargo in 2012/13 (48 million tonnes) followed by Victoria (29 million tonnes).

Table 49 Australian Port Throughput Statistics by State for 2012-2013

State	Number of Ports	Total Mass Tonnage Throughput by State	Port with Highest Mass Tonnage by State	Mass Tonnage handled 2012-13 (million)
Queensland	17	286,799,271	Hay Point	96
New South Wales	6	198,701,775	Newcastle	149
Victoria	4	55,234,906	Melbourne	35
Tasmania	4	11,223,040	Burnie	3.5
South Australia	7	22,948,510	Port Adelaide	15
Western Australia	8	549,831,147	Port Hedland	288
Northern Territory	1	4,299,008	Darwin	4.3
Total	47	1,129,037,657		

(Sourced from Ports Australia Association, 2013)

Port Headland (288 million tonnes), Dampier (180 million tonnes) and Newcastle (149 million tonnes) had the three largest total trade throughput by mass tonnage for individual ports in 2012-13 followed by Hay Point (96 million tonnes) and Gladstone (85 million tonnes).

In terms of growth for the bulk ports²²⁷ for the ten years between 2001/02 and 2011/12, Gladstone, Newcastle and Dampier demonstrated an average throughput growth of around five per cent to six per cent. This was out performed by the large scale Pilbara ports of Port Walcott and Port Headland, with growth rates 11.2 per cent and 12.4 per cent respectively.

²²⁶ Australian Government Department of Infrastructure and Regional Development 2013, Australian Sea Freight 2011-12, Statistical Report, http://bitre.gov.au/publications/2013/asf_2011_12.aspx.

²²⁷ DIRDD, 2014

10.9.2 Queensland Ports

Queensland has 17 trading ports, the most of any state in Australia and double the next highest state, Western Australia with eight ports. Trade statistics indicate that total throughput for Queensland ports in 2012/13 was 286.8 million tonnes (Table 50). This represented a 9 per cent increase on the previous year. Coal export remains the largest traded commodity, accounting for 62.8 per cent (179.9 million tonnes) of total Queensland trade, followed by bauxite with a total throughput of 45.24 million tonnes.

Table 50 Queensland Ports Throughput Statistics 2012-2013

Ports with Highest Throughput	Imports Mass Tonnage	Exports Mass Tonnage	Total Throughput Mass Tonnage
Hay Point	0	96,540,226	96,540,226
Gladstone	20,650,809	64,642,951	85,293,760
Brisbane	18,158,429	19,404,992	37,563,421
Weipa	116,964	28,924,608	29,041,572
Abbot Point	0	17,744,621	17,744,621
Townsville	6,671,391	5,434,413	12,105,804
Mackay	1,592,937	1,677,030	3,269,967
Cape Flattery	0	1,678,060	1,678,060
Cairns	647,717	407,891	1,055,608
Others	339,341	2,166,891	2,506,232
Total	47,177,588	238,621,683	286,799,271

(Sourced from Ports Australia Association, 2013)

Hay Point handled the greatest volume of trade (96.5mtpa or 38 per cent) compared to 85mtpa (34 per cent) at Gladstone and 37.5mtpa (15 per cent) at Brisbane. Similarly Hay Point and Gladstone handled the two largest volumes of exports, however, Weipa handled the third largest export volume (28.9mtpa). Gladstone handled the highest volume of imports (20.6mtpa or 44 per cent) followed by Brisbane with 18mtpa or 39 per cent in 2012-13 (Table 50).

It is important to recognise that some ports in Queensland which handle small volumes of cargo fulfil a specialist role in terms of cargo types. This includes:

- Port Alma (Rockhampton) – imports a number of commodities including ammonium nitrate, explosives and general cargo, reported as 350,000 tonnes in 2012/13
- Bundaberg - exported 205,000 tonnes of sugar in 2012/13

- Cairns – caters for cruise shipping, naval shipping and fishing fleets as well as a range of bulk and general cargo, with 1 million tonnes of total trade in 2012/13.

Figure 34 below illustrates that there has been gradual increase in throughput (mtpa for all ports).

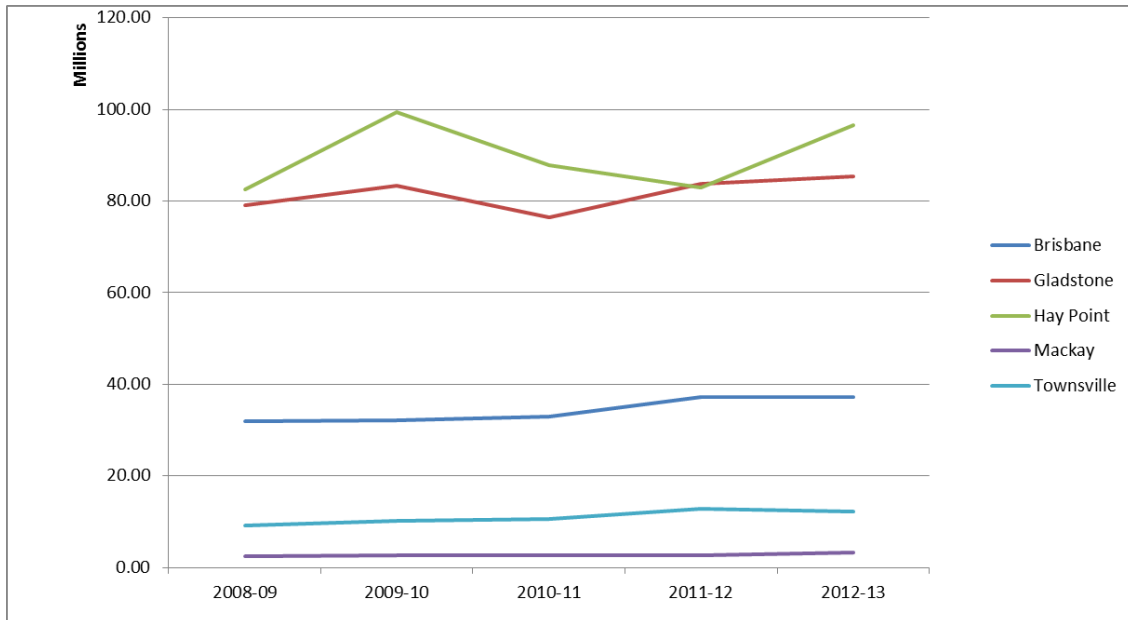


Figure 34 Change in total throughput by Port (mtpa)

A comparison of vessel movements as recorded for 2012/13 is provided in Table 51. It is noted that the Port of Gladstone and Port of Brisbane have a high proportion of vessel calls, two to three times higher than Hay Point which handles the largest throughput by volume. This is likely to reflect the multiple commodities being handled at Brisbane and Gladstone Ports compared to the Port of Hay Point which is a single commodity, coal.

Table 51 Comparison of total vessel visits for Queensland Major Ports

Financial Year	2012-2013	Percentage
Total Vessels		
Port of Abbot Point	201	3%
Port of Brisbane	2,669	41%
Port of Gladstone	1,869	29%
Port of Hay Point	883	13%
Port of Mackay	209	3%
Port of Townsville	721	11%
Total	6,552	

10.9.3 Competitiveness of the Port of Gladstone

A 2011/12 Bureau of Infrastructure, Transport and Regional Economics (BITRE)²²⁸ report referenced the findings of the 1991 Productivity Commission regarding factors influencing ships visiting Australian Ports. These findings, some of which apply particularly to containerised cargos, included:

- availability of high technology cargo handling equipment
- sufficient areas of cargo storage and assembly activity
- good interfaces with no congestion in the connecting rail and road networks and / or the land transport modes (freight trains and trucks)
- one stop advanced port information systems: good coordination in planning and timely information exchange of supply chains by cargo owners
- government policy settings and operational regulations (noise, light and weight).

The Port of Gladstone is well placed to facilitate exports from Central Queensland and to some extent from southern and northern Queensland regions as well. Gladstone offers transport routes with less congestion and fewer population conflict issues than the Port of Brisbane. New expansion areas e.g. the Fisherman's Landing precinct in conjunction with the GSDA offer opportunities to develop state of the art technology cargo handling equipment at greenfield sites.

A distinct advantage of the Port of Gladstone is its ability to handle Capesize vessels with Abbott Point and Hay Point/Dalrymple Bay being the only other ports in Queensland capable of handling vessels of this size. Furthermore, it is understood that the other priority ports may be subject to greater limiting factors than Gladstone in relation to future development. The Hay Point and Abbott Point facilities have offshore wharves which may reduce the potential for these terminals to expand to other products. The Port of Brisbane and Townsville may also be limited in their capacity to be deepened and widened for the handling of Capesize vessels.

Due to these limitations, the Port of Gladstone has the greatest potential for expansion to cater for the long term development of the Queensland economy. Significant land banks around the port allows for development of a variety of products and trades, industry and the supply chain interface. The Port of Bundaberg and the Gulf ports are located outside of the GBRWHA and may accommodate future growth; however, they have limited development capacity or are primarily dedicated to single commodities.

Planning at state and local government levels has established priority industrial development areas near the port together with transport corridors linking directly with port facilities including rail, road and other transport methods such as pipelines and conveyors. In addition, the deep draught available at the Port of Gladstone facilitates the use of larger vessels to improve economies of scale.

In addition to the points above, clearly there will be other market factors that will influence throughput at the Port of Gladstone, particularly in relation to exports or imports of bulk liquid

²²⁸ Australian Government Department of Infrastructure and Regional Development 2013, Australian Sea Freight 2011-12, Statistical Report, http://bitre.gov.au/publications/2013/asf_2011_12.aspx.

and solid materials. These include availability and proximity to resource projects and other industries that generate a demand for import / export of cargo. Where the geographic relationship between the product source and the port is not the determining factor due to transport costs, competition is likely to be significant between ports with superior access to efficient supply chain options and improved ability to access intended markets. However, improvements or upgrades to road and rail transport routes that connect regional areas to port nodes is largely the domain of the state government.

10.10 Conclusions

In summary, the Port of Gladstone is a major centre for the import and export of products for the manufacturing, mining and process industries. Handling more than 1800 vessels annually, it is one of the busiest ports in Australia and plays a vital role in the local, state and national economies. It is the largest multi-commodity port in Queensland with established bulk material handling facilities and container and general cargo facilities. Key conclusions that have been drawn from the economic assessment are summarised below:

- The volume of throughput at the Port of Gladstone is influenced by the two main functions of the port i.e. the export of resources from the Central Queensland region and the import of raw material and the export of finished products associated with major industries in Gladstone. Both of these functions are driven by global and local economic factors.
- The continued attraction of industry with import and/or export requirements is recognised as a strong growth opportunity for the Port of Gladstone. Future production industries are able to be located close to port export/import facilities.
- In relation to exports, overall, even with a minimal growth projection it is expected there will be larger export volumes mainly driven by the dominant commodity, coal, as well as LNG as facilities commence exporting. For medium and high growth projections a more favourable trend is anticipated.
- In relation to imports, overall even with a minimal growth projection it is also expected that there will be larger volumes. This is because bauxite consumption will increase in line with the anticipated expansion of Yarwun and petroleum consumption will increase mainly driven by mining demand and also transport sector demand.
- There is significant potential to expand upon existing bulk materials handling at Gladstone Port, particularly at Port Central and Fisherman's Landing. In addition, Gladstone is in a position to facilitate new exports or imports of new or temporary commodities at short notice at Port Central due to the winding down of the construction phase of the LNG facilities on Curtis Island.
- There are several large industry projects proposed for the Gladstone region in various stages of approval listed on the Queensland Government's Department of State Development website.
- The Gladstone Region has existing infrastructure that provides a competitive advantage to the region in attracting a range of industry sectors. This infrastructure includes essential utilities such as water (Awoonga Dam) and electricity (Gladstone Power Station), the Port of Gladstone and access to rail infrastructure. Appropriate infrastructure promotes private sector investment and demand for industrial land.

11 | Summary of Conclusions



11.0 Summary of conclusions

This report has provided a detailed desktop analysis of the land use, environmental, social and cultural heritage values within the proposed Gladstone port master planned area. The key findings from each section that will be used to inform the preparation of the Master Plan are summarised below.

11.1 Land use summary

The preparation of a master plan for the Gladstone Port provides an opportunity to coordinate a holistic approach to land use planning matters within the boundary of the proposed master planned area. The following key points have been derived from the land use assessment:

- The fragmented nature of planning jurisdictions covering the Gladstone Port and its surrounds creates a complex setting for coordinating appropriate land use planning outcomes. The preparation of a master plan for the Gladstone Port provides an opportunity to coordinate a holistic approach to land use planning matters within the boundary of the proposed master planned area.
- Activities and supporting infrastructure critical to the function of the port need to be protected from incompatible development and the future capacity of supply chain and supporting infrastructure needs to be safeguarded through appropriate land use designations within the master plan.
- Each of the land use planning instruments operating within the proposed Gladstone port master planned area includes areas either set aside for environmental purposes or to ensure appropriate separation between incompatible developments (e.g. between residential and heavy industry). These buffer areas need to be retained and reinforced within the master plan.
- There are some instances where land use planning instruments do not provide adequate separation distances between incompatible land use interfaces. This is highlighted in the context of the residential interfaces of Barney Point and Gladstone Central with port development.

11.2 Summary of environmental values

This report provides a high level review of environmental values in the proposed Gladstone port master planned area primarily using state and Commonwealth environmental databases. Detailed information exists in specific places within the proposed master planned area, often associated with development proposals. Ongoing site based specific surveys would be required to confirm local environmental values pertaining to any particular area and assessment of impacts on water and air quality values as set out under the relevant Environmental Protection Policies.

11.3 Summary of social values

The Port of Gladstone master planned area and its surrounds contain significant features of social amenity and cultural importance for both the local community and the traditional owners of the land. The following key points have been derived from the assessment of social values:

- Gladstone is one of the fastest growing LGAs in Queensland with strong non-resident population increases supplementing steady residential growth. The estimated resident population of the Gladstone LGA is forecast to nearly double from 65,845 in 2014 to 121,266 in 2036 (Queensland Government medium series population projections, 2013 edition).
- Population growth derived from major infrastructure projects and port expansion will be difficult to project into the future and will place pressure on the provision of trunk infrastructure, accommodation/housing and key social services. The Social Infrastructure Strategic Plan (SISP) and Needs Assessment undertaken for the Gladstone region found that significant investment in social infrastructure would be required to meet the needs of Gladstone's projected population growth to 2031. This included the identified need for a significantly larger hospital and higher service levels by 2031.
- The construction and manufacturing industry together account for approximately 30 per cent of the Gladstone LGA's workforce and are strongly aligned with the operation of the Port of Gladstone. The management and sustained growth of these industries within the proposed Gladstone port master planned area is therefore an integral consideration in supporting the continued economic performance of the wider Gladstone area.
- The Gladstone region has a number of features of environmental, recreational, social and economic importance to the surrounding community. These include:
 - Environment:
 - the biodiversity and natural values of the environment
 - protection of the Great Barrier Reef.
 - the protection of areas with high visual amenity
 - minimising noise, dust and degradation to air and water quality
 - Recreation and social:
 - the water-based recreational value of the harbour and its surrounds, particularly for boating and fishing
 - Maintained wellbeing and amenity in the context of industrial development and growth
 - the social benefits of national parks and state forests aesthetically, health-wise and recreationally
 - access and use of the harbour including the foreshore, beaches, boat ramps and viewing facilities
 - access to an adequate provision of social and community infrastructure
 - recognition of Indigenous heritage
 - Economic:
 - tourism
 - affordability
 - job opportunities
 - access to high quality transport infrastructure including roads and public transport
 - access to education and training facilities.

11.4 Summary of cultural values

The proposed Port of Gladstone master planned area contains a range of significant heritage features of Indigenous and non-Indigenous cultural importance for the community of Gladstone. These sites identified within Section 8 need to be need to be recognised, considered and appropriately managed.

It should be noted that there is still potential for currently unknown sites to exist in the area, particularly in undisturbed contexts. Previous studies in the region suggest that archaeological sites are most likely to be found near waterways and coastal areas, and are most likely to be evidenced by collections of stone tools and discarded shells.

Further consultation with the Gidarjil Cultural Heritage Corporation will need to be undertaken for planned future development activity.

11.5 Summary of economic factors

The Port of Gladstone is a major centre for the import and export of products for the manufacturing, mining and process industries. Handling more than 1800 vessels annually, it is one of the busiest ports in Australia and plays a vital role in the local, state and national economies. The following key points have been derived from the economic assessment:

- The continued attraction of industry with import and/or export requirements is recognised as a strong growth opportunity for the Port of Gladstone. Future production industries are able to be located close to port export/import facilities.
- In relation to exports, overall, even with a minimal growth projection it is expected there will be larger export volumes mainly driven by the dominant commodity, coal, as well as LNG as facilities commence exporting. For medium and high growth projections a more favourable trend is anticipated.
- In relation to imports, overall even with a minimal growth projection it is also expected that there will be larger volumes. This is because bauxite consumption will increase in line with the anticipated expansion of Yarwun and petroleum consumption will increase mainly driven by mining demand and also transport sector demand.
- There is significant potential to expand upon existing bulk materials handling at the Port of Gladstone, particularly at Port Central and Fisherman's Landing. In addition, Gladstone is in a position to facilitate new exports or imports of new or temporary commodities at short notice at Port Central due to the winding down of the construction phase of the LNG facilities on Curtis Island.

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