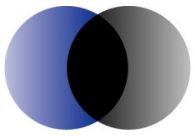
Confidential
Final Report

Social and economic impact assessment

The social and economic impacts of the proposed Bluewaters Phase III and IV project

Prepared for Griffin Energy Ltd

March 2008



ACIL Tasman

Economics Policy Strategy

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Executive summary

In response to growing electricity demand in the South West Interconnected System (SWIS), Griffin Energy Ltd (Griffin) is proposing to expand its Bluewaters Power Station. The existing Power Station is located within the Coolangatta Industrial Estate, approximately 4 km east of Collie in the South West region of Western Australia.

It is a subcritical coal fired power station with a base load operation 24 hours per day, 365 days per year. It consists of two 208 MW coal fired boilers (Bluewaters Phase I and II), which are currently under construction. Phase I is due for commissioning at the end of 2008 and phase II in August 2009.

Bluewaters Phase III and IV will consist of two base-load sub-critical coal-fired boilers each 208 MW in size. Construction of Phase III will begin in late 2009 with commissioning in late 2012. Phase IV will begin construction in late 2010 with commissioning in late 2014.

The construction of the Bluewaters Phase III and IV will involve capital expenditure of $1 billion and will require a peak workforce of approximately 600. In operation, Bluewaters Phase III and IV will employ around 30 workers and will involve operating expenditure of around $100 million per annum.

The construction and operation phases of the proposed project will have important economic, social and strategic impacts that will benefit the town of Collie, the South West Region and Western Australia.

In order to estimate these benefits, ACIL Tasman undertook general socio economic analysis and economic modelling using the Tasman Global General Equilibrium Model.

This analysis found that during the peak construction period in 2010 when both Power Station units are under construction, the project will add $16.6 million to the Gross Regional Product of the South West and $15.7 million to the Gross State Product of Western Australia. Impacts are also significant in the operation phase with a boost to Gross Regional Product of around $167 million and Gross State Product of $64 million in 2014 which is the first full year of operation.

It is estimated that direct and indirect employment in the South West will rise by 110 during the peak construction phase and 97 in the first full year of the operation phase. In Western Australia, total job creation was in the order of 176 jobs during peak construction and 70 jobs in the first full year of operation. This represents a significant boost to State and regional

employment particularly for the town of Collie where unemployment rates are higher than the State average and employment diversification is limited.

Bluewaters Phase III and IV will also add to the economic and social sustainability of Collie and the South West by providing long term employment, education and training opportunities, new and increased local business opportunities, and the possibility of increasing the population of the local area. In addition, the project will support the local coal industry, contribute to the diversification of Western Australia's energy portfolio and assist in driving down the per unit costs of coal production.

1 Introduction

Due to large growth in electricity demand, Western Australia requires new investment in a balanced generation portfolio to meet growing energy demands and to achieve energy security through diversity of supply.

Griffin Energy (Griffin) believes it is ideally positioned to meet the State's growing energy demands, with a balanced portfolio of new generation assets including coal, renewable and gas energy generation projects.

One such project being proposed by Griffin is an expansion of its Bluewaters Power Station located approximately 4 km North East of the town of Collie in Western Australia. The Bluewaters Power Station has been designed to be developed in a modular fashion in order to grow with the demands of the Western Australian electricity market.

The proposed expansion of Bluewaters Power Station requires the addition of two base-load sub-critical coal-fired boilers each 208 MW in size.

The project will utilise pulverised coal technology to allow biomass co-firing capability of up to 15 per cent resulting with the potential for significant greenhouse benefits.

Griffin will design the Bluewaters project to be capable of adopting carbon capture technology in the future once this new technology becomes commercially viable.

The project will meet all environmental regulations, and be designed to ensure the health and wellbeing of Collie and surrounding communities, with the added benefit of job creation and strengthening the South West economy.

A series of engineering, environmental, social and economic assessments are being undertaken to document the Bluewaters Phase III and IV proposal and its potential effects, and to propose measures to manage them. This document outlines the likely economic, social and strategic impacts of the Bluewaters development on the Shire of Collie, the South West and Western Australia.

1.1 Project overview

Griffin Energy Ltd (Griffin) is proposing to expand its Bluewaters Power Station located within the Coolangatta Industrial Estate, approximately 4 km east of Collie (Figure 1). The existing Power Station is a subcritical coal fired power station with a base load operation 24 hours per day, 365 days per year. It consists of two 208 MW coal fired boilers (Bluewaters Phase I and II), which

are currently under construction. Phase I is due for commissioning at the end of 2008 and phase II in August 2009.

Griffin Energy proposes to expand the Bluewaters Power Station via the addition of an additional two 208 MW coal fired boilers. The boilers for this expansion will be located immediately adjacent to Bluewaters Phase I and II boilers and will share infrastructure already located within the Power Station.

A saline disposal pipeline will be constructed to transport waste water from the site to the coastline, unless an alternative means of disposal such as a proposed water distribution and disposal utility is commissioned.

Coal from the adjacent Ewington Mining Operations owned and operated by the Griffin Coal Mining Company Limited (Griffin Coal) will supply the project.

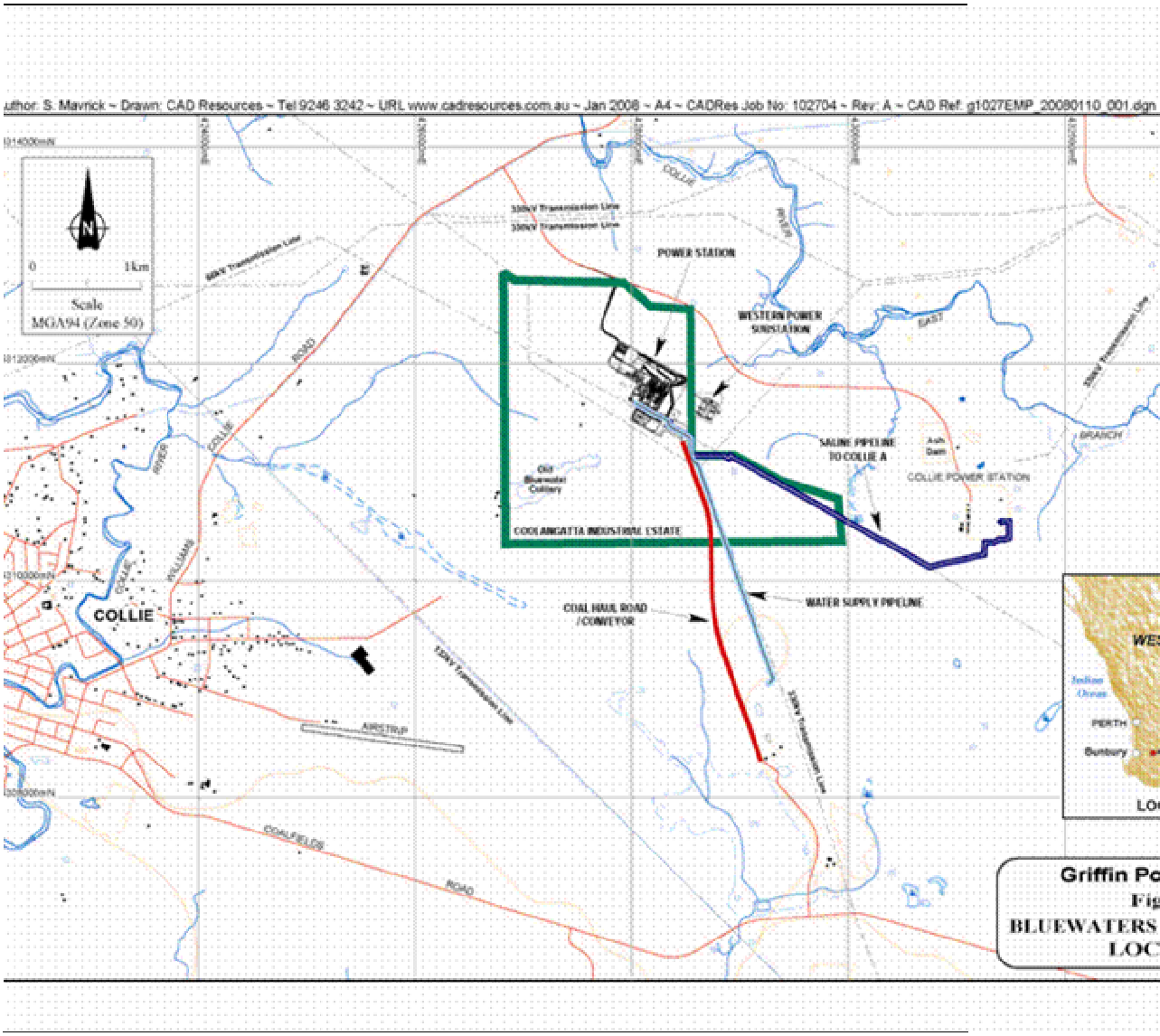
The aim of the project is to produce additional electricity to supply to the South West Interconnected System (SWIS) grid or to supply electricity direct to major customers, including those in the proposed Coolangatta Industrial Estate.

Construction of Bluewaters Phase III and IV Power Station units is expected to cost around $1 billion and is expected to take around three years for each unit beginning late 2009.

The construction and commissioning of the two phases of the project will be staged as follows:

- September 2009 – Commencement of construction phase III
- September 2010 – Commencement of construction phase IV
- April 2012 – Completion of construction phase III
- October 2012 – Commissioning Phase III
- April 2014 – Completion of construction phase IV
- October 2014 – Commissioning Phase IV.

Figure 1 **Bluewaters Power Station location**



Source: Griffin Energy Ltd

2 Socio economic overview

2.1 Population

The South West region is the largest of Western Australia's regional areas with around 141,677 people or 7 per cent of the State's population as illustrated in Table 1. The majority of the population lives in and around the major centres of Bunbury, Australind and Busselton on the coast and at Collie in the Darling Range.

The population of the region is growing as a result of population increases in the coastal areas of Bunbury, Australind and Busselton. Despite this growth, the share of the State's population has not changed since 2001.

In contrast, the population of the Shire of Collie has remained stable since 2001 at around 9,100 people. The majority of the people living in the Shire live in the town of Collie and in small settlements including Ewington, Allanson, Cardiff, Buckingham, Collie-Burn, Shotts, Mungalup, Worsley, and Preston Road.

Table 1 **Population: Western Australia, South West region and Shire of Collie**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006p
Shire of Collie	9,124	9,215	9,160	9,146	9,072	9,179	9,245	9,179	9,182	9,104
South West region	115,247	118,832	122,715	126,375	129,413	131,189	132,059	134,496	138,616	141,677
Western Australia	1,794,992	1,822,668	1,849,733	1,874,459	1,901,159	1,925,641	1,952,372	1,982,006	2,016,395	2,059,045

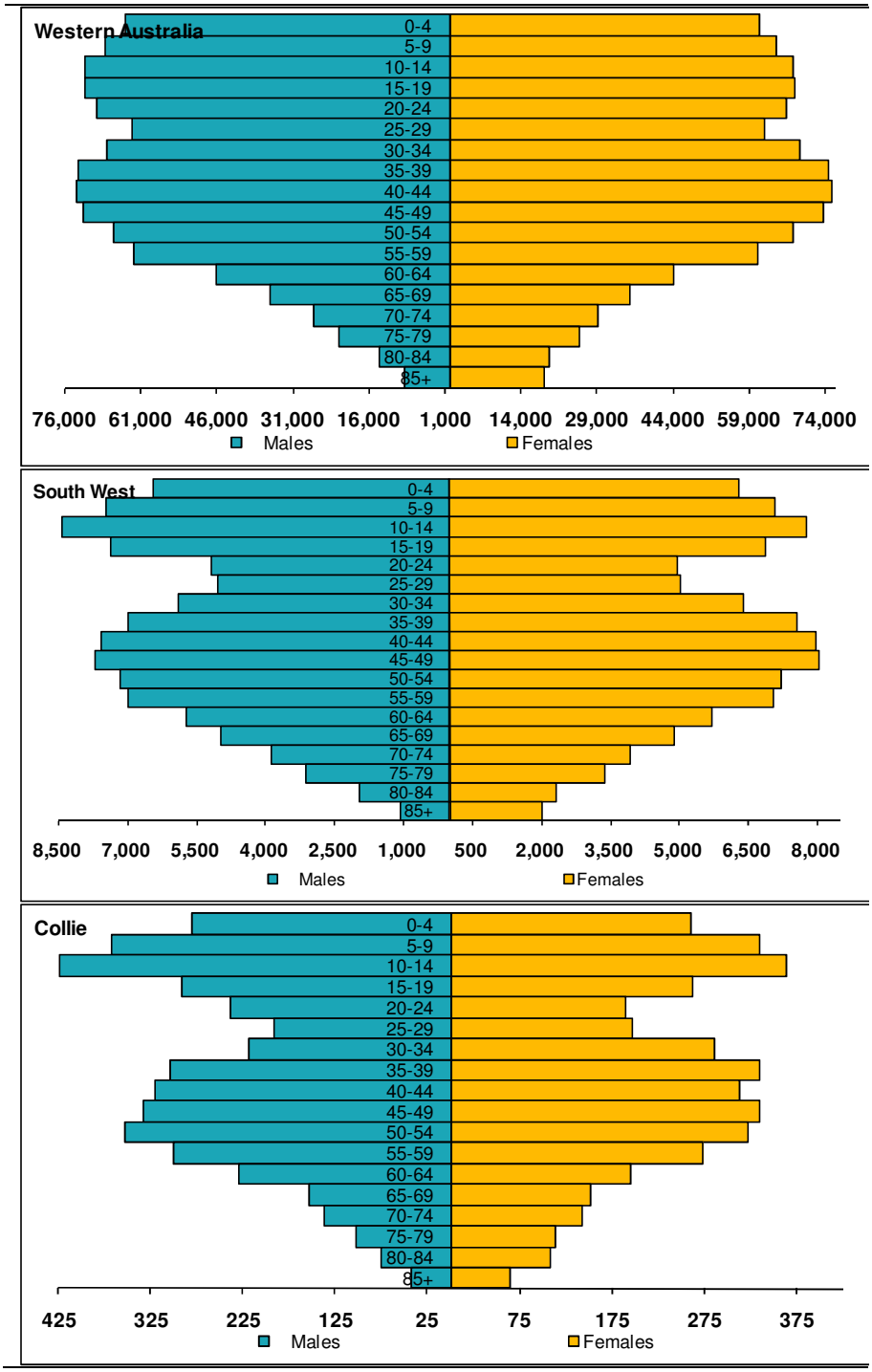
Note: p = projected

Data source: Department of Local Government and Regional Development

2.2 Population characteristics

In general the South West supports an older population when compared to Western Australia. 34 per cent of the population is over the age of 50 compared to 30 per cent of the State population. In addition, there is a noticeable lack of people in the 20 to 30 age group as illustrated in Figure 2. In Western Australia, 13 per cent of the population belongs to this age group but in the South West only 10 per cent of the population is of this age. This trend is common to regional areas and is due to the tendency of younger people to temporarily leave regional areas for a number of reasons including for further education purposes, to seek employment and to experience life in other places.

Figure 2 **Population age distribution: Western Australia, South West region and Shire of Collie (2006)**



Data source: Australian Bureau of Statistics 2006 Census

There has been a significant ageing of the population since the 2001 Census in the South West. In 2001, 30 per cent of the population was aged over 50

compared to 34 per cent in 2006. This is most likely a reflection of retirement aged people locating to the coastal areas.

The Shire of Collie has a similar but more pronounced population profile to the South West. Whilst there is also a lack of people in the 20 to 30 age group there is also a lack of children between the ages of 15 and 20. This is also common of regional areas and is normally a reflection of high school aged children leaving the area for educational purposes.

Over time the population profile of the Shire of Collie has also aged. At the 2001 Census, 28 per cent of the population was over the age of 50 and in 2006 this figure had risen to 32 per cent. This is a result of people in these age groups moving to the town to take advantage of the relative proximity of the town to the coast combined with affordable housing. In the Shire of Collie, the average house price[1] is around $147,000 compared to $256,000 for the South West region.

2.3 Aboriginal population

Aboriginal[2] people comprise 2.7 per cent of the total Western Australian population. In comparison, the South West has a small Aboriginal population which makes up 1.8 per cent of the population. Aboriginal people comprise 3 per cent of the population of Collie.

The share of Aboriginal people as part of the total population has fallen marginally since the 2001 Census. In the case of Western Australia and the South West the total Aboriginal population has increased. However, the total population has increased at a greater rate as illustrated in Table 2. In the Shire of Collie the Aboriginal population has fallen.

Table 2 **Aboriginal population: Western Australia, South West region and Shire of Collie**

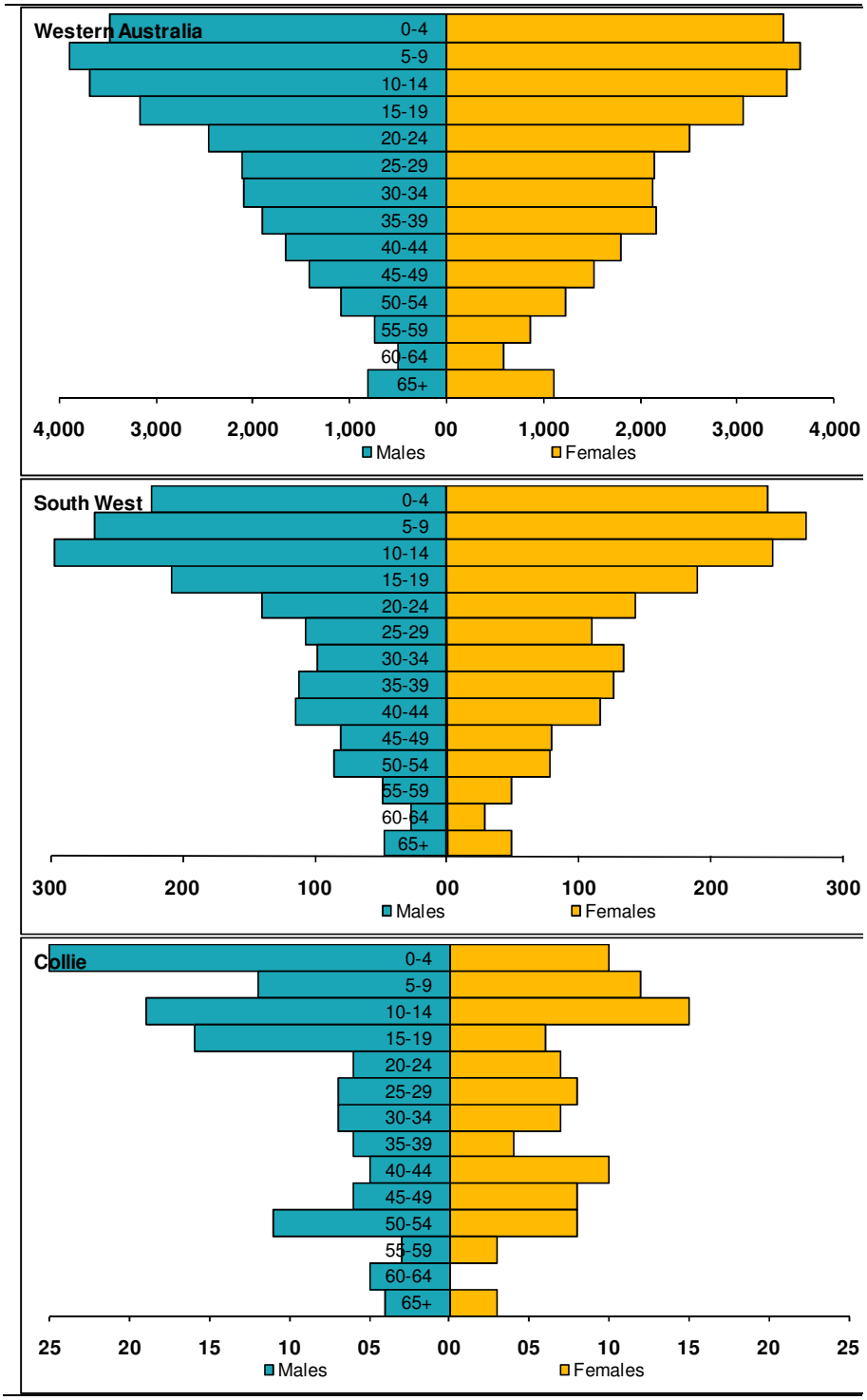
	2001			2006		
	Aboriginal population	Total population	% of total population	Aboriginal population	Total population	% of total population
Shire of Collie	263	8,616	3.1%	232	8,613	2.7%
South West	3,520	184,625	1.9%	3,713	207,340	1.8%
Western Australia	58,467	1,828,294	3.2%	58,712	1,959,086	3.0%

Note: Aboriginal includes Aboriginal and Torres Strait Islander people
Data source: Australian Bureau of Statistics 2001 and 2006 Census

[1] Average sales value for 2005 provided by the South West Development Commission

[2] Includes Aboriginal and Torres Strait Islander people.

Figure 3 **Population age distribution: Aboriginal population: Western Australia, South West region and Shire of Collie (2006)**



Note: Aboriginal includes Aboriginal and Torres Strait Islander people

Data source: Australian Bureau of Statistics 2006 Census

Figure 3 shows the population profile for the Aboriginal populations of Western Australia, the South West and the Shire of Collie. The Figure shows that while the profiles of Western Australia and the South West show a relatively normal population distribution, the profile of the Shire of Collie is very narrow.

The population of the Shire of Collie is very young with a large number of children and comparatively few people of working age. Nearly 50 per cent of the Aboriginal population of the Shire is aged less than 20 years old and 48 per cent are of working age (20 to 65 years of age).

The South West also supports a very young Aboriginal population with 52 per cent of the Aboriginal population aged less than 20 years of age and only 38 per cent of the population of working age.

2.4 Population tenure

The South West region has a stable population when compared to that of the State as illustrated in Table 3 which shows that 73 per cent of the South West population lived at the same address in the previous year and 45 per cent at the same address five years previously. This is unusual for a regional area and is most likely a reflection of a number of factors including the older population base, diverse economy and ranging employment opportunities in the South West that encourage people to stay in the region rather than relocate.

This stability has increased since the 2001 Census. For example, 42 per cent of the population lived at the same address five years previously compared to 45 per cent of the 2006 population. Furthermore, 72 per cent of the 2001 population lived at the same address in the previous year compared to 73 per cent of the 2006 population.

Table 3 **Place of usual residence: Western Australia, South West region and Shire of Collie (2006)**

	Western Australia		South West region		Shire of Collie	
Same address 1 year ago	1,444,062	74%	151,551	73%	6,833	79%
Different address 1 year ago	357,736	18%	40,846	20%	1,143	13%
Same address 5 years ago	909,971	46%	92,312	45%	4,875	57%
Different address 5 years ago	778,499	40%	88,138	43%	2,590	30%

Note: Based on place of usual residence Data source: Australian Bureau of Statistics 2006 Census

The Shire of Collie has a very high rate of population stability that lies well above the State average. In addition, this rate of stability has increased significantly since the 2001 Census. For example, in 2006, 79 per cent of the population lived at the same address in the previous year which is a 2 per cent rise from 2001. Furthermore, while 54 per cent of the 2001 population lived at

the same address five years previously, this figure had risen to 57 per cent by the 2006 Census.

2.5 Social infrastructure

The South West region has an excellent overall level of social infrastructure. Most facilities are located around the coastal areas of Bunbury and Busselton where the bulk of the population is situated. Bunbury is considered the administrative centre of the South West and as such is where most regional facilities are located including those for TAFE, the Health Department and the Department of Education and Training.

Given the small size of the population in Collie and its proximity to Bunbury it has a high level of social infrastructure including Collie Senior High School which offers VET courses and is associated with the adjacent TAFE facilities, several primary schools, Collie District Hospital and a number of sport and recreation facilities.

Collie District Hospital offers a number of services including emergency, geriatric, maternity, occupational therapy, pathology, pharmacy, physiotherapy, and surgery. There are major private and public health facilities located in Bunbury.

The Shire of Collie has a stock of affordable housing when compared to elsewhere in the South West region. In addition, residential building approvals[3] are high at around $61.4 million in 2006/07 which represents 11 per cent of all residential building approvals in the South West region and is the fourth highest of any of the South West Local Government Areas.

2.6 Social drivers

Collie is increasingly being considered a good place to live especially amongst people of retirement age who are attracted to the town because of its relative proximity to the coast and its comparatively affordable housing when compared to elsewhere in the South West.

There is a good deal of pride in the town which is evidenced by the town winning the Tidy Towns award in 2006. The town has become more cosmopolitan over the past five years with the construction of a new hotel and an increase in the number of cafes and restaurants. The Shire of Collie is improving the amenity of the town through upgrading visitor facilities, and the beautification of the entrance to the town.

[3] South West Development Commission, Building Approvals data sourced from Department of Local Government and Regional Development based on ABS data, September 2007

However, anecdotal evidence suggests that young people are leaving the town because of a lack of employment opportunities. Furthermore there appears to be a high rate of antisocial behaviour amongst young people in the town including drug taking and alcoholism.

Greater employment opportunities as a result of the construction and future operation of Bluewaters Phase I (due for completion at the end of 2008) and Bluewaters Phase II (due for completion at the end of 2009), the planned expansion of the Worsley alumina refinery, the planned expansion of Boddington Gold Mine and the planned construction of Bluewaters Phase III and IV may assist in providing young people with an incentive to remain in the town.

3 Economic overview

3.1 General economic description

3.1.1 South West

The economy of the South West is fairly sophisticated. Although dominated by mining and mineral processing, a number of other industries provide an important contribution to the region including electricity generation, agriculture, agricultural processing (particularly dairy, beef processing and wine making) and tourism.

The total value of minerals and energy production in the South West region in 2006/07 was $722.5 million. The main commodities produced in the region are heavy mineral sands, coal, spodumene, tantalum and tin. In addition alumina and synthetic rutile are processed in the region, and titanium dioxide pigment and silicon are manufactured.

The Shire of Collie produced $267.2 million or 37 per cent of this minerals and energy wealth primarily through the production of coal. A small amount of clay shale is also produced in the Shire. There is a significant amount (around $1.4 billion) of alumina processed in the Shire at the Worsley alumina refinery.

The agriculture industry in the South West is diverse but primarily comprises of beef cattle production, dairy and horticulture including wine grape production.

Tourism is an established part of the economy supporting a significant number of jobs and businesses. The South West is the second most visited area in Western Australia (after the Perth Metropolitan Area) with just over 2 million visitors in 2006 and an annual expenditure of around $756 million[4].

3.1.2 Shire of Collie

The economy of the Shire of Collie is diverse but is largely reliant on the coal mining industry and associated power generation sector. Nevertheless, the surrounding agriculture sector remains an important economic contributor to the economy.

Nearly one quarter (23%) of all employment in the Shire is in either the coal mining or electricity generation industries. Major commercial operations in the Shire of Collie include the coal mining operations of Griffin Coal Mining and Wesfarmers Premier Coal, the Muja Power Station, and Worsley Alumina

[4] Tourism WA, Tourism Region Fact Sheet: Australia's South West 2006, p 7

Refinery. The Griffin Energy Bluewaters Phase I Power Station unit is due for completion at the end of 2008.

The Shire of Collie has well developed road and rail infrastructure to support major industry. The Port of Bunbury is 60 km away and is connected to the town of Collie by road and rail.

3.2 Employment by industry

Figure 4 shows the industry of employment for the workforces of Western Australia, the South West and the Shire of Collie.

The employment profile for the South West region is similar to that of Western Australia and is reflective of the diverse economy in the region. The primary differences are the higher shares of employment in Agriculture, Manufacturing and in Construction. These differences reflect the relative importance of agriculture and mining to the region and the current high level of investment in the residential and commercial sectors of the economy.

There have been some significant shifts in the employment profile of the South West region since the 2001 Census which reflect the growing diversification of the economy and the shift away from the agriculture sector as the primary source of employment. These shifts include a decrease in the share of employment in Agriculture, Forestry and Fishing of 3 per cent, a significant increase in employment in Construction of over 4,200 jobs, and a decrease of some 1,000 jobs in Retail Trade. As a result of these changes, the major industry of employment in the South West is no longer Retail Trade but Manufacturing as illustrated in Table 4.

The Figure highlights the importance of the mining industry in the Shire of Collie. While the share of employment in the industry has fallen from 18 per cent in 2001 to 17 per cent of total employment in 2006 it remains the major industry of employment in the Shire. The other major industries of employment are Manufacturing (11% of the workforce) which is largely a result of employment at the Worsley alumina refinery and Retail Trade (11%).

Table 4 **Top employment by industry (% of workforce): Western Australia, South West region and Shire of Collie**

	Western Australia	South West region	Shire of Collie
2001	Retail trade (15%)	Retail trade (16%)	Mining (18%)
2006	Retail trade (11%)	Manufacturing (13%)	Mining (17%)

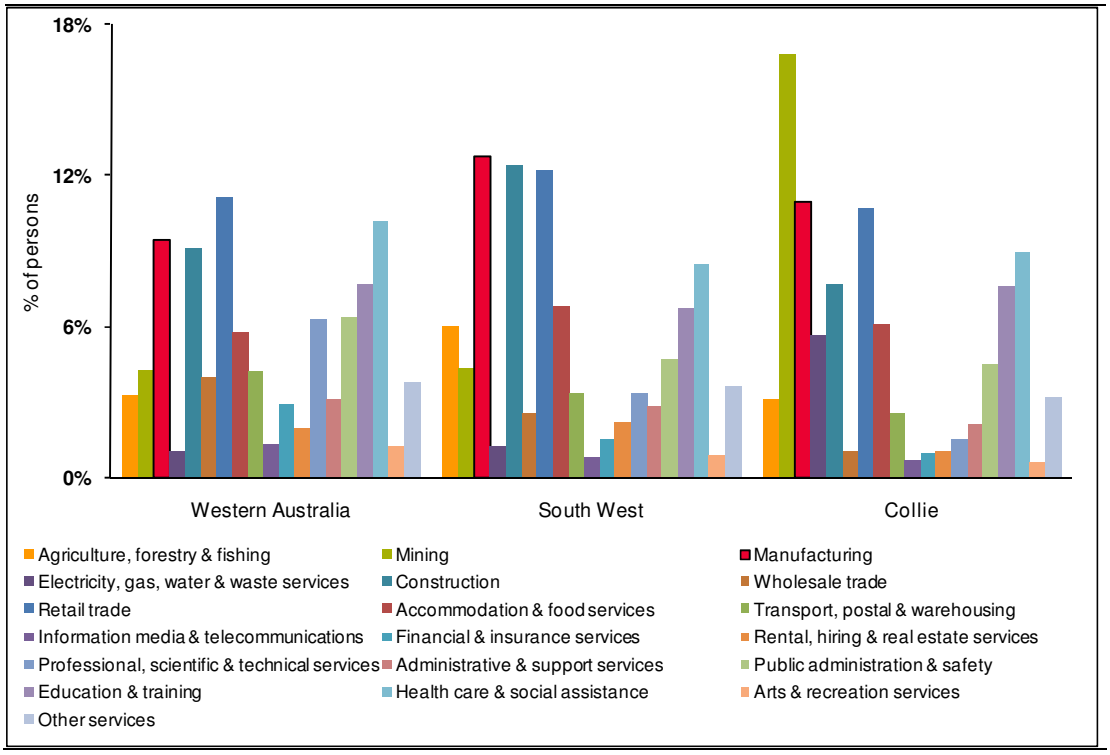
Data source: Australian Bureau of Statistics 2001 and 2006 Censuses

There are a number of major employers in the Collie area including the Worsley Alumina Refinery, the Wesfarmers and Griffin coal mining operations, the Muja and Collie power stations.

The employment profile of the Shire of Collie has remained fairly consistent since the 2001 Census. The major changes were in:

- Construction which currently accounts for 8 per cent of jobs in the Shire of Collie compared to 6 per cent in 2001 and is largely a result of construction of the Bluewaters Phase Phse I Power Station, the Worsley alumina refinery expansion and residential construction activity in the Shire.
- A fall in employment in Retail Trade of around 70 jobs. In terms of share of employment this represents a drop from 14 per cent of the workforce in 2001 to 11 per cent of the workforce in 2006.
- An increase in Accommodation and Food Services from 4 per cent of the workforce in 2001 to 6 per cent of the workforce in 2006 reflecting the growth in the number of cafes and restaurants and the construction of a new hotel in the town of Collie.

Figure 4 **Employment by industry (% of workforce): Western Australia, South West region and Shire of Collie (2006)**



Note: Employed persons aged 15 years and over

Data source: Australian Bureau of Statistics 2006 Census

Table 5 **Employment by industry (% of workforce): Western Australia, South West region and Shire of Collie (2006)**

	Western Australia	South West region	Shire of Collie
Agriculture, forestry & fishing	3%	6%	3%
Mining	4%	4%	17%
Manufacturing	9%	13%	11%
Electr, gas, water & waste services	1%	1%	6%
Construction	9%	12%	8%
Wholesale trade	4%	3%	1%
Retail trade	11%	12%	11%
Accommodation & food services	6%	7%	6%
Transport, postal & warehousing	4%	3%	3%
Info media & telecommunications	1%	1%	1%
Financial & insurance services	3%	2%	1%
Rental, hiring & real estate services	2%	2%	1%
Prof, scientific & technical services	6%	3%	2%
Administrative & support services	3%	3%	2%
Public administration & safety	6%	5%	4%
Education & training	8%	7%	8%
Health care & social assistance	10%	8%	9%
Arts & recreation services	1%	1%	1%
Other services	4%	4%	3%
Total workforce (persons)	**936,128**	**90,875**	**3,474**

Data source: Australian Bureau of Statistics 2006 Census

3.3 Employment and unemployment

The unemployment rate in the South West region and the Shire of Collie is shown in Table 6 along with the size of the workforce (employed persons only). The Table shows that employment in the South West has risen substantially by over 14,300 jobs between Census periods whilst unemployment has decreased by over 4 per cent. Despite the fall in the unemployment rate and the massive growth in jobs, nearly 4,000 job seekers remain unemployed in the region.

Employment in the Shire of Collie has also increased over the Census periods. Around 240 new jobs were created in the Shire while unemployment fell by nearly 6 per cent. In real terms, the fall in the number of people looking for work in the Shire closely matches the increase in the number of new jobs.

Latest unemployment data[5] shows that unemployment has fallen further to reach 3.2 per cent in Western Australia and 5.9 per cent in the Shire of Collie.

[5] Department of Employment and Workplace Relations, Small Area Labour Markets Australia: September Quarter 2007, p26

Table 6 **Selected labour force statistics: Western Australia, South West region and Shire of Collie**

	2006		2001	
	Size of workforce	Unemployment rate	Size of workforce	Unemployment rate
Shire of Collie	3,474	5.4%	3,231	11.1%
South West region	90,873	4.2%	76,561	8.6%
Western Australia	936,132	3.8%	829,051	7.5%

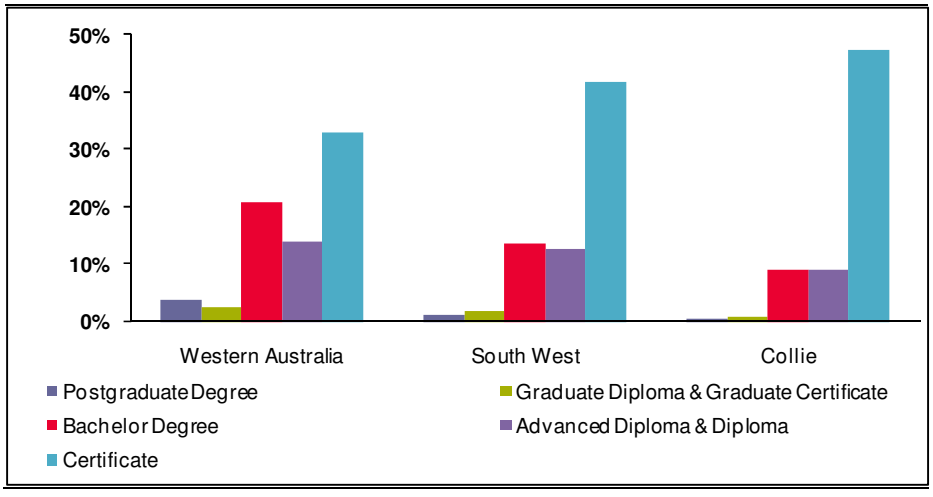
Note: Employed persons aged 15 years and over
Data source: Australian Bureau of Statistics 2001 and 2006 Censuses

3.4 Skills

The level of skill for people with a qualification in the South West and the Shire of Collie is illustrated in Figure 5. The Figure shows the most common form of qualification in both areas is a Certificate and that the share of people holding a Certificate qualification is very high when compared with Western Australia.

In Collie where industry (including the Wesfarmers and Griffin coal mines, the Worsley Alumina Refinery, and the Collie and Muja power stations) is a large employer, 47 per cent of the qualified population hold a Certificate qualification. Industry is also a large employer in the South West and this is reflected in 42 per cent of qualified people in the South West holding a Certificate qualification. In comparison, 33 per cent of qualified Western Australians are educated to Certificate level.

Figure 5 **Level of qualification (% of persons): Western Australia, South West and Shire of Collie**



Note: persons over the age of 15 with a qualification
Data source: Data source: Australian Bureau of Statistics 2006 Census

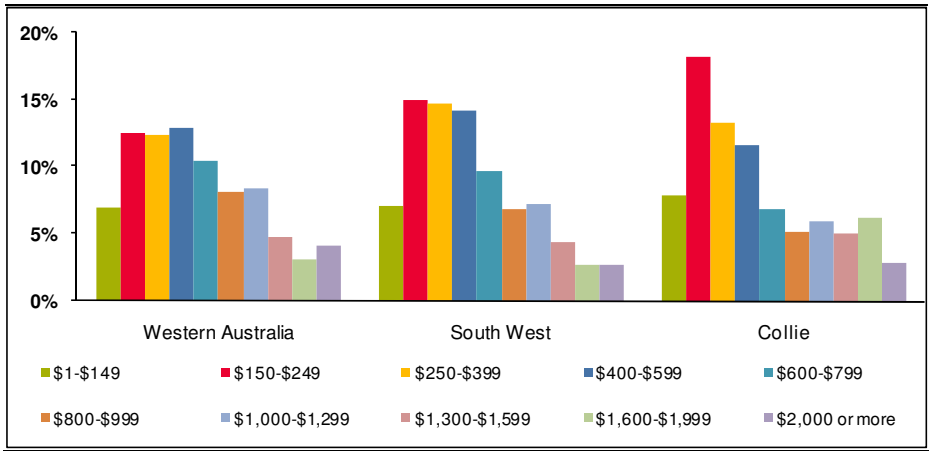
When compared to the level of qualification recorded at the 2001 Census there has been a decrease[6] in the share of people holding a Certificate qualification across Western Australia including in the South West and Collie. For example, in 2001, 50 per cent of the Collie population with a qualification held a Certificate compared to 47 per cent in 2006.

Despite the decrease in this share, there has been an increase in the number of qualified people in Collie of some 400 people of which 116 are Certificate qualified.

3.5 Income

There is a relatively large income disparity in the Shire of Collie. Whereas there are a high number of low weekly income earners in the Shire of Collie there are also some very high income earners as illustrated in Figure 6. For example, 32 per cent of the population of the Shire earn below $250 per week compared to 28 per cent of the South West and 26 per cent of Western Australia. On the other hand, 20 per cent of the population earn in excess of $1,000 per week which is consistent with the State and above that of the South West where 17 per cent of the population earn a similar income.

Figure 6 **Level of income (%): Western Australia, South West region, and Shire of Collie (2006)**



Note: persons over the age of 15

Data source: Data source: Australian Bureau of Statistics 2006 Census

Incomes in Western Australia have increased substantially since the 2001 Census. In 2001, 11 per cent of Western Australian's and 14 per cent of the population of Collie earned more than $1,000 per week.

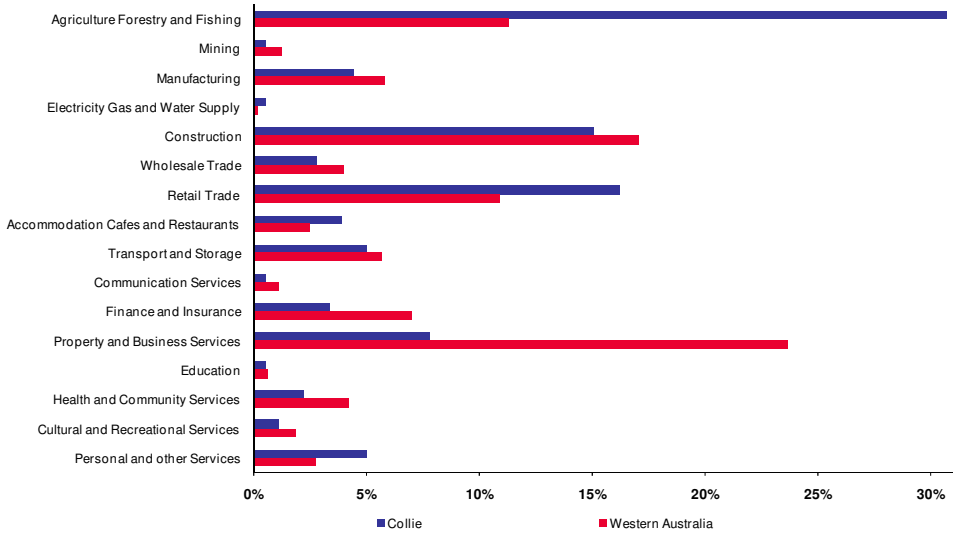
[6] Note that this does not include those people who did not state or inadequately described their qualification on the Census form.

3.6 Description of local businesses

The long history and large presence of industry in Collie and the South West has resulted in a large number of businesses establishing in the region for the purposes of servicing industry. There are a range of businesses that are experienced and capable of servicing the construction and operation of the proposed Bluewaters Phase III and IV Power Station units.

Figure 7 shows the number of businesses (including sole operators) in Collie (post code 6225). The Figure shows that the majority of businesses in the area are in the industries of Agriculture, Forestry and Fishing (31%), Retail Trade (16%) and Construction (15%). Mining and Manufacturing businesses comprise 5 per cent of all businesses in Collie.

Figure 7 **Number of businesses: Collie*(2006)**



Note: post code 6225 only
Data source: Australian Bureau of Statistics Catalogue 8165.0

In comparison, the majority of businesses (including sole operators) in Western Australia in the industries of Property and Business Services (24%), Construction (17%), Retail Trade (11%) and Agriculture, Forestry and Fishing (11%).

4 Direct economic impacts

The construction and operation of Bluewaters Phase III and IV will directly impact the economies of the South West and Western Australia.

Direct impacts have been estimated through general economic analysis and are presented in the following sections.

4.1 Direct impacts: construction phase

The construction of phases III and IV of the Bluewaters Power Station involves estimated capital expenditure of over $1 billion. This expenditure is expected to occur over a five year period and will create a number of direct economic impacts which will benefit the Shire of Collie, the South West and Western Australia. These impacts are described in the following sections.

4.1.1 Employment

Unemployment rates in Western Australia are at historically low levels and there is a shortage of skilled workers. However, unemployment rates in the South West and Collie are higher than the State average. While there has been strong job creation in the region created by the construction of a number of large developments, close to 5,000 job seekers are currently unemployed.

It is expected that a large share of workers in the construction phase will be sourced from the South West region. The construction of Bluewaters Phase III and IV therefore represents an important potential employment opportunity for local job seekers. The construction phase also represents increased diversification in the employment profile particularly in Collie where the mining industry is the major industry of employment.

While the construction periods for Bluewaters Phase I and II and Phase III and IV do not follow immediately from each other, it is possible that workers who were involved in the construction of Bluewaters Phase I and II will be available for the construction of Bluewaters Phase III and IV. This will be particularly beneficial as these workers will have the required experience and skills for the construction phase of the project.

During the construction phase of the proposed Bluewaters expansion, a peak construction workforce of around up to 600 people will be employed. These jobs will primarily be in the fields of engineering and construction.

Griffin intends to maximise the use of local labour from Collie and the South West. However, given the current shortage of skilled labour in Western Australia and the gap between the construction of Bluewaters Phase I and II

and Bluewaters Phase III and IV, there may be some skills that are not available from the local workforce and these might have to be sourced from elsewhere in Western Australia and Australia.

Workers that require accommodation during construction will either be housed in purpose built construction camps located close to or on the site or in accommodation in nearby towns such as Collie and Bunbury.

4.1.2 Education and training

The construction of the Bluewaters Phase III and IV project requires specialist skills as the Power Station units are technologically advanced. It is therefore expected that some level of education and training will be required to meet the skills demands of the construction phase. The education and training, if required, for this phase of the project will be provided by the contractors employed to construct the Power Station units.

On the job training provides important opportunities for the workforce to increase their level of skills. It also provides workers the opportunity to gain skills and experience in construction which can then be leveraged to assist in finding employment on other construction projects elsewhere.

Given the relatively high (compared to the State average) rates of unemployment in Collie and the South West, the opportunity for education and training is particularly important for unemployed people wishing to re-enter the workforce, especially for the long term unemployed and young workforce entrants.

The construction of Bluewaters Phase III and IV in addition to other projects in the region (notably Bluewaters Phase I and II and the proposed Worsley expansion) will provide a sustained demand for construction workers. Not only will this provide longevity of employment opportunities, but it will also enable current secondary students to aspire to local construction work and commence their training at school. In many locations, it has been demonstrated that local employment opportunities enhance aspiration levels and participation in trade training amongst school students.

4.1.3 Local businesses

The proposed Bluewaters project provides opportunities for local businesses to provide goods and services to the construction of the project.

While Griffin Energy intends to maximise local expenditure, the technical specification of the equipment required for the Bluewaters Phase III and IV Power Station units means that many of these items will be purchased from overseas. It is however intended that a number of major items will be

purchased from Australia such as civil works, concrete, structural steel, cooling towers and transformers.

Local South West businesses will also benefit from the construction phase of the project by providing services such as professional services, transport and delivery, general construction and other services.

There are a number of businesses located in Western Australia and the South West that are capable of and experienced in servicing the construction of projects. The recent and planned high level of construction in Western Australia, including in the South West means that there are a number of businesses with recent experience in this sector. However, the high demand for construction related services may indicate a shortage of supply of some services. A number of local businesses which secured contracts on Bluewaters Phase I and II will have direct working experience of the construction of a coal fired power station. However the gap between the construction of Bluewaters Phase III and the completion of Bluewaters Phase II may preclude them from being available to work on the construction of Bluewaters Phase III and IV, opening up opportunities for others.

In addition, local businesses are likely to benefit from flow on spending by the workforce employed in the construction of the project. The construction phase is likely to result in increased demand for services such as accommodation, supermarkets, restaurants and cafes, licensed hotels and outlets, and sporting/entertainment facilities.

4.2 Direct impacts: operation phase

While the impacts in operation tend to be of a smaller magnitude, they are of a long term nature and therefore add to the sustainability of an economy. Griffin estimates that around $100 million per annum will be spent in operating the Bluewaters Phase III and IV Power Station units[7].

Around half of all operating expenditure will be spent in the South West. This includes over $50 million on purchases of coal and around $3.6 million on wages (assuming operation employees will be located in the region).

4.2.1 Employment

Griffin intends to bring one Power Station unit into operation at a time, two years apart. The expected operation workforce for Bluewaters Phase I and II is 50 to 60 personnel. When Bluewaters Phase III is in operation, it is estimated that around 20 additional personnel will be required to operate it and

[7] Personal communication with Ken Muir of Griffin Energy.

the Bluewaters Phase I and II Power Station units. Once Bluewaters Phase IV is operational, Griffin has estimated that another 10 personnel will be required to operate the Power Station unit. A total workforce of around 80 to 90 personnel will be required to operate all four Power Station units[8].

It is expected that many of these workers will be sourced from Collie and the Bunbury/Australind areas of the South West. Bluewaters Phase III and IV therefore represent important long term employment opportunities in skilled/technical professions for job seekers in the South West region, including Collie where unemployment rates are above the State average.

The skills required for the operation workforce include mechanical and electrical fitters (trades qualified), control and instrument technicians, IT experts and operators from a trades back ground with qualifications for operating steam boiler turbines, foremen/supervisors, engineers (electrical, mechanical and control), safety experts, environmental experts, chemists accounting staff, clerical, and management skills. Note that not all these skills are required on a full time basis.

The operation phase of the project also represents an important diversification of the employment profile of Collie and the South West. This is particularly important for Collie where employment is dominated by the mining industry.

4.2.2 Education and training

The presence of industry as a major employer in Collie and the South West has resulted in a highly skilled regional workforce. Some 47 per cent of the Collie population are qualified and 42 per cent of qualified people in the South West hold a Certificate qualification. Griffin's Bluewaters Power Station will utilise leading edge subcritical plant technology and requires a high level of skills as detailed in Section 4.2.1. The operation of the Bluewaters Phase III and IV Power Station units offers an opportunity for the workforce to learn and utilise a high level of technical skills.

It is expected that workers employed in the operation phase of the Power Station will be offered employment and training courses including ongoing formal and on the job training. These courses will be offered by the operator of the Power Station.

4.2.3 Local businesses

Griffin already has a close relationship with a number of local suppliers in Collie and the South West region. These businesses provide services such as parts and equipment, maintenance services, catering and so on to Griffin's

[8] Personal communication with Ken Muir of Griffin Energy.

existing businesses in Collie including its coal mining activities and the construction of Bluewaters Phase I and II. While contracts have not yet been finalised for the operation phase of Bluewaters Phase I and II, it is expected that many contracts will be extended to cater for the operation of Bluewaters Phase III and IV. It is Griffin's intention to maximise the local content of its operations by maintaining current and, if required, seeking new relationships with local suppliers.

Given the long history of industry in Collie and the South West and the large number of developments, there are a number of businesses that are experienced in servicing developments similar to Bluewaters such as the Muja and Collie power stations.

It is expected that the cumulative nature of Bluewaters Phase III and IV is such that the many of the opportunities for local suppliers will be to increase their current business that they have with the (then operating) Bluewaters Phase I and II and other industry in the area.

4.2.4 Government revenue

The construction and operation phases of the proposed Bluewaters Phase III and IV project will generate a number of Federal, Territory and Local Government revenues.

Federal Government revenue will be realised through such taxes as Company tax, Income tax and GST payments.

The Western Australian Government will receive additional revenue from taxes including minerals royalties (from the coal required to fire the Power Station units), Payroll tax, and Stamp Duties.

The Shire of Collie may receive revenue through an increase in rates revenue from any additional housing, as well as from other taxes and charges however any increase in revenue is expected to be small.

Payroll tax[9]

Payroll tax is a general purpose tax that is levied by the Western Australian Government at rate of 5 per cent (as of July 1, 2008) of the total wages paid by an employer.

The addition of 30 additional workers to the total Bluewaters workforce once Bluewaters Phase III and IV are in operation will generate additional payroll tax for the Western Australian Government. With an assumed average wage

[9] Department of Treasury and Finance, Overview of State Taxes 2006-07, p 49

(including shift allowances) of $120,000 per worker the additional payroll tax is estimated at $180,000 per annum.

Note that this does not include the payroll tax paid by contractors to the project.

Minerals royalties

In Western Australia mineral royalties are payable either under the Mining Regulations 1981 (WA) Act or various State Agreement Acts. Griffin operates under the Collie Coal (Griffin) Agreement Act 1979 and the royalty rate is defined under this Act.

Assuming a royalty rate of $1 per tonne which is prescribed under the Mining Regulations 1981 (WA), Griffin will be required to pay around $1.7 million per year to the State Government.

5 Indirect economic impacts

5.1 Economic model

5.1.1 Description of economic model

The economic impact assessment was undertaken using ACIL Tasman's general equilibrium model, Tasman Global. General equilibrium economic models mimic the workings of the economy through a system of interdependent behavioural and accounting equations which are linked to an input-output database.

These models provide a representation of the whole economy, set in a national and international trading context, using a 'bottom-up approach' – starting with individual markets, producers and consumers and building up the system via demands and production from each component.

When an economic shock or disturbance such as a new project is applied to the model, each of the markets adjusts to a new equilibrium according to the set of behavioural parameters which are underpinned by economic theory.

In addition to recognising the linkages between industries in an economy, general equilibrium models also recognise the constraints that apply in an economy (e.g. increased demand for labour may push the costs of labour up if there is full employment).

Labour supply and labour mobility are important issues in economic modelling. In Tasman Global labour supply is allowed to respond to changes in real wages. Tasman Global also allows labour to move between regions in response to relative changes in real wages

Tasman Global is dynamic, which means that its outputs allow estimates of changes in economic variables such as Gross State Product and employment to be analysed at different points in time in aggregate and by industry.

5.1.2 Base case scenario

An important element of general equilibrium analysis is the development of a base case. Once the base case has been developed it forms the basis against which the impact of changes can be modelled. The outcomes of this modelling are deviations from the base case. In the modelling of Bluewaters Phase III and IV the selection of the base case was of critical importance to the modelling outcomes.

The Western Australian economy continues to experience strong economic growth fuelled by continuing demand for the State's minerals wealth. As growth continues it becomes clear that additional electricity generation capacity will be required to meet the demands of business and private consumers.

It is therefore necessary to consider the alternative electricity generation strategy to the construction of Bluewaters Phase III and IV in formulating the base case. In the base case used for the simulations, additional generating capacity is provided by two gas-fired power stations of equivalent size to the Bluewaters units. These power stations are built in Western Australia, but outside of the South West region on the same construction and production schedule as Bluewaters Phase III and IV. The modelling results therefore provide a comparison of two alternative paths to meet the State's growing need for electricity capacity.

For the modelling undertaken in this report, Tasman Global has been configured to recognise Western Australia and the South West as separate economies.

5.1.3 Data sources

Griffin Energy supplied ACIL Tasman with construction and operation cost data for phases III and IV of the Bluewaters Power Station. The cost data included a breakdown of the costs of goods and services used in construction according to their source of supply; from the South West, Western Australia, Australia or overseas.

Costs were broken down by source of supply for the operation phase.

5.1.4 Assumptions of modelling

Labour mobility

The assumptions made when running model simulations have a critical bearing on the results obtained. Labour market assumptions are an important factor in determining model results. In these simulations it has been assumed that labour is able to shift between regions and states in response to differences in real wages and that labour supply is influenced by real wages.

Timing

The base case for these simulations has included the construction and operation of gas fired electricity capacity in Western Australia (but outside of the South West). The construction and operation of Bluewaters Phase III and IV have been compared against this base case. In each case two units, each of 208MW, are constructed over a four year period beginning at the start of 2010.

It is assumed that the first unit will come into production in late 2012 and the second in late 2014.

Modelling and other analysis has identified the impacts of the plants to the year 2020. Even though 2020 has been chosen as the end date for the analysis, the economic benefits in operation will persist for the life of the project.

Synergies with Bluewaters Phase I and II construction

The construction phase of Bluewaters Phase II is expected to end in 2008 and the construction of Bluewaters Phase III is expected to begin in late 2009. The synergies from the continuum of contracts, labour, and so on for the construction of each Power Station unit are expected to be limited given the time lapse between the two construction periods.

5.1.5 Modelling results

Table 7, Table 8 and Table 9 present the economic modelling results for the South West region and for Western Australia using the Tasman Global model. The Tables shows the construction and operation of the Bluewaters Phase III and IV Power Station units in each year of construction and into the operation phase of the project. Note there is some overlap between the operation of Bluewaters Phase III and the construction of Bluewaters Phase IV. There are therefore construction impacts from Bluewaters Phase IV and operation impacts from Bluewaters Phase III appearing in years 2012-13 and 2013-14.

The impacts in the Tables compare Bluewaters Phase III and IV versus a gas fired power station constructed and operated outside of the South West. The tables show the additional benefits of the construction and operation of a coal fired power station over and above the benefits of a gas fired power station.

5.2 Indirect impacts: construction phase

Construction of *each* Bluewaters Power Station unit will cost over $500 million over a period of around four and a half years. The modelling assumes that construction of the Bluewaters project begins in September 2009 with Bluewaters Phase III and continues in each year until April 2014 when construction of Bluewaters Phase IV is complete.

The technology associated with coal-fired power stations is such that a sizable portion of the construction expenditure is anticipated to be spent within Australia. However, due to current and anticipated constraints in the Western Australian labour market and with many suppliers running at or near capacity, local sourcing is likely to be lower than in Bluewaters Phase I and II.

It is expected that the majority of the Australian content will be sourced from within Western Australia, and most of that from within the South West region.

The construction impacts are most clearly identified in 2009-10 and 2010-11, as no new electricity production is associated with these years. In the years 2011-2012, 2012-13 and 2013-14 new electricity production is associated with the construction activities and so it is not possible to isolate construction from production activities in those years.

5.2.1 Gross product

The capital cost of constructing both the Bluewaters Phase III and IV Power Station units is estimated to be over $1 billion with expenditure incurred over a four and a half to five year period. This expenditure will have an impact on the Gross State Product of Western Australia and the Gross Regional Product of the South West region.

Gross Product measures the total market value of all goods and services produced in an economy in a given period of time (normally one year), and is expressed in dollar terms. It is the common measure of the size of an economy. Gross State Product (GSP) refers to the state level and Gross Regional Product (GRP) the regional level.

Table 7 **Real gross product impact of the proposed Bluewaters Phase III and IV projects - deviation from base case: construction and operation phases**

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Values (A$ million)											
South West	7.7	16.6	21.3	67.3	90.4	140.9	166.7	178.1	190.2	202.9	216.3
Western Australia	7.5	15.7	18.7	31.3	40.0	54.5	63.9	68.7	73.6	78.7	83.8
Percentage change											
South West	0.08	0.17	0.21	0.65	0.83	1.24	1.40	1.43	1.46	1.50	1.53
Western Australia	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04

Data source: ACIL Tasman modelling results using the Tasman Global computable general equilibrium model

The construction phase of Bluewaters Phase III and IV is expected to have positive effects on the South West and Western Australian economies. Table 7 shows that in 2010-11 and 2011-12 the impact on Gross Regional and State Product from the construction phase is at its greatest. These are the peak years of construction activity, with both Bluewaters Phase III and Bluewaters Phase IV under construction. Over this peak period, Gross Regional Product increases by $17 to $21 million in the South West and Gross State Product increases by $16 to $19 million in the whole of Western Australia.

It is not possible to quantify the impact on Gross Product from the construction phase of Bluewaters Phase IV as the model results for the latter

stages of this construction also include impacts from the operation phase of Bluewaters Phase III.

5.2.2 Private consumption

Table 8 shows the impact of Bluewaters Phase III and IV on private consumption when compared with the base case. Private consumption represents the consumption of goods and services by private households and is considered a measure of economic welfare. In the Tasman Global model private consumption is a positively related to wages and profits but negatively related to debt.

Table 8 **Private consumption impact of the proposed Bluewaters Phase III and IV projects - deviation from base case: construction and operation phases**

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Values (A$ million)											
South West	6.3	4.6	-9.8	3.4	7.9	32.0	44.5	46.4	48.6	51.1	53.7
Western Australia	5.2	5.6	-2.7	-1.9	-1.9	4.9	8.6	8.0	7.3	6.6	5.8
Percentage change											
South West	0.11	0.08	-0.15	0.05	0.11	0.41	0.54	0.53	0.53	0.52	0.52
Western Australia	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00

Data source: ACIL Tasman modelling results using the Tasman Global computable general equilibrium model

Years 2009-10 to 2011-12 in Table 8 show mixed results for private consumption over the construction period for Bluewaters Phase III. In 2009-10 and 2010-11 the impact is clearly positive in the South West and in Western Australia as a whole. However, the overall impact in 2011-12 is for a negative impact on the South West and the State.

This decline in 2011-12 is due to the increased net debt (savings less investment) in Western Australia as a result of Bluewaters Phase III construction. The construction of a coal-fired power station is more expensive than the construction of equivalent gas-fired capacity; however, operation is less expensive. In 2011-12 net debt has increased without offsetting production increases and this is the cause of the sharp decline in private consumption from 2011-12.

When operation commences in 2012-13 a positive income stream is generated to allow for debt servicing and private consumption returns to a positive figure for the South West in all years, as shown in Table 8. Private consumption for the State as a whole becomes positive in 2014-15 when Bluewaters Phase IV comes into operation.

5.2.3 Employment

Major construction projects are noted for their positive impact on total employment. In addition to direct employment on Bluewaters Phase III and IV, a number of flow on or indirect jobs will be created. These jobs will be created in the businesses that provide goods and services to the construction phase. These employment impacts are presented in Table 9.

Employment in the South West is enhanced by the construction of Bluewaters Phase III and IV, with jobs increasing by up to 110 in the South West and by up to 176 in the whole of the State (in the year 2010-11). This includes the workforce employed directly on the construction of the Power Station units as well as the indirect workforce created by the flow on impacts of the construction phase.

Table 9 **Employment (direct and indirect) impact of the proposed Bluewaters Phase III and IV projects - deviation from base case: construction and operation phases**

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Jobs											
South West	62	110	91	73	77	81	97	97	96	96	96
Western Australia	96	176	159	98	92	62	70	68	66	63	59
Percentage change											
South West	0.12	0.20	0.16	0.13	0.13	0.14	0.16	0.15	0.15	0.15	0.15
Western Australia	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Data source: ACIL Tasman modelling results using the Tasman Global computable general equilibrium model

5.3 Indirect impacts: operation phase

The modelling assumes that Bluewaters Phase III comes into full operation on October 2012 and that Bluewaters Phase IV comes into full operation in October 2014. There is therefore a period in which one Power Station unit is in operation while the other is being constructed.

The modelling results presented in Table 7, Table 8 and Table 9 for the years 2012-13 and 2013-14 include the operation of Bluewaters Phase III and construction of Bluewaters Phase IV. It is therefore not possible to isolate the impacts of operation until 2014.

Note also that the results presented in Table 7, Table 8 and Table 9 are the benefits associated with electricity generation from the Bluewaters Phase III and IV Power Station units compared with electricity production from gas fired sources located outside the South West. They show the additional benefits from the construction of a coal fired power station above that of a similar gas fired power station.

5.3.1 Gross product

In the operation phase of the project, Bluewaters Phase III and IV are expected to require around $100 million per annum to operate. This expenditure in the economy will impact the Gross Regional Product of the South West.

Table 7 shows the impact of Bluewaters Phase III and IV during the operation phase of the project on Gross Product in the South West and in Western Australia. In 2015-16 (the first full year of operation of both Phase II and Phase IV) Gross Regional Product in the South West is $167 million higher than the base case (a gas fired power station). In Western Australia, Gross State Product is $64 million higher.

The impact on the local South West region economy is relatively high due to the large purchases of coal and employment/wages from the South West required to operate the Power Station units.

5.3.2 Private consumption

Table 8 shows that Private Consumption in the South West gains a major benefit from the operation of the Bluewaters Power Station units. In 2015-16 when both units are in full operation, private consumption increases by an estimated $45 million.

The overall State impact is shown to be on a smaller scale of around $9 million. This is because there has been a transfer of private consumption from Western Australia to the South West region. The impact on the South West is therefore greater.

5.3.3 Employment

The employment impacts in the operation phase of Bluewaters Phase III and IV are shown in Table 9. It is estimated that there will be employment growth of nearly 100 long term jobs in the South West. These jobs include those employed directly at the Power Station units and those in the businesses that provide goods and services to Bluewaters.

In Western Australia as a whole over 60 direct and indirect jobs will created in the operation phase of the project. Employment creation in Western Australia is lower than the South West because it is assumed that labour is mobile and that some people will move from the rest of Western Australia to the South West to take up new employment.

6 Social impact

6.1 Construction impact

6.1.1 Population

The construction of the proposed Bluewaters Phase III and IV Power Station units will require a peak workforce of around up to 600 personnel however the amount of people required during construction will vary over the construction period. Many of these workers will typically be young single males who will be housed in a construction work camp which will most likely be located adjacent to the construction site and away from the town of Collie. They will commute to and from the camp and their home base by vehicle.

However, it is likely that workers from construction site will frequent the town to purchase goods and services and as they travel through on their way to and from the construction work camp. The increase in population from these movements will therefore be temporary.

A more permanent increase will occur if any of these workers and/or their families relocate to the area to be closer to the construction site. Anecdotal evidence suggests that experience of other construction projects in the area (including Bluewaters Phase I and II and the Worsley Alumina Refinery expansion) suggest that it is likely that a large share of the workforce will be sourced from the South West and that a small section of the workforce from outside of the region will relocate to the nearby areas of Collie or the wider South West. The likelihood of this type of relocation occurring will be increased the longer the duration of employment during construction.

6.1.2 Social well being

The impact on the social cohesion of Collie will be impacted as a result of both the temporary and longer term increase in population described above. Although the construction camp is likely to be located away from the town of Collie, it is likely that workers will enter the town to purchase goods and services and to travel to and from their work place. There could be an impact, albeit temporary, on the social cohesion of the town during these times.

There will be a greater impact on social cohesion should workers and their families relocate to the town during the construction period. Given that the population profile of the Shire of Collie in Figure 2 shows a lack of young people in the 20 to 30 age group, the increase in population as a result of the Bluewaters project could create a more normalised population profile and add to the social sustainability of the town.

The impact on the social cohesion of the construction of Bluewaters Phase III and IV on the South West is likely to be less due to the greater size of the population and therefore its ability to absorb any increase.

6.1.3 Social infrastructure

It is likely that some of the construction workforce will relocate to the area to be close to the construction site. Some of those that relocate will bring their families with them. As a result there will be an increase in demand for social infrastructure particularly in the areas of health, education and housing.

There could be some pressure in the areas of housing and education in Collie however it is expected that the general level of social infrastructure is adequate to service the construction workforce and any associated increase in population.

Anecdotal evidence suggests that current rental vacancies in the Shire of Collie are low due to the high amount of activity in the construction sector including for Bluewaters Phase I and II, the Worsley Alumina Refinery expansion and residential building. However, given the high level of residential building approvals in the Shire (see Section 2.5), this pressure may be eased by the time construction on Bluewaters Phase III and IV begins given the lag between the construction of Bluewaters Phase II ending and III beginning. There is currently a reasonable stock of affordable housing for purchase in the Shire.

Despite a good range of education facilities in Collie, a shortage of teachers led to recruitment of overseas teachers to fill vacancies[10] in early 2007. The State Government is continuing in their efforts to address this issue.

It is expected that the current level of social infrastructure in the South West is adequate to cater for the impact of any increase in population however there may be some pressure placed on housing due to the high demand for housing in the coastal areas of Bunbury and Australind. Nevertheless, building approvals in the South West are currently high and this may go some way to easing pressure on the housing market.

6.2 Operation impact

6.2.1 Population

The operation of the Bluewaters Phase III and IV Power Station units will require a relatively small workforce of around 30 people because the project is an expansion of the Bluewaters Power Station. The construction of each

[10] Minister for Education and Training, Media Statement titled *State Embarks on UK Teacher Recruitment Campaign*, 21 February 2007

power station will be two years apart and therefore each Power Station unit will come into operation two years apart. While Bluewaters Phase III is operating, it will require a workforce of around 20 persons. Once Bluewaters Phase III and IV are in operation a combined workforce of around 30 people will be required. These people will work across the Bluewaters Power station. Total operation of the Power Station will be around 80 to 90 people.

The workforce required for the operation phase will be sourced from Collie and the South West area where possible. It is possible that workers will be sourced from outside of the region. In this case it is possible that these people will relocate to the Collie area and some may bring their families with them.

There will also be a flow on workforce required for the operation of Bluewaters Phase III and IV. These people will be required in the businesses that supply goods and services to the proposed project.

The impact on the existing population will therefore be a function of several variables including:

- The size of the total workforce sourced from outside of the area
- Whether the families of these workers also relocate to the area.

Although unemployment rates in Collie and the South West are historically low, they remain higher than the State average. This indicates that some of the 30 employment opportunities in the operation phase may be absorbed by the existing South West population. The impact on population from the direct workforce is therefore expected to be low.

It is not expected that the cumulative indirect workforce will impact existing populations to any great extent.

6.2.2 Social well being

While the population increase as a result of the direct and indirect workforce for the Bluewaters expansion is expected to be small, it will be of a long term nature. There may be an impact on the well being of existing residents because of the presence of new families in the area. This is particularly so in the Shire of Collie where the size of the population is relatively small (around 9,000 people).

However, it is likely that the current population is large enough that the impact of any additional population on the social cohesion of the Shire of Collie will be minimal. It is also likely that this impact will be positive as it will add to the social sustainability of the town.

The impact of any increase in population from the operation phase of the project is expected to be small and is therefore not expected to influence the social cohesion of the South West region.

6.2.3 Social infrastructure

The expected impact on the local population during the operation phase of Bluewaters is expected to be small. However, any increase in population will place additional demand on community and social infrastructure including housing, education and health facilities.

Despite this additional demand and due to the small nature of the likely population increase, it is expected that any population increase will be absorbed by the current level of social infrastructure in the South West and Collie.

7 Strategic impacts

In addition to economic and social impacts, the construction and operation of Bluewaters Phase III and IV will create a number of strategic impacts for the South West and Western Australia that add to the sustainability of the State. These impacts are difficult to quantify but are described in the following sections.

7.1 Contributing to WA's energy diversity and competitiveness

One of the most important strategic issues facing Western Australia is its energy supply. This includes the availability of primary energy (coal, gas and liquids), the cost of energy and supply risks.

Economic growth in WA is expected to lead to sustained growth in electricity demand. This growth is projected to lead to a capacity shortfall in the SWIS of over 1,000 MW and an energy shortfall of up to 7,000 GWh in 2016-17.

The expanded Bluewaters Power Station will contribute to Western Australia's energy sustainability through:

- Utilisation of a resource that can sustain electricity generation in Western Australia for at least the next 100 years
- Helping to optimise the use of the Western Australia's energy endowment
- Contributing to a balanced and secure energy supply through diversification of primary energy sources
- Production of electricity at prices providing strong price competition to gas and enabling continued expansion of local industrial activity
- Replacing ageing electricity generation infrastructure
- Continuation of coal as a major contributor to the economy of the South West.

As current rates of use, the Collie coal resources are sufficient to sustain their contribution to Western Australia's electricity generation needs for well over 100 years. They provide a proven, long life, low cost source of fuel that is an integral component of the Western Australia's primary energy supply.

Collie coal is ideally suited to low cost baseload electricity generation. It complements gas, which is best suited to intermediate and peak load generation. It provides essential competition to gas, providing a ceiling on generation costs.

Short term gas supply to support new power generation projects in Western Australia is constrained by a combination of fully contracted gas supplies, limited pipeline capacity and rising gas prices.

Medium term gas supplies for power generation projects in Western Australia are dependent on the commercialisation of the new gas fields during 2010 and 2011 and resolution of gas pipeline constraints. There are significant uncertainties associated with both.

Renewable energy generation, while playing an increasingly important role in Western Australia's energy mix, will be unable to meet anticipated generation shortfalls in the short to medium term and within the currently proposed State and national policy settings.

Coal-fired generation therefore will continue to play an important role in maintaining security of electricity supply. Collie coal and the electricity it generates are secure sources of supply for the SWIS, with robust supply chains. The Bluewaters Phase III and IV Power Station units will enhance the diversity of power stations and coal mines and so reduce risks and enhance security of supply. Planned expansion and reinforcement of transmission lines between Collie and the rest of the SWIS will also enhance supply security.

Four 60MW units at the Muja Power Station were shut down in April 2007, having reached the end of their economic lives. The remaining four units, built between 21 and 26 years ago, generate a total of 854MW. These are expected to become obsolescent between 10 to 15 years from now. The new Bluewaters units will provide modern plant that can in large part replace the Muja units.

Development of the four Bluewaters Power Station units will provide an expanded long-term market for Collie coal, particularly with the future shut-down and/or curtailment of generation at the remaining Muja units. This will ensure that coal mining and its contribution to the economies of Collie and the wider South West will be sustained.

7.2 The role of volume in driving down unit costs of coal mining

Coal is a vital part of Western Australia's primary energy mix, particularly for electricity generation. Volume is critical to the economics of coal mining. The Bluewaters expansion will utilise around 1.7 million tonnes of coal per year, doubling the volume from Griffin Coal's Ewington mine and reducing unit costs. In turn, this helps to keep electricity prices at competitive levels for all consumers.

In addition, reduced unit costs of coal mining will improve the competitiveness of coal for other uses, such as for coal char production, for direct use as a

reductant for metallurgical production, and for firing of cogeneration plants, notably for alumina refining.

7.3 The social and economic sustainability of the town of Collie

The development of Bluewaters Phase III and IV will bring greater sustainability to the town of Collie as well as to the wider South West region. The greater sustainability will be felt through an improved long term economic and social outlook. This will be a direct result of key economic indicators such as:

- increased and more secure employment opportunities over the long term
- increased business opportunities to service the Bluewaters Power Station and the Bluewaters workforce
- increased investment in the area as new industries set up to take advantage of the creation of a readily available supply of competitively-priced electricity
- the focus on Collie and the South West as a destination for additional economic activity.

Social sustainability will be achieved through key social indicators such as:

- greater employment, especially stable long term employment
- greater population in regional areas creating more demand for local goods and services
- greater use of social infrastructure such as hospitals and schools
- education and training opportunities that allow local people to take advantage of employment on the Bluewaters project but also on other construction activities in the area, and
- the focus on Collie and the South West as a destination for others to live.

8 Summary of impacts

Table 10 provides a summary of the direct economic and social impacts of the proposed Bluewaters Phase III and IV project.

Table 10 **Summary of the direct economic and social impacts of Bluewaters Phase III and IV**

	Construction phase	Operation phase
Capital cost	Approximately $1 billion	-
Annual operation cost	-	Approximately $100 million
Direct employment	up to 600 peak	30

Data source: Griffin Power Pty Ltd

In addition to the impacts presented in Table 10 there will be a number of impacts that are more difficult to quantify. These include:

- Education and training opportunities for people who wish to be employed on the construction and operation phases of the project
- New employment opportunities in the Shire of Collie and the South West where unemployment rates are higher than the State average. In particular, the operation phase provides long term skilled job opportunities
- Possibility of new families moving to Collie and the South West during operation which will add to the social sustainability of the region
- New and expanded business opportunities for local businesses to service the construction and operation phases of the project
- Strategic impacts such as adding to the economic and social sustainability of the Collie area, contributing to the energy diversification of Western Australia and assisting in driving down the per unit costs of coal production.

In order to estimate the indirect impacts of the Griffin Bluewaters Phase III and IV Power Station units, economic modelling was used. The Tasman Global model assumes a business as usual case for Western Australia in which future demand for electricity generation is met by the construction of new gas fired power generation. Bluewaters Phase III and IV was then modelled as the alternative means of electricity generation to meet this demand.

Table 11 presents the indirect economic impacts of Bluewaters Phase III and IV *over and above* the construction and operation of a similar gas fired power station. The Table presents the impacts in the first year of construction (2010) and in the first full year of production (2014).

Table 11 **Summary of the indirect economic and social impacts of Bluewaters Phase III and IV relative to the base case**[11]

	Construction phase (2010 first year of construction of both phases)	Operation phase (2014 first year of full operation)
Total South West employment*	110	97
Total Western Australian employment*	176	70
Gross Regional Product	$16.6 million	$166.7 million
Gross State Product	$15.7 million	$63.9 million
Private South West consumption	$4.6 million	$44.5 million
Private State consumption	$5.6 million	$8.6 million

Data source: ACIL Tasman modelling results using the Tasman Global computable general equilibrium model

* Total employment = direct plus indirect employment

[11] See Section 5.1.2 for definition of base case.