ACIL ALLEN CONSULTING

REPORT TO
APPEA
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PETROLEUM DEVELOPMENT IN THE GREAT AUSTRALIAN BIGHT

A PRELIMINARY VIEW OF THE ECONOMIC IMPACT OF DEVELOPMENT

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The Australian Petroleum Production & Exploration Association (APPEA)[1] has engaged ACIL Allen Consulting (ACIL Allen) to undertake a preliminary study and report on the economic impact of successful petroleum exploration and production in the Great Australian Bight.

In undertaking this study, ACIL Allen has developed a financial model based on two production scenarios where significant oil discoveries are made in the Great Australian Bight and those discoveries are developed during the next decade. ACIL Allen has endeavoured to use assumptions in its modelling derived from credible sources, but recognises that the forecasting of some variables, such as future oil prices, the size of the hydrocarbon discovery, and field development costs, and future tax changes, is difficult.

The financial models have been used as the source of inputs to the economic impact modelling using *Tasman Global*, ACIL Allen's Computable General Equilibrium (CGE) model of the Australian economy. The economic impacts of an oil basin development in the Great Australian Bight are reported and summarised in this report.

The study examines two possible development scenarios; a Base Case Development Scenario (Base Case) of a resource of 1.9 billion barrels of oil equivalent liquids, and a High Case Development Scenario (High Case) based on the production potential of the Bass Strait, of a resource of 6 billion barrels of oil equivalent liquids. A base and high case have been used to highlight a plausible range of development opportunities that could emerge in the Great Australian Bight. To put the significance of these scenarios into context, the Bass Strait development has produced over four billion barrels of crude oil and a further eight billion cubic feet of gas since the development commenced in 1969.

For each scenario, it is assumed that the resource is commercialised by a number of ventures;

- under the Base Case, three proponents of different sizes are assumed to produce 1.9 billion barrels of oil equivalent liquids over the economic life of the ventures; and
- under the High Case, four proponents of different sizes are assumed to produce 6 billion barrels of oil equivalent liquids over the economic life of the ventures.

The economic impact of exploration and development in the Great Australian Bight is assessed on both production scenarios on an output basis (the impact on Gross Domestic Product or Gross State Product), on an income basis (the impact on real incomes), and employment (on a full time equivalent basis). The economic impact is also assessed based on the total taxation payments – that is both direct and indirect taxes – that result from the project.

[1]The Australian Petroleum Production & Exploration Association is the peak body representing Australia's upstream oil and gas industry. It has about 60 full member companies, which account for an estimated 98 per cent of the nation's petroleum production. More information: www.appea.com.au.

Base Case Development Scenario

ACIL Allen has found that if a major petroleum development in the Great Australian Bight materialises as modelled, the economic impact to the South Australian and national economies would be significant – even in the more conservative Base Case scenario that was formulated from a 2015 report by Wood Mackenzie.

Australia's Gross Domestic Product (GDP) is projected to increase on average by A$5.9 billion per annum, and by A$243.1 billion over the study period (from 2020 to 2060). The majority of the economic dividend from the development is expected to be realised in South Australia.

It is projected that the South Australian economy – as measured by Gross State Product (GSP) – will increase on average by A$5.8 billion per annum over the study period, and by A$237 billion over the study period. The petroleum developments in the Bight, if they materialise as modelled, represent an increase of around 6 per cent in South Australia's annual GSP compared to the present.

To the extent that the project will generate employment opportunities and taxation receipts for government, this will significantly boost Australia's national income. Under the Base Case, real income is projected to increase on average by A$3.2 billion per annum, and by A$131.6 billion over the study period. For South Australia, the average increase in real income is projected to be A$0.8 billion per annum, and total A$33.4 billion over the study period.

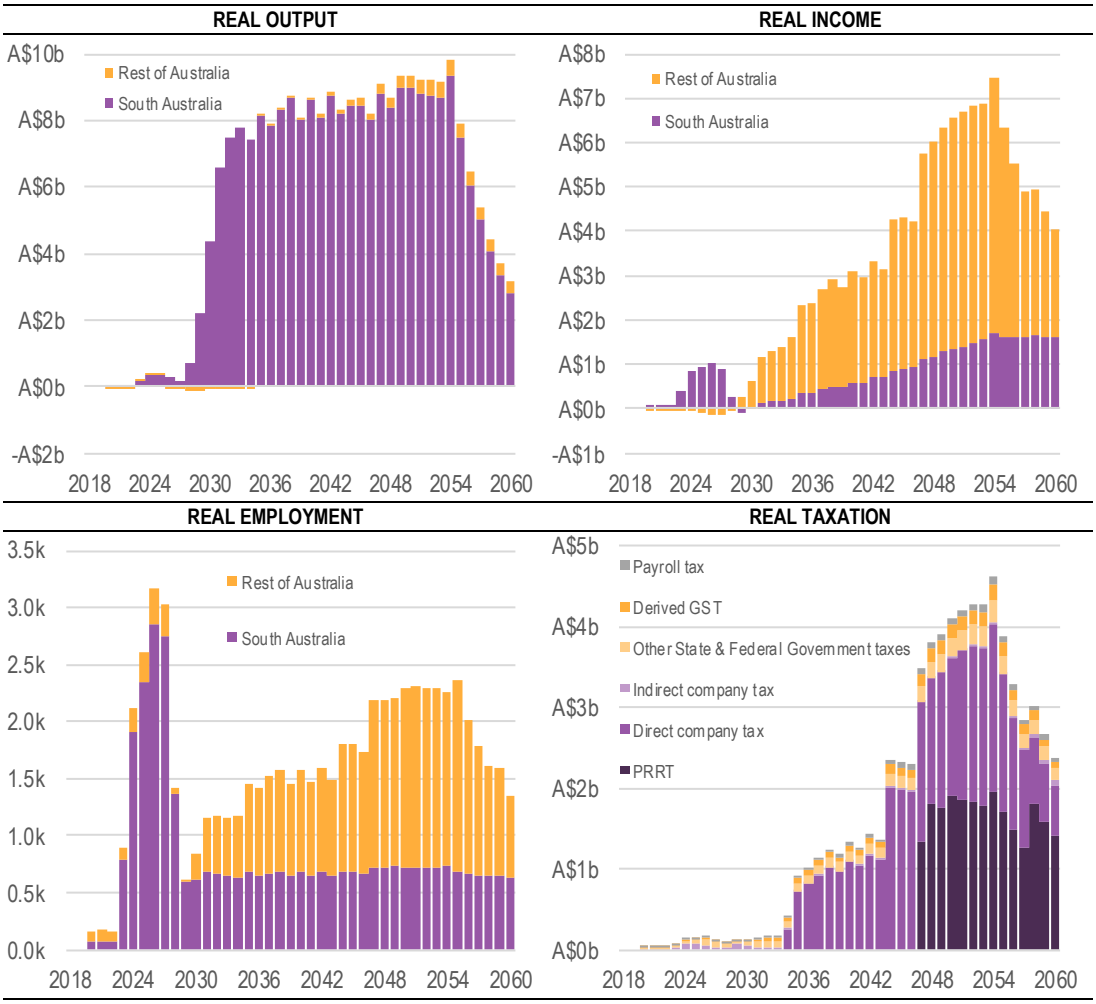
Importantly, the additional oil exploration and development will increase employment in South Australia by an average of 826 FTE jobs per year over the study period, with an average of 697 FTE jobs during production between 2028 and 2060. The majority of these jobs will be in relation to operating each Floating Production Storage and Offloading (FPSO) facility. There will also be additional job creation in logistics and other support staff, such as helicopter support, environmental monitoring, safety management, marketing, and catering. The exploration and construction phase of the development will also see significant job creation in South Australia, with an average of 1,361 FTE jobs created per annum between 2020 and 2028.

Across Australia, it is projected that 1,648 FTE jobs per year will be created as a result of this development over the study period.

FIGURE ES 1 BASE CASE DEVELOPMENT SCENARIO, ESTIMATED BENEFITS TO SOUTH AUSTRALIA

SOURCE: ACIL ALLEN CONSULTING

FIGURE ES 2 SUMMARY OF ECONOMIC CONTRIBUTION, BASE CASE DEVELOPMENT SCENARIO



SOURCE: ACIL ALLEN CONSULTING

In addition to the economic and employment benefits, petroleum exploration and production will generate significant payments to governments, particularly the Commonwealth Government. Based on the study assumptions, real taxation payments to all Governments over the study period are projected to total A$70.6 billion.

The Commonwealth Government will be the major beneficiary of the development, with ACIL Allen estimating that over the study period A$36 billion will be collected in the form of company taxes (average of A$1.3 billion per annum once the development becomes liable for company tax), A$23.5 billion in the form of Petroleum Resource Rent Taxation (PRRT) (average of A$1.7 billion per annum once the development becomes liable for PRRT), A$1 billion from indirect company taxation (A$24.3 million per annum), A$5.2 billion from other[2] taxes (A$125.6 million per annum), and GST receipts of around A$3.2 billion as a result of increased commercial activity (A$77.2 million per annum).

Payments to the South Australian Government will largely be in the form of additional payroll tax receipts, which are projected to accumulate to A$1.7 billion over the study period, or by around A$41.7 million per annum.

[2] "Other taxes" includes personal income, fridge benefits and capital gains taxation payments.

TABLE ES 1 SUMMARY OF ECONOMIC CONTRIBUTION, BASE CASE DEVELOPMENT SCENARIO

	Total	Average	NPV
Economic output			
South Australia	A$237.0bn	A$5.8bn	A$47.4bn
Rest of Australia	A$6.1bn	A$149.3m	A$0.5bn
Australia	**A$243.1bn**	**A$5.9bn**	**A$48.0bn**
Real incomes			
South Australia	A$33.4bn	A$0.8bn	A$6.5bn
Rest of Australia	A$98.1bn	A$2.4bn	A$14.7bn
Australia	**A$131.6bn**	**A$3.2bn**	**A$21.1bn**
Employment			
	Average	Construction average	Production average
South Australia	826 FTE jobs	1,361 FTE jobs	697 FTE jobs
Rest of Australia	821 FTE jobs	170 FTE jobs	976 FTE jobs
Australia	**1,648 FTE jobs**	**1,531 FTE jobs**	**1,673 FTE jobs**
Taxation			
South Australia payroll tax	A$1.7bn	A$41.7m	A$0.3bn
Derived GST	A$3.2bn	A$77.2m	A$0.5bn
PRRT	A$23.5bn	A$1.7bn*	A$2.2bn
Direct company tax	A$36.0bn	A$1.3bn*	A$5.2bn
Indirect company tax	A$1.0bn	A$24.6m	A$0.4bn
Other State & Federal taxes	A$5.2bn	A$125.6m	A$0.9bn
Total tax	**A$70.6bn**	**A$1.7bn**	**A$9.5bn**

**DENOTES THE AVERAGE DURING THE PERIOD WHEN THESE TAXES ARE PAYABLE*

SOURCE: ACIL ALLEN CONSULTING

High Case Production Scenario

Under the High Case, which assumes a resource development equivalent to Bass Strait, the economic impact of developments in the Great Australian Bight would be significantly larger than under the Base Case.

Australia's Gross Domestic Product (GDP) is projected to increase on average by A$19.3 billion per annum, and overall by A$791 billion over the study period (from 2020 to 2060). The majority of the economic dividend from the development is expected to be realised in South Australia.

It is projected that the South Australian economy – as measured by Gross State Product (GSP) – will increase on average by A$18.4 billion per annum, and by A$755.4 billion over the study period. The petroleum developments in the Bight, if they materialise as modelled, represent an increase of around 18 per cent in South Australia's annual GSP compared to the present.

To the extent that the project will generate employment opportunities and taxation receipts for government, this will significantly boost Australia's national income. Under the High Case, real income is projected to increase on average by A$12.6 billion per annum, and by A$515.4 billion over the study period. For South Australia, the average increase in real income is projected to be A$2.8 billion per annum, or a total of A$113.3 billion over the study period.

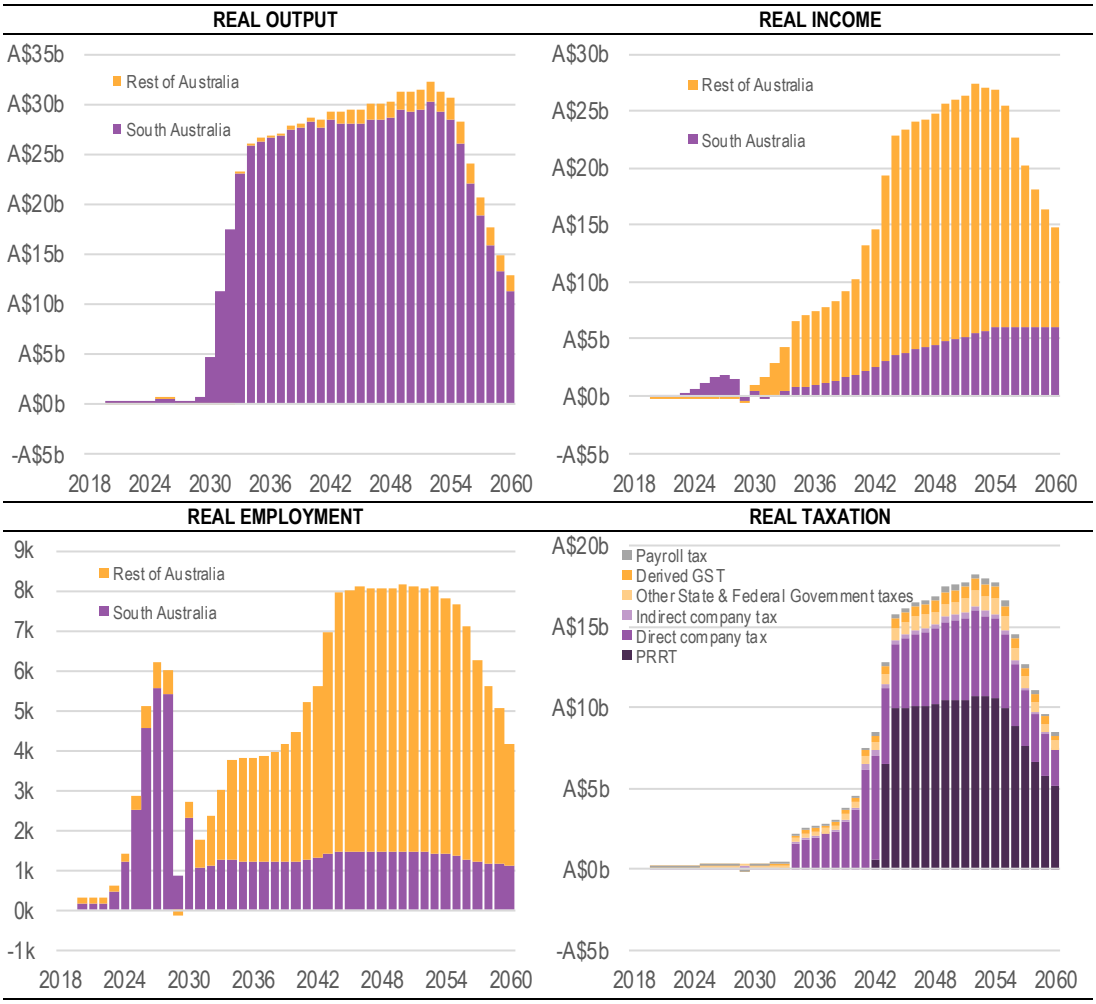
Importantly, the additional oil exploration and development will increase employment in South Australia by an average of 1,521 FTE jobs per year over the study period, with an average of 1,443 FTE jobs during production between 2028 and 2060. The majority of these jobs will be in relation operating each Floating Production Storage and Offloading (FPSO) facility. There will also be additional job creation in logistics and other support staff, such as helicopter support, environmental monitoring, safety management, marketing, and catering. The exploration and construction phase of the development will also see significant job creation in South Australia, with an average of 2,116 FTE jobs created per annum between 2020 and 2030.

Across Australia, it is projected that 4,962 FTE jobs per year will be created as a result of this development over the study period.

FIGURE ES 3 HIGH CASE DEVELOPMENT SCENARIO, ESTIMATED BENEFITS TO SOUTH AUSTRALIA

SOURCE: ACIL ALLEN CONSULTING

FIGURE ES 4 SUMMARY OF ECONOMIC CONTRIBUTION, HIGH CASE DEVELOPMENT SCENARIO



SOURCE: ACIL ALLEN CONSULTING

In addition to the economic and employment benefits, petroleum exploration and production will generate significant payments to governments, particularly the Commonwealth Government. Based on the study assumptions, real taxation payments to all Governments over the study period are projected to total A$314.6 billion.

The Commonwealth Government will be the major beneficiary of the development, with ACIL Allen estimating that over the study period A$105 billion will be collected in the form of company taxes (average of A$3.9 billion per annum once the development becomes liable for company tax), A$164.9 billion in the form of PRRT (average of A$8.7 billion per annum once the development becomes liable for PRRT), A$6.8 billion from indirect company taxation (A$0.2 billion per annum), A$17.9 billion from other taxes[3] (A$0.4 billion per annum), and GST receipts of around A$14 billion as a result of increased commercial activity (A$0.3 billion per annum).

Payments to the South Australian Government will largely be in the form of additional payroll tax receipts, which are projected to accumulate to A$6 billion over the study period, or by around A$147.2 million per annum.

[3] "Other taxes" includes personal income, fridge benefits and capital gains taxation payments.

TABLE ES 2 SUMMARY OF ECONOMIC CONTRIBUTION, HIGH CASE DEVELOPMENT SCENARIO

	Total	Average	NPV
Economic output			
South Australia	A$755.4bn	A$18.4bn	A$139.4bn
Rest of Australia	A$35.5bn	A$0.9bn	A$4.1bn
Australia	**A$791.0bn**	**A$19.3bn**	**A$143.6bn**
Real incomes			
South Australia	A$113.3bn	A$2.8bn	A$17.3bn
Rest of Australia	A$402.1bn	A$9.8bn	A$57.8bn
Australia	**A$515.4bn**	**A$12.6bn**	**A$75.0bn**
Employment			
	Average	Construction average	Production average
South Australia	1,521 FTE jobs	2,116 FTE jobs	1,443 FTE jobs
Rest of Australia	3,442 FTE jobs	343 FTE jobs	4,201 FTE jobs
Australia	**4,962 FTE jobs**	**2,579 FTE jobs**	**5,644 FTE jobs**
Taxation			
South Australia payroll tax	A$6.0bn	A$147.2m	A$0.9bn
Derived GST	A$14.0bn	A$0.3bn	A$2.0bn
PRRT	A$164.9bn	A$8.7bn*	A$18.7bn
Direct company tax	A$105.0bn	A$3.9bn*	A$15.6bn
Indirect company tax	A$6.8bn	A$0.2bn	A$1.3bn
Other State & Federal taxes	A$17.9bn	A$0.4bn	A$2.9bn
Total tax	**A$314.6bn**	**A$7.7bn**	**A$41.4bn**

**DENOTES THE AVERAGE DURING THE PERIOD WHEN THESE TAXES ARE PAYABLE*

SOURCE: ACIL ALLEN CONSULTING

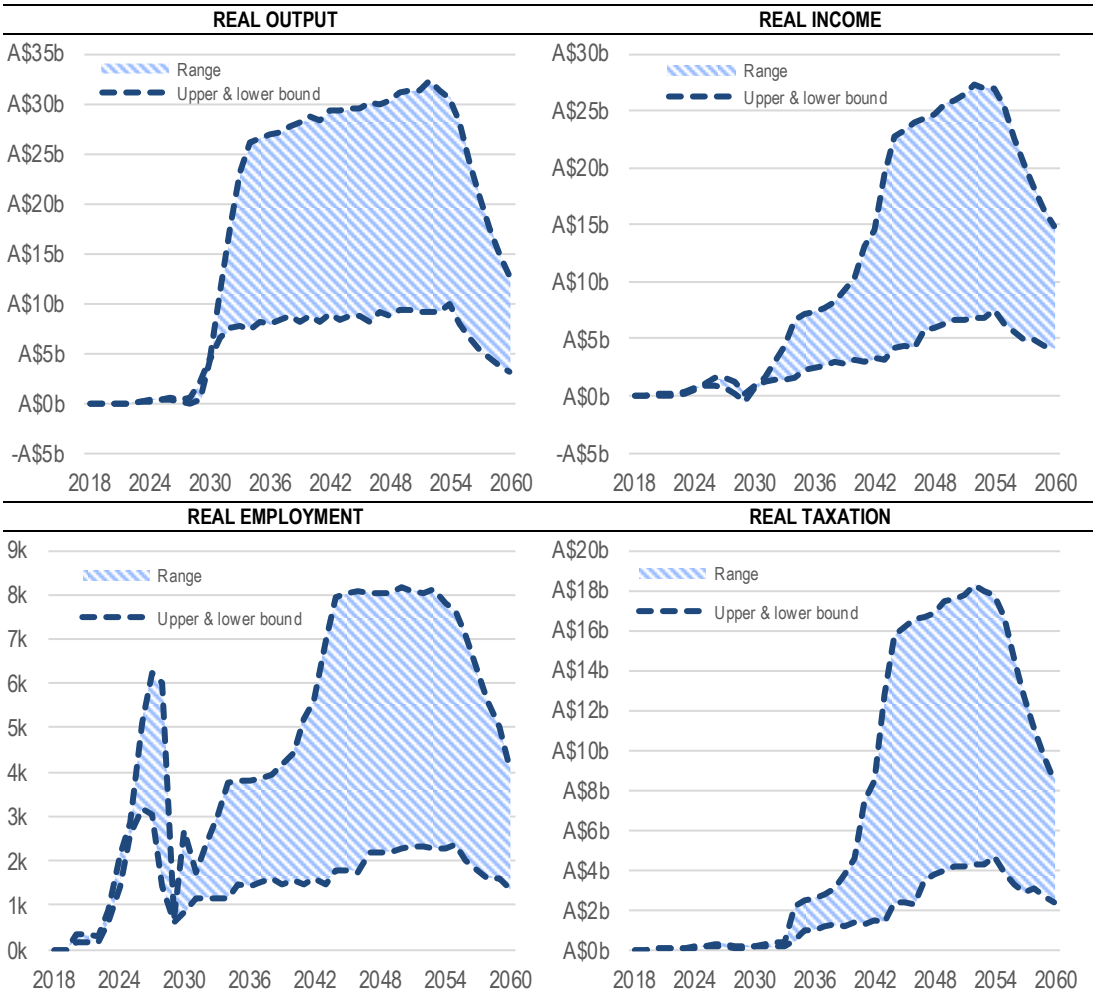
Comparison of Scenarios

As a preliminary study, a number of assumptions have necessarily been used to derive the overall results, including the potential size of a hydrocarbon discovery in the Great Australian Bight. Because of this uncertainty, ACIL Allen has modelled two plausible scenarios – a base and high case scenario. Based on the results from the two scenarios, over the study period it is estimated that the project will generate:

- the creation of between 1,648 FTE jobs and 4,962 FTE jobs per annum or a difference of 201 per cent;
- an increase in GDP (real output) of between A$243.1 billion and A$791 billion per annum or a difference of 255 per cent;
- an increase in real incomes of between A$131.6 billion and A$515.4 billion per annum or a difference of 292 per cent; and
- an increase in taxation payments of between A$70.6 billion and A$314.6 billion per annum or a difference of 346 per cent.

The comparison of the key economic parameters between the Base Case and the High Case are also presented in the chart below, and a range of outcomes is presented in the table below.

FIGURE ES 5 SUMMARY OF ECONOMIC CONTRIBUTION, COMPARISON OF SCENARIOS



SOURCE: ACIL ALLEN CONSULTING

TABLE ES 3 SUMMARY OF ECONOMIC CONTRIBUTION, COMPARISON OF SCENARIOS, ANNUAL AVERAGE CONTRIBUTION, A$ BILLION

Indicator	Base Case Development Scenario	High Case Development Scenario
Real output	A$5.9bn	A$19.3bn
Real income	A$3.2bn	A$12.6bn
Real taxation	A$1.7bn	A$7.7bn
Employment (FTE jobs)	1,648 FTE jobs	4,962 FTE jobs

SOURCE: ACIL ALLEN MODELLING

1 INTRODUCTION & OVERVIEW

The Australian Petroleum Production & Exploration Association (APPEA) has engaged ACIL Allen Consulting (ACIL Allen) to undertake a preliminary study and report on the economic impact of successful petroleum exploration and production in the Great Australian Bight (The Bight).

The Bight is a wide embayment of the Indian Ocean, indenting Australia's southern coast, extending eastward from West Cape Howe in Western Australia, to South West Cape in Tasmania[4]. The more generally accepted boundaries are from Cape Pasley east of Esperance, to Cape Carnot near Port Lincoln, a distance of approximately 1,160 km.

FIGURE 1.1 THE GREAT AUSTRALIAN BIGHT

SOURCE: ACIL ALLEN CONSULTING, ABC NEWS

[4] International Hydropathic Bureau.

The Bight hosts the Great Australian Bight Basin. Most of the Basin is in deep water, and around half is in water depths of over 3,000 metres.[5] The Bight contains three sub basins, the Ceduna, Duntroon and Eyre sub basins. Between 1972 and 2003, 12 exploration wells were drilled in the Basin, with no petroleum discoveries made during that time. Several international and Australian petroleum companies hold exploration permits in the Bight.

In undertaking this study, ACIL Allen has developed a financial model based on two production scenarios, where significant oil discoveries are made in the Great Australian Bight, and those discoveries are developed during the next decade. ACIL Allen has endeavoured to use assumptions in its modelling derived from credible sources, but recognises that the forecasting of some variables, such as future oil prices, the size of the hydrocarbon discovery, and field development costs, is difficult.

The financial models have been used as the source of inputs to the economic impact modelling using *Tasman Global*, ACIL Allen's Computable General Equilibrium (CGE) model of the Australian economy. The economic impacts of an oil basin development in the Great Australian Bight is reported and summarised in this report.

The study examines two possible development scenarios; a Base Case Development Scenario (Base Case) of a resource of 1.9 billion barrels of oil equivalent liquids, and a High Case Development Scenario (High Case) based on the production potential of the Bass Strait, of a resource of six billion barrels of oil equivalent liquids. A low and high case have been used to highlight a plausible range of development opportunities that could emerge in the Great Australian Bight.

For each scenario, it is assumed that the resource is commercialised by a number of ventures;

— under the Base Case, three proponents of different sizes are assumed to produce 1.9 billion barrels of oil equivalent liquids over the economic life of the ventures; and
— under the High Case, four proponents of different sizes are assumed to produce six billion barrels of oil equivalent liquids over the economic life of the ventures.

The economic impact of exploration and development in the Great Australian Bight is assessed on both production scenarios on an output basis, that is, the contribution that development makes to Gross Domestic Product or Gross State Product, on an income basis (real incomes), and in relation to the impact on employment (on a full time equivalent basis). The economic impact is also assessed based on the total taxation payments – that is both direct and indirect taxes – that result from the project.

1.1 Structure of Report

This report is presented in three key sections:

— **Section 2** provides an introduction to the economic profile of the South Australian economy over the past decade.
— **Section 3** provides a summary of the modelling framework, assumptions and financial results of each development scenario.
— **Section 4** provides results for the economic impact assessment modelling under both development scenarios.

The report also includes a detailed description of ACIL Allen's economic model, *Tasman Global*, this can be found in **Appendix A**.

[5] Australia Great Australian Bight exploration basin, Wood Mackenzie, December 2015.

1.2 Glossary of Key Economic and Financial Terms

All economic impact results are presented in terms of the direct plus the indirect (or flow on) impact of the study. This indirect impact is often referred to in other forums as the multiplier effect. This indirect impact embodies the effect of changes in demands from other industries which is caused when the initial impact from the construction and operations of a new project leads to more spending in the economy which creates more income and taxes which leads to further spending and so on. The indirect impact also embodies any crowding out effects as scarce resources (particularly labour and capital) are directed away from other possible economic activities toward the development.

Base Case Development Scenario (Base Case)

A development scenario that is modelled on a hydrocarbon discovery of 1.9 billion barrels of oil over the life of the project in the Great Australian Bight. This development scenario has been built off the initial work of Wood Mackenzie,[6] and updated based on industry feedback to reflect contemporary estimates. The assumptions underpinning this scenario are discussed further in Section 3.

High Case Development Scenario (High Case)

A development scenario that is modelled on a hydrocarbon discovery of six billion barrels of oil over the life of the project in the Great Australian Bight. This development scenario has been built off the initial work of Wood Mackenzie,[7] and updated based on industry feedback that the potential size of a development in the Great Australian Bight could be equivalent to the development in the Bass Strait[8]. The assumptions underpinning this scenario are discussed further in Section 3.

Gross Product or Real Economic Output

A measure of the size of an economy

Real economic output is a measure of the output generated by an economy over a period of time (typically a year). It represents the total dollar value of all goods and services produced over a specific time period and is considered as a measure of the size of the economy. At a national level, real economic output is referred to as Gross Domestic Product (GDP). At the state level, economic output (or GDP equivalent) is called Gross State Product (GSP) while at a regional level is usually called Gross Regional Product (GRP).

Real Incomes

A measure of the welfare of residents in an economy through their ability to purchase goods and services and to accumulate wealth

Although changes in real economic output are useful measures for estimating how much the output of the economy may change due to the development, changes in real income are also important as they provide an indication of the change in economic welfare of the residents of a region through their ability to purchase goods and services.

Real income, also referred to as Gross National Product, measures the income available for final consumption and saving after adjusting for inflation. An increase in real income means that there has been a rise in the capacity for consumption as well as a rise in the ability to accumulate wealth in the form of financial and other assets. The change in real income from a development is a measure of the change in the economic welfare of residents within an economy.

Employment

The number of net full time equivalent job years created as a result of a project

Employment is the direct and indirect (flow on) employment as a result of the development. The impact is created as a result of spending in the economy to construct and operate a project. It is a net

[6] Source: Wood Mackenzie, Great Australian Bight Exploration Basin, December 2015.
[7] Source: Wood Mackenzie, Great Australian Bight Exploration Basin, December 2015.
[8] Source: Chevron Australia appearance before Senate Environment and Communications References Committee, 16 November 2016.

effect meaning that it takes into account transfers of labour from one job to another (crowding out effects).

Job Years

Real employment is measured in job years. A job year is employment of one full time equivalent (FTE) person for one year. Alternatively it can be expressed as one 0.5 FTE person for two years, etc.

Net Present Value (NPV)

The value of a future stream of income (or expenses) converted into current terms by an assumed annual discount rate. The underlying premise is that receiving, say, $100 in 10 years is not 'worth' the same (i.e. is less desirable) than receiving $100 today.

For the purposes of this study, NPV calculations have been made based on a discount rate of seven per cent.

Net Cash Flows

The net cash flows of a company are defined as the gain or loss of a company's cash position over a period of time after all debts have been paid. If a company has a surplus of cash at the end of an accounting period they had positive cash flow. Similarly, if a company has a deficit of cash at the end of an accounting period they had negative cash flow.

Real and Nominal Dollars

Nominal dollars are dollars that are expressed in the actual dollars that are spent or earned in each year, including inflation effects. Real dollars have been adjusted to exclude any inflationary effects and therefore allow better comparison of economic impacts in different years. Over time, price inflation erodes the purchasing power of a dollar thereby making the comparison of a dollar of income in 2060 with a dollar of income in 2018 invalid. Adjusting nominal dollars into real dollars overcomes this problem.

1.3 Acronyms

The following acronyms are used throughout this report. These and their meaning are presented below.

APPEA	The Australian Petroleum Production & Exploration Association
CGE model	Computable General Equilibrium model, in this case *Tasman Global*, a model of the Australian economy
FPSO	Floating production, storage and offloading facilities
GDP	Gross Domestic Product – is the total market value of goods and services produced in an economy within a given period of time after deducting the cost of goods and services used in the process of production, but before deducting allowances for the consumption of fixed capital.
GSP	Gross State Product – is defined in the same way as GDP, however refers to production within a state or territory only.
GVA	Industry Gross Value Added – measures the value of industry production. It is used to measure the contribution of individual industries to the gross product of a state or territory.
mmbbl	Million barrels of oil or other hydrocarbon equivalent.
PRRT	Petroleum Resource Rent Tax – is a tax generally on profits generated from the sale of marketable petroleum commodities.[9]
NPV	Net present value – discounted at seven per cent for the purposes of this report.

[9] Australian Taxation Office, *Petroleum resource rent tax (PRRT)*, https://www.ato.gov.au/Business/Petroleum-resource-rent-tax/.

2 ECONOMIC CONTEXT

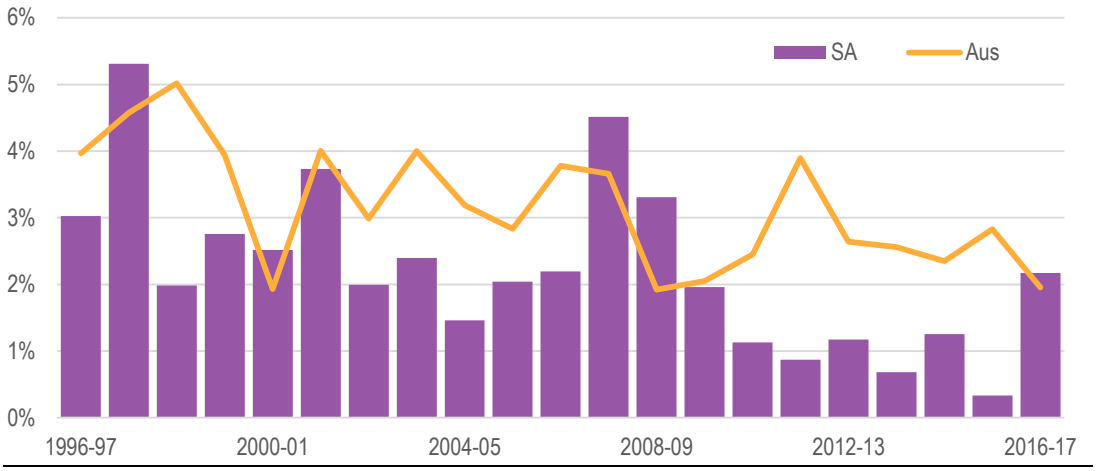
This chapter provides a broad overview of the South Australian economy, setting the scene to the potentially significant impact of a proposed development in the Great Australian Bight.

The South Australian economy has faced structural challenges (including those relating to the decision by car manufacturers to cease operations), but also cyclical challenges (associated with the decline in commodity prices) that have impacted on its economic performance in recent years.

These challenges have meant that South Australia's economic performance over the past decade have suffered, with its economy growing well below the rates experienced across Australia. The South Australian economy has grown at an average of 1.8 per cent per annum over the past decade, compared to 2.7 per cent per annum across Australia (refer to **Figure 2.1** below).

While the State's economy grew by 2.2 per cent in 2016-17 (above the national average of two per cent), this was more a function of the weak growth experienced the previous year (just 0.3 per cent). Further, in the six years prior, the economy averaged under one per cent growth per annum.

FIGURE 2.1 ECONOMIC GROWTH, SOUTH AUSTRALIA VS AUSTRALIA, ANNUAL PERCENTAGE CHANGE



SOURCE: ACIL ALLEN CONSULTING, ABS CAT. 5220.0

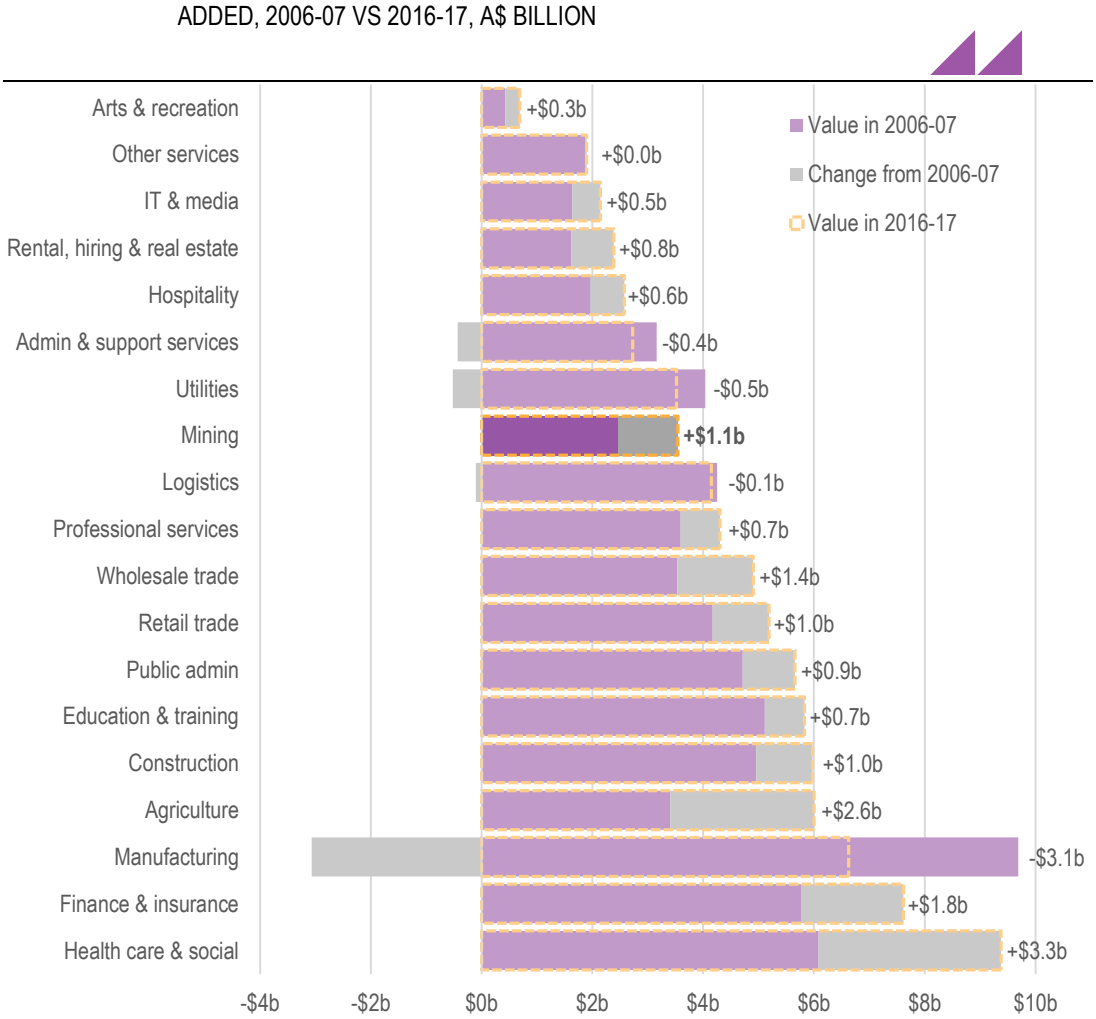
The key driver of the State's economy in 2016-17 was the agriculture industry, which grew by 28.9 per cent over the year and accounted for 73 per cent of industry growth in South Australia. Excluding the agriculture industry, South Australia's industry base grew by just 0.7 per cent in 2016-17.

The structural and cyclical challenges that the South Australian economy has gone through over the past decade has progressively eroded and narrowed the economic base of the State. The value of the State's manufacturing industry peaked in 2002-03 at $10.2 billion (or 14.8 per cent of industry output), compared to just $6.6 billion in 2016-17 (representing 7.8 per cent of industry output).

Like the experience across Australia, the mining industry (which includes oil and gas) has also increased its contribution to the South Australian economy over the past decade, growing by 44 per cent (or $1.1 billion) to $3.5 billion, elevating the industry to be the State's 12th largest (refer to **Figure 2.2** below).

Strong growth from the State's services and agriculture industries have helped offset some of the structural and cyclical challenges in South Australia's economy over the past decade. The largely government funded health care and social services industry has grown by 54 per cent (or $3.3 billion) to $9.4 billion and has become the State's largest industry. Significant contributions are also made by the State's finance and insurance industry, which has grown by 32 per cent (or $1.8 billion) to $7.6 billion, and agriculture, which has grown by 76 per cent (or $2.6 billion) to $6 billion.

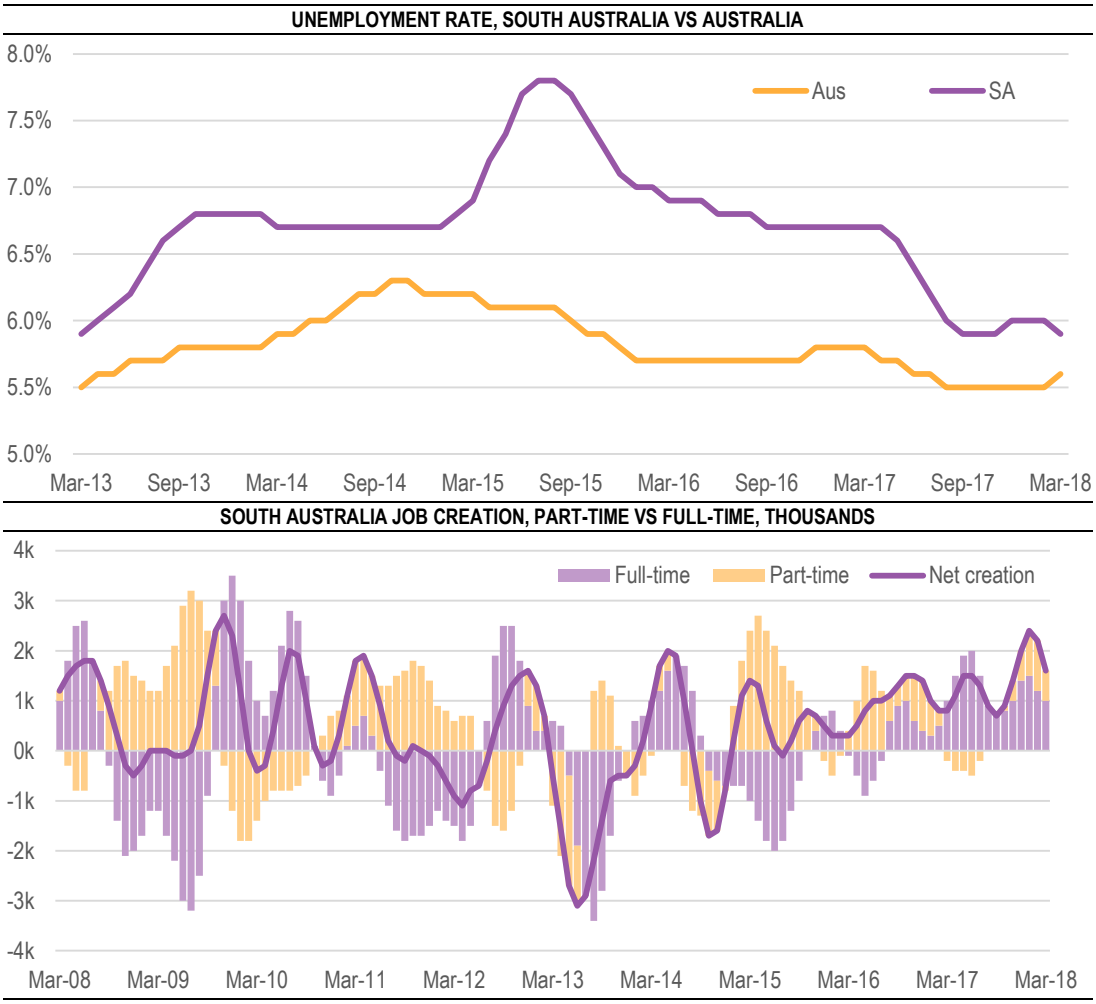
FIGURE 2.2 COMPOSITION OF THE SOUTH AUSTRALIAN ECONOMY, INDUSTRY GROSS VALUE ADDED, 2006-07 VS 2016-17, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING, ABS CAT. 5220.0

The State's labour market has followed a similar trend to its overall economic performance. Over the past decade, South Australia's unemployment rate has average 0.9 percentage points more than the national average (refer to **Figure 2.3** below). This gap peaked at 1.7 percentage points in mid-2015 when South Australia's unemployment rate peaked at 7.8 per cent. South Australia's unemployment rate has gradually declined since 2016, standing at 5.9 per cent in March 2018.

FIGURE 2.3 SOUTH AUSTRALIA LABOUR MARKET, UNEMPLOYMENT RATE AND JOB CREATION



SOURCE: ACIL ALLEN CONSULTING, ABS CAT. 6202.0

The fall in the unemployment rate has been a function of improved job prospects, with 60,700 jobs created over the past decade. However, the majority of jobs created over the past decade have been part-time (51,000), rather than full-time (9,700).

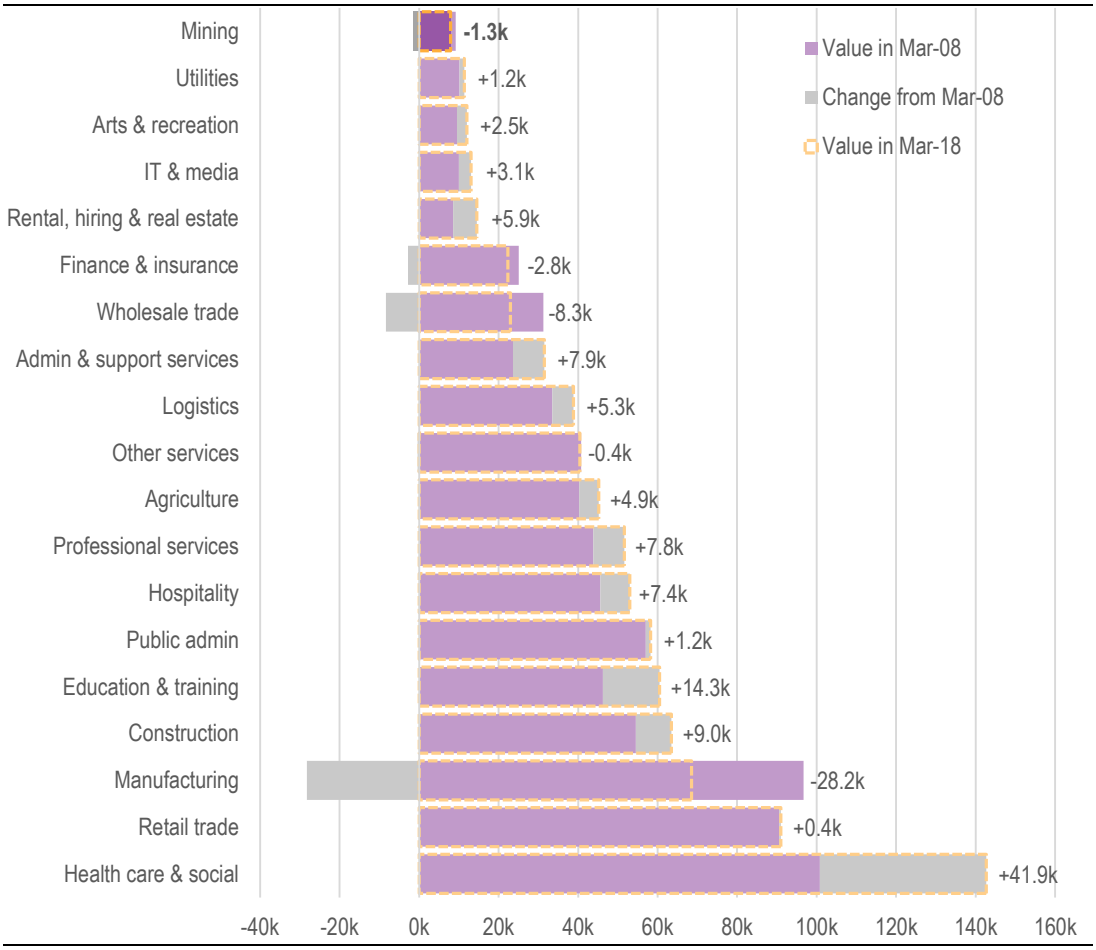
Strong part-time job creation can be explained when looking at the composition of the State's labour market (refer to **Figure 2.4** below). The State's two largest employing industries are health care and social services and retail trade, both of which have around half of their workforce working on a part-time basis.

The State's retail sector has seen the strongest employment growth over the past decade (41,900 jobs), offsetting losses in the State's manufacturing industry (28,200 jobs), where 82 per cent of the industry's employment are employed of a full-time basis.

South Australia's mining industry is not among the highest employing sectors in the state, but the majority of the people employed are on a full-time basis (94 per cent of 7,400 jobs), and in typically higher paying roles. However, despite the growth in the sector in terms of output over the past decade, the industry has shed 1,300 jobs. This reflects the likely focus on productivity and efficiencies in a lower commodity price environment.

The underlying weakness in the South Australia's economy reflects the absence of significant investment in industries outside of health care and retail. Over the past decade, business investment in South Australia has contracted by 14 per cent, standing at $8.9 billion in 2016-17.

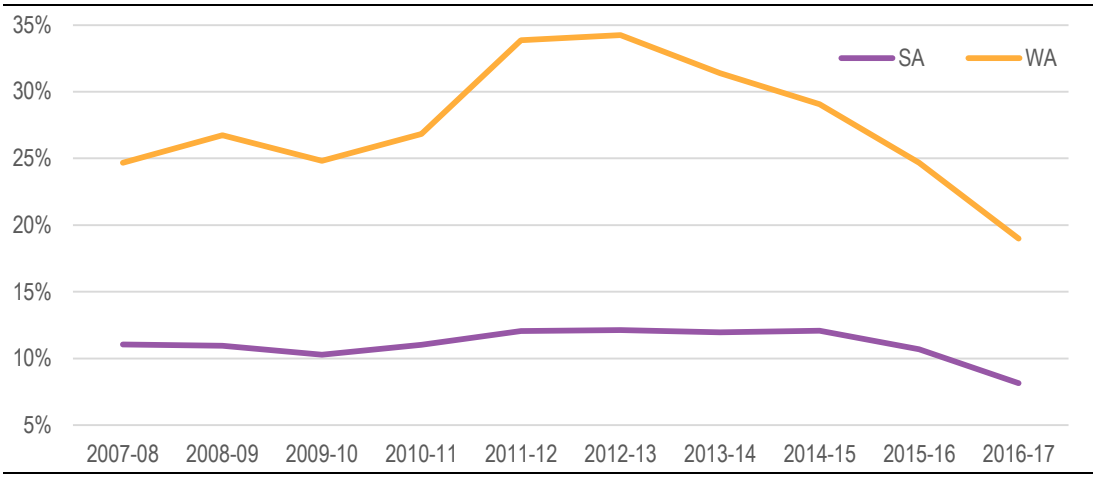
FIGURE 2.4 COMPOSITION OF THE SOUTH AUSTRALIAN LABOUR MARKET, INDUSTRY EMPLOYMENT, MARCH 2008 VS MARCH 2018, THOUSANDS



SOURCE: ACIL ALLEN CONSULTING, ABS CAT. 6203.0

As a share of the State's domestic economy, business investment has averaged 11 per cent over the past decade, which compares to an average of 28 per cent in Western Australia over the same period (refer to **Figure 2.5** below). Business investment in Western Australia peaked at $80.4 billion in 2012-13, and was driven by the development of the LNG industry. This level of investment in Western Australia equated to the total level of investment into the South Australian economy between 2010-11 and 2016-17.

FIGURE 2.5 BUSINESS INVESTMENT AS A SHARE OF DOMESTIC ECONOMY, SOUTH AUSTRALIA VS WESTERN AUSTRALIA



SOURCE: ACIL ALLEN CONSULTING, ABS CAT. 5220.0

3 MODELLING FRAMEWORK & METHODOLOGY

ACIL Allen has assembled data from various credible sources in order to construct a financial model of two scenarios in which exploration results in a discovery of hydrocarbons (in this case oil), and that discovery results in the development and operation of multiple oil projects in the Great Australian Bight basin.

The financial models and their assumptions were validated with APPEA and then used as input to ACIL Allen's CGE model, *Tasman Global*, which models the economic impact of the oil projects on the Australian and South Australian economies. Appendix A provides further details of *Tasman Global* and its key assumptions.

3.1 Modelling Framework

3.1.1 Financial Modelling

ACIL Allen has developed comprehensive discounted cash flow (DCF) models of the operations of potential development in the Great Australian Bight, and is the primary input into our proprietary economic model.

A DCF model is a detailed picture of an organisation's income, expenditure assets, investments, debt and taxation arrangements, which are projected forward. A detailed cash flow model was developed for each proponent for both development scenarios.

ACIL Allen's cash flow models will be used to estimate the **direct financial impacts** that are expected to result from the potential development over 40 years, including:

- revenues;
- operating costs;
- non-operating costs;
- taxation payments; and
- net cash flows.

3.1.2 Economic Modelling

The results from the cash flow modelling form the critical input into ACIL Allen's economic model, the *Tasman Global* computable general equilibrium (CGE) model. Further details on *Tasman Global* are found in Appendix A.

ACIL Allen estimated the economic impact of the potential development under both development scenarios on the Australian and South Australian economies, using the following indicators:

- real output (Gross Domestic Product, Gross State Product);

- real income (Gross Real Income);
- real exports;
- real employment (Full Time Equivalent employment, and by occupation classification); and
- taxation (by major heads of taxation).

The results for each indicator will be presented in terms of the direct impacts (for example, the direct taxation payments made) and the indirect impacts (this will be the primary output of the economic modelling, highlighting the flow on impacts of the potential development across the economy and industry).

3.2 Key Assumptions & Data Sources

The following section details the methodology used and the assumptions used to populate ACIL Allen's DCF model. The assumptions of ACIL Allen's DCF model are taken from the initial work of Wood Mackenzie,[10] and have been updated based on industry feedback to reflect contemporary estimates.

For this study, ACIL Allen has estimated two development scenarios; a resource the size of 1.9 billion barrels of oil equivalent liquids (Base Case Development Scenario) and a resource the size of six billion barrels of oil equivalent liquids (High Case Development Scenario).

Table 3.1 below presents the key inputs and assumption that underpins the DCF model under each scenario.

TABLE 3.1 KEY ASSUMPTIONS & DATA INPUTS

Data	Value	Source
Reporting type	Calendar year	APPEA
Study period	2020 to 2060	APPEA
Years to target production	4 years	ACIL Allen
Number of years at target production	24 years	ACIL Allen
Forecast exchange rate (1US$=A$)	0.75	ACIL Allen
Interest rate on debt	4%	ACIL Allen (based on industry feedback)
Capital depreciation rate	13.3%	ACIL Allen (based on ATO)
Average salary	US$200,000	ACIL Allen (based on industry feedback)
FPSO employment	200 FTEs	ACIL Allen (based on industry feedback)
Onshore employment	Between 100 FTEs and 350 FTEs	ACIL Allen (based on industry feedback)

Further explanation of key assumptions is presented below.

- ACIL Allen has assumed each Floating Production Storage and Offloading (FPSO) will require a crew and support staff of approximately 200 FTE employees. A further 100 FTE jobs (Base Case) and 350 FTE jobs will be required onshore to support the offshore activity, including in finance, legal, procurement, environment, health and safety, and drilling engineers.
- Petroleum Resource Rent Tax (PRRT) payments have been estimated using ACIL Allen's financial model. It should be noted that payments for PRRT are heavily influenced by oil prices and the expenditure profile of the project developer. ACIL Allen has used its understanding of this project and the methodology for calculating payments for PRRT to derive a PRRT payments schedule, based on the PRRT rate of 40 per cent.
- The Australian ownership in each project is assumed to be 15 per cent, which is broadly consistent with the Australian-owned share of production in all Australian offshore petroleum production. This assumption is important in understanding the flow of profits to shareholders from the project, and therefore the impact of the proposed development on incomes in an economy.

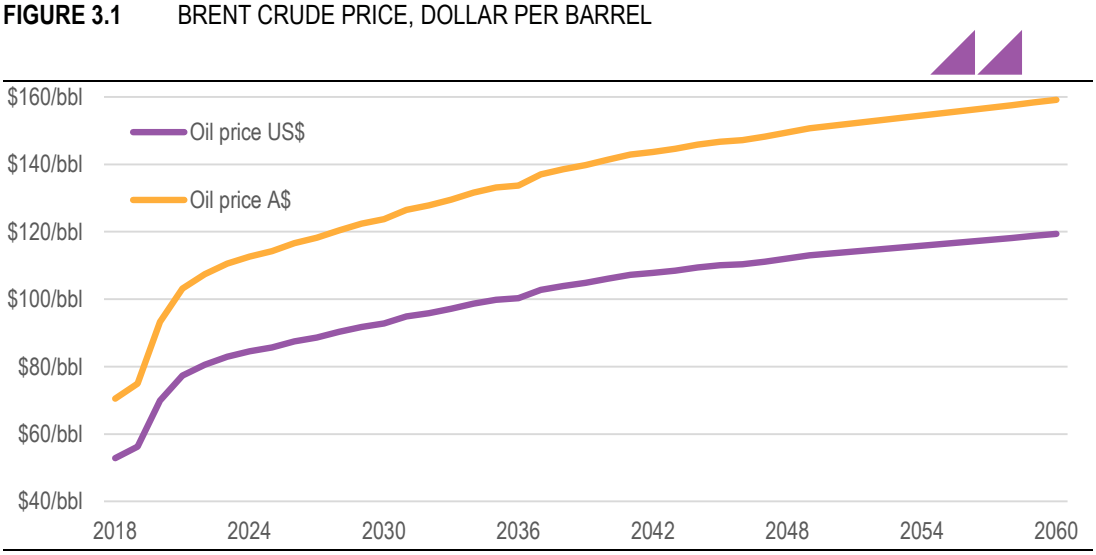
[10] Source: Wood Mackenzie, Great Australian Bight Exploration Basin, December 2015.

3.2.1 Brent Crude Prices

ACIL Allen has modelled the economic impact of development under one single price scenario. Brent crude oil price were sourced from the Energy Information Administration (EIA) and are presented in **Figure 3.1** below.

Forecast prices were converted from US Dollars to Australian Dollars using a flat exchange rate of US$0.75. Australian Dollar prices were then used to forecast revenues for each development scenario.

FIGURE 3.1 BRENT CRUDE PRICE, DOLLAR PER BARREL



SOURCE: ACIL ALLEN CONSULTING, EIA

3.3 Base Case Development Scenario

The Base Case Development Scenario (Base Case) is based off three projects being developed in the Great Australian Bight, totalling a resource of 1.9 billion barrels of oil equivalent liquids. The three projects have been modelled on the basis of:

- Project 1: a resource of 1,000 million barrels;
- Project 2: a resource of 700 million barrels; and
- Project 3: a resource of 200 million barrels.

Each project utilises an FPSO, which is tied to multiple subsea wells. ACIL Allen has estimated that a total of 101 wells will be required across all projects over the economic life of the development (including exploration wells), producing at a maximum rate of 62 million barrels per annum between 2032 and 2054.[11] To put the significance of a development of this scale into context, Australia's total production of petroleum liquids was 122 million barrels in 2017, an peak production was 287 million barrels in 2000.

Capital expenditure across all projects is estimated to total A$70.4 billion. The majority of expenditure has been assumed to be funded by a combination of equity, cash flows and debt. During peak production, it is assumed that operational costs across the development will average of A$8.20 per barrel.[12]

[11] ACIL Allen based on industry feedback and, Wood Mackenzie, *Great Australian Bight Exploration Basin*, December 2015.
[12] ACIL Allen based on industry feedback and, Wood Mackenzie, *Great Australian Bight Exploration Basin*, December 2015.

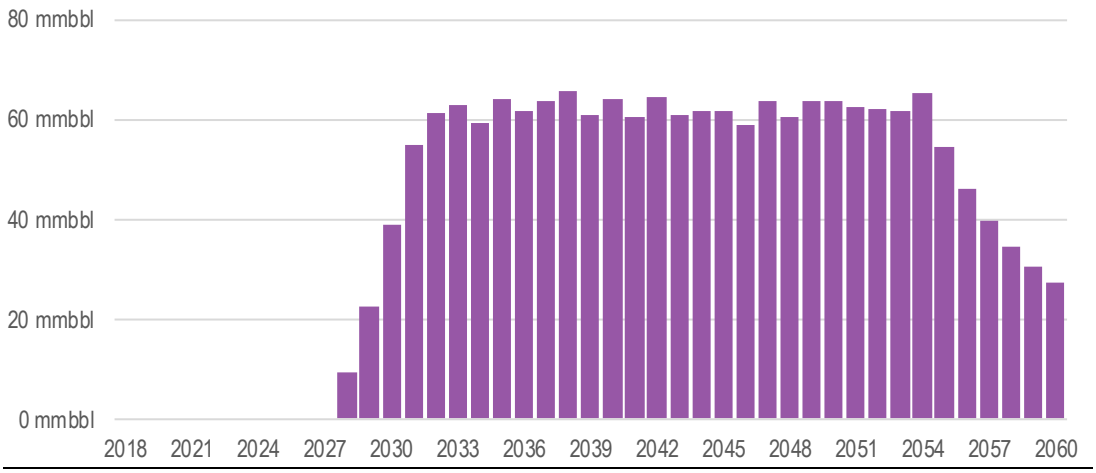
3.3.1 Production

ACIL Allen has assumed the exploration drilling results in the discovery and development of an oil basin. The model does not assume any production and sale of natural gas, either to the domestic market or as Liquified Natural Gas (LNG).

The development of the discoveries utilises FPSO facilities, with no crude or product pipeline infrastructure to the mainland, nor any processing of the crude oil on the mainland.

Under the Base Case a resource of 1.9 billion barrels of oil equivalent liquids has been modelled (refer to **Figure 3.2**). Production is first realised in 2028 at nine million barrels and ramps up to an average of 62 million barrels per annum between 2032 and 2054, with production volumes scaling back as the resource is depleted beyond the end of the study period.

FIGURE 3.2 BASE CASE DEVELOPMENT SCENARIO; PRODUCTION PROFILE, MILLION BARRELS



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

Based on the oil prices and the production profile presented above, revenues of A$1.1 billion will be realised in 2028, scale up to an average of A$8.9 billion between 2032 and 2054, and then slowly decline thereafter in line with falling production volumes.

3.3.2 Taxation

Payroll taxation is estimated to be paid to the South Australian Government as each project scales up its workforce. Once each project becomes cash flow positive, has paid off its debt obligations and recovered its losses, it becomes liable for profits-based taxation payments to the Commonwealth (refer to **Figure 3.3**).

Over the study period, total direct taxation payments from the development is estimated to total A$60.2 billion at an average of A$1.6 billion per annum. Over the study period, taxation payments are estimated to average A$34.20 per barrel, peaking at A$77 per barrel in 2058.

From a taxation perspective, the development goes through three phases:

1. Between 2022 and 2033 payments are solely payroll taxation, with total payments averaging A$14 million per annum;
2. Between 2034 and 2047 payments are mainly driven company taxation, with total payments averaging A$1.2 billion per annum; and
3. Between 2048 and 2060 payments also include PRRT, with total payments averaging A$3.2 billion per annum.

Payroll Taxation

Payments to the South Australian Government are first estimated to occur in 2023 and total A$6 million. Once all three projects are operational (between 2029 and 2060), payments are

estimated to average A$18 million per annum. Over the study period, payments are estimated to total A$655 million at an average of A$17 million per annum.

Company Taxation

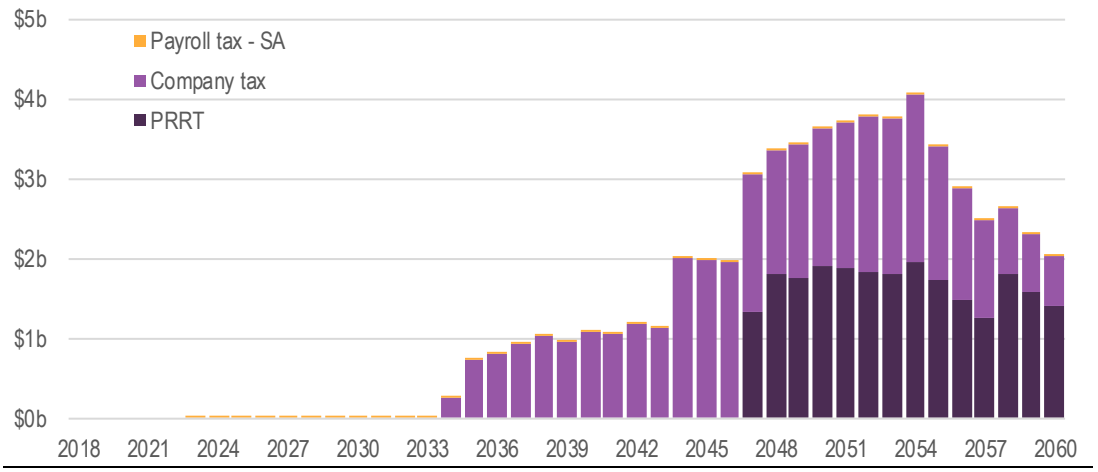
Company taxation payments are first estimated to be realised in 2034 (A$245 million). Payments are estimated reach a peak of A$2 billion in 2046, before reducing as each project becomes liable for PRRT in 2047.

Company taxation is estimated to total A$36 billion at an average of A$1.3 billion per annum over the period when the projects are liable.

PRRT

PRRT payments are first estimated to be realised in 2047 (A$1.3 billion), which is 15 years after the proposed development scales to full production (in 2032). This reflects the significant upfront capital investment required under the Base Case (A$70.4 billion). PRRT payments from the development are estimated to reach a peak of A$1.9 billion in 2054, before gradually declining in line with production volumes. PRRT payments are estimated to total A$23.5 billion at an average of A$1.7 billion per annum over the period when the projects are liable.

FIGURE 3.3 BASE CASE DEVELOPMENT SCENARIO; TAXATION, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

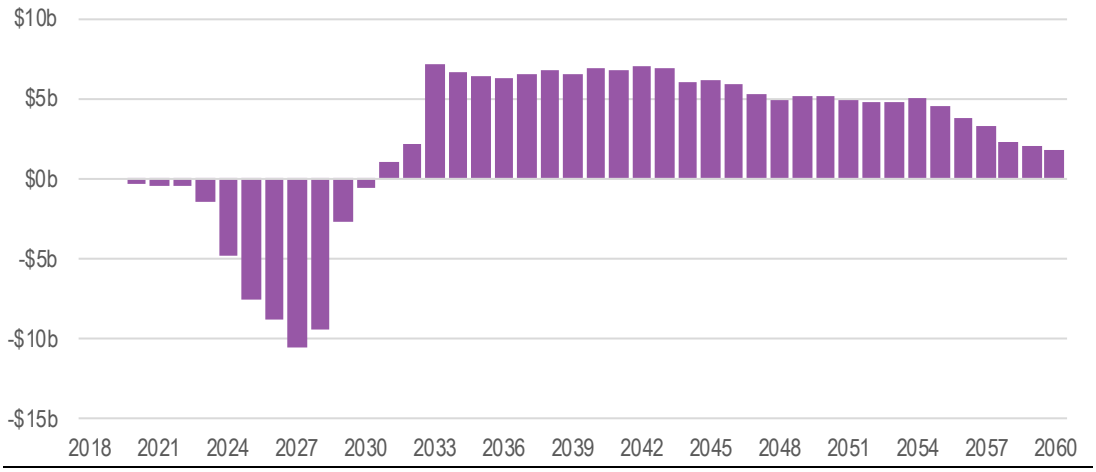
3.3.3 Net Cash Flows

Net cash flows refer to the difference between the cash flows in and the cash flows out, in a given period of time. It takes into consideration the cash cost of capital, operations, taxes paid and abandonment. Estimates for the net cash flows of development in Great Australian Bight under the Base Case are presented in **Figure 3.4**.

Production from the development is first realised in 2028, when it generates its first cash flow. However, during the first years of production, the capital and operational cash flows out are estimated to be higher, with negative net cash flows projected until 2030.

The first positive net cash flow of A$1.1 billion is realised in 2031 and gradually increases to peak at A$7 billion in 2042. During steady state production (2032 and 2054), net cash flows are estimated to average A$5.8 billion per annum. Over the study period, net cash flows average A$2.6 billion per annum, totalling A$104.9 billion.

FIGURE 3.4 BASE CASE DEVELOPMENT SCENARIO; NET CASH FLOWS, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

3.4 High Case Development Scenario

The High Case Development Scenario (High Case) is based off four projects being developed in the Great Australian Bight, totalling a resource of 6 billion barrels of oil equivalent liquids. The four projects have been modelled on the basis of:

- Project 1: a resource of 2,300 million barrels;
- Project 2: a resource of 2,300 million barrels;
- Project 3: a resource of 1,000 million barrels; and
- Project 4: a resource of 400 million barrels.

Each project utilises an FPSO, which is tied to multiple subsea wells. ACIL Allen has estimated that a total of 272 wells will be required across all projects over the economic life of the development (including expiration wells), producing at a maximum rate of 199 million barrels per annum between 2034 and 2054.[13]

Capital expenditure across all projects is estimated to total A$170.1 billion. The majority of expenditure has been assumed to be funded by a combination of equity, cash flows and debt. During peak production, it is assumed that operational costs across the development will average of A$5.30 per barrel.[14]

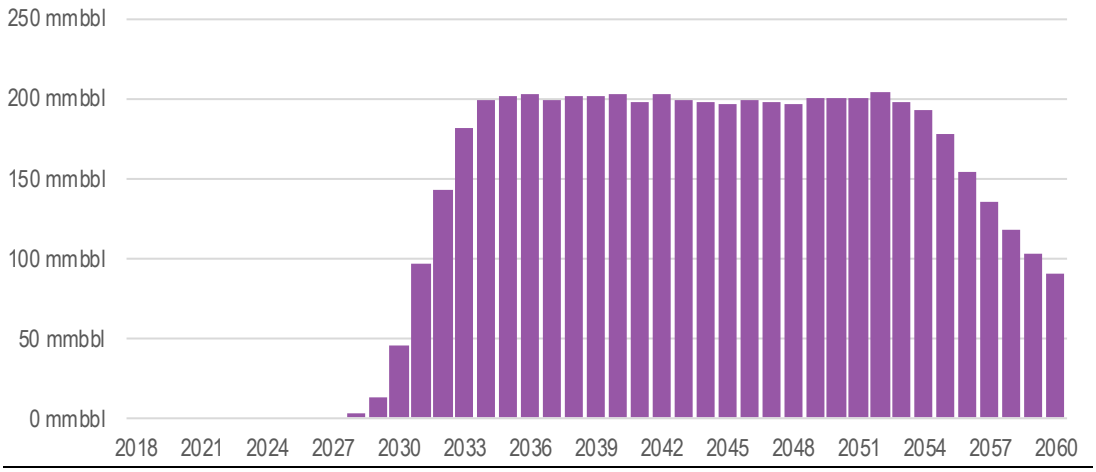
3.4.1 Production

ACIL Allen has assumed the exploration drilling results in the discovery and development of an oil basin. The model does not assume any production and sale of natural gas, either to the domestic market or as LNG. The development of the discoveries utilises FPSO facilities, with no crude or product pipeline infrastructure to the mainland, nor any processing of the crude oil on the mainland.

Under the High Case a resource of six billion barrels of oil equivalent liquids has been modelled (refer to **Figure 3.2**). Production is first realised in 2028 at three million barrels and ramps up to an average of 199 million barrels per annum between 2034 and 2054, before scaling back as the resource is depleted beyond the end of the study period.

[13] ACIL Allen based on industry feedback and, Wood Mackenzie, *Great Australian Bight Exploration Basin*, December 2015.
[14] ACIL Allen based on industry feedback and, Wood Mackenzie, *Great Australian Bight Exploration Basin*, December 2015.

FIGURE 3.5 HIGH CASE DEVELOPMENT SCENARIO; PRODUCTION PROFILE, MILLION BARRELS



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

Based on the oil prices and the production profile presented above, revenues of A$393.7 million will be realised in 2028, scale up to an average of A$28.8 billion between 2034 and 2054, and then decline thereafter in line with falling production volumes.

3.4.2 Taxation

Payroll taxation is estimated to be paid to the South Australian Government as each project scales up its workforce. Once each project is cash flow positive, has paid off its debt obligations and recovered its losses, it becomes liable for profits-based taxation payments to the Commonwealth (refer to **Figure 3.3**).

Over the study period, total direct taxation payments from the development is estimated to total A$270.8 billion at an average of A$7.1 billion per annum. Over the study period, taxation payments are estimated to average A$46.70 per barrel, peaking at A$82.30 per barrel in 2056.

From a taxation perspective, the development goes through three phases:

1. Between 2023 and 2034 payments are largely payroll taxation, with total payments averaging A$18 million per annum;
2. Between 2035 and 2041 payments are mainly driven company taxation, with total payments averaging A$2.8 billion per annum; and
3. Between 2042 and 2060 payments also include PRRT, with total payments averaging A$13 billion per annum.

Payroll Taxation

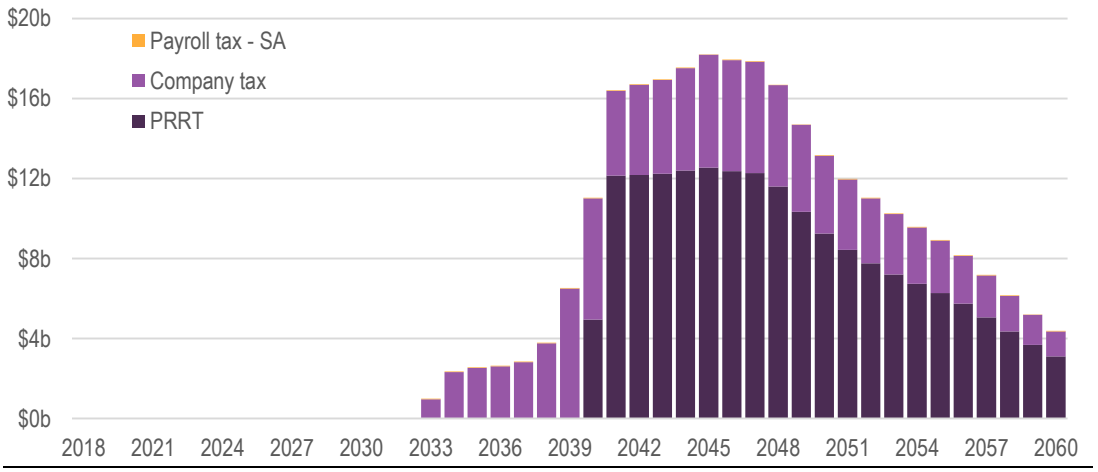
Payments to the South Australian Government are first estimated to occur in 2023 at A$3 million. Once all four projects are operational (between 2031 and 2060), payments are estimated to average A$27 million per annum. Over the study period, payments are estimated to total A$932 million at an average of A$25 million per annum.

Company Taxation

Company taxation payments are first estimated to be realised in 2034 (A$1.6 billion). Payments are estimated reach a peak of A$6.4 billion in 2042, the year before PRRT starts to be paid.

Company taxation payments are estimated to total A$105 billion at an average of A$3.9 billion per annum over the period when company taxation is paid.

FIGURE 3.6 HIGH CASE DEVELOPMENT SCENARIO; TAXATION, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

PRRT

PRRT payments are first estimated to be realised in 2042 (A$569 million), which is 10 years after the proposed development scales to full production (in 2032). This reflects the significant upfront capital investment required under the High Case (A$170.1 billion). Payments from the development are estimated to reach a peak of A$10.8 billion in 2052, before gradually declining in line with production volumes. Payments are estimated to total A$164.9 billion at an average of A$8.7 billion per annum over the period when PRRT payments are made.

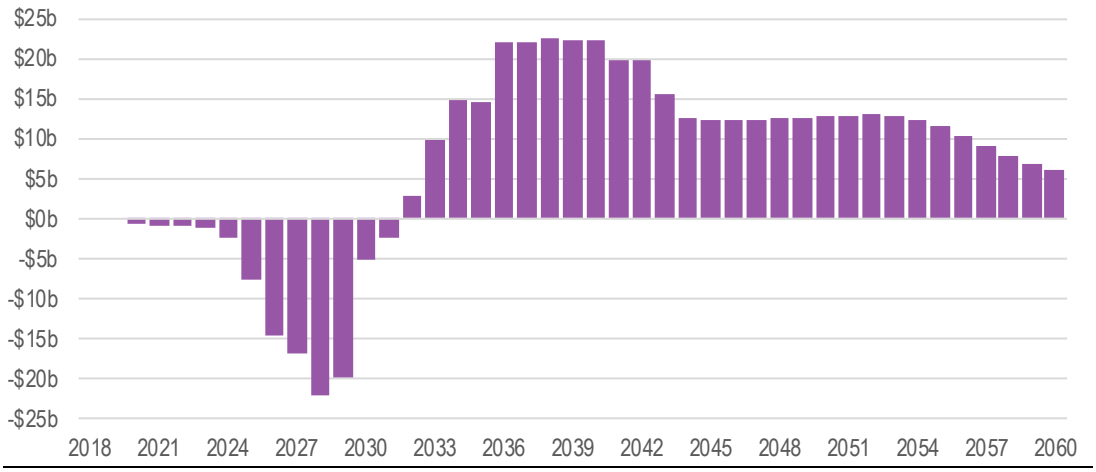
3.4.3 Net Cash Flows

Net cash flows refer to the difference between the cash flows in and the cash flows out, in a given period of time. It takes into consideration the cash cost of capital, operations, taxes paid and abandonment. Estimates for the net cash flows of development in Great Australian Bight under the High Case are presented in **Figure 3.4**.

Production from the development is first realised in 2028, when it generates its first cash flow in. However, during the first years of production, the capital and operational cash flows out are estimated to be higher, with negative net cash flows projected until 2031.

The first positive net cash flow of A$2.8 billion is realised in 2032 and gradually increases to peak at A$22.5 billion in 2038. During steady state production (2034 and 2054), net cash flows are estimated to average A$15.9 billion per annum. Over the study period, the net cash flows average A$7.3 billion per annum, totalling A$301.3 billion.

FIGURE 3.7 HIGH CASE DEVELOPMENT SCENARIO; NET CASH FLOWS, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

3.5 Comparison of Scenarios

As a preliminary study, a number of assumptions have necessarily been used to derive the overall results, including the potential size of a hydrocarbon discovery in the Great Australian Bight.

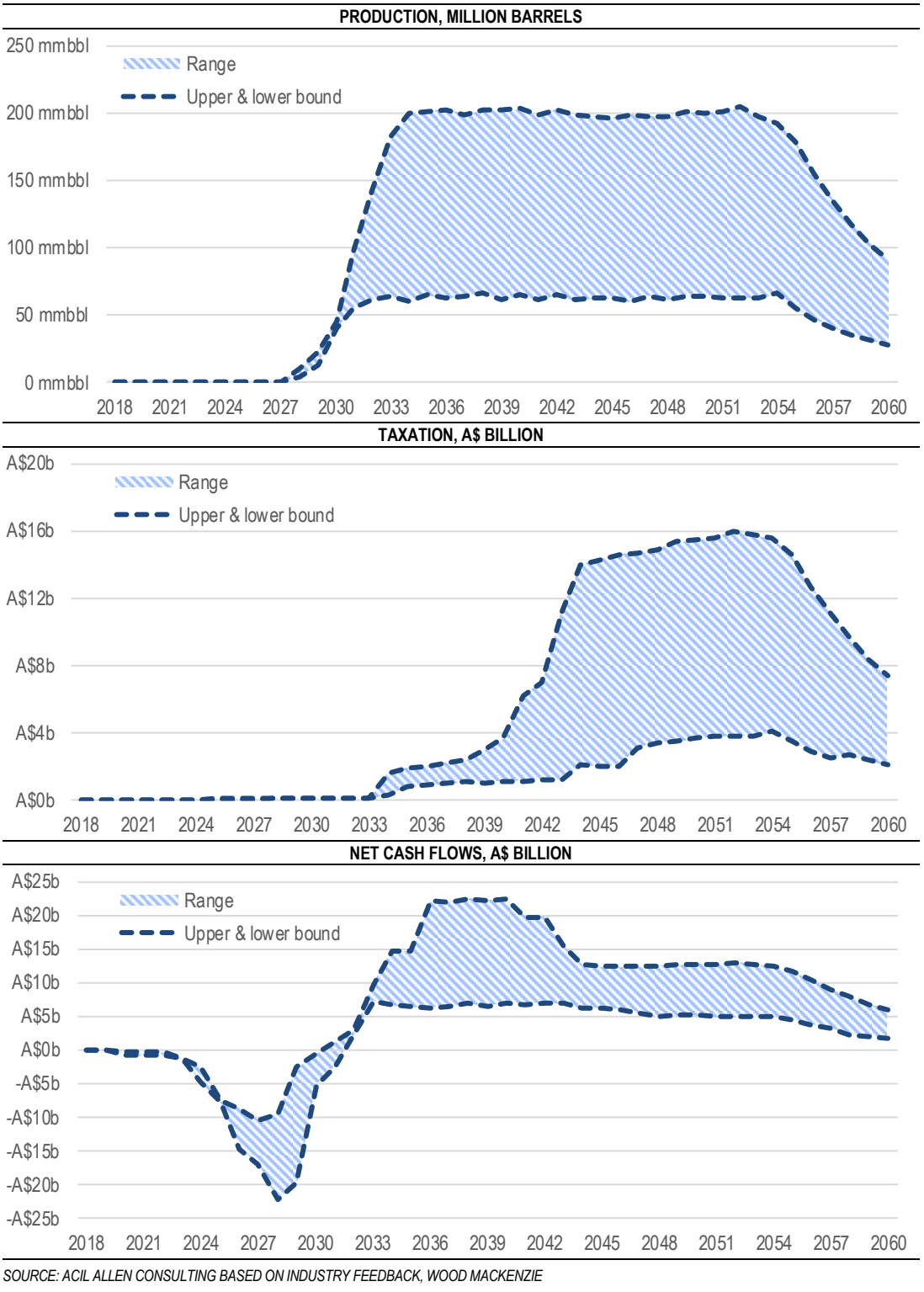
As a result, ACIL Allen has undertaken an economic impact assessment of two plausible scenarios – a resource the size of 1.9 billion barrels of oil equivalent and of a resource the size of six billion barrels of oil equivalent. To put the significance of these scenarios into context, the Bass Strait development has produced over four billion barrels of crude oil and a further eight billion cubic feet of gas since the development commenced in 1969.

Figure 3.8 below presents the degree to which the financial results vary depending on development scenarios. Because ACIL Allen has not modelled the impact different oil prices have on the economics of development, it is production volumes that drive the results of taxation and net cash flow estimates (the key inputs into *Tasman Global*).

Overall, the increase in the resource size under each scenario produces an equally large increase in overall production volumes over the study period, from 1.8 billion barrels to 5.4 billion barrels. This in turn generates a significant increase in taxation payments (from A$60.2 billion to A$280.8 billion), with PRRT payments driving the increase between the two scenarios (from A$23.5 billion to A$164.9 billion).

Increased production volumes under the High Case also provides a significant boost to the level of net cash flows, although this is moderated to some extent by higher taxation payments. As a result, the increase in net cash flows is not expected to increase to the same degree as overall production volumes (from A$104.9 billion to A$301.3 billion).

FIGURE 3.8 BASE CASE VS HIGH CASE DEVELOPMENT SCENARIO



SOURCE: ACIL ALLEN CONSULTING BASED ON INDUSTRY FEEDBACK, WOOD MACKENZIE

4 ECONOMIC IMPACT ASSESSMENT

This section explores the broader economic impacts of the successful petroleum exploration and production in the Great Australian Bight over the study period from 2020 to 2060 for South Australia and Australia using ACIL Allen's *Tasman Global* computable general equilibrium model.

The economic impact is assessed on an output basis (Gross Domestic Product, Gross State Product), on an income basis (real incomes), and in relation to the impact on employment (on a full time equivalent basis). The economic impact is also assessed based on the total taxation payments – that is both direct and indirect taxes – that result from the project. These results are produced for both the Base Case and High Case production scenarios.

4.1 Real Economic Output

Under the assumptions of the modelled exploration and development of significant oil discoveries in the Great Australian Bight, it is projected that the real GSP of South Australia and the real GDP of Australia will increase significantly.

The shape of the projected increase in real economic output over time primarily reflects the scaling up of production once the projects are operational. The step down in economic output towards the end of the study period also reflects the production profile of the projects. The construction phase for each of the assumed oil discoveries has a small impact on real economic output because it is assumed that the FPSO's will be constructed offshore. The real output impact is primarily reflected through the impact development has on value of South Australia's and Australia's exports of oil to international markets.

4.1.1 Base Case Development Scenario

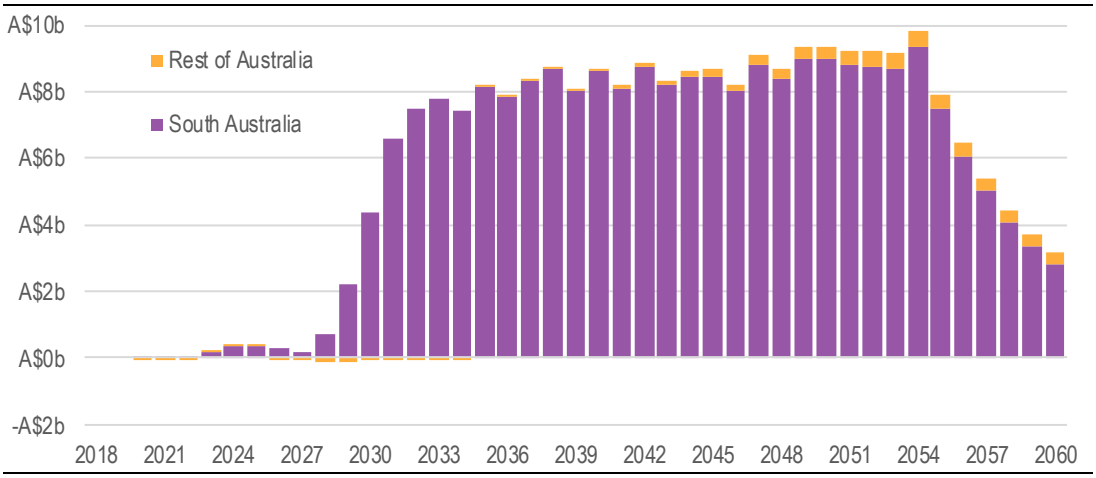
Under the Base Case, real economic output across Australia is projected to increase on average by A$5.9 billion per annum over the study period, and by a total of A$243.1 billion over the study period (refer to **Figure 4.1** below). Due to development occurring off the coast of South Australia, the majority of the impact is estimated to be realised in South Australia.

The real economic output of South Australia is projected to increase on average by A$5.8 billion per annum over the study period, and in total by A$237 billion. The petroleum development in the Bight, if materialised as modelled, represent an increase of around six per cent in South Australia's annual GSP compared to the present.

Throughout the Rest of Australia[15], it is projected real output will increase on average by A$149.3 million per annum over the study period, and in total by A$6.1 billion.

[15] Throughout this study, "Rest of Australia" refers to all of Australia minus the South Australian economy.

FIGURE 4.1 CONTRIBUTION TO REAL ECONOMIC OUTPUT, BASE CASE DEVELOPMENT SCENARIO, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

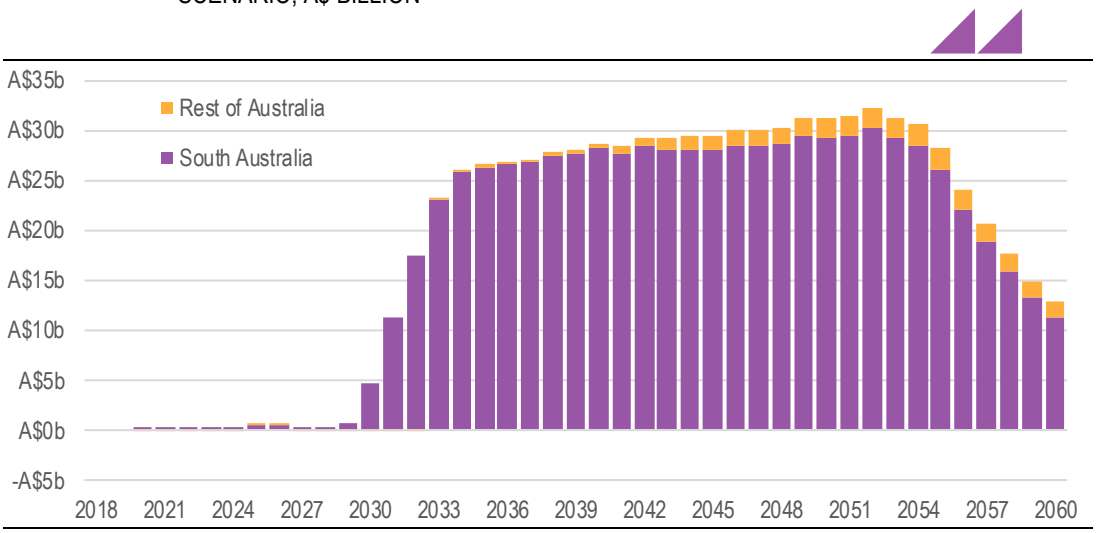
4.1.2 High Case Development Scenario

Under the High Case, real economic output across Australia is projected to increase on average by A$19.3 billion per annum over the study period, and by a total of A$791 billion over the study period (refer to **Figure 4.2** below). Due to development occurring off the coast of South Australia, the majority of the impact is estimated to be realised in South Australia.

The real economic output of South Australia is projected to increase on average by A$18.4 billion per annum over the study period, and in total by A$755.4 billion. The petroleum development in the Bight, if materialised as modelled, represent an increase of over 18 per cent in South Australia's annual GSP compared to the present.

Throughout the Rest of Australia, it is projected real output will increase on average by A$0.9 billion per annum over the study period, and in total by A$35.5 billion.

FIGURE 4.2 CONTRIBUTION TO REAL ECONOMIC OUTPUT, HIGH CASE DEVELOPMENT SCENARIO, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

4.1.3 Comparison of Scenarios

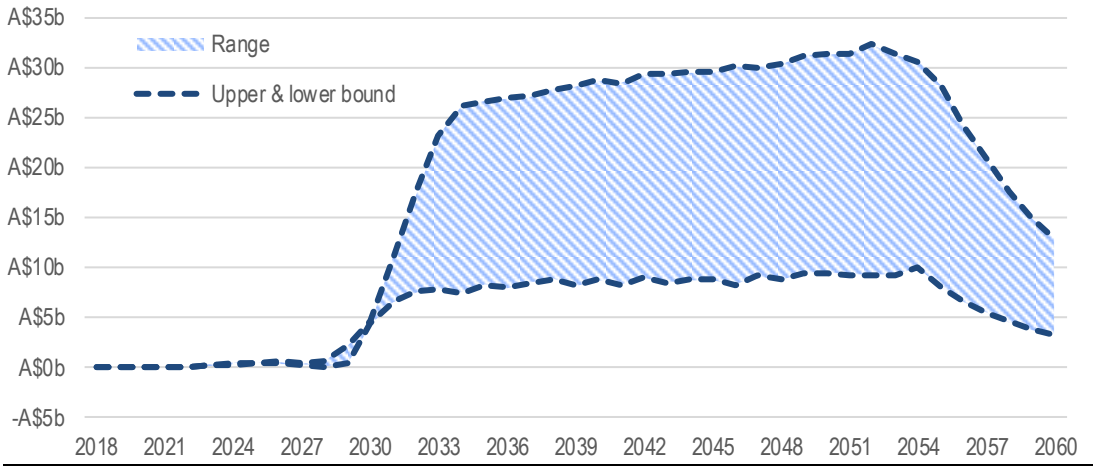
As a preliminary study, a number of assumptions have necessarily been used to derive the overall results, including the potential size of a hydrocarbon discovery in the Great Australian Bight.

As a result, ACIL Allen has undertaken an economic impact assessment of two plausible scenarios – a resource the size of 1.9 billion barrels of oil equivalent and of a resource the size of six billion barrels of oil equivalent.

Figure 4.3 below presents the degree to which real output varies depending on development scenario. Because ACIL Allen has not modelled the impact different oil prices have on the economics of development, it is production volumes that drive the results of taxation and net cash flow estimates (the key inputs into *Tasman Global*).

Relative to the Base Case, under the High Case real output is estimated to increase more than three-fold from A$243.1 billion to A$791 billion, or on average from A$5.9 billion to A$19.3 billion per annum.

FIGURE 4.3 CONTRIBUTION TO REAL ECONOMIC OUTPUT, COMPARISON OF SCENARIOS, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

4.2 Real Income

ACIL Allen estimates that development in Great Australian Bight will have a significant impact on real incomes across Australia, and particularly in South Australia. Real income is a measure of the economic welfare (or standard of living) improvement as a result of the development. The change in real income captures the effect of net foreign income transfers associated with ownership of the capital along with changes in the purchasing power of Australian residents.

The real income impact of the development is different to the real output impact because, in an output sense, the value of the development's production is realised in South Australia, whereas in an income sense, the value of the development's production is realised through profits generated and taxation payments made, both of which get transferred to the rest of Australia.

A significant real income impact is still realised in South Australia, through increased employment and a redistribution of the profits-based taxation payments from the Commonwealth back to the State. Taxation payments made to the South Australian Government also contribute to the real income impact in South Australia.

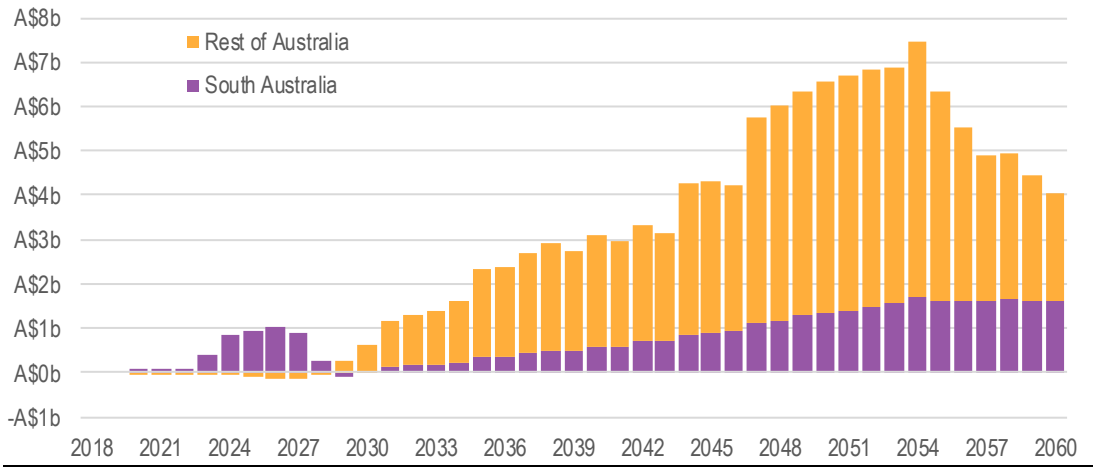
4.2.1 Base Case Development Scenario

Under the Base Case, real income across Australia is projected to increase on average by A$3.2 billion per annum over the study period, and by a total of A$131.6 billion over the study period

(refer to **Figure 4.4** below). Due to transfer of profits-based taxation payments from South Australia to the Commonwealth and the assumed ownership structure of the proponents of the development, the majority of the impact is estimated to be realised in Rest of Australia.

The real income impact in South Australia is projected to increase on average by A$0.8 billion per annum over the study period, and in total by A$33.4 billion. Throughout the Rest of Australia, real incomes are projected will increase on average by A$2.4 billion per annum over the study period, and in total by A$98.1 billion.

FIGURE 4.4 CONTRIBUTION TO REAL INCOME, BASE CASE DEVELOPMENT SCENARIO, A$ BILLION

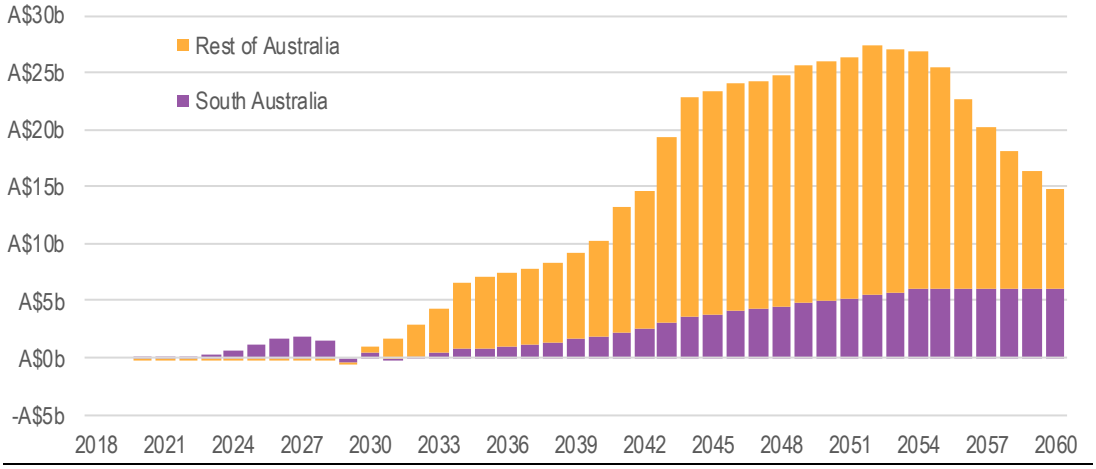


SOURCE: ACIL ALLEN CONSULTING

4.2.2 High Case Development Scenario

Under the Base Case, real income across Australia is projected to increase on average by A$12.6 billion per annum over the study period, and by a total of A$515.4 billion over the study period (refer to **Figure 4.5** below). Due to transfer of profits-based taxation payments from South Australia to the Commonwealth and the assumed ownership structure of the proponents of the development, the majority of the impact is estimated to be realised in Rest of Australia.

FIGURE 4.5 CONTRIBUTION TO REAL INCOME, HIGH CASE DEVELOPMENT SCENARIO, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

The real income impact in South Australia is projected to increase on average by A$2.8 billion per annum over the study period, and in total by A$113.3 billion. Throughout the Rest of Australia, it is projected real incomes will increase on average by A$9.8 billion per annum over the study period, and in total by A$402.1 billion.

4.2.3 Comparison of Scenarios

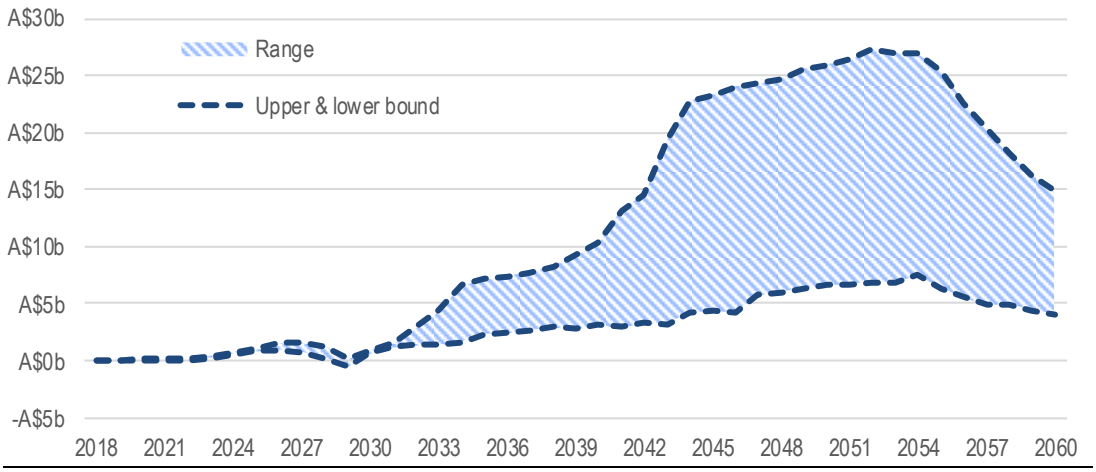
As a preliminary study, a number of assumptions have necessarily been used to derive the overall results, including the potential size of a hydrocarbon discovery in the Great Australian Bight.

As a result, ACIL Allen has undertaken an economic impact assessment of two plausible scenarios – a resource the size of 1.9 billion barrels of oil equivalent and of a resource the size of six billion barrels of oil equivalent.

Figure 4.6 below presents the degree to which real income varies depending on development scenario. Because ACIL Allen has not modelled the impact different oil prices have on the economics of development, it is production volumes that drive the results of taxation and net cash flow estimates (the key inputs into *Tasman Global*).

Relative to the Base Case, under the High Case real income is estimated to increase nearly four-fold from A$131.6 billion to A$515.4 billion, and on average from A$3.2 billion to A$12.6 billion.

FIGURE 4.6 CONTRIBUTION TO REAL INCOME, COMPARISON OF SCENARIOS, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

4.3 Real Employment

Estimating the wider employment impacts of a major project such as this development is difficult, and depends on a range of assumptions. For this study, ACIL Allen has conservatively assumed that there will be no additional net foreign migration compared to the reference case (although interstate migration is allowed).

Further, ACIL Allen has assumed that there is a constrained labour market with a moderate unemployment rate (of between 5.0 per cent and 6.5 per cent) throughout the study period, which means many of the additional jobs opportunities created by the development will be met by moving labour away from other, more marginal, economic activities. These assumptions generate more conservative projections of the net employment impacts associated with the project.

The projected employment benefits for the South Australian economy broadly aligns with the direct and indirect employment opportunities expected by developing and operating the new fields, while the projected nation-wide impacts reflect the employment stimulated through the increased consumption generated by the additional real income.

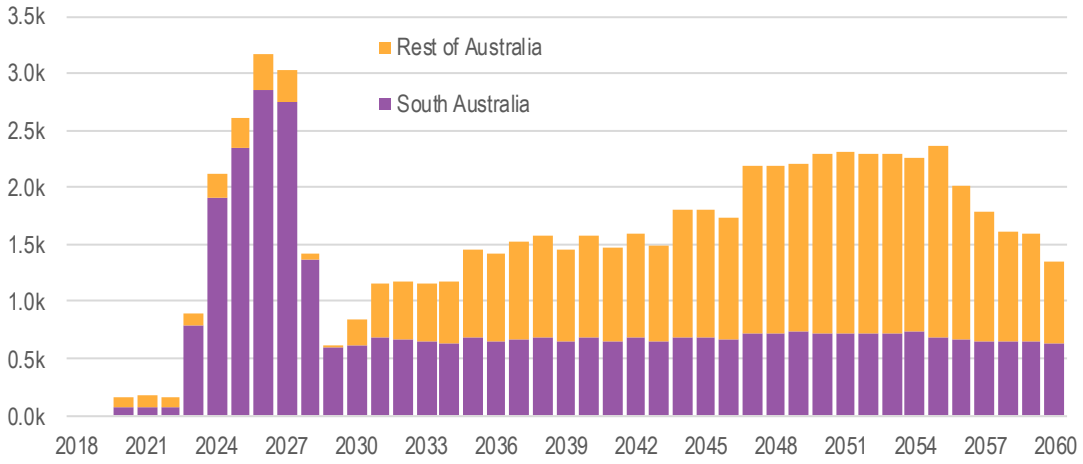
4.3.1 Base Case Development Scenario

Under the Base Case, real employment across Australia is projected to increase on average by 1,648 FTEs per annum over the study period (refer to **Figure 4.7** below).

The real employment impact in South Australia is projected to increase on average by 826 FTEs per annum over the study period. During the exploration and construction phase of the development (2020-2028), the average employment impact is estimated to be higher, averaging 1,361 FTEs per annum. Once the development reaches production (2028-2060), a significant employment benefit is still realised through the operational workforce across the development and the realised real income benefit (697 FTEs per annum).

Once the development is operational and the real incomes increase, this will provide a significant employment boost throughout the Rest of Australia, with an average of 821 FTEs per annum created as a result of the development over the study period.

FIGURE 4.7 CONTRIBUTION TO REAL EMPLOYMENT, BASE CASE DEVELOPMENT SCENARIO, FTES



SOURCE: ACIL ALLEN CONSULTING

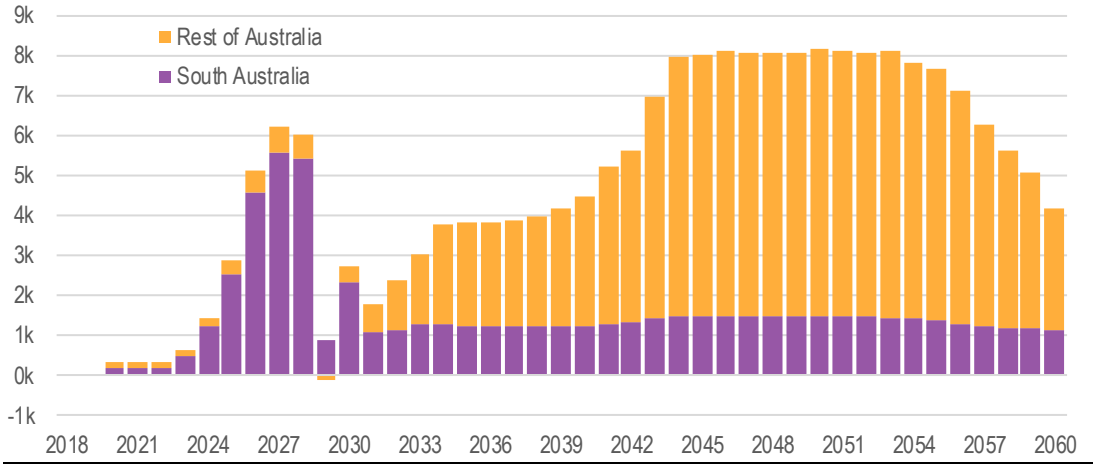
4.3.2 High Case Development Scenario

Under the High Case, real employment across Australia is projected to increase on average by 4,962 FTEs per annum over the study period (refer to **Figure 4.8** below).

The real employment impact in South Australia is projected to increase on average by 1,521 FTEs per annum over the study period. During the exploration and construction phase of the development (2020-2030), the average is estimated to reach 2,116 FTEs per annum. Once the development reaches production (2028-2060), a significant employment benefit is still realised through operational workforce across the development and the realised real income benefit (1,443 FTEs per annum).

Once the development is operational and the real incomes increase, this will provide a significant employment boost throughout the Rest of Australia, with an average of 3,442 FTEs per annum created as a result of the development over the study period.

FIGURE 4.8 CONTRIBUTION TO REAL EMPLOYMENT, HIGH CASE DEVELOPMENT SCENARIO, FTES



SOURCE: ACIL ALLEN CONSULTING

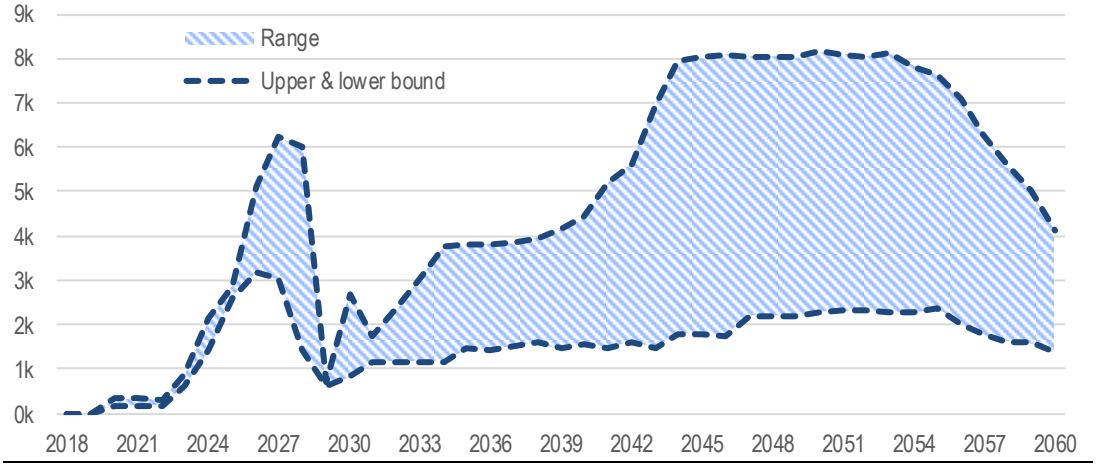
4.3.3 Comparison of Scenarios

As a preliminary study, a number of assumptions have necessarily been used to derive the overall results, including the potential size of a hydrocarbon discovery in the Great Australian Bight.

As a result, ACIL Allen has undertaken an economic impact assessment of two plausible scenarios – a resource the size of 1.9 billion barrels of oil equivalent and of a resource the size of six billion barrels of oil equivalent.

Figure 4.9 below presents the degree to which real employment varies depending on development scenario. Relative to the Base Case, under the High Case real employment is estimated to increase three-fold, from an average of 1,648 FTEs to 4,962 FTEs per annum.

FIGURE 4.9 CONTRIBUTION TO REAL EMPLOYMENT, COMPARISON OF SCENARIOS, FTES



SOURCE: ACIL ALLEN CONSULTING

4.3.4 Employment by Occupation

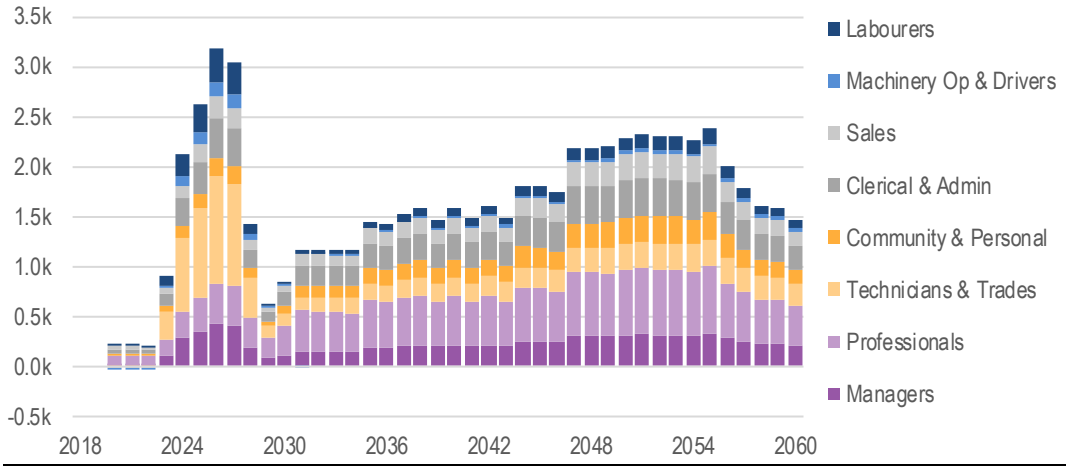
Across Australia, it is estimated the development will generate employment opportunities across a range of professions.

Base Case Development Scenario

While the development results in some reallocation of labour from other industries around Australia, on average the real employment impact by occupation is significantly positive for Australia (refer to **Figure 4.10**):

- **Managers**: It is projected the development will increase the number of managers by an average of 217 direct and indirect FTE jobs per annum over the study period.
- **Professionals**: It is projected the development will increase the number of professionals by an average of 446 direct and indirect FTE jobs per annum over the study period.
- **Technicians & Trades**: It is projected the development will increase the number of technicians & trade workers by an average of 268 direct and indirect FTE jobs per annum over the study period.
- **Community & Personal Services**: It is projected the development will increase the number of community & personal services workers by an average of 164 direct and indirect FTE jobs per annum over the study period.
- **Clerical & Administrative**: It is projected the development will increase the number of clerical & administrative workers by an average of 261 direct and indirect FTE jobs per annum over the study period.
- **Sales**: It is projected the development will increase the number of sales workers by an average of 160 direct and indirect FTE jobs per annum over the study period.
- **Machinery Operators & Drivers**: It is projected the development will increase the number of machinery operators & drivers by an average of 31 direct and indirect FTE jobs per annum over the study period.
- **Labourers**: It is projected the development will increase the number of labourers by an average of 103 direct and indirect FTE jobs per annum over the study period.

FIGURE 4.10 CONTRIBUTION TO REAL EMPLOYMENT, BY OCCUPATION, BASE CASE DEVELOPMENT SCENARIO, FTES



SOURCE: ACIL ALLEN CONSULTING

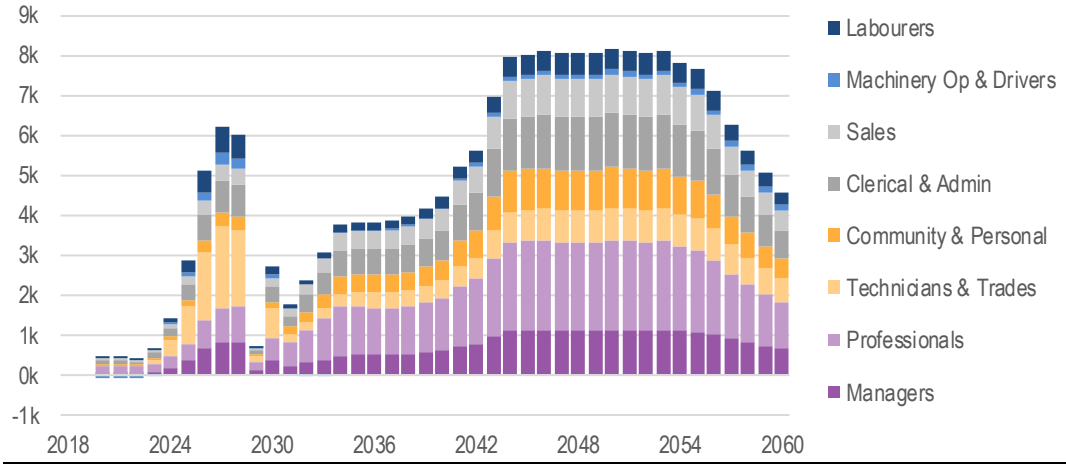
High Case Development Scenario

While the development under the High Case results in some reallocation of labour from other industries around Australia, on average the real employment impact by occupation is significantly positive for Australia (refer to **Figure 4.11**):

- **Managers**: It is projected the development will increase the number of managers by an average of 673 direct and indirect FTE jobs per annum over the study period.
- **Professionals**: It is projected the development will increase the number of professionals by an average of 1,331 direct and indirect FTE jobs per annum over the study period.

- **Technicians & Trades**: It is projected the development will increase the number of technicians & trade workers by an average of 630 direct and indirect FTE jobs per annum over the study period.
- **Community & Personal Services**: It is projected the development will increase the number of community & personal services workers by an average of 568 direct and indirect FTE jobs per annum over the study period.
- **Clerical & Administrative**: It is projected the development will increase the number of clerical & administrative workers by an average of 568 direct and indirect FTE jobs per annum over the study period.
- **Sales**: It is projected the development will increase the number of sales workers by an average of 552 direct and indirect FTE jobs per annum over the study period.
- **Machinery Operators & Drivers**: It is projected the development will increase the number of machinery operators & drivers by an average of 80 direct and indirect FTE jobs per annum over the study period.
- **Labourers**: It is projected the development will increase the number of labourers by an average of 327 direct and indirect FTE jobs per annum over the study period.

FIGURE 4.11 CONTRIBUTION TO REAL EMPLOYMENT, BY OCCUPATION, HIGH CASE DEVELOPMENT SCENARIO, FTES



SOURCE: ACIL ALLEN CONSULTING

4.4 Real Taxation

The major economic impact of the oil discoveries and their subsequent development would be the monetisation of additional natural resources. In addition, the Commonwealth would be a major beneficiary through the receipt of taxes on the profits earned by the development's proponents.

Over the study period, payments to governments are projected to be substantial. While financial modelling results in the previous chapter estimated that there would be significant direct taxation revenues resulting from the development, there substantial indirect taxation revenues are also estimated to be realised.

4.4.1 Base Case Development Scenario

Under the Base Case, real taxation across Australia is projected to increase on average by A$1.7 billion per annum over the study period, and by a total of A$70.6 billion over the study period (refer to **Figure 4.12** below).

The level of taxation paid by the proponents of the development can be viewed in three phases. During the first phase between 2020 and 2033, taxation payments made are estimated to average A$0.1 billion per annum, with the primary tax payments being in the form of indirect company taxation payments and other state and federal taxes.

From 2034, it is estimated that proponents of the development will commence paying company taxes, reflecting the paying down of debt and the corresponding boost to profitability. Between 2034 and 2046, it is estimated that average tax payments will jump to A$1.4 billion per annum. Direct company taxation payments are estimated to total A$36 billion at an average of A$1.3 billion per annum over this period.

From 2047, it is estimated that proponents of the development will become liable for PRRT payments, and between 2047 and 2060 it is estimated that average tax payments will jump to A$3.6 billion per annum. PRRT payments are estimated to total A$23.5 billion at an average of A$1.7 billion per annum over this period.

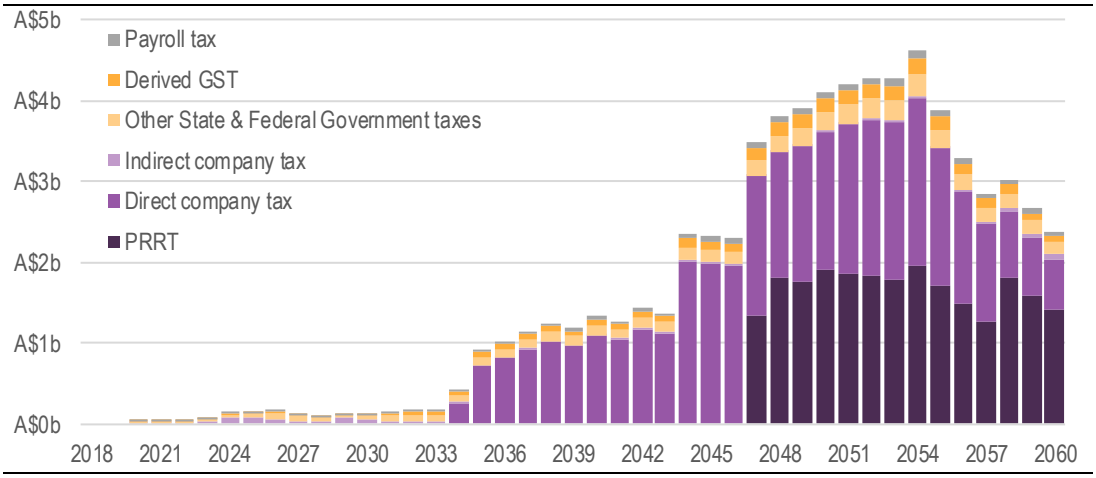
The development is also estimated to generate other indirect taxation payments to the Commonwealth, including a significant amount of indirect company taxation payments (A$1 billion over the study period), and other indirect taxes such as personal income, excises, fringe benefits and capital gains tax receipts (A$5.2 billion at an average of A$125.6 million per annum).

Payments to the South Australian Government are estimated to primarily occur through payroll taxation payments, which are estimated to total A$1.7 billion over the study period.

Increased economic activity in South Australia as a result of the activities surrounding the development are also estimated to result in GST revenues increasing by A$3.2 billion over the study period at an average of A$77.2 billion per annum.

However, this does not necessarily represent the estimated GST receipts for the South Australian Government, as it does not take into account the redistribution of GST as part of the Commonwealth Grants Commission Process.

FIGURE 4.12 CONTRIBUTION TO REAL TAXATION, BASE CASE DEVELOPMENT SCENARIO, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

4.4.2 High Case Development Scenario

Under the High Case, real taxation across Australia is projected to increase on average by A$7.7 billion per annum over the study period, and by a total of A$314.6 billion over the study period (refer to **Figure 4.13** below).

The level of taxation paid by the proponents of the development can be viewed in three phases. During the first phase between 2020 and 2033, taxation payments made are estimated to average A$0.1 billion per annum, with the primary tax payments being in the form of indirect company taxation payments and other state and federal taxation payments.

From 2034, it is estimated that proponents of the development will commence paying company taxes, reflecting the paying down of debt and the corresponding boost to profitability. Between 2034 and 2041, it is estimated that average tax payments will jump to A$3.6 billion per annum. Direct company

taxation payments are estimated to total A$105 billion at an average of A$3.9 billion per annum over this period.

From 2042, it is estimated that proponents of the development will become liable for PRRT payments, and between 2042 and 2060 it is estimated that average tax payments will jump to A$14.9 billion per annum. PRRT payments are estimated to total A$164.9 billion at an average of A$8.7 billion per annum over this period.

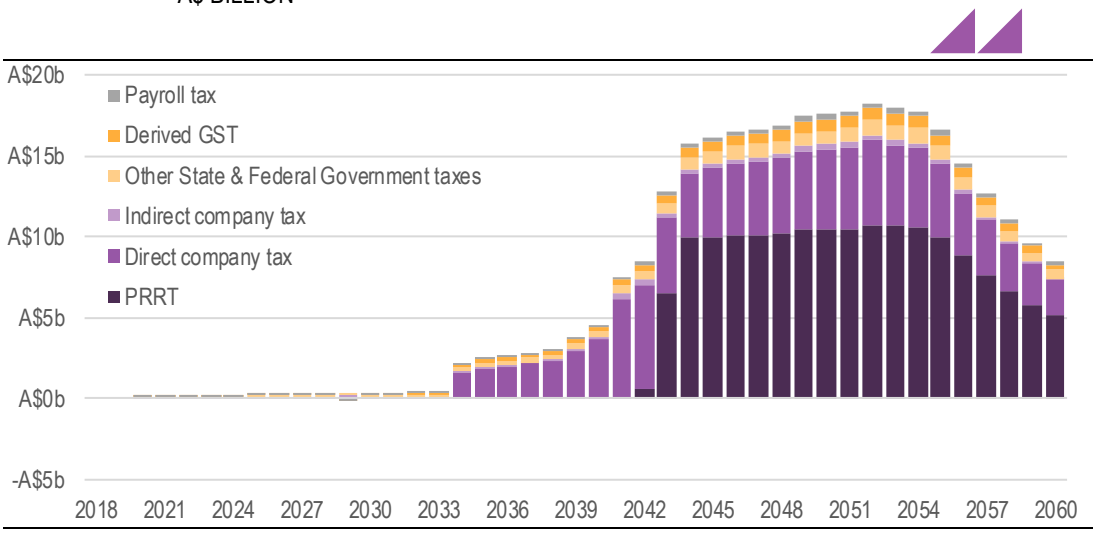
The development is also estimated to generate other indirect taxation payments to the Commonwealth, including a significant amount of indirect company taxation payments (A$6.8 billion over the study period at an average of A$0.2 billion per annum), and other indirect taxes such as personal income, excises, fringe benefits and capital gains tax receipts (A$17.9 billion at an average of A$0.4 billion per annum).

Payments to the South Australian Government are estimated to primarily occur through payroll taxation payments, which are estimated to total A$6 billion over the study period at an average of A$147.2 million per annum.

Increased economic activity in South Australia as a result of the activities surrounding the development are also estimated to result in GST revenues increasing by A$14 billion over the study period at an average of A$0.3 billion per annum.

However, this does not necessarily represent the estimated GST receipts for the South Australian Government, as it does not take into account the redistribution of GST as part of the Commonwealth Grants Commission Process.

FIGURE 4.13 CONTRIBUTION TO REAL TAXATION, HIGH CASE DEVELOPMENT SCENARIO, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

4.4.3 Comparison of Scenarios

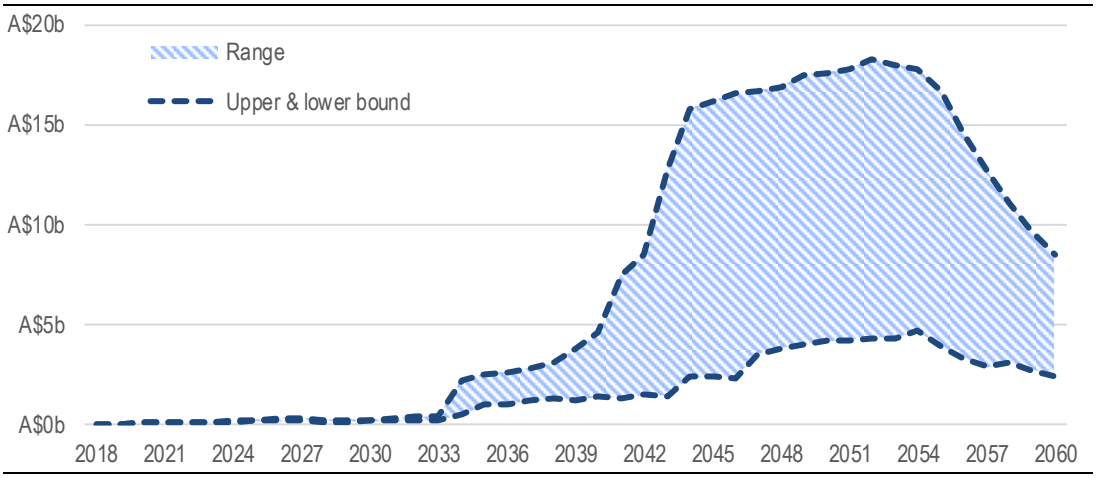
As a preliminary study, a number of assumptions have necessarily been used to derive the overall results, including the potential size of a hydrocarbon discovery in the Great Australian Bight.

As a result, ACIL Allen has undertaken an economic impact assessment of two plausible scenarios – a resource the size of 1.9 billion barrels of oil equivalent and of a resource the size of six billion barrels of oil equivalent.

Figure 4.14 below presents the degree to which real income varies depending on development scenario. Because ACIL Allen has not modelled the impact different oil prices have on the economics of development, it is production volumes that drive the results of taxation and net cash flow estimates (the key inputs into *Tasman Global*).

Relative to the Base Case, under the High Case real taxation is estimated to increase from A$70.6 billion to A$314.6 billion over the study period, and on average from A$1.7 billion to A$7.7 billion per annum.

FIGURE 4.14 CONTRIBUTION TO REAL TAXATION, COMPARISON OF SCENARIOS, A$ BILLION



SOURCE: ACIL ALLEN CONSULTING

A TASMAN GLOBAL COMPUTABLE GENERAL EQUILIBRIUM MODEL

ACIL Allen's computable general equilibrium model *Tasman Global* is a powerful tool for undertaking economic impact analysis at the regional, state, national and global level. There are various types of economic models and modelling techniques. Many of these are based on partial equilibrium analysis that usually considers a single market. However, in economic analysis, linkages between markets and how these linkages develop and change over time can be critical. *Tasman Global* has been developed to meet this need.

Tasman Global is a large-scale computable general equilibrium model which is designed to account for all sectors within an economy and all economies in the world. ACIL Allen uses this modelling platform to undertake industry, project, scenario and policy analyses. The model is able to analyse issues at the industry, global, national, state and regional levels to determine the impacts of various economic changes on production, consumption and trade at the macroeconomic and industry level.

A.1 A dynamic model

Tasman Global is a model that estimates relationships between variables at different points in time. This is in contrast to comparative static models, which compare two equilibriums (one before a policy change and one following). A dynamic model such as *Tasman Global* is beneficial when analysing issues where both the timing of and the adjustment path that economies follow are relevant in the analysis.

A.2 The database

A key advantage of *Tasman Global* is the level of detail in the database underpinning the model. The database is derived from the latest Global Trade Analysis Project (GTAP) database (version 8.1). This database is a fully documented, publicly available global data base which contains complete bilateral trade information, transport and protection linkages among regions for all GTAP commodities.

The GTAP model was constructed at the Centre for Global Trade Analysis at Purdue University in the United States. It is the most up-to-date, detailed database of its type in the world.

Tasman Global builds on the GTAP model's equation structure and database by adding the following important features:

- dynamics (including detailed population and labour market dynamics)
- detailed technology representation within key industries (such as electricity generation and iron and steel production)
- disaggregation of a range of major commodities including iron ore, bauxite, alumina, primary aluminium, brown coal, black coal and LNG
- the ability to repatriate labour and capital income

- a detailed emissions accounting abatement framework
- explicit representation of the states and territories of Australia
- the capacity to explicitly represent multiple regions within states and territories of Australia

Nominally the *Tasman Global* database divides the world economy into 141 regions (133 international regions plus the 8 states and territories of Australia) although in reality the regions are frequently disaggregated further. ACIL Allen regularly models Australian projects or policies at the regional level.

TABLE A.1 SECTORS IN THE TASMAN GLOBAL DATABASE

	Sector		Sector
1	Paddy rice	36	Paper products, publishing
2	Wheat	37	Diesel (incl. nonconventional diesel)
3	Cereal grains nec	38	Other petroleum, coal products
4	Vegetables, fruit, nuts	39	Chemical, rubber, plastic products
5	Oil seeds	40	Iron ore
6	Sugar cane, sugar beef	41	Bauxite
7	Plant- based fibres	42	Mineral products nec
8	Crops nec	43	Ferrous metals
9	Bovine cattle, sheep, goats, horses	44	Alumina
10	Animal products nec	45	Primary aluminium
11	Raw milk	46	Metals nec
12	Wool, silk worm cocoons	47	Metal products
13	Forestry	48	Motor vehicle and parts
14	Fishing	49	Transport equipment nec
15	Brown coal	50	Electronic equipment
16	Black coal	51	Machinery and equipment nec
17	Oil	52	Manufactures nec
18	Liquefied natural gas (LNG)	53	Electricity generation
19	Other natural gas	54	Electricity transmission and distribution
20	Minerals nec	55	Gas manufacture, distribution
21	Bovine meat products	56	Water
22	Meat products nec	57	Construction
23	Vegetables oils and fats	58	Trade
24	Dairy products	59	Road transport
25	Processed rice	60	Rail and pipeline transport
26	Sugar	61	Water transport
27	Food products nec	62	Air transport
28	Wine	63	Transport nec
29	Beer	64	Communication
30	Spirits and RTDs	65	Financial services nec
31	Other beverages and tobacco products	66	Insurance
32	Textiles	67	Business services nec
33	Wearing apparel	68	Recreational and other services
34	Leather products	69	Public Administration, Defence, Education, Health
35	Wood products	70	Dwellings

Note: nec = not elsewhere classified.

The *Tasman Global* database also contains a wealth of sectoral detail currently identifying up to 70 industries (Table A.1). The foundation of this information is the input-output tables that underpin the database. The input-output tables account for the distribution of industry production to satisfy industry and final demands. Industry demands, so-called intermediate usage, are the demands from each industry for inputs.

For example, electricity is an input into the production of communications. In other words, the communications industry uses electricity as an intermediate input. Final demands are those made by households, governments, investors and foreigners (export demand). These final demands, as the name suggests, represent the demand for finished goods and services. To continue the example, electricity is used by households – their consumption of electricity is a final demand.

Each sector in the economy is typically assumed to produce one commodity, although in *Tasman Global*, the electricity, transport and iron and steel sectors are modelled using a 'technology bundle' approach. With this approach, different known production methods are used to generate a homogeneous output for the 'technology bundle' industry. For example, electricity can be generated using brown coal, black coal, petroleum, base load gas, peak load gas, nuclear, hydro, geothermal, biomass, wind, solar or other renewable based technologies – each of which have their own cost structure.

The other key feature of the database is that the cost structure of each industry is also represented in detail. Each industry purchases intermediate inputs (from domestic and imported sources) primary factors (labour, capital, land and natural resources) as well as paying taxes or receiving subsidies.

A.3 Factors of production

Capital, land, labour and natural resources are the four primary factors of production. The capital stock in each region (country or group of countries) accumulates through investment (less depreciation) in each period. Land is used only in agriculture industries and is fixed in each region. *Tasman Global* explicitly models natural resource inputs as a sector specific factor of production in resource based sectors (coal mining, oil and gas extraction, other mining, forestry and fishing).

A.4 Population growth and labour supply

Population growth is an important determinant of economic growth through the supply of labour and the demand for final goods and services. Population growth for the 112 international regions and for the 8 states and territories of Australia represented in the *Tasman Global* database is projected using ACIL Allen's in-house demographic model. The demographic model projects how the population in each region grows and how age and gender composition changes over time and is an important tool for determining the changes in regional labour supply and total population over the projection period.

For each of the 120 regions in *Tasman Global*, the model projects the changes in age-specific birth, mortality and net migration rates by gender for 101 age cohorts (0-99 and 100+). The demographic model also projects changes in participation rates by gender by age for each region, and, when combined with the age and gender composition of the population, endogenously projects the future supply of labour in each region. Changes in life expectancy are a function of income per person as well as assumed technical progress on lowering mortality rates for a given income (for example, reducing malaria-related mortality through better medicines, education, governance, etc.). Participation rates are a function of life expectancy as well as expected changes in higher education rates, fertility rates and changes in the workforce as a share of the total population.

Labour supply is derived from the combination of the projected regional population by age by gender and the projected regional participation rates by age by gender. Over the projection period labour supply in most developed economies is projected to grow slower than total population as a result of ageing population effects.

For the Australian states and territories, the projected aggregate labour supply from ACIL Allen's demographics module is used as the base level potential workforce for the detailed Australian labour market module, which is described in the next section.

A.5 The Australian labour market

Tasman Global has a detailed representation of the Australian labour market which has been designed to capture:

- different occupations
- changes to participation rates (or average hours worked) due to changes in real wages
- changes to unemployment rates due to changes in labour demand
- limited substitution between occupations by the firms demanding labour and by the individuals supplying labour
- limited labour mobility between states and regions within each state.

Tasman Global recognises 97 different occupations within Australia – although the exact number of occupations depends on the aggregation. The firms who hire labour are provided with some limited scope to change between these 97 labour types as the relative real wage between them changes. Similarly, the individuals supplying labour have a limited ability to change occupations in response to the changing relative real wage between occupations. Finally, as the real wage for a given occupation rises in one state relative to other states, workers are given some ability to respond by shifting their location. The model produces results at the 97 3-digit ANZSCO (Australian New Zealand Standard Classification of Occupations) level which are presented in Table A.2.

The labour market structure of *Tasman Global* is thus designed to capture the reality of labour markets in Australia, where supply and demand at the occupational level do adjust, but within limits.

Labour supply in *Tasman Global* is presented as a three stage process:

1. labour makes itself available to the workforce based on movements in the real wage and the unemployment rate
2. labour chooses between occupations in a state based on relative real wages within the state
3. labour of a given occupation chooses in which state to locate based on movements in the relative real wage for that occupation between states.

By default, *Tasman Global*, like all CGE models, assumes that markets clear. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model).

A.6 Detailed energy sector and linkage to *PowerMark* and *GasMark*

Tasman Global contains a detailed representation of the energy sector, particularly in relation to the interstate (trade in electricity and gas) and international linkages across the regions represented. To allow for more detailed electricity sector analysis, and to aid in linkages to bottom-up models such as ACIL Allen's *GasMark* and *PowerMark* models, electricity generation is separated from transmission and distribution in the model. In addition, the electricity sector in the model employs a 'technology bundle' approach that separately identifies up to twelve different electricity generation technologies:

1. brown coal (with and without carbon capture and storage)
2. black coal (with and without carbon capture and storage)
3. petroleum
4. base load gas (with and without carbon capture and storage)
5. peak load gas
6. hydro
7. geothermal
8. nuclear
9. biomass
10. wind
11. solar
12. other renewables.

To enable more accurate linking to *PowerMark,* the generation cost of each technology is assumed to be equal to their long run marginal cost while the sales price in each region is matched to the average annual dispatch weighted prices projected by *PowerMark* – with any difference being returned as an economic rent to electricity generators. This representation enables the highly detailed market based projections from *PowerMark* to be incorporated as accurately as possible into *Tasman Global*.

TABLE A.2 OCCUPATIONS IN THE TASMAN GLOBAL DATABASE, ANZSCO 3-DIGIT LEVEL (MINOR GROUPS)

ANZSCO code, Description	ANZSCO code, Description	ANZSCO code, Description
1. MANAGERS	**3. TECHNICIANS & TRADES WORKERS**	**5. CLERICAL & ADMINISTRATIVE**
111 Chief Executives, General Managers and Legislators	311 Agricultural, Medical and Science Technicians	511 Contract, Program and Project Administrators
121 Farmers and Farm Managers	312 Building and Engineering Technicians	512 Office and Practice Managers
131 Advertising and Sales Managers	313 ICT and Telecommunications Technicians	521 Personal Assistants and Secretaries
132 Business Administration Managers	321 Automotive Electricians and Mechanics	531 General Clerks
133 Construction, Distribution and Production Managers	322 Fabrication Engineering Trades Workers	532 Keyboard Operators
134 Education, Health and Welfare Services Managers	323 Mechanical Engineering Trades Workers	541 Call or Contact Centre Information Clerks
135 ICT Managers	324 Panel beaters, and Vehicle Body Builders, Trimmers and Painters	542 Receptionists
139 Miscellaneous Specialist Managers	331 Bricklayers, and Carpenters and Joiners	551 Accounting Clerks and Bookkeepers
141 Accommodation and Hospitality Managers	332 Floor Finishers and Painting Trades Workers	552 Financial and Insurance Clerks
142 Retail Managers	333 Glaziers, Plasterers and Tilers	561 Clerical and Office Support Workers
149 Miscellaneous Hospitality, Retail and Service Managers	334 Plumbers	591 Logistics Clerks
	341 Electricians	599 Miscellaneous Clerical and Administrative Workers
2. PROFESSIONALS	342 Electronics and Telecommunications Trades Workers	
211 Arts Professionals	351 Food Trades Workers	**6. SALES WORKERS**
212 Media Professionals	361 Animal Attendants and Trainers, and Shearers	611 Insurance Agents and Sales Representatives
221 Accountants, Auditors and Company Secretaries	362 Horticultural Trades Workers	612 Real Estate Sales Agents
222 Financial Brokers and Dealers, and Investment Advisers	391 Hairdressers	621 Sales Assistants and Salespersons
223 Human Resource and Training Professionals	392 Printing Trades Workers	631 Checkout Operators and Office Cashiers
224 Information and Organisation Professionals	393 Textile, Clothing and Footwear Trades Workers	639 Miscellaneous Sales Support Workers
225 Sales, Marketing and Public Relations Professionals	394 Wood Trades Workers	
231 Air and Marine Transport Professionals	399 Miscellaneous Technicians and Trades Workers	**7. MACHINERY OPERATORS & DRIVERS**
232 Architects, Designers, Planners and Surveyors		711 Machine Operators
233 Engineering Professionals	**4. COMMUNITY & PERSONAL SERVICE**	712 Stationary Plant Operators
234 Natural and Physical Science Professionals	411 Health and Welfare Support Workers	721 Mobile Plant Operators
241 School Teachers	421 Child Carers	731 Automobile, Bus and Rail Drivers
242 Tertiary Education Teachers	422 Education Aides	732 Delivery Drivers
249 Miscellaneous Education Professionals	423 Personal Carers and Assistants	733 Truck Drivers
251 Health Diagnostic and Promotion Professionals	431 Hospitality Workers	741 Storepersons
252 Health Therapy Professionals	441 Defence Force Members, Fire Fighters and Police	
253 Medical Practitioners	442 Prison and Security Officers	**8. LABOURERS**
254 Midwifery and Nursing Professionals	451 Personal Service and Travel Workers	811 Cleaners and Laundry Workers
261 Business and Systems Analysts, and Programmers	452 Sports and Fitness Workers	821 Construction and Mining Labourers
262 Database and Systems Administrators, and ICT Security Specialists		831 Food Process Workers
263 ICT Network and Support Professionals		832 Packers and Product Assemblers
271 Legal Professionals		839 Miscellaneous Factory Process Workers
272 Social and Welfare Professionals		841 Farm, Forestry and Garden Workers
		851 Food Preparation Assistants
		891 Freight Handlers and Shelf Fillers
		899 Miscellaneous Labourers

SOURCE: ABS (2009), ANZSCO – AUSTRALIAN AND NEW ZEALAND STANDARD CLASSIFICATIONS OF OCCUPATIONS, FIRST EDITION, REVISION 1, ABS CATALOGUE NO. 1220.0.

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