# SMITH BAY WHARF

DRAFT ENVIRONMENTAL IMPACT STATEMENT

## APPENDIX O

PREPARED FOR KANGAROO ISLAND PLANTATION TIMBERS BY ENVIRONMENTAL PROJECTS JANUARY 2019

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## APPENDIX O

## **APPENDIX O – ECONOMIC ASSESSMENT**

01	Economic Impact of the Smith Bay Wharf
02	Impact of KIPT Development on Kangaroo Island Gross Regional Product
03	Cost Benefit Analysis of the Smith Bay Wharf Development



Appendix O1 – Economic Impact of the Smith Bay Wharf – EconSearch

# Economic Impact of the Smith Bay Wharf

A report to

## Kangaroo Island Plantation Timbers



4 October 2017

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# ABBREVIATIONS

ABS	Australian Bureau of Statistics
ANZSIC	Australia and New Zealand Standard Industrial Classification
fte	full time equivalent
GRP	gross regional product
GSP	gross state product
GDP	gross domestic product
I-O	Input-output
КІ	Kangaroo Island
mtpa	million tonnes per annum
RISE	Regional Industry Structure and Employment
SA	South Australia



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# **1.INTRODUCTION**

## 1.1 Background

Kangaroo Island Plantation Timbers (KIPT) is proposing to construct a deep-water wharf at Smith Bay. The major components of the proposed project are:

- a deep water port and export facility, with capacity to export up to 0.6 mtpa of timber.
- a long-term, sustainable timber harvesting operation.

Demand for timber in Australia's region is growing, coupled with the decreasing availability of native forests for logging. That gap will be filled by plantation timber. The supply of plantation timber in Australia is diminishing, however, due to the end of distortions caused by managed investment schemes and the long lead-time required to produce the end product. Indeed, approximately 50 per cent of Australia's hardwood plantation estate is expected to return to conventional agriculture rather than remain in timber production<sup>1</sup>.

KIPT's existing standing timber assets on the Island exceed 3.6 million m<sup>3</sup> and will grow to at least 5.4 million m<sup>3</sup> by the time of harvest. In economic terms, this timber has an approximate value of \$800 million on world markets, once harvested and shipped to customers.

Even without considering the trees owned by various other parties, the KIPT resource is sufficient to establish a sustainable plantation forestry industry on the Island, based on the export of timber to markets in Asia.

Kangaroo Island is one of the best regions in Australia to grow plantation timber, because it has:

- high rainfall over 600 mm per annum
- low rainfall variability
- mild summers low evaporation
- no salinity issues
- high growth rates for timber (mean average increment (MAI)).

The plantation estates are also relatively proximate to the proposed wharf, which means the land transport costs are low by comparison with plantations on the mainland and in Tasmania.

For these reasons, Kangaroo Island is one of the best regions in Australia for plantation forestry, and plantation forestry represents a long-term sustainable (and non-seasonal) economic opportunity for Kangaroo Island. However, there is currently no cost effective method of exporting timber from the Island.

<sup>&</sup>lt;sup>1</sup> David Evans, New Forests Asset Management, interviewed on the ABC Country Hour, 24 October 2016.

The proposed deep-water wharf is a critical piece of infrastructure required to unlock this opportunity; it provides the direct access to market (i.e. no re-handling on mainland Australia), which is essential to establishing a commercial operation that can be sustained through all phases of the business cycle.

## 1.2 Project Scope

On 16 February 2017, the Minister for Planning ('the Minister') declared the deep water port facility at Smith Bay on Kangaroo Island to be assessed as a Major Development pursuant to Section 46 of the Development Act 1993 (the Act) (published in the Government Gazette on 23 February 2017). Section 46 of the Act ensures that matters affecting the environment, the community or the economy to a significant extent, are to be fully examined and taken into account in the assessment of this proposal (DPTI 2017).

The Development Assessment Commission has determined that the proposal will be subject to the processes of an Environmental Impact Statement (EIS). The EIS must include an assessment of expected environmental, social and economic effects.

EconSearch was commissioned by KIPT to produce an independent analysis of the economic impact of the proposal. The estimates of economic impact required for this study were based on the input-output (I-O) method. I-O analysis provides a comprehensive economic framework that is extremely useful in the resource planning process and is typical of the approach used for the estimation of the impact of a new or changing level of activity on a regional economy.

The construction of the deep-water port and the harvest of the timber are likely to generate significant economic impacts on the economies of Kangaroo Island and South Australia. Impacts were estimated for the infrastructure development and operation of the project. RISE models<sup>2</sup> for the Kangaroo Island (KI), South Australian (SA) and Australian economies have been used for this purpose.

An outline of the method and indicators of economic impact used in the analysis are provided in Section 2. A profile of economic activity on Kangaroo Island and South Australia is presented in Section 3. Data and assumptions are outlined in Section 4 and, in Section 5, the estimates of the economic impacts of the proposed wharf and timber harvesting activities are provided.

<sup>&</sup>lt;sup>2</sup> RISE (regional industry structure and employment) models are models designed for measuring the impact on regions of economic change. The models, which have at their core the input-output (I-O) method, were originally constructed by EconSearch for the South Australian Department of Premier and Cabinet (EconSearch 2017).

# 2. METHOD OF ANALYSIS

This is an economic impact assessment. The estimates of regional economic impact presented are based on the use of an extension of the conventional input-output method. Over the past decade EconSearch has developed an extended input-output model known as the RISE model (Regional Industry Structure & Employment). The RISE model provides a comprehensive economic framework that is extremely useful in the resource planning process, particularly for regional economic impact applications<sup>3</sup>.

The indicators used in impact analysis typically include output, employment, household income and gross state/regional product which are used in this report.

## 2.1 Estimation of Economic Effects – Key Concepts

## 2.1.1 Economic activity

*Economic activity indicators:* the primary focus of this report is the generation of economic activity resulting from the deep water wharf at Smith Bay. The key economic activity indicators considered in the analysis are output, employment, household income and gross regional/state/domestic product (GRP/GSP/GDP).

*Economic impact:* changes in economic activity are referred to as economic impacts. Generally, changes in *economic activity indicators* result from some stimulus or external shock imposed. In this analysis the concept of economic impact includes the increase in economic contribution from the construction and operation of the project, i.e. the contribution of KIPT's economic activities (made possible by the port's operation), in addition to direct port construction and operational impacts made to the economy. This *economic impact* is measured in terms of the *economic activity indicators* referred to above.

## 2.1.2 Indicators of economic activity defined

*Employment units:* Employment numbers are usually reported in either full time equivalent (fte) units or total job units defined as follows:

fte: is a way to measure a worker's involvement in a project or industry activity. An fte
of 1.0 means that the person is equivalent to a full-time worker, while an fte of 0.5
signals that the worker is only half-time. Typically, different scales are used to calibrate
this number, depending on the type of industry and scope of the analysis but the basic
calculation is the total hours worked divided by average annual hours worked in fulltime jobs.

<sup>&</sup>lt;sup>3</sup> RISE models have been constructed for both the South Australian and Victorian Governments at both a state and regional level (EconSearch 2013a, 2013b).

- *Jobs:* is used to refer to the number of workers employed in an industry or on a project at any point in time. It typically refers to either:
  - the *maximum* number of workers required at any point over the analytical period or the duration of the project; or
  - the *average* number of workers required over the analytical period/duration of the project. This can be calculated on a daily, weekly, monthly or annual basis.

In this report employment has been reported in terms of fte units on a per annum basis.

*Output (Value of):* is a measure of the gross revenue of goods and services produced by commercial organisations (e.g. value of mine output) and gross expenditure by government agencies. Total output needs to be used with care as it can include elements of double counting when the output of integrated industries is added together (e.g. the value of processed product includes the value of mine output).

*Gross regional/state/domestic product (GRP/GSP/GDP):* is a measure of the contribution of an activity to the economy. GRP/GSP/GDP is measured as value of gross output (business revenue) less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as the sum of household income, gross operating surplus and gross mixed income net of payments to owner managers and taxes less subsidies on products and production. It represents payments to the primary inputs of production (labour, capital and land). Using GRP/GSP/GDP as a measure of economic impact avoids the problem of double counting that may arise from using value of output for this purpose.

*Household income:* is a component of GRP/GSP/GDP and is a measure of wages and salaries paid in cash and in-kind, drawings by owner operators and other payments to labour including overtime payments, employer's superannuation contributions and income tax excluding payroll tax.

## 2.1.3 Categories of economic activity in the infrastructure supply chain

A useful way to think about economic activity and economic impact (as measured by employment, GRP, etc.) is using the concept of a 'supply chain'. The supply chain, in the context of an infrastructure project includes, the planning and management of all activities involved in sourcing and procurement, conversion of materials, and all the logistics management activities. It also includes coordination and collaboration with suppliers, intermediaries and third-party service providers.

Broadly speaking there are four categories of employment and GRP along the infrastructure supply chain.

- 1. Direct employment and GRP this is employment in those firms, businesses and organisations that are directly engaged in project construction. Typically, this will include:
  - a. construction companies
  - b. construction sub-contractors
  - c. planning and engineering services

- d. material supply firms.
- 2. *First round employment and GRP* refers to employment in firms that supply inputs and services to the 'direct employment' businesses, i.e. those categorised under #1 above.
  - a. energy
  - b. raw materials
  - c. logistics
  - d. business support services
  - e. other inputs
- 3. Industrial-support employment and GRP is the term applied to 'second and subsequent round' effects as successive waves of output increases occur in the economy to provide industrial support, as a response to the original infrastructure expenditure. This category excludes any employment associated with increased household consumption.
- 4. Consumption-induced employment and GSP is the term applied to as those effects induced by increased household income associated with the original infrastructure expenditure. The expenditure of household income associated with all three categories of employment (direct, first round and industrial-support) will generate economic activity that will in itself generate jobs.

*Flow-on* (or *indirect*) *economic impact* is the sum of categories 2, 3 and 4. In this analysis *direct* and *flow-on* employment, GRP and household income generated by the infrastructure supply chain have been reported. To avoid double counting, the supply chain *value of output* is reported only in terms of the direct impact.

## 2.2 Economic Impact Models

I-O models are widely used to assess the economic impact of existing or changing levels of economic activity<sup>4</sup>, such as regional infrastructure projects and their associated uses. The EconSearch RISE models, which have I-O at their core, are widely used by State and Local Government. RISE models for the Kangaroo Island, South Australian and Australian economies have been used in this assessment.

Input-output models, such as the RISE model, provide a detailed picture of the structure of an economy at a particular point in time. The model provides a basis for analysis of inter-sectoral relationships within the economy. Accordingly, this makes the model ideal for regional impact analysis.

The RISE model format was originally developed by EconSearch as a user-friendly, Excel based tool for use by regional development analysts in South Australia. EconSearch was contracted to

<sup>&</sup>lt;sup>4</sup> Called an 'exogenous shock' in model terminology.

develop a set of easy to use regional impact models that could be assist regional planning at both a state and regional level.

The first set of South Australian models were commissioned by the Regional Communities Consultative Council in 2004. They were updated in 2007 for the SA Department of Trade and Economic Development, and updated again in 2010 and then annually from 2013 to 2017 for the SA Department of Premier and Cabinet.

EconSearch also developed a set of RISE models at the local government area (nonmetropolitan) and regional level for the Victorian Department of Primary Industries in 2010. These models were updated in 2013 for the Department of Environment and Primary Industries.

#### **RISE Model Extensions**

The RISE model can be distinguished from the standard input-output model through a number of features or add-ons that allow for more realistic assessments of regional economic impacts. These include the following:

**Price Response Model** - One of the key limitations of a standard input-output model is its lack of flexibility to take into account different scenarios of market response and regional adjustment for impact analysis. The price sensitive RISE model is a development of the conventional inputoutput model which provides for non-linearity in production in both primary and intermediate inputs. The model extension delivers results (e.g. multipliers and simulated impacts) that are more closely aligned with CGE modelling yet with greater rigour and credibility for analysis at a local scale.

**Demographic Economic Model** - The RISE model has also been extended as demographiceconomic (DECON) models. The two key characteristics of the DECON model, when compared with a standard economic model, are as follows.

- The introduction of a population 'sector' (or row and column in the model) makes it possible to estimate the impact on local population levels of employment growth or decline.
- The introduction of an unemployed 'sector' makes it possible to account for the consumption-induced impact of the unemployed in response to economic growth or decline.

**Tourism Satellite Accounts** – The tourism industry is not defined as a separate industry in the standard industry classification system used by ABS and others. The ABS has developed a set of "satellite accounts" at the national level and a process that can be adopted at the regional level to better define the tourism industry. This process has been adopted in the RISE model so that tourism industry impacts can be directly assessed.



# 3. SOCIO-ECONOMIC PROFILE OF KANGAROO ISLAND

This section of the report brings together a wide range of existing Australian Bureau of Statistics (ABS) and some non-ABS data. It has been designed, at a broad level, to aid understanding of the composition and economic and social structure of the region, to indicate how the Kangaroo Island (KI) region contributes to the state's economy and to help explain recent socio-economic trends. Most data are presented for KI and for SA as a whole for the purpose of comparison. This socio-economic profile serves to provide the reader with background information, providing context for the results to be presented in the sections that follow. The regional economic and social indicators are categorised under the following headings:

- total population and projections (Section 3.1)
- population profile by age, birth and death rates (Section 3.2)
- regional migration (Section 3.3)
- education, employment and labour force (Section 3.4)
- income and housing (Section 3.5)
- business (Section 3.6)
- regional economic structure (Section 3.7).

The information is presented as a time series using the latest available data. When analysing the data care needs to be taken as time periods, definitions, methodologies, scope and coverage differ between variables. For detailed information refer to the relevant source publications that are listed in the References.

## 3.1 Total Population and Population Projections

## 3.1.1 Estimated resident population

The Estimated Regional Population (ERP) for KI and SA are illustrated in Figure 3-1. In 2015/16 the ERP on KI was 4,635 persons, representing approximately 0.3 per cent of the state total (around 1.71 million persons). Over the 13 years, 2003/04 to 2015/16, KI experienced slow population growth, with the total population increasing by around 6 per cent (280 persons). SA experienced more moderate population growth over these years with the population increasing by almost 12 per cent.



Figure 3-1 Estimated resident population for KI and SA, 2003/04 to 2015/16

Source: ABS (2015a)

#### 3.1.2 Population projections

It is possible to derive broad population projections for KI and SA for the period 2011 to 2031 based on information published by the Department of Planning Transport and Infrastructure<sup>5</sup>. Population projections for KI and SA, for the period 2011 to 2031 are detailed in Table 3-1 and illustrated in Figure 3-2.

The projections are based on ABS 2011 Census resident population estimates and trends in mortality, fertility and overseas and interstate migration. The 30-Year Plan for Greater Adelaide identifies the key strategic planning priorities for the development of the Greater Adelaide Region during the next thirty years. The Plan was based on an all-of-State projection specially prepared for that purpose in late 2007 that used preliminary 2006 Census results (Department of Planning and Local Government 2010a). The results presented below are the set of official projections based on final 2011 Census results.<sup>6</sup>

Based on the Planning SA projections, the population on KI is expected to increase by 16 per cent over the 20 years from 2011 (Census year) whereas the total SA population is expected to increase by around 18 per cent (Figure 3-2).

<sup>5</sup> Formally the Department of Planning and Local Government

<sup>&</sup>lt;sup>6</sup> 'It is now considered that population growth in some Outer Adelaide LGAs for the early years of the 30-Year Plan (2011-26) will be slightly less than that implicitly assumed in the medium series of the all-of-State and Statistical Division projections upon which they are based. As a result, the sum of all LGA projections for the years 2011-26 will differ slightly from the State projections released in January 2011' (Department of Planning and Local Government 2011).

The projected increase in population is not uniform across all age cohorts.

- Population projections for persons aged 0 to 14 years indicate that there will be an increase of 8 per cent (from 2011) in this age cohort.
- The working age population (15 to 64 years) is expected to fall by almost 9 per cent.
- The population projections for persons 65 or older indicate that a significant increase of around 123 per cent in this age cohort is expected over the 20 years (Table 3-1).

	2011	2016		20	21	20	26	2031	
Age	Population	Population	Change from 2011						
	no.	no.	%	no.	%	no.	%	no.	%
Kangai	oo Island								
0-14	810	891	10.0%	936	15.6%	909	12.2%	876	8.1%
15-64	2,965	2,770	-6.6%	2,695	-9.1%	2,659	-10.3%	2,708	-8.7%
65+	747	1,021	36.7%	1,225	64.0%	1,483	98.5%	1,668	123.3%
Total	4,522	4,682	3.5%	4,856	7.4%	5,051	11.7%	5,252	16.1%
SA									
0-14	290,659	304,557	4.8%	318,849	9.7%	326,328	12.3%	328,519	13.0%
15-64	1,087,362	1,107,895	1.9%	1,129,698	3.9%	1,153,799	6.1%	1,184,999	9.0%
65+	261,593	302,847	15.8%	343,220	31.2%	386,588	47.8%	423,294	61.8%
Total	1,639,614	1,715,299	4.6%	1,791,767	9.3%	1,866,715	13.9%	1,936,812	18.1%

Table 3-1Population projections for KI and SA, 2011 to 2031

Source: Department of Planning and Local Government (2015 and 2016)



Figure 3-2 Population projections for KI and SA, change from 2006

Source: Department of Planning and Local Government (2015 and 2016)

## 3.2 Population by Age, Birth and Death Rates

## 3.2.1 Age distribution

The age structures of the population for KI and SA for 2011 and 2016 (Census years) are summarised in Table 3-2.

	Ka	angaroo Islan	d	S	South Australia			
Age	2011	2011 2016 <sup>%</sup> ch from 2		2011	2016	% change from 2011		
0 to 14	786	780	-1%	286,937	292,997	2%		
15 to 64	2,878	2,839	-1%	1,052,085	1,077,056	2%		
65 or older	752	1,094	45%	257,547	306,591	19%		
Total	4,416	4,713	7%	1,596,569	1,676,644	5%		

Table 3-2 Age distribution of the population for KI and SA, 2011 and 2016 (no. of persons)

Source: ABS (2017a)

Comparison with South Australia highlights some significant differences in changes in the age structure of the state and regional populations, between 2011 and 2012.

- Number of persons aged 0 to 14 years decreased by 1 per cent on KI but increased by 2 per cent in SA.
- Number of persons aged 15 to 64 years decreased by 1 per cent on KI but increased by 2 per cent in SA.
- Number of persons aged 65 years or older increased by 45 per cent on KI and 19 per cent in SA.

The population age structure is summarised on an annual basis for the years 2005/06 to 2014/15 in Table 3-3. In 2014/15, 17 per cent of the region's population was under the age of 15 years, the majority of the population (approximately 61 per cent) was aged between 15 and 64 years and approximately 22 per cent of the population was aged over 65 years (Table 3-3).

Compared with the age distribution of the state, KI has a similar concentration of younger people (aged 0 to 14 years), a smaller than average share of persons aged 15 to 64 years and a larger share of people aged 65 and over. The 15 to 64 year age group could be characterised as the working-age population.

KIPT

	Year											
Age	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15		
Kangaroo Is	land											
0 to 14	19%	19%	18%	18%	18%	18%	18%	18%	17%	17%		
15 to 64	66%	67%	67%	67%	66%	66%	64%	62%	62%	61%		
65 or older	14%	15%	15%	15%	16%	17%	18%	20%	21%	22%		
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		
South Austra	alia											
0 to 14	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%		
15 to 64	67%	67%	67%	67%	66%	66%	66%	66%	65%	65%		
65 or older	15%	15%	15%	15%	16%	16%	16%	17%	17%	17%		
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		

Table 3-3 Age distribution of the population for KI and SA, 2005/06 to 2014/15

Source: ABS (2016a)

#### 3.2.2 Crude birth rates and death rates

Crude birth rates<sup>7</sup> are illustrated for KI and SA in Figure 3-3 for the period 2003/04 to 2014/15. The number of births on KI rose from 44 in 2003/04 to a peak of 65 in 2007/08 but has fallen since and was 44 in 2014/15. In SA the number of births rose from 17,140 in 2003/04 to a peak of 20,433 in 2011/12 but has also fallen slightly since to 19,587 in 2014/15. Accordingly, the crude birth rate for KI fell slightly from 10.1 births per thousand residents in 2003/04 to 9.5 in 2014/15. The crude birth rate for SA was slightly higher in 2014/15 (11.5 births per thousand residents) than in 2003/04 (11.2 births per thousand residents) (Figure 3-3).

Crude death rates<sup>8</sup> for KI and SA are illustrated in Figure 3-4 for the period 2003/04 to 2014/15. The annual number of deaths on KI fluctuated from year to year over the 12 years to 2014/15 but remained consistently below that for SA as a whole. In 2003/04, there were 25 deaths on KI and in 2014/15 there were 31 deaths in the region. Accordingly, the crude death rate for KI increased from 5.7 deaths per thousand residents in 2003/04 to 6.7 in 2014/15. The crude death rate for SA was slightly higher in 2014/15 (8.0 deaths per thousand residents) than in 2003/04 (7.6 deaths per thousand residents) despite slight fluctuations in between years. The total number of deaths rose from 11,629 deaths in SA in 2003/04 to 13,647 in 2014/15 (Figure 3-4). The rise in the number of deaths was not fully reflected in the death rate as the population also increased over this period. Note that the yearly variation in the birth and death rates on KI almost certainly influenced by the relatively small population size.

<sup>&</sup>lt;sup>7</sup> The number of births are calculated on the basis of usual residence of the mother regardless of where in Australia the birth occurred. The crude birth rate is the number of live births registered in the 12 months ending 30 June per 1,000 residents. The number of residents is equivalent to the ERP.

<sup>&</sup>lt;sup>8</sup> The number of deaths are calculated on the basis of usual residence of the deceased, regardless of where in Australia the death occurred. The crude death rate is the number of deaths registered in the 12 months ending 30 June per 1,000 residents. The number of residents is equivalent to the ERP.



Figure 3-3 Crude birth rates on KI and in SA, 2003/04 to 2014/15

Source: ABS (2015a and 2014b)





Source: ABS (2015a and 2014b)

## 3.3 Regional Migration

## 3.3.1 In-migration

The majority of KI residents (79 per cent) were living on KI five years ago (2006, the time of the previous Census). Of those KI residents who have moved into the region, 820 persons across all age groups, around 44 per cent came from an Adelaide metropolitan Local Government Area (LGA), 30 per cent from Other SA, 13 per cent from interstate and 13 per cent from overseas (Figure 3-5).



Figure 3-5 Where inward migrating residents lived 5 years ago, 2011 ª

<sup>a</sup> Excludes those KI residents who were living on KI 5 years ago, and not stated.

Source: ABS (2017a)

The age profile of those residents who have moved into the region is provided in Figure 3-6 and compared to that of non-migrating residents. The age of the residents who have moved into the region since the last census peeked between the ages of 25 and 34 (20 per cent of inward migrating residents) and between the ages of 40 and 64 (44 per cent of inward migrating residents). For non-migrating KI residents, the peak age of residents falls between the ages of 40 and 69 (Figure 4-2).

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Figure 3-6 Age profile of in-bound KI residents, 2011

Source: ABS (2017a)

#### 3.3.2 Out-migration

As noted above, the majority of KI residents (79 per cent) who were living on KI five years ago (2006) are still living on KI. Of those KI residents who have moved out of the region, 781 persons across all age groups, around 47 per cent moved to an Adelaide metropolitan Local Government Area (LGA), 33 per cent moved to elsewhere in SA and 19 per cent moved interstate (Figure 3-7).



Figure 3-7 Where outward migrating residents are living now, 2011 °

<sup>a</sup> Excludes those KI residents who were living on KI 5 years ago.

Source: ABS (2017a)

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The age profile of those residents who have moved out of the region is provided in Figure 4-4. Over half of the residents who have moved out of the region since the last census fall between the ages of 5 and 34 (53 per cent of outward migrating residents), whereas this age cohort accounts for just 28 per cent of non-migrating KI residents (Figure 3-8).





Two previous charts compared the age profile of non-migrating KI residents with in-bound migrating residents (Figure 3-7) and out-bound migrating residents (Figure 3-8). Figure 3-9 compares the age profile of the in-bound and out-bound migrating residents. As noted earlier, between 2006 and 2011 the number of in-migrating residents (820 persons) was only marginally above the number of out-migrating residents (781 persons). The age profile of the two groups was also similar, but with some notable differences:

- The age group of 15-24 years comprised a smaller proportion of in-bound migrating residents (10 per cent) than of out-bound migrating residents (27 per cent).
- By contrast, there was a greater proportion of in-bound migrating residents (26 per cent) in the 25-39 years cohort than the proportion of out-bound migrating residents in that age cohort (18 per cent).
- Interestingly, the 55+ cohort comprised a higher proportion of in-bound migrating residents (22 per cent) than of out-bound migrating residents (18 per cent).

Source: ABS (2017a)



Figure 3-9 Age profile of in-bound and out-bound KI residents, 2011

Source: ABS (2017a)

## 3.4 Education, Employment and Labour Force

## 3.4.1 Education and training

Total enrolments for government and non-government schools located on KI and in SA are detailed in Table 3-4 for the five census years 1996, 2001, 2006, 2011 and 2016. The total number of students enrolled in primary school on KI decreased by 34 per cent between 1996 and 2016. This is in contrast to a 5 per cent decline for SA as a whole over the same period.

The total number of KI students enrolled in secondary school decreased by 2 per cent between 1996 and 2016. Again this is in contrast to the trend at the state level where the total enrolments increased by 13 per cent over the same period.

Enrolments in non-government schools accounted for 3 per cent of total school enrolments on KI in 2016. At the state level the comparable figure is 38 per cent.

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		C	ensus Year		
	1996	2001	2006	2011	2016
Kangaroo Island					
Pre-school	54	68	54	41	51
Primary					
- Government	525	433	431	376	344
- Non-Government	5	6	10	12	7
Total Primary Student	530	439	441	388	351
Secondary Students					
- Government	238	283	216	202	226
- Non-Government	3	0	3	18	9
Total Secondary Student	241	283	219	220	235
South Australia					
Pre-school	17,218	18,166	18,577	20,579	20,291
Primary					
- Government	112,199	103,630	93,512	87,779	94,524
- Non-Government	38,615	43,142	46,003	48,763	48,784
Total Primary Student	150,814	146,772	139,515	136,542	143,308
Secondary Students					
- Government	55,044	57 <i>,</i> 533	52,037	52,221	52,725
- Non-Government	27,665	31,557	35,259	38,731	40,535
Total Secondary Student	82,709	89,090	87,296	90,952	93,260

Table 3-4 School enrolment on KI and in SA, census years 1996 to 2016 (no. of persons)

Source: ABS (2017a)

Enrolments at universities, technical colleges and other education institutes for five census years (1996 to 2011) are summarised in Table 3-5 for KI and SA. Between 1996 and 2016 the total number of KI residents enrolled in a higher education institute rose by more than 180 per cent. This is a significantly greater increase than for SA as a whole, where the total number of residents undertaking higher education increased by 50 per cent.

	Kangaroo Island					South Australia				
-	1996	2001	2006	2011	2016	1996	2001	2006	2011	2016
TAFE										
Full-time students	6	3	11	5	11	8,743	10,616	9,581	12,075	12,017
Part-time students	31	42	75	73	37	25,333	25,896	22,725	22,374	19,124
Not Stated	0	0	6	0	0	255	227	441	390	257
Total	37	45	92	78	48	34,331	36,739	32,747	34,839	31,398
University										
Full-time students	3	9	6	19	15	29,712	31,303	37,104	47,223	58,559
Part-time students	12	26	21	26	21	17,283	17,528	16,309	18,387	19,923
Not Stated	0	0	0	0	0	158	164	313	354	298
Total	15	35	27	45	36	47,153	48,995	53,726	65,964	78,780
Other										
Full-time students	6	3	3	3	3	2,282	2,675	2,654	3,469	4,042
Part-time students	4	16	14	13	16	4,455	7,796	6,842	7,380	7,273
Not Stated	0	0	0	0	0	109	188	245	246	187
Total	10	19	17	16	19	6,846	10,659	9,741	11,095	11,502
Institute type and/or status not stated	142	163	339	278	483	63,526	52,718	105,797	98,693	106,439
Total	204	262	475	417	586	151,856	149,111	202,011	210,591	228,119
Total (excl not-stated)	62	99	136	139	103	88.330	96.393	96.214	111.898	121.680

Table 3-5Higher education enrolments for KI and SA, census years 1996 to 2016 a (no. of persons)

<sup>a</sup> 'Other education institution' includes residents who did not state the type of educational institution.

Source: ABS (2017a)

The level of qualification held by residents on KI and SA are detailed in Table 3-6 for the years 1996, 2001, 2006 and 2011<sup>9</sup>. The total number of residents on KI with a non-school qualification increased steadily over the four Census years. In 2011, approximately 50 per cent of all persons aged 15 or over on KI, held some form of non-school qualification (increasing from 33 per cent in 1996). The level of qualification was generally higher for KI than for SA with the number of persons aged 15 and over holding some form of non-school qualification in SA being 45 per cent in 2011.

<sup>&</sup>lt;sup>9</sup> Data for the 2016 Census were not available at the time the report was prepared.

# Table 3-6Highest level of qualifications for persons aged 15 and over on KI and in SA, 1996,<br/>2001, 2006 and 2011

Qualification	Kangaroo Island								
Qualification	1996		200	1	2006		2011		
Postgraduate Degree	18	2%	24	2%	36	2%	55	3%	
Graduate Diploma & Graduate Certificate	37	4%	40	3%	45	3%	50	3%	
Bachelor Degree	132	13%	191	16%	273	18%	350	19%	
Advanced Diploma & Diploma	150	14%	156	13%	189	12%	245	14%	
Certificate:									
Certificate Level, nfd(b)	n.a.	-	10	1%	50	3%	63	4%	
Certificate III & IV	331	32%	398	34%	490	32%	614	34%	
Certificate I & II	103	10%	68	6%	54	4%	54	3%	
Level of education not described	20	2%	37	3%	45	3%	32	2%	
Level of education not stated	252	24%	246	21%	360	23%	335	19%	
Total	1,043	100%	1,170	100%	1,542	100%	1,798	100%	
	South Australia								
	199	6	2001		2006		2011		
Postgraduate Degree	11,790	3%	15,203	3%	22,897	4%	35,999	5%	
Graduate Diploma & Graduate Certificate	12,680	3%	14,361	3%	16,098	3%	20,277	3%	
Bachelor Degree	73,761	17%	95 <i>,</i> 812	20%	120,979	20%	152,185	22%	
Advanced Diploma & Diploma	64,328	15%	63 <i>,</i> 469	13%	79 <i>,</i> 698	13%	95 <i>,</i> 689	14%	
Certificate:									
Certificate Level, nfd(b)	n.a.	-	5,775	1%	21,172	4%	21,518	3%	
Certificate III & IV	120,797	27%	155,056	32%	176,066	30%	205,850	30%	
Certificate I & II	35,905	8%	24,298	5%	15,343	3%	18,387	3%	
Level of education not described	8,447	2%	14,999	3%	15,940	3%	13,792	2%	
Level of education not stated	112,132	25%	100,201	20%	127,186	21%	116,517	17%	
Total	439,840	100%	489,174	100%	595,379	100%	680,214	100%	

Source: ABS (2017a)

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#### 3.4.2 Employment and labour force

This section reports on the major labour force characteristics relevant to KI and SA. The major labour force statistics include:

- labour force<sup>10</sup>
- number of unemployed persons
- unemployment rate<sup>11</sup>
- participation rate<sup>12</sup>.

#### Labour Force

The total number of persons in the labour force is illustrated for KI and SA in Figure 3-10 for the period March quarter 2007 to March quarter 2017. The total number of persons in the labour force on KI fluctuated over the period, ranging from a low of 2,244 in March 2007 to a high of 2,682 in June 2009. Despite some fluctuations, the labour force in SA increased over the 10 years, from 794,186 in March 2007 to 873,417 in March 2017.



Figure 3-10 Labour force on KI and in SA, March 2007 to March 2017

Source: DEEWR (2017)

- <sup>10</sup> The labour force is defined as the total number of employed and unemployed persons.
- <sup>11</sup> The unemployment rate is defined as the number of unemployed persons expressed as a percentage of the total labour force.
- <sup>12</sup> The participation rate is a measure of the total labour force as a proportion of the civilian population (persons aged 15 and over).

While the cause of the relatively sharp rise in the KI labour force from 2007 to 2009 is unclear, it does demonstrate there is scope for a rapid labour market supply-side response to an increase in demand. Relevant to this study, it does demonstrate that increased demand could be met in response to a change in demand and that it is unlikely to lead to significant local wage pressures<sup>13</sup>.

#### Unemployment

The number of unemployed persons is illustrated for KI and SA in Figure 3-11 for the period March 2007 to March 2017. The number of unemployed persons on KI fluctuated over the period ranging between 44 in September 2007 and 146 in September 2016. Comparison of the two end quarters indicate that the total number of unemployed persons increased by 43 persons (approximately 90 per cent) on KI. The number of unemployed persons in SA also increased over the same period, by 18,000 persons (approximately 45 per cent), but also fluctuated over the years (Figure 3-11).





Source: DEEWR (2017)

<sup>&</sup>lt;sup>13</sup> Table 3-7 shows there was no more than trend increases in mean taxable income between 2007/08 and 2009/10.

#### Unemployment Rate

The unemployment rates are illustrated for KI and SA in Figure 3-12 for the period March quarter 2007 to March quarter 2017. The unemployment rate on KI fluctuated over the period but increased overall and was estimated to be 3.8 per cent in March 2017. The unemployment rate on KI was, on average, lower than the rate for SA (6.7 per cent in March 2017) over the same period (Figure 3-12).



Figure 3-12 Unemployment rate on KI and in SA, March 2007 to March 2017

Source: DEEWR (2017) and EconSearch analysis

#### **Participation Rate**

The participation rate is illustrated for KI and SA in Table 3-13 for the period 2004/05 to 2014/15<sup>14</sup>. The labour force participation rate for KI fluctuated over the nine years but overall followed an increasing trend. The labour force participation rate in SA was relatively steady, ranging from 61 to 63 per cent and was consistently lower than the KI rate over the whole period. In 2014/15 the labour force participation rate was 89 per cent on KI and 62 per cent for SA as a whole. KI's relatively high participation rate suggests that increased demand for labour will lead to an increase in migration to the Island (Table 3-13).

<sup>&</sup>lt;sup>14</sup> Due to the latest population by age data (ABS 2014a) being available for 2014/15, the participation rate can only be calculated up until 2014/15, despite having employment data up until January 2017.





Source: DEEWR (2017), ABS (2016a) and EconSearch analysis

## 3.2 ncome and o as ng

#### 3.5.1 Household income

This section provides information on average annual income relevant to KI and SA. The taxable income data presented below can serve to provide broad comparisons to the household income impacts (presented in later sections). Such comparisons allow for consideration of the social impact, via increase household income, to the region. The proportion of taxable individuals and the mean taxable income are presented in Table 3-7 for KI and SA, for the period 2004/05 to 2014/15.

The proportion of taxable individuals<sup>15</sup> (compared to non-taxable individuals<sup>16</sup>) on KI fluctuated slightly over the 12 years, overall decreasing from 75 per cent to 67 per cent. In the 2014/15, there were 1,708 taxable and 858 non-taxable individuals on KI. Despite a decrease over the 10 years (from 81 per cent to 75 per cent), the proportion of taxable individuals in SA as a whole was greater than KI in all years.

<sup>&</sup>lt;sup>15</sup> Refers to personal taxpayers who submitted a return with net tax payable of more than \$0.

<sup>&</sup>lt;sup>16</sup> An individual is considered non-taxable when the net tax payable by the individual is equal to zero.

	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Kangaroo Island											
Proportion of taxable individuals (%) <sup>a</sup>	75%	75%	72%	72%	67%	64%	66%	68%	61%	65%	67%
Mean taxable income - nominal (\$) <sup>b</sup>	34,360	35,461	38,623	40,623	42,835	43,766	47,274	49,502	51,160	53,042	53,060
Mean taxable income - real (\$) <sup>c</sup>	44,373	44,140	47,250	47,519	49,351	49,047	50,999	52,763	53,411	53,695	53,060
South Australia											
Proportion of taxable individuals (%) <sup>a</sup>	81%	82%	79%	78%	75%	74%	74%	77%	74%	75%	75%
Mean taxable income - nominal (\$') <sup>b</sup>	41,513	42,778	46,643	48,669	51,932	54,349	57,448	58,933	63,048	64,808	65,248
Mean taxable income - real (\$) <sup>c</sup>	53,611	53,249	57,062	56,932	59,831	60,908	61,974	62,815	65,822	65,607	65,248

Table 3-7	Taxable individuals and	taxable income on	KI and in SA,	, 2004/	05 to 2014	/15
-----------	-------------------------	-------------------	---------------	---------	------------	-----

<sup>a</sup> Refers to personal taxpayers who submitted a return with net tax payable of more than \$0.

<sup>b</sup> Mean (average) taxable income refers only to taxable individuals and is calculated by dividing net taxable income of the region as a whole by the number of taxable individuals.

<sup>a</sup> The real mean individual taxable income is the nominal income adjusted by the purchasing power of money. The consumer price index (CPI) has been used to make this adjustment (ABS 2014d). It enables meaningful comparisons of incomes to be made between years.

Source: ATO (2014) and ABS (2014d)
Taxable income is the amount remaining after deducting from assessable income all allowable deductions under the Income Tax Assessment Act 1936. Taxable income is the amount to which tax rates are applied. Average taxable income in an area is the taxable income per person (calculated by dividing the total taxable income for the region by the total number of taxable individuals). The mean individual taxable incomes on KI and in SA for the period 2004/05 to 2014/15 are illustrated in Figure 3-14 (nominal terms) and Figure 3-15 (real terms). The mean individual taxable income the state average over the period in both nominal and real terms.

The lower taxable income on the Island relative to the whole of state and the smaller proportion of taxable individuals is clear evidence that KI is a poorer community than SA as a whole. In 2004/05 mean taxable income on KI was 82.7 per cent of the SA average. By 2014/15 this proportion had fallen to 81.3 per cent, indicating a worsening of KI's relative position in the state economy (Table 3-7). This suggests there is significant scope to improve social outcomes (i.e. reduced income inequality) on KI, relative to the rest of the state, from local economic development projects.



Figure 3-14 Nominal mean individual taxable income on KI and in SA, 2004/05 to 2014/15

Source: ATO (2014)



Figure 3-15 Real mean individual taxable income on KI and in SA, 2004/05 to 2014/15 a

<sup>a</sup> In 2014/15 dollars.

Source: ATO (2014) and ABS (2014d)

#### 3.5.3 Building approvals

This section provides the number and value of approvals for new residential dwellings on KI and in SA. Building approval figures provide a barometer for the attractiveness of the region to residents and investors. To an extent, these figures can reflect the status of the regional economy (e.g. a sharp increase in dwelling approvals can suggest increased population pressure due to improved opportunities). The number and total value of approvals on KI and SA are illustrated in Figure 3-16 and Figure 3-17, respectively, for the period 2004/05 to 2015/16.



Figure 3-16 Number and value of new residential dwelling approvals on KI, 2004/05 to 2015/16

Source: ABS (2015b)

The total number of building approvals on KI decreased overall from 85 in 2004/05 to just 21 in 2015/16, a fall of 75 per cent. The total value of approvals decreased by a less dramatic but still significant 57 per cent, from \$12 million in 2004/05 to \$5 million in 2015/16 (Figure 3-16). In real terms the decrease was even greater, with total value of approvals decreasing by 67 per cent (from \$16 million in 2004/05).

Comparison of the two end years (2004/05 and 2015/16) highlights the significant increase in the value of building approvals in SA, from \$1.9 billion in 2004/05 to \$3.2 billion in 2015/16. Despite the total number of approvals being just 16 per cent higher in 2015/16 than in 2004/05, the total value was 69 per cent higher (Figure 3-17). In real terms the increase was significantly smaller, with total value of approvals increasing by 30 per cent (from \$2.5 billion in 2004/05).

The average value per approval on KI and in SA is illustrated in Figure 3-18. The average value per approval on KI increased by over 75 per cent between 2004/05 and 2015/16, from \$145,000 to \$255,000. For SA, the value per approval increased from \$177,000 in 2003/04 to \$259,000 in 2015/16, an increase of 46 per cent (Figure 3-18).



Due to the significant (75 per cent) decline in number of approvals over the ten years to 2015/16, the increase in the value per approval on KI is the result of an increasing proportion of higher valued developments. Although the average value of approvals has increased, the decreasing number of approvals on KI suggests a trend of decreasing economic opportunities on the Island.



Figure 3-17 Number and value of new residential dwelling approvals in SA, 2004/05 to 2015/16



Figure 3-18 Average value per approval on KI and in SA, 2004/05 to 2015/16

Source: ABS (2015b)



### 3.5.4 Internet access

Internet access figures provide further indication of regional economic capital as well as regional adaptive capacity. The number of dwellings with internet access for the three latest census years (2006, 2011 and 2016) are summarised in Table 3-8 for KI and SA. Between 2006 and 2016 the total number of KI dwellings with internet access (broadband, dial-up or other) increased from 51 per cent to 72 per cent. For SA as a whole the total number of dwellings with access to some form of internet increased from 54 per cent to 77 per cent. The number of dwellings with no internet access on KI fell by from 41 per cent to 18 per cent between 2006 and 2016, while for the State as a whole the proportion dropped from 39 per cent in 2006 to 17 per cent in 2016 (Table 3-8).

The increase in internet connections on KI suggests an improvement in connectivity and communication, allowing for better commercial opportunities relative to the past. However, connectivity remains lower than the whole of state, implying further opportunity for improvement on KI.

Type of Internet Connection -	Kangaroo Island						
Type of Internet Connection	2006		2011		2016		
Internet accessed from dwelling	926	51%	1,297	67%	1,482	76%	
Internet not accessed from dwelling	752	41%	517	27%	368	19%	
Not stated	138	8%	133	7%	209	11%	
Total	1,816	100%	1,947	100%	2,059	106%	
			SA				
	2006		2011		2016		
Internet accessed from dwelling	331,645	54%	457,873	71%	520,911	81%	
Internet not accessed from dwelling	240,773	39%	147,996	23%	111,332	17%	
Not stated	37,489	6%	38 <i>,</i> 025	6%	41,296	6%	
Total	609,907	100%	643,894	100%	673 <i>,</i> 539	105%	

Table 3-8	Dwellings with	internet access or	KL and in SA	2006	2011 and	2016
Table J-0	Dwenings with	internet access of	r Kranu in SA	, 2000,	, 2011 anu	2010

Source: ABS (2017a)

# 3.6 Business

A count of business by industry and the number of people employed is detailed in Table 3-9 for KI and in Table 3-10 for SA as a whole for 2016. On KI the industries with the most number of businesses were agriculture, forestry and fishing (45 per cent of the total number of businesses in the region), construction (12 per cent), accommodation and food services (7 per cent) and rental, hiring and real estate (6 per cent) (Table 3-9). For SA the industries with the most number of businesses were construction (15 per cent of total businesses in SA), agriculture, forestry and fishing (12 per cent), rental, hiring and real estate services (12 per cent) and financial and insurance services (10 per cent) (Table 3-10).

	Kangaroo Island							
Industry	Non						Share of	
	employing	1-4	5-19	20-199	200+	Total	Total	
A Agriculture. Forestry and Fishing	198	85	29	3	0	321	Businesses 45%	
B Mining	0	3	0	0	0	3	0%	
C Manufacturing	18	3	6	0	0	19	3%	
D Electricity, Gas, Water and Waste Services	3	0	0	0	0	3	0%	
E Construction	56	24	0	0	0	82	12%	
F Wholesale Trade	4	3	3	0	0	10	1%	
G Retail Trade	14	13	9	0	0	35	5%	
H Accommodation and Food Services	23	9	18	0	0	53	7%	
I Transport, Postal and Warehousing	22	7	9	0	0	33	5%	
J Information Media and Telecommunications	3	0	0	0	0	3	0%	
K Financial and Insurance Services	14	0	0	0	0	14	2%	
L Rental, Hiring and Real Estate Services	37	9	3	0	0	44	6%	
M Professional, Scientific and Technical Services	17	11	0	0	0	26	4%	
N Administrative and Support Services	6	0	3	0	0	8	1%	
O Public Administration and Safety	0	0	0	0	0	0	0%	
P Education and Training	0	0	0	0	0	3	0%	
Q Health Care and Social Assistance	17	3	0	0	0	19	3%	
R Arts and Recreation Services	3	3	0	0	0	7	1%	
S Other Services	4	4	0	0	0	11	2%	
Not Classified 1	14	0	0	0	0	15	2%	
Total	453	177	80	3	0	709	100%	
Share of Total Businesses	64%	25%	11%	0%	0%	100%		

Table 3-9 Count of businesses by number of people employed on KI, June 2016<sup>17</sup>

Source: ABS (2012g)

On KI the majority of businesses (64 per cent) did not employ another person, 25 per cent employed between 1 and 4 persons, 11 per cent employed between 5 and 19 people, less than 1 per cent employed between 20 and 199 and no businesses employing more than 200 people, very similar to SA as a whole (Table 3-9 and Table 3-10).

<sup>&</sup>lt;sup>17</sup> The ABS has excluded the "Type of Legal Organisation – 3000 General Government" from the counts. The exclusion of the General Government institutional sector particularly impacts on counts for the Public Administration and Safety, Education and Training, and Health Care and Social Assistance ANZSIC divisions (O, P and Q respectively). The business counts in these divisions include private sector and public corporation activity only (ABS 2017).

		South Australia							
In	dustry	Non employing	1-4	5-19	20-199	200+	Total	Share of Total Businesses	
Α	Agriculture, Forestry and Fishing	11,486	4,698	1,513	202	3	17,841	12%	
в	Mining	315	106	57	12	6	507	0%	
С	Manufacturing	2,864	1,535	1,307	422	30	6,231	4%	
D	Electricity, Gas, Water and Waste Services	239	124	62	15	3	466	0%	
Е	Construction	1 <b>4,1</b> 56	5,422	1,430	252	7	21,263	15%	
F	Wholesale Trade	2,560	1,352	786	188	16	4,901	3%	
G	Retail Trade	3,696	2,902	1,756	357	25	8,714	6%	
н	Accommodation and Food Services	1,586	1,865	1,732	500	9	5,750	4%	
Т	Transport, Postal and Warehousing	5,962	1,497	386	114	11	7,996	6%	
J	Information Media and Telecommunications	615	215	54	20	0	916	1%	
к	Financial and Insurance Services	12,957	1,846	271	47	6	15,095	10%	
L	Rental, Hiring and Real Estate Services	14,911	1,310	397	72	6	16,672	12%	
м	Professional, Scientific and Technical Services	8,130	4,016	1,105	249	7	13,512	9%	
Ν	Administrative and Support Services	3,061	1,193	494	206	19	4,953	3%	
о	Public Administration and Safety	169	90	68	28	0	378	0%	
Ρ	Education and Training	799	297	189	152	6	1,469	1%	
Q	Health Care and Social Assistance	5,044	2,244	983	283	29	8,499	6%	
R	Arts and Recreation Services	906	313	125	48	9	1,442	1%	
s	Other Services	3,042	2,283	681	74	3	6,035	4%	
No	ot Classified 1	1,506	215	60	15	3	1,835	1%	
Тс	tal	94,004	33 <i>,</i> 523	13,456	3,256	198	144,475	100%	
Sh	are of Total Businesses	65%	23%	9%	2%	0%	100%		

Table 3-10 Count of businesses by number of people employed in SA, June 2016

Source: ABS (2012g)

# 3.7 Economic Structure of the Regional Economy

For the purpose of describing the current level economic activity on KI and in order to estimate the regional economic impact of the tourism industry, a RISE model<sup>18</sup> was constructed for 2015/16.

The detailed profile of the economic structure of the KI regional economy for 2015/16 provided below is consistent with the method and data sources used by the consultants in a modelling exercise for the Department of Premier and Cabinet (EconSearch 2017a).

Economic activity in the region in 2015/16 is presented in Table 3-11 to Table 3-13 in terms of the following indicators:

<sup>&</sup>lt;sup>18</sup> See Section 2.2 for an overview of the Regional Industry Structure and Employment (RISE) model.

- employment
- output
- household income
- other value added
- gross regional product (GRP)
- imports
- tourism expenditure
- exports.

**Employment** is a measure of the number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalents and total (i.e. full-time and part-time) jobs. Employment is measured by place of remuneration rather than place of residence.

(Value of) Output is a measure of the gross revenue of goods and services produced by commercial organisations (e.g. farm-gate value of production) and gross expenditure by government agencies. Total output needs to be used with care as it includes elements of double counting (e.g. the value of winery output includes the farm-gate value of grapes) and overstates the real contribution to economic activity.

**Household income** is a component of GRP and is a measure of wages and salaries paid in cash and in kind, drawings by owner operators and other payments to labour including overtime payments, employer's superannuation contributions and income tax, but excluding payroll tax.

**Other value added** is another component of GRP and includes gross operating surplus (excluding the drawings of working proprietors) and all taxes, less subsidies.

**Gross regional product (GRP)** is a measure of the net contribution of an activity to the regional economy<sup>19</sup>. Gross regional product is measured as value of output less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as household income plus other value added (gross operating surplus and all taxes, less subsidies). It represents payments to the primary inputs of production (labour, capital and land).

*Imports* are a measure of the value of goods and services purchased by intermediate sectors and by components of final demand in the region/state of interest from other regions, interstate and overseas.

*Tourism expenditure* is a measure of the value of sales of goods and services to visitors to the state or region.

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<sup>&</sup>lt;sup>19</sup> Similarly, contribution to gross state product (GSP) is a measure of the net contribution of an activity to the state economy.

*Exports (other)* are a measure of the value of goods and services sold from the region/state of interest to consumers in other regions, interstate and overseas, net of sales to visitors to the region.

The demographic impact of changes in the level of employment in the region was measured using **population** (i.e. the number of people resident in the region) as an indicator.

A brief summary of the regional economic structure of KI for 2015/16 follows. These data were derived from the regional economic impact model prepared specifically for this project. The economic profile of the regional economy has been prepared in terms of a 23-sector industry classification<sup>20</sup>. Economic activity in the region is described in terms of:

- employment
- gross regional product (GRP)
- imports and exports.

## 3.7.1 Employment

It was estimated that there were approximately 2,300 fte jobs (around 2,460 total jobs) on KI in 2015/16 (Table 3-11). A sectoral breakdown of employment, household income and household expenditure for KI in 2015/16 is provided in Table 3-11. The top five contributors to fte employment in the region in 2015/16 were:

- agriculture, forestry and fishing<sup>21</sup> (27 per cent)
- retail trade (12 per cent)
- transport, postal and warehousing (11 per cent).
- health care and social assistance (9 per cent)
- accommodation and food services (8 per cent)

In 2015/16 employment in South Australia was approximately 695,087 (fte jobs) which means KI accounts for approximately 0.3 per cent of the total state employment.

For the remainder of the document this will refer to the sum of the agriculture sector, the aquaculture, fishing, hunting & trapping sector, the forestry & logging sector and the agriculture, forestry & fishing support services sector.



<sup>&</sup>lt;sup>20</sup> This corresponds to 19 ANZSIC division sectors, plus ownership of dwellings, with further disaggregation applied to the agriculture, forestry & fishing sector. The comparisons in the following sections are at the divisional level for consistency purposes. The economic profile of the regional economy is also available in terms of a 78-sector industry classification if required. See appendix 1 for intermediate sector specification.

Table 3-11	Employment	household income and house	ehold expenditure.	Kangaroo Island, 2015	<b>/16</b> <sup>a</sup>
					/

	Total Empl	oyment	FTE Emplo	yment	Household Income		Household Expenditure	
SECTOR	(jobs)	(%)	(fte)	(%)	(\$m)	(%)	(\$m)	(%)
Agriculture, forestry & fishing								
Agriculture	428	17.4%	540	23.5%	31	23.2%	3	2.6%
Aquaculture, Fishing, Hunting & Trapping	90	3.7%	67	2.9%	7	5.3%	3	2.6%
Forestry & Logging	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Agriculture, Forestry & Fishing Support Services	7	0.3%	9	0.4%	1	0.5%	0	0.0%
Mining	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Manufacturing	39	1.6%	42	1.8%	2	1.5%	3	2.4%
Electricity, gas & water	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Building & construction	119	4.8%	100	4.4%	5	3.8%	0	0.0%
Wholesale trade	17	0.7%	19	0.8%	1	1.1%	1	1.0%
Retail trade	367	14.9%	270	11.7%	11	8.5%	8	6.3%
Accommodation, cafes & restaurants	255	10.4%	188	8.2%	8	6.0%	3	2.4%
Transport & storage	225	9.2%	255	11.1%	20	14.9%	6	5.0%
Communication & publishing services	21	0.9%	20	0.9%	1	0.8%	3	2.7%
Finance & insurance	13	0.5%	10	0.4%	1	0.8%	2	1.3%
Ownership of dwellings <sup>b</sup>	0	0.0%	0	0.0%	0	0.0%	16	12.4%
Rental Hiring Real Estate Services	28	1.1%	26	1.1%	2	1.5%	0	0.0%
Prof Scientific Tech Services	154	6.3%	166	7.2%	9	7.0%	1	0.6%
Admin Support Services	149	6.1%	87	3.8%	5	3.6%	1	0.6%
Public administration & defence	152	6.2%	145	6.3%	9	7.0%	0	0.2%
Education & training	123	5.0%	105	4.6%	6	4.2%	2	1.2%
Health & community services	213	8.7%	203	8.8%	12	9.2%	5	4.1%
Cultural & recreational services	0	0.0%	1	0.0%	0	0.0%	0	0.0%
Personal & other services	59	2.4%	49	2.1%	2	1.1%	1	1.1%
Total Intermediate	2,460	100.0%	2,300	100.0%	133	100.0%	59	46.6%
PRIMARY INPUTS								
Household Income	-	-	-	-	-	-	0	0.0%
GOS & GMI c	-	-	-	-	-	-	0	0.0%
Taxes Less Subsidies	-	-	-	-	-	-	9	7.0%
Imports	-	-	-	-	-	-	58	46.4%
Primary Inputs Total	-	-	-	-	-	-	67	53.4%
GR& TOTAL	2,460	100.0%	2,300	100.0%	133	100.0%	126	100.0%

<sup>a</sup> The economic profile of the regional economy is also available in terms of a 78-sector industry classification if required.

<sup>b</sup> The ownership of dwellings sector is a notional sector designed to impute a return to the state's housing stock. Total value of output in this sector is an estimate of rent earned on leased dwellings and imputed rent on the balance of owner-occupied dwellings.

<sup>c</sup> Gross operating surplus and gross mixed income.

Source: EconSearch Analysis



## 3.7.2 Gross regional product

GRP on KI in 2015/16 was estimated to be \$257 million (Table 3-12). The contribution of an individual industry to GRP is calculated as the sum of household income, gross operating surplus and gross mixed income and indirect taxes less subsidies. In 2015/16, the top six contributors to GRP were:

- agriculture, forestry and fishing (30 per cent)
- transport, postal and warehousing (14 per cent)
- ownership of dwellings (6 per cent).
- health care and social assistance (5 per cent)
- retail trade (5 per cent)
- accommodation and food services (5 per cent)

In 2015/16 South Australia's gross state product was \$100.3 billion which means that KI accounts for approximately 0.3 per cent of the state economy.

## Table 3-12 Components of gross regional product in the Kangaroo Island economy by industry, 2015/16 \*

	Household	Income	GOS and	GMI <sup>c</sup>	Taxes less Subsidies		Gross Re	gional	Outp	ut
SECTOR	(\$m)	(%)	(\$m)	(%)	(\$m)	(%)	(\$m)	(%)	(\$m)	(%)
Agriculture, forestry & fishing										
Agriculture	31	23.2%	46	48.2%	3	22.3%	80	31.0%	137	32.1%
Aquaculture, Fishing, Hunting & Trapping	7	5.3%	4	3.8%	1	6.6%	11	4.5%	20	4.6%
Forestry & Logging	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Agriculture, Forestry & Fishing Support Services	1	0.5%	1	0.6%	0	1.0%	1	0.5%	7	1.5%
Mining	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Manufacturing	2	1.5%	1	0.8%	0	1.2%	3	1.2%	9	2.2%
Electricity, gas & water	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Building & construction	5	3.8%	0	0.0%	0	1.5%	5	2.1%	14	3.2%
Wholesale trade	1	1.1%	2	1.6%	0	1.2%	3	1.2%	8	1.8%
Retail trade	11	8.5%	1	0.9%	1	4.5%	13	4.9%	21	4.9%
Accommodation, cafes & restaurants	8	6.0%	2	2.3%	1	11.5%	12	4.5%	23	5.3%
Transport & storage	20	14.9%	15	15.7%	2	19.5%	37	14.5%	69	16.1%
Communication & publishing services	1	0.8%	2	2.1%	0	0.5%	3	1.2%	6	1.4%
Finance & insurance	1	0.8%	4	3.8%	0	1.9%	5	1.9%	7	1.5%
Ownership of dwellings <sup>b</sup>	0	0.0%	15	15.3%	2	13.5%	16	6.3%	21	5.0%
Rental Hiring Real Estate Services	2	1.5%	1	1.2%	0	3.5%	4	1.4%	9	2.2%
Prof Scientific Tech Services	9	7.0%	0	0.0%	0	2.5%	10	3.8%	16	3.7%
Admin Support Services	5	3.6%	0	0.0%	0	2.4%	5	2.0%	12	2.8%
Public administration & defence	9	7.0%	2	1.7%	0	2.9%	11	4.4%	20	4.7%
Education & training	6	4.2%	1	0.8%	0	0.7%	6	2.5%	9	2.0%
Health & community services	12	9.2%	1	1.0%	0	2.3%	14	5.3%	18	4.1%
Cultural & recreational services	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Personal & other services	2	1.1%	0	0.1%	0	0.6%	2	0.6%	3	0.8%
Total Intermediate	133	100.0%	96	100.0%	12	100.0%	241	93.7%	426	100.0%
Net Taxes in Final Dem&	-	-	-	-	-	-	16	6.3%	-	_
Gross Regional Product	-	-	-	-	-	_	257	100.0%	-	-

<sup>a-c</sup> See footnotes for Table 3-11.

Source: EconSearch Analysis

## 3.7.3 Imports and exports

A breakdown of the value of imports and exports by industry sector for Kangaroo Island in 2015/16 is provided Table 3-13. These data were derived from the RISE model for the region (see Section 2.2), developed specifically for this project. Some of the key points to note from these data follow.

- Agriculture, forestry and fishing accounted for almost 15 per cent of the total value of goods and services imported into the region in 2015/16 from intrastate (i.e. other regions within SA), interstate and overseas.
- Among the remaining intermediate sectors, the top importers in the region in 2012/13 were the transport, postal and warehousing (almost 9 per cent) and accommodation and food services (2.5 per cent) sectors.
- Expenditure by tourists (\$110m) contributed approximately 36 per cent of the total value of exports from the region in 2015/16. The balance (i.e. 'other exports'), approximately \$192m, represents the value of goods and services purchased by consumers (i.e. households, businesses, governments, etc.) in other regions within SA, interstate and internationally.
- Total regional expenditure by tourists (\$110m) comprised around 2 per cent of the SA total expenditure by tourists in 2015/16 (\$5.9b).
- The top contributors to the value of 'other exports' from the region in 2015/16 were the agriculture, forestry and fishing (63 per cent) and transport, postal and warehousing (20 per cent) sectors.
- The trade balance (i.e. exports less imports) on KI in 2015/16 was approximately \$52m.

Table 3-13 Value of imports and exports by industry, Kangaroo Island, 2015/16 <sup>a</sup>

	Tourism		Other Exports		Total Exports		Imports	
SECTOR	(\$m)	(%)	(\$m)	(%)	(\$m)	(%)	(\$m)	(%)
Agriculture, forestry & fishing								
Agriculture	0	0.0%	106	55.2%	106	35.1%	30	12.0%
Aquaculture, Fishing, Hunting & Trapping	0	0.0%	12	6.2%	12	3.9%	5	1.9%
Forestry & Logging	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Agriculture, Forestry & Fishing Support Services	0	0.0%	3	1.6%	3	1.0%	3	1.0%
Mining	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Manufacturing	2	1.5%	3	1.6%	5	1.6%	4	1.5%
Electricity, gas & water	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Building & construction	0	0.0%	2	1.3%	2	0.8%	5	2.0%
Wholesale trade	2	1.6%	1	0.7%	3	1.0%	2	0.9%
Retail trade	10	9.4%	1	0.6%	12	3.8%	4	1.7%
Accommodation, cafes & restaurants	15	13.4%	4	1.9%	18	6.1%	6	2.5%
Transport & storage	7	6.7%	39	20.1%	46	15.2%	22	8.6%
Communication & publishing services	0	0.0%	1	0.7%	1	0.5%	2	0.6%
Finance & insurance	0	0.0%	3	1.7%	3	1.1%	1	0.4%
Ownership of dwellings <sup>b</sup>	5	4.3%	1	0.4%	5	1.8%	4	1.6%
Rental Hiring Real Estate Services	2	1.9%	2	0.8%	4	1.2%	3	1.2%
Prof Scientific Tech Services	0	0.0%	6	3.3%	6	2.1%	4	1.6%
Admin Support Services	0	0.0%	3	1.8%	3	1.1%	4	1.5%
Public administration & defence	0	0.0%	2	0.8%	2	0.5%	6	2.3%
Education & training	2	1.6%	1	0.3%	2	0.8%	1	0.6%
Health & community services	0	0.0%	0	0.2%	0	0.1%	3	1.2%
Cultural & recreational services	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Personal & other services	0	0.1%	1	0.4%	1	0.3%	1	0.4%
Total Intermediate	45	40.7%	191	99.8%	236	78.3%	109	43.6%
PRIMARY INPUTS								
Household Income	0	0.0%	0	0.0%	0	0.0%	-	-
GOS & GMI c	0	0.0%	0	0.0%	0	0.0%	-	-
Taxes Less Subsidies	5	4.4%	0	0.0%	5	1.6%	-	-
Imports	60	54.9%	0	0.2%	61	20.1%	-	-
Primary Inputs Total	65	59.3%	0	0.2%	66	21.7%	-	-
FINAL DEM&								
Household Expenditure	-	-	-	-	-	-	58	23.4%
Government Expenditure	-	-	-	-	-	-	10	4.0%
Gross Fixed Capital	-	-	-	-	_	-	12	4.9%
Change in Inventories	-	-	-	-	-	-	0	0.0%
Tourism	-	-	-	-	-	-	60	24.1%
Other Exports	-	-	-	-	-	-	0	0.2%
Final Dem& Total	-	-	-	-	-	-	141	56.6%
GR& TOTAL	110	100.0%	192	100.0%	302	100.0%	250	100%

<sup>a-c</sup> See footnotes for Table 3-11.



# 4. DATA AND ASSUMPTIONS

Detailed cost estimates of the project were provided by KIPT for the purpose of the economic impact assessment of the construction and operation phases of the project.

Under the construction phase detailed expenditure data were broken down into materials, services and labour for each of the years in the construction period. Assumptions were also provided on where the expenditures are likely to occur, i.e. on Kangaroo Island, elsewhere in SA, elsewhere in Australia and outside Australia. Similar data were provided for the number of jobs that were estimated to occur during the construction phase.

For the analysis of the operating phase, expenditure and employment data were provided using the same method outlined above. Additional data were provided on revenue per annum over the life of the project.

During the operating phase it is anticipated that the majority of the workforce would live locally.

## 4.1 Construction Phase

Capital expenditure values were based on the wharf costing data (marine side) provided by KIPT. Total capital expenditure, including contingencies, is estimated to be \$41.2 million as detailed below in Table 4-1.

Expenditure Category —		Expenditur	e, (\$'000)	
Expenditure Category —	2016/17	2017/18	2018/19	Total
Floating wharf	-	6,645	3,745	10,390
Barge restraints and mooring dolphins	-	-	6,850	6,850
Dredging	-	-	3,550	3,550
Installation causeway	-	-	4,600	4,600
Detailed design and project management	-	-	2,375	2,375
Total port infrastructure	-	6,645	21,119	27,764
Civil works and roads	-	-	4,500	4,500
Other buildings and purchase of forestry assets	-	-	1,988	1,988
Total land based infrastructure	-	-	6,488	6,488
Silvicultural and land management costs	931	1,361	-	2,291
Corporate overhead cost	2,194	2,499	-	4,693
Total operating costs (construction phase) <sup>a</sup>	3,124	3,860	-	6,984
Total construction phases expenditure	3,124	10,505	27,607	41,236

 Table 4-1
 Construction phase expenditure by broad expenditure categories

<sup>a</sup> Silvicultural and land management costs and corporate overhead costs for the years 2016/17 and 2017/18 have been treated as capital expenditure costs. These costs were treated as operating expenditures for all later years.

Source: KIPT



A great deal of information was provided under the broad expenditure categories listed in Table 4-1. Values for each expenditure item within each expenditure category were allocated to (and in some cases split between) relevant industries using the ANZSIC codes (ABS 2017a). The allocation of each expenditure item was dependent upon the economic activity involved in the production, delivery and procurement of each item.

- Some expenditure items were broad enough in their description to involve different economic activities where expenditure was allocated to the relevant industries on a proportional basis.
- The allocations of individual items were guided by the available description in the data (e.g. "Includes \$50,000 for a specialised placement frame").
- If an individual item was allocated across two or more industry sectors, the proportions were based on the available information but generally applied broadly, e.g. on a 50:50 basis, 25:25:50 basis, etc.
- Contingency expenditure was also allocated and modelled separately:
  - The contingency amounts were based on the relevant expenditure subtotals and the contingency percentages provided in the description for wharf costings
  - In some cases, the estimated amount was inclusive of contingencies, overheads and margins in which case the contingency value was estimated according to the contingency percentage provided and the residual was assumed to be overheads and margins
  - The residual value was allocated to relevant margin sectors.
- All capital expenditure impacts were modelled for the year 2016/17 to 2018/19.
- All impacts were modelled to result in the same year as the expenditure.

Capital expenditure allocated by industry (and region) is provided in Table 4-2. Appendix 1 (Appendix Table 1) shows the breakdown of capital expenditure with and without contingencies.



Sector	Description	Total Expenditure (\$m)						
		КІ	RoSA	RoAust	OS	Total		
53	Other Construction	0.0	13.0	0.0	1.4	14.4		
44	Other Machinery & Equipment Manufacturing	0.0	0.9	0.0	6.7	7.7		
54	Construction Services	1.6	2.7	0.0	0.0	4.4		
61	Water, Pipeline & Other Transport	0.0	1.4	0.0	1.9	3.3		
19	Non Metallic Mineral Mining	0.0	2.1	0.0	0.0	2.1		
55	Wholesale Trade	0.0	0.8	0.0	0.0	0.8		
70	Professional, Scientific & Technical Services	0.4	0.6	0.0	0.0	1.0		
59	Road Transport	0.0	0.5	0.0	0.0	0.5		
39	Non-metallic Mineral Product Manufacturing	0.0	0.1	0.0	0.2	0.3		
68	Rental, Hiring & Real Estate Services	0.0	0.2	0.0	0.0	0.2		
43	Motor Vehicles & Other Transport Manufacturing	0.0	0.1	0.0	0.1	0.2		
71	Administrative & Support Services	0.1	0.1	0.0	0.0	0.3		
67	Insurance & Other Financial Services	0.0	0.2	0.0	0.0	0.3		
15	Agriculture, Forestry & Fishing Support Services	0.2	0.1	0.0	0.0	0.2		
	Direct Employment	1.4	3.1	0.6	0.0	5.1		
	All Other Sectors	0.3	0.2	0.0	0.0	0.4		
	Total	4.0	26.0	0.9	10.3	41.2		

 Table 4-2
 Summary capital expenditure by sector by region, 2016/17 - 2018/19 (\$m)

Source: KIPT and EconSearch Analysis

# 4.2 Operating Phase

Total operating expenditure was based on the cash flow statement, income statement and input workings sheet data provided by KIPT.

Total expenditure was aligned to the cash flow statement. The income statement and input workings sheet were used to derive further detail to assist in allocating expenditure to ANZSIC codes.

Total operating expenditure for the years 2018/19 to 2030/31 were allocated to ANSZIC codes in similar fashion to the capital expenditure data (Section 4.1). These were then allocated to the relevant sectors in the 78-sector RISE models used for the impact assessment.

Operating expenditures allocated by industry (and region) are provided in Table 4-3. Appendix 1 (Appendix Table 2) shows the breakdown of expenditure for low, medium and high activity scenarios.

Sector	Description	Operating expenditure (\$m)							
		KI	RoSA	RoAust	OS	Total			
Interm	ediate Inputs								
70	Professional, Scientific & Technical Services	16.9	10.0	9.0	0.0	36.0			
44	Other Machinery & Equipment Manufacturing	0.0	5.7	0.0	23.0	28.8			
78	Personal & Other Services	7.9	4.2	0.9	8.8	21.7			
37	Petroleum & Coal Product Manufacturing	0.0	0.0	10.8	10.8	21.5			
71	Administrative & Support Services	11.4	1.7	0.3	2.3	15.7			
66	Finance	9.5	0.1	1.6	2.2	13.4			
54	Construction Services	6.7	0.8	0.2	2.4	10.1			
15	Agriculture, Forestry & Fishing Support Services	5.1	2.1	0.0	0.0	7.2			
67	Insurance & Other Financial Services	0.0	2.1	0.3	1.4	3.8			
43	Motor Vehicles, Parts & Other Transport Equipment	2.7	0.0	0.3	3.0	6.1			
61	Water, Pipeline & Other Transport	1.8	0.4	0.1	1.2	3.5			
63	Transport Support Services & Storage	2.7	0.0	0.0	0.0	2.7			
48	Electricity Supply	1.2	0.1	0.1	1.0	2.4			
59	Road Transport	0.7	0.8	0.2	0.7	2.2			
72	Public Administration & Regulatory Services	1.5	0.2	0.0	0.0	1.7			
	All Other Sectors	0.9	1.9	0.2	0.9	3.8			
Prima	ry Inputs								
	Wages and salaries	166.4	-	-	-	166.4			
	Gross operating surplus	239.3	-	-	-	239.3			

 Table 4-3
 Operating expenditure (\$m) - summary 2018/19 - 2030/31

Source: EconSearch Analysis

Total

Taxes less subsidies

Sensitivity analysis was undertaken by allowing for low, medium and high activity scenarios. These were based on production/cost metrics derived from the Organisational Chart and Employment Calculation Sheet provided by KIPT.

• The **medium scenario** corresponds to the data as it is reported in the Cash Flows statement provided to EconSearch.

89.4

564.0

29.9

23.9

57.7

- The **low scenario** corresponds to lower expected revenue and generally lower expenditure (with exception to planting/replanting costs).
- The **high scenario** corresponds to similar production levels to the medium scenario but higher planting/replanting costs.

# 4.3 Additional Assumptions

In addition to the assumptions embodied in the input-output model itself (see Appendix 1), it was necessary to make a number of other general assumptions in estimating the economic impacts:

89.4

675.6

- The impacts were measured using a model that represents the structure of the regional economy for the year in which the most recent data are available (2015/16). However, over time there are likely to be improvements in primary factor productivity in these economies. Primary factors can refer to the labour, capital and land inputs required for production (e.g. employees, machinery, and real-estate components of a business). One particular assumption is that labour productivity may improve in future years. To allow for the improvements, an across-the-board (all sectors) labour productivity improvement rate of 1 per cent per annum for subsequent years of the construction and operation phases have been incorporated into the modelling.
- When new jobs are created, an assessment needs to be made about where the people come from to fill those jobs. In some cases the jobs will be taken by previously unemployed locals or by someone who is currently employed locally but whose own job is taken by a previously unemployed local. In both cases the impact is partially offset by the fact that someone who was previously receiving unemployment benefits, for example, is no longer doing so. To calculate this effect requires estimates of the parameter *rho*. Rho can be interpreted as the proportion of new jobs in the region filled by previously unemployed locals (see Appendix 7). For the construction and operating phases, it was estimated to be 0.4 for Kangaroo Island, 0.9 for South Australia and 1.0 for Australia<sup>22</sup>.



<sup>&</sup>lt;sup>22</sup> Given the current low unemployment (Figure 3-12) and high labour force participation rates (Figure 3-13) on the Island, and the need for some specific skills and experience, it is likely that at least 60 per cent of the total jobs would be taken by people currently living off the Island. Likewise, a significantly greater proportion of employment is expected to be sourced from South Australia as whole (at least 90 per cent), with no employment originating from overseas.

# 5. ECONOMIC IMPACT OF THE SMITH BAY WHARF

The analysis investigated the economic impact to the Kangaroo Island, South Australian and Australian economies resulting from the construction of the Smith Bay Wharf and the operation of the resultant timber growing, harvesting and exporting activities.

# 5.1 Construction Phase

The capital cost estimates for the wharf development are detailed in Section 4.1. The development will involve a total capital investment of around \$41.2 million over a three-year period (Table 4-1). The economic impact of the development will be determined by the extent of local labour and raw materials used and the level of expenditures associated with the specialised contractors and equipment that will occur in the region. The extent to which services and materials will be sourced locally is detailed in Table 4-2.

The flow-on impacts were calculated using RISE models as detailed in Section 2.2. The flow-on impacts measure the economic effects in other sectors of the economy (trade, health, manufacturing, business services, etc.) generated by these direct activities, that is, the multiplier effects.

The economic impacts (direct and flow-on) of the construction phase were estimated in terms of gross regional product, employment and household income and are reported in the following sub-sections.

## 5.1.1 Gross regional product (GRP)

GRP is a measure of the net contribution of an activity or industry to the regional economy. It represents payments to the primary inputs of production (labour, capital and land) and is a regional level equivalent of gross state product and gross domestic product. Estimates for the three-year construction period are provided in Table 5-1.

The total contribution to GRP on Kangaroo Island as a result of the construction expenditure is expected to be around \$7.5 million, \$5.4 million directly and \$2.2 million in flow-on impacts (Table 5-1). The impacts on the Island are relatively small as the majority of expenditure is expected to occur on the mainland.

A more substantial impact is likely to be felt on SA as whole with an additional \$29.4 million in GRP generated elsewhere in the state to give a total GSP impact of \$36.9 million. Impacts elsewhere in Australia are expected to add another \$5.1 million to yield a total GDP impact of \$42.0 million.



	Total Impact				
—	GRP	Employment	H'hold Income		
	(\$m)	(fte) <sup>a</sup>	(\$m)		
Kangaroo Island					
Direct	5.4	15	5.3		
Production Induced	0.4	1	0.2		
Consumption Induced	1.8	5	0.8		
Total Kangaroo Island	7.5	22	6.3		
Rest of South Australia					
Direct	11.2	30	8.3		
Production Induced	9.2	24	6.6		
Consumption Induced	8.9	14	3.6		
Total Rest of South Australia	29.4	68	18.6		
Rest of Australia					
Direct	0.7	0	0.7		
Production Induced	1.8	1	0.4		
Consumption Induced	2.5	4	0.8		
Total Rest of Australia	5.1	6	1.9		
Australia					
Direct	17.3	46	14.3		
Production Induced	11.4	26	7.3		
Consumption Induced	13.3	23	5.2		
Total Australia	42.0	96	26.8		

#### Table 5-1Construction phase impacts, 2016/17 - 2018/19

<sup>a</sup> Employment impacts are presented as per annum averages for the construction period 2016/17 to 2018/19.

<sup>b</sup> Rounding errors occur.

Source: EconSearch Analysis

## 5.1.2 Employment

Employment is a key indicator of both regional economic activity and the welfare of regional households. Direct employment on Kangaroo Island is expected to be 15 fte jobs per annum over the three-year period 2016/17 to 2018/19. The estimates presented in Table 5-1 show that, including indirect effects (impacts on local businesses and service organisations), the employment effect is projected to be around 22 fte over the period.

As with GSP, the majority of the employment impact will occur elsewhere in the State, estimated to be an additional 68 fte jobs to give a state-wide impact of 90 fte per annum over the period. Economic activity elsewhere in Australia is expected to add further 6 fte to generate a total employment impact of 96 fte per annum over the construction period.

## 5.1.3 Household income (\$m)

Household income would normally be aligned closely with employment. For the construction phase of this project many of the jobs will be with contracting businesses that are based on the mainland but undertaking work on the Island. In these instances, workers are likely to come to the Island to work for a week or a fortnight at a time but return home in between. For the purpose of modelling (counting on-Island jobs), these workers are assumed to be located off KI but will spend a proportion of their income on living expenses while on the Island. For this reason, direct household income on KI during the construction phase is high relative to employment because of the local expenditure of those temporarily staying on the Island (i.e. the FIFO/DIDO workers).

Total household income impact on Kangaroo Island is expected to be \$6.3 million in 2017/18. The estimates presented in Table 5-1 show that, including indirect effects (impacts on local businesses and service organisations), a further \$18.6 million in household income will be generated in South Australia and another \$1.9 million elsewhere in Australia to give a national household income impact of \$26.8 million over the construction period.

# 5.2 Operating Phase

The operation of the proposed wharf together with the plantation harvesting operation and the hauling of timber products to the wharf constitute the operating phase of the development. Once operating, the development will involve annual operating costs of almost \$27 million (average over first 13 years of operation).

As with the construction phase impact, the economic impact of the operating phase on Kangaroo Island will be determined by the extent of local labour and raw materials used and the level of expenditures associated with the specialised contractors and equipment that will occur on the Island. It was estimated that around two-thirds of operating expenditure will be spent on the Island. As with the construction phase, the flow-on impacts were calculated using 2015/16 RISE models.

## 5.2.1 Gross regional product (GRP)

Estimates of the annual contribution to GRP/GSP/GDP for first five complete years of the operating phase are provided in Table 5-2<sup>23</sup>. The expected annual average contribution to Kangaroo Island GRP over that five-year period is \$41.7 million, \$34.9 million directly and \$6.8 million in flow-on impacts. On that basis, the projected contribution to GRP would boost the region's GRP (\$257 million in 2015/16) by around 16 per cent.

At the state level, the development will generate a further \$7.2 million in GSP for an average annual GSP impact of \$48.9 million. At the national level, a further \$4.3 million will be generated to yield an average annual contribution to GDP of \$53.2 million.

Please note that the first year (2018/19) was not a complete year for operating activities (i.e. preparing inventories for the following year). Because of such impacts for 2018/19 were minor relative to later years.

							5-year
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	average
Kangaroo Island							
Direct	2.9	23.5	33.4	34.4	47.9	35.6	34.9
Production Induced	0.4	3.1	3.2	3.4	3.6	3.1	3.3
Consumption Induced	0.8	3.3	3.5	3.7	3.9	3.3	3.5
Total Kangaroo Island <sup>b</sup>	4.1	29.9	40.0	41.4	55.4	42.0	41.7
Rest of South Australia							
Production Induced	0.6	2.5	2.6	2.9	2.9	2.5	2.7
Consumption Induced	1.0	4.3	4.5	4.7	5.0	4.2	4.5
Total Rest of South Australia <sup>b</sup>	1.6	6.8	7.0	7.6	7.8	6.7	7.2
Total South Australia							
Direct	2.9	23.5	33.4	34.4	47.9	35.6	34.9
Production Induced	1.0	5.6	5.7	6.3	6.5	5.6	5.9
Consumption Induced	1.8	7.6	7.9	8.4	8.8	7.5	8.1
Total South Australia <sup>b</sup>	5.7	36.7	47.1	49.1	63.2	48.6	48.9
Rest of Australia							
Production Induced	0.5	1.7	1.8	1.9	2.1	1.6	1.8
Consumption Induced	0.5	2.3	2.5	2.6	2.8	2.3	2.5
Total Rest of Australia <sup>b</sup>	1.0	4.1	4.3	4.4	4.8	3.9	4.3
Australia							
Direct	2.9	23.5	33.4	34.4	47.9	35.6	34.9
Production Induced	1.5	7.3	7.6	8.2	8.5	7.2	7.8
Consumption Induced	2.3	10.0	10.4	11.0	11.6	9.8	10.5
Total Australia <sup>b</sup>	6.6	40.7	51.4	53.5	68.1	52.6	53.2

Table 5-2 Operating phase impacts, medium scenario, gross regional product (\$m)<sup>a</sup>

<sup>a</sup> Estimates for the 13 years to 2030/31 are provided in Appendix 2.

<sup>b</sup> Rounding errors occur.

<sup>c</sup> 5-year average covers the years 2019/20 to 2023/24. Impacts for 2018/19 were excluded from the average due to operating activities only being for part of the year.

Source: EconSearch analysis

#### 5.2.2 Employment

The estimates presented in Table 5-3 show that total employment generated by the development on Kangaroo Island is expected to be around 234 on-going fte jobs, 163 fte jobs directly and 71 fte jobs from flow-on effects.

At the state level, the development will generate a further 20 jobs for an average annual impact of 254 fte jobs. At the national level, a further 14 jobs will be generated to yield an average annual employment impact of 267 fte jobs.

							5-year
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	average <sup>c</sup>
Kangaroo Island							
Direct	40	161	165	169	175	145	162.9
Production Induced	6	41	42	45	49	41	43.5
Consumption Induced	6	26	27	28	30	25	27.2
Total Kangaroo Island <sup>b</sup>	52	228	234	242	253	210	233.6
Rest of South Australia							
Production Induced	3	10	10	12	11	9	10.4
Consumption Induced	3	9	10	11	10	9	9.8
Total Rest of South Australia <sup>b</sup>	6	19	20	23	21	18	20.2
Total South Australia							
Direct	40	161	165	169	175	145	162.9
Production Induced	9	51	52	57	59	50	53.9
Consumption Induced	9	36	37	39	40	34	37.0
Total South Australia <sup>b</sup>	58	247	254	265	275	228	253.8
Rest of Australia							
Production Induced	1	3	3	2	3	2	2.7
Consumption Induced	2	11	11	11	12	10	10.9
Total Rest of Australia <sup>b</sup>	3	13	14	14	15	12	13.6
Australia							
Direct	40	161	165	169	175	145	162.9
Production Induced	9	54	55	59	63	52	56.6
Consumption Induced	12	46	48	50	52	43	47.9
Total Australia <sup>b</sup>	61	261	268	278	290	240	267.5

Table 5-3 Operating phase impacts, medium scenario, employment (fte)<sup>a</sup>

a-c See Table 5-2

Source: EconSearch analysis

## 5.2.3 Household income

Household income is one component (return to labour) of GRP. The impact of the development, once operational, on household income on Kangaroo Island is expected to be around \$16.2 million per year, \$12.4 million directly and \$3.9 million from flow-on effects.

At the state level, the development will generate a further \$4.2 million in household income for an average annual income impact of \$20.4 million. At the national level, a further \$2.1 million will be generated to yield an average annual household income of \$22.5 million.

In terms of direct impacts relative to employment, the development, once operational, will result in household income of almost \$74,000 per fte job, in comparison to the KI average of \$57,900 per fte job (Table 3-11)<sup>24</sup>.

<sup>&</sup>lt;sup>24</sup> Existing household income and impacts (presented in sections 3.7 and Error! Reference source not found. respectively) will differ from taxable income (section 3.5.1). Note the former values are presented before tax deductions and should generally be greater.

							5-year
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	average <sup>c</sup>
Kangaroo Island							
Direct	2.9	11.7	12.3	12.8	13.6	11.4	12.4
Production Induced	0.3	2.2	2.3	2.4	2.6	2.3	2.4
Consumption Induced	0.3	1.4	1.5	1.6	1.7	1.4	1.5
Total Kangaroo Island <sup>b</sup>	3.5	15.4	16.0	16.8	17.8	15.1	16.2
Rest of South Australia							
Production Induced	0.4	1.9	1.9	2.2	2.2	1.9	2.0
Consumption Induced	0.5	2.0	2.1	2.2	2.3	2.0	2.1
Total Rest of South Australia <sup>b</sup>	0.9	3.9	4.0	4.4	4.5	3.9	4.2
Total South Australia							
Direct	2.9	11.7	12.3	12.8	13.6	11.4	12.4
Production Induced	0.7	4.1	4.2	4.6	4.8	4.1	4.4
Consumption Induced	0.8	3.5	3.6	3.8	4.0	3.4	3.7
Total South Australia <sup>b</sup>	4.4	19.2	20.1	21.3	22.4	19.0	20.4
Rest of Australia							
Production Induced	0.2	0.9	0.9	0.9	1.0	0.8	0.9
Consumption Induced	0.3	1.1	1.2	1.2	1.3	1.1	1.2
Total Rest of Australia <sup>b</sup>	0.5	2.0	2.1	2.1	2.3	1.9	2.1
Australia							
Direct	2.9	11.7	12.3	12.8	13.6	11.4	12.4
Production Induced	0.9	4.9	5.1	5.5	5.9	5.0	5.3
Consumption Induced	1.1	4.6	4.8	5.0	5.3	4.5	4.8
Total Australia <sup>b</sup>	4.9	21.2	22.2	23.4	24.7	20.9	22.5

Table 5-4 Operating phase impacts, medium scenario, household income (\$m)<sup>a</sup>

a-c See Table 5-2

Source: EconSearch analysis

#### 5.2.4 Comparative economic contribution

A per hectare comparison of the existing economic contribution of agricultural activity and the estimated forestry (operating phase) economic contribution is provided in Table 5-5. The agricultural data are estimates for 2015/16 and the forestry values were derived from the average indicators for the first five complete years of operation under the medium activity scenario (Table 5-2 to Table 5-4).

The data in Table 5-5 show that employment intensity in forestry is over 130 per cent higher than in agriculture (9.0 direct fte jobs per 1,000 ha compared with 3.9 direct fte agriculture jobs per 1,000 ha) and more than double in terms of GRP and household income. There is considerable variation within the agriculture sector so it should be recognised that the agricultural data provided represent an average across all agricultural industries on KI.

	Agriculture <sup>a</sup>	Forestry <sup>b</sup>
Managed Land (ha)	140,078	18,100
Direct gross regional product: total (\$m)	80	35
Direct gross regional product: per hectare (\$/ha)	569	1,931
Direct employment: total (fte)	540	163
Direct employment: per hectare (fte/'000 ha)	3.9	9.0
Direct household income: total (\$m)	31	12
Direct household income: per hectare (\$/ha)	220	683

#### Table 5-5 Operating phase impacts, medium scenario, household income (\$m)<sup>a</sup>

<sup>a</sup> Agriculture estimates for 2015/16.

<sup>b</sup> Forestry estimates derived from the average GRP for the first 5 complete years of operation under the medium activity scenario.

Source: KIPT, ABS (2016), EconSearch analysis

## 5.3 Sensitivity Analysis

#### 5.3.1 Forestry activity

Sensitivity analysis was undertaken for the operating phase results by allowing for low, medium and high forestry activity scenarios. These were based on production/cost metrics derived from the Organisational Chart and Employment Calculation Sheet provided by KIPT. The three activity scenarios are described below and detailed in Appendix 6.

- The **low scenario** corresponds to lower expected revenue and generally lower expenditure (with exception to planting/replanting costs).
- The **medium scenario** corresponds to the data as it is reported in the Cash Flows statement as provided by KIPT. The operating phase impacts reported in Section 5.2 are based on the medium activity scenario.
- The **high scenario** corresponds to similar production levels to the medium scenario but higher planting/replanting costs.

#### **Gross Regional Product**

As would be expected, the low activity scenario (lower inputs and 20 per cent lower throughput) is estimated to generate significantly lower GRP (approximately 21 per cent lower on Kangaroo Island). The reason the GRP contribution falls by a greater proportion than throughput is that some operating costs are fixed (i.e. do not vary with throughput). Hence operating surplus, an important component of GRP, will fall by a greater proportion than the decline in throughput.

	5-year ave	5-year average (2019/20 to 2023/24)			
	Low	Medium	High		
	(\$m)	(\$m)	(\$m)		
Kangaroo Island					
Direct	26.5	34.9	34.7		
Production Induced	3.1	3.3	3.4		
Consumption Induced	3.3	3.5	3.9		
Total Kangaroo Island <sup>b</sup>	32.9	41.7	42.0		
Rest of South Australia					
Production Induced	2.5	2.7	2.7		
Consumption Induced	4.2	4.5	5.0		
Total Rest of South Australia <sup>b</sup>	6.7	7.2	7.7		
South Australia					
Direct	26.5	34.9	34.7		
Production Induced	5.6	5.9	6.1		
Consumption Induced	7.5	8.1	8.9		
Total South Australia <sup>b</sup>	39.6	48.9	49.7		
Rest of Australia					
Production Induced	1.6	1.8	1.8		
Consumption Induced	2.3	2.5	2.7		
Total Rest of Australia <sup>b</sup>	4.0	4.3	4.5		
Australia					
Direct	26.5	34.9	34.7		
Production Induced	7.3	7.8	7.9		
Consumption Induced	9.8	10.5	11.5		
Total Australia <sup>b</sup>	43.6	53.2	54.1		

Table 5-6 Operating phase impacts, low, medium & high scenarios, contribution to GRP (\$m)<sup>a</sup>

<sup>a</sup> Estimates for the 13 years across the three scenarios to 2030/31 are provided in Appendices 2-4.

<sup>b</sup> Rounding errors occur.

Source: EconSearch analysis

Comparison of the medium and high scenarios reveals fairly minor differences in terms of GRP contribution. The direct contribution on KI is a little lower for the high activity scenario (\$34.7 million compared to \$34.9 million for the medium activity scenario). This arises from a lower operating surplus which results from higher costs. This is partially negated as some of the higher costs are for labour, noting that GRP is broadly comprised of operating surplus and payments to labour. The production and consumption induced effects are larger for the high activity scenario due to high expenditures (including wages). These larger flow-on effects more than offset the lower direct contribution which means the overall contribution of the high activity scenario to GRP on KI (\$42.0 million) is slightly higher than the medium activity scenario (\$41.7 million).

#### Employment

The estimated employment outcomes do vary across the three scenarios, driven mostly by different levels of direct employment together with different levels of expenditure on purchased

inputs and services occurring on Kangaroo Island. Total employment on KI is estimated to be almost 8 per cent lower under the low activity scenario (215 fte) whereas the high activity scenario would have around 10 per cent more jobs (257 fte) than the medium activity scenario (234 fte).

	5-year ave	5-year average (2019/20 to 2023/24)			
	Low	Medium	High		
	(fte)	(fte)	(fte)		
Kangaroo Island					
Direct	150	163	182		
Production Induced	40	43	45		
Consumption Induced	25	27	30		
Total Kangaroo Island <sup>b</sup>	215	234	257		
Rest of South Australia					
Production Induced	10	10	11		
Consumption Induced	9	10	11		
Total Rest of South Australia <sup>b</sup>	19	20	22		
South Australia					
Direct	150	163	182		
Production Induced	50	54	56		
Consumption Induced	34	37	41		
Total South Australia <sup>b</sup>	235	254	279		
Rest of Australia					
Production Induced	2	3	3		
Consumption Induced	10	11	12		
Total Rest of Australia <sup>b</sup>	13	14	14		
Australia					
Direct	150	163	182		
Production Induced	53	57	58		
Consumption Induced	45	48	53		
Total Australia <sup>b</sup>	247	267	293		

Table 5-7 Operating phase impacts, low , medium & high scenarios, employment (fte)<sup>a</sup>

<sup>a</sup> Estimates for the 13 years across the three scenarios to 2030/31 are provided in Appendices 2-4.

<sup>b</sup> Rounding errors occur.

Source: EconSearch analysis

#### **Household Income**

Not surprisingly, the differences in household income estimates between scenarios (Table 5-8) are quite similar to the differences observed in the employment estimates (Table 5-9). On Kangaroo Island, the total household income effect for the low activity scenario (\$15.0 million) is estimated to be 8 per cent below the medium activity scenario (\$16.2), whereas the high activity scenarios (\$17.9 million) is 10 per cent higher than the medium scenario.

	5-year aver	5-year average (2019/20 to 2023/24)			
	Low	Medium	High		
	(\$m)	(\$m)	(\$m)		
Kangaroo Island					
Direct	11.4	12.4	13.8		
Production Induced	2.2	2.4	2.4		
Consumption Induced	1.4	1.5	1.7		
Total Kangaroo Island <sup>b</sup>	15.0	16.2	17.9		
Rest of South Australia					
Production Induced	1.9	2.0	2.1		
Consumption Induced	2.0	2.1	2.4		
Total Rest of South Australia <sup>b</sup>	3.9	4.2	4.4		
South Australia					
Direct	11.4	12.4	13.8		
Production Induced	4.1	4.4	4.5		
Consumption Induced	3.4	3.7	4.0		
Total South Australia <sup>b</sup>	18.9	20.4	22.4		
Rest of Australia					
Production Induced	0.9	0.9	0.9		
Consumption Induced	1.1	1.2	1.3		
Total Rest of Australia <sup>b</sup>	2.0	2.1	2.2		
Australia					
Direct	11.4	12.4	13.8		
Production Induced	5.0	5.3	5.4		
Consumption Induced	4.5	4.8	5.3		
Total Australia <sup>b</sup>	20.8	22.5	24.5		

Table 5-8 Operating phase impacts, low, medium & high scenarios, household income (\$m)<sup>a</sup>

<sup>a</sup> Estimates for the 13 years across the three scenarios to 2030/31 are provided in Appendices 2-4.

<sup>b</sup> Rounding errors occur.

Source: EconSearch analysis

#### 5.3.2 Price sensitivity

The estimates set out in the preceding sections are based on multiplier effects that should be treated with some caution as is the case with any economic modelling. Care has been taken in the compilation of the data and the application of the models to ensure that expenditures on Kangaroo Island, in particular, have been conservatively estimated so as not to overstate the impacts. However, there are some inherent biases and shortcomings in the modelling approach, as with all economic models, that are well recognised and documented<sup>25</sup>.

<sup>&</sup>lt;sup>25</sup> In particular, the I-O method implicitly assumes linear production functions at fixed prices and does not consider production constraints. The latter assumption was considered to not be an issue in the context of this analysis,

To address an important component of these shortcomings, further sensitivity analysis was undertaken by relaxing the fixed price assumptions implicit in the standard I-O methodology. The RISE model can be run under standard fixed price assumptions (the standard model) or under flexible price assumptions allowing for price response in key markets (the price model).

To identify the key markets affected, the results from standard model impacts were compared to the existing profile of economic activity. This enabled potential "pressure points" in the local economy to be identified and thus the areas where the analysis may benefit from relaxing the fixed price assumptions.

A number of pressure points were identified with respect to the operating impacts for the KI region, however the most significant was in the labour market. The medium activity scenario yields a five-year average<sup>26</sup> increase in local employment of 234 fte (Table 5-3) which represents an 10.0 per cent increase on the 2015/16 employed labour force estimate of 2,300 fte (Table 3-11). The relative increase is even greater in terms of household income where the average increase over the first five complete years of \$16.2 million represents a 12.2 per cent lift in gross personal income on the Island.

The sensitivity analysis was therefore undertaken in terms of wage price and labour productivity, utilising the price model function within the RISE model. The price model is based on a development by West and Jackson (2005) of the conventional input-output model which provides for non-linearity in production in both primary and intermediate inputs. With this extension, the model can account for price changes in relevant markets resulting from a change in demand and adjust the impact estimates accordingly.

The price model utilises elasticity parameters to allow varying assumptions with regards to required primary inputs (e.g. labour, capital and land). This departs from the linear assumptions of the standard I-O model where primary inputs are assumed to be required at existing model proportions (e.g. fte jobs per dollar of production are fixed to historic proportions). Changing the elasticity parameters will result in different cost structures to the economy and will allow various market responses to be modelled.

For example, it may be prudent to model an impact under the assumption that more workers will be required than on average to achieve an economic outcome (i.e. lower productivity). Conversely, the project may exhibit productivity improvements to the Island, which suggest a lower number of workers needed to produce a similar economic outcome.

following examination of the standard I-O impact results, i.e. local businesses would have capacity to meet increased demands arising from the projected level of forestry activity.

<sup>&</sup>lt;sup>26</sup> Over the years 2019/20 to 2023/24. Impacts for 2018/19 were excluded from the five-year average in section 5.2 due to operating activities only being for part of the year.

Impacts were generated for a range of labour productivity<sup>27</sup> and wage price<sup>28</sup> elasticities, which were varied from 0.5 to 1.5 for each parameter. All other elasticity parameters were set to 1.0, the implicit values in the standard model.

Where an elasticity value is less than 1.0 implies that less labour (or lower wages) are required to satisfy demand for additional output. These responses will generally produce lower impacts in terms of the economic indicators reported (i.e. GRP, employment, and household income) since less primary inputs are required to fulfil the new demands. The reverse is true for where elasticity values are greater than 1.0.

#### **Gross regional product**

Table 5-9 indicates the sensitivity of gross regional product to labour productivity and the price of labour. A wage price elasticity value of 0.5 in a given sector implies that if demand for output in that sector increased by 10 per cent then the wage rate in that sector would increase by only 5 per cent. Similarly, a labour productivity elasticity value of 0.5 in a given sector implies that if demand for output in that sector increased by 10 per cent by 10 per cent then the demand for labour would increase by only 5 per cent. Even at this very low elasticity value of 0.5 for each parameter, the aggregate impact on GRP is a relatively small. The GRP estimate of \$41.7 million under the standard model (unitary elasticities) is \$39.9 million if both elasticities are set to 0.5, a difference of less than 5 per cent.

At the other extreme, elasticity values of 1.5 for each parameter would yield a GRP estimate of \$44.4 million, approximately 6 per cent above the standard model estimate. In either case, high or low elasticity values will not have a significant impact on the total gross regional product generated by the Smith Bay Wharf development and associated forestry activity.

	GRP (\$m) - Kangaroo Island						
	Labour Elasticity	0.50	0.75	1.00	1.25	1.50	
Wage Elasticity							
0.50		39.9	40.2	40.5	40.8	41.1	
0.75		40.2	40.7	41.1	41.5	41.9	
1.00		40.5	41.0	41.7	42.2	42.8	
1.25		40.8	41.5	42.2	42.9	43.6	
1.50		41.1	41.9	42.8	43.6	44.4	

Table 5-9	5-vear average.	price sensitive	impacts.	GRP	(\$m)
	o year arerage,	price sensitive	mpacco,	0111	\¥,

Source: EconSearch analysis

<sup>&</sup>lt;sup>27</sup> Labour productivity elasticities refer to substitution between primary input factors. High labour productivity elasticities imply substitution possibilities in favour of labour (due to changes in output) are high and the sector is capital intensive.

<sup>&</sup>lt;sup>28</sup> Wage-price elasticities show how responsive is the demand for labour as a factor input in production when there is a change in the market wage rate.

#### Employment

Table 5-10 shows the sensitivity of aggregate employment to labour productivity and the price of labour. Clearly the level of employment is quite insensitive to wage price elasticity. Even if the rate of wage increase is less than the increase in demand for a sector's output (a wage price elasticity less than 1.0), it will have only a very minor (although positive) impact on aggregate employment.

Aggregate employment is, however, more sensitive to the labour productivity elasticity. If there are significant opportunities in the economy to substituting capital for labour (labour productivity elasticity of less than 1.0) then the employment impacts will be slightly below those estimated in the standard model; around 10 per cent lower (211 fte) in the case of an extremely low labour productivity elasticity (0.5). At the other extreme (labour productivity elasticity of 1.5), the total employment contribution on KI could be up to 8 per cent higher (253 fte) than the standard model estimate (234 fte).

	Employment (fte) - Kangaroo Island					
	Labour Elasticity	0.50	0.75	1.00	1.25	1.50
Wage Elasticity						
0.50		211	222	233	243	254
0.75		211	222	233	243	253
1.00		211	222	234	243	253
1.25		211	222	232	243	253
1.50		211	222	232	242	253

 Table 5-10
 5-year average, price sensitive impacts, employment (fte)

Source: EconSearch analysis

#### Household Income

Table 5-11 shows the sensitivity of aggregate employment to labour productivity and the price of labour. Aggregate payments to households (i.e. household income) would be expected to be higher in line with higher wage price elasticities. Similarly, household income would be expected to increase with higher labour productivity elasticities.

Indeed, this is what can be observed in Table 5-11 where combined low elasticity values would yield a household income effect of \$14.4 million (11 per cent below that estimated under the standard model) and combined high elasticity values would yield an aggregate household income contribution of \$19.0 million (17 per cent above that estimated under the standard model). Under more plausible elasticity values (in the range 0.75 to 1.25) the household income effect is likely to be well within 10 per cent of that estimated under the standard model (\$16.2 million).

KI	PΤ
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	Household Income (\$m) - Kangaroo Island							
	Labour Elasticity	0.50	0.75	1.00	1.25	1.50		
Wage Elasticity								
0.50		14.4	14.7	15.0	15.3	15.6		
0.75		14.7	15.2	15.6	16.0	16.4		
1.00		15.0	15.5	16.2	16.7	17.3		
1.25		15.3	16.0	16.7	17.4	18.1		
1.50		15.6	16.4	17.3	18.1	19.0		

 Table 5-11
 5-year average, price sensitive impacts, household income (\$m)

Source: EconSearch analysis

# 5.4 Other Considerations

The analysis and presentation of results set out above does not fully describe the indirect economic impact of the deep-water wharf on Kangaroo Island itself, which flow from the development of a new, sustained plantation forestry industry. The indirect impacts of this new industry will include:

**Population growth** – as indicated in Section 5.2.2, the total employment effect over the first five complete years of operation is expected to be around 234 fte jobs. There is a shortage of available labour on the Island to fill the new jobs that will be created by the development. As reported in Section 3.4.2, there was estimated to be 3.8 per cent of the labour force on the Island unemployed in March 2017 or just under 100 persons in total. Although this does not take account of underemployment (people currently employed but wanting to work more hours), it is likely that many of the jobs created will be taken by people currently not living on the Island.

Many of the new jobs directly created also require a specific set of skills and experience that are not currently available on Kangaroo Island. As a consequence, there is likely to be a net migration of skilled workers and their families to the Island. Given the current low unemployment and high labour force participation rates on the Island, and the need for some specific skills and experience, it is likely that at least 60 per cent of the total jobs (140 fte jobs) would be taken by people currently living off the Island. Under this assumption and with an average household size of 2.4 persons in South Australia, a population increase of around 336 persons would be a conservative estimate.

**New housing demand** – the net migration will boost demand for housing on the Island, which in the short-term will place some pressure on rents and cause some holiday accommodation to be brought into the rental market. In the longer term, it is likely to boost demand for new housing to accommodate the workers employed on the plantation estates, and their families, as well as others drawn to opportunities in other sectors of the local economy. Although this is difficult to estimate, if the majority of households moving to the Island were to, directly or indirectly, create demand for a new dwelling, there would likely to be upward of 100 additional dwellings required to accommodate the increased population. **Government revenues** – state government revenues will increase (principally via payroll tax on wages and salaries arising from the growth in new jobs, and stamp duties associated with conveyancing and other transactions). The assessed capital value of the plantation forest estates will increase as a result of forestry activities, adding to the council's rate base; whether this leads to a net increase in rate revenue or reduces the rates paid by other Island land owners will depend on decisions by the Kangaroo Island Council on rating policy.

**Government expenditure** - state government expenditure on Kangaroo Island will increase through wages and salaries (i.e. additional public sector employees, especially in health and education), and both state and local government will need to spend more money on road maintenance. KIPT and the Kangaroo Island Council have been in discussion with regards to road funding options at the time of writing this document. KIPT has indicated they will fund the full cost of the proposed wharf; no government contributions will be sought or required.

The full extent of the economic benefit from the proposed deep-water wharf at Smith Bay extend beyond the impact associated with forestry operations. In particular, we note the following economic benefits:

**Economic resilience** - the development of plantation forestry broadens the economic base of the Island, which is a stated objective of government policy, and is a benefit to both Kangaroo Island and South Australia. The economic modelling showed that significant employment, additional to the direct employment in forestry operations, would be generated in a range of local service industries including Professional, Scientific & Technical Services, Construction Trade Services, Retail Trade Services, and Personal & Other Services.

**Stable, not seasonal, impacts** – the operation of the plantation forestry will not exacerbate the seasonality associated with tourism and agriculture, the other dominant economic activities on the Island. Given that business seasonality has been described by the Economic Development Board as the 'stand-out issue' affecting all aspects of tourism, service and retail operations on the Island, the stable, year-round economic activity associated with sustainable plantation forestry will be a significant benefit to the Island economy.

**Other users and uses for the deep-water wharf**– the preliminary design for the proposed deepwater wharf is consistent with the stated objective of developing a multi-user facility with minimal environmental impact. Smith Bay is intended to be a bulk timber product export facility, but could be used without modification for a range of other users, including agricultural exports (especially containerised grains), and cruise ships bringing domestic and international tourists to the Island.

**Impact on land prices** – to the extent that a new wharf supports agriculture (i.e. through cheaper imported inputs, a greater volume or higher value exports, or lower cost to export) it has the potential to improve returns from agriculture and, thereby, improve land prices on Kangaroo Island. Currently Kangaroo Island land prices are significantly lower than on the mainland, limiting the ability of Island farm enterprises to raise capital and to invest in productivity improvements.

**Impact on other existing industries** – Yumbah operates an abalone aquaculture enterprise on land adjacent to the Smith Bay site. According to KIPT, concerns have been raised by Yumbah about the proposed development relating to water quality, dust, noise, light and vibration, and perceptual factors. There are around 25 full-time staff at Yumbah's Kangaroo Island abalone breeding, growing, harvest and value adding facility<sup>29</sup>. If this facility were to close as a result of the Smith Bay Wharf project, it is likely the majority of these jobs would be lost to the Island, as well as some indirect employment that is dependent on the operation of facility. Using an industry average coefficient of 1.85, representing the ratio of direct to flow-on jobs for aquaculture on Kangaroo Island (EconSearch 2017b, p. 41), an additional 21 fte flow-on jobs would be at risk.

<sup>&</sup>lt;sup>29</sup> Sourced from http://www.yumbah.com/our-story/our-places.



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### Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and KIPT. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

# APPENDIX 1 EXPENDITURE ALLOCATIONS EXPANDED

Appendix Table 1 Capital expenditure - with and without contingencies, 2016/17 – 2018/19 (\$m)

Sector	Description	Expendi	ture excl	uding cont	ingencies	(\$m)		Conti	ngencies (\$	m)			٦	īotal (\$m)		
		KI	RoSA	RoAust	OS	Total	КІ	RoSA	RoAust	OS	Total	КІ	RoSA	RoAust	OS	Total
53	Other Construction	0.0	11.1	0.0	1.4	12.6	0.0	1.9	0.0	0.0	1.9	0.0	13.0	0.0	1.4	14.4
44	Other Machinery & Equipment Manufacturing	0.0	0.8	0.0	6.7	7.5	0.0	0.2	0.0	0.0	0.2	0.0	0.9	0.0	6.7	7.7
54	Construction Services	1.6	2.5	0.0	0.0	4.2	0.0	0.2	0.0	0.0	0.2	1.6	2.7	0.0	0.0	4.4
61	Water, Pipeline & Other Transport	0.0	1.3	0.0	1.9	3.2	0.0	0.1	0.0	0.0	0.1	0.0	1.4	0.0	1.9	3.3
19	Non Metallic Mineral Mining	0.0	1.8	0.0	0.0	1.8	0.0	0.3	0.0	0.0	0.3	0.0	2.1	0.0	0.0	2.1
55	Wholesale Trade	0.0	0.8	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.8
70	Professional, Scientific & Technical Services	0.4	0.6	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6	0.0	0.0	1.0
59	Road Transport	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5
39	Non-metallic Mineral Product Manufacturing	0.0	0.1	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.3
68	Rental, Hiring & Real Estate Services	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
43	Motor Vehicles & Other Transport Manufacturing	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.2
71	Administrative & Support Services	0.1	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3
67	Insurance & Other Financial Services	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3
15	Agriculture, Forestry & Fishing Support Services	0.2	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.2
	Direct Employment	1.4	3.1	0.6	0.0	5.1	0.0	0.0	0.0	0.0	0.0	1.4	3.1	0.6	0.0	5.1
	All Other Sectors	0.3	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.4
	Total	4.0	23.4	0.8	10.3	38.5	0.0	2.7	0.1	0.0	2.7	4.0	26.0	0.9	10.3	41.2



Secto	r Description		Low Ac	tivity Scer	nario		1	Medium	Activity So	enario			High A	ctivity Sce	nario	
Ζ.	-	KI	RoSA	RoAust	OS	Total	KI	RoSA	RoAust	OS	Total	KI	RoSA	RoAust	OS	Total
Interr	nediate Inputs															
70	Professional, Scientific & Technical Services	17.3	10.1	9.0	0.0	36.4	16.9	10.0	9.0	0.0	36.0	17.9	10.2	9.0	0.0	37.1
44	Other Machinery & Equipment Manufacturing	0.0	5.7	0.0	18.7	24.4	0.0	5.7	0.0	23.0	28.8	0.0	5.7	0.0	23.0	28.8
78	Personal & Other Services	6.3	3.4	0.7	7.0	17.3	7.9	4.2	0.9	8.8	21.7	7.9	4.2	0.9	8.8	21.7
37	Petroleum & Coal Product Manufacturing	0.0	0.0	8.6	8.6	17.1	0.0	0.0	10.8	10.8	21.5	0.0	0.0	10.8	10.8	21.5
71	Administrative & Support Services	10.7	1.7	0.3	2.3	14.9	11.4	1.7	0.3	2.3	15.7	11.4	1.7	0.3	2.3	15.7
66	Finance	9.3	0.1	1.5	2.0	13.0	9.5	0.1	1.6	2.2	13.4	9.5	0.1	1.6	2.2	13.4
54	Construction Services	6.1	0.7	0.2	1.9	9.0	6.7	0.8	0.2	2.4	10.1	6.7	0.8	0.2	2.4	10.1
15	Agriculture, Forestry & Fishing Support Services	5.9	2.2	0.0	0.0	8.1	5.1	2.1	0.0	0.0	7.2	6.9	2.6	0.0	0.0	9.5
67	Insurance & Other Financial Services	0.0	2.1	0.3	1.4	3.8	0.0	2.1	0.3	1.4	3.8	0.0	2.1	0.3	1.4	3.8
43	Motor Vehicles, Parts & Other Transport Equipment	2.2	0.0	0.2	2.4	4.8	2.7	0.0	0.3	3.0	6.1	2.7	0.0	0.3	3.0	6.1
61	Water, Pipeline & Other Transport	1.4	0.3	0.1	0.9	2.8	1.8	0.4	0.1	1.2	3.5	1.8	0.4	0.1	1.2	3.5
63	Transport Support Services & Storage	2.1	0.0	0.0	0.0	2.1	2.7	0.0	0.0	0.0	2.7	2.7	0.0	0.0	0.0	2.7
48	Electricity Supply	1.1	0.1	0.1	1.0	2.3	1.2	0.1	0.1	1.0	2.4	1.2	0.1	0.1	1.0	2.4
59	Road Transport	0.5	0.8	0.1	0.5	2.0	0.7	0.8	0.2	0.7	2.2	0.7	0.8	0.2	0.7	2.2
72	Public Administration & Regulatory Services	1.5	0.2	0.0	0.0	1.7	1.5	0.2	0.0	0.0	1.7	1.5	0.2	0.0	0.0	1.7
	All Other Sectors	0.8	1.8	0.1	0.8	3.5	0.9	1.9	0.2	0.9	3.8	0.9	1.9	0.2	0.9	3.8
Prima	iry Inputs															
	Direct employment	154.2	-	-	-	154.2	166.4	-	-	-	166.4	187.3	-	-	-	187.3
	Gross operating surplus	136.6	-	-	-	136.6	239.3	-	-	-	239.3	214.0	-	-	-	214.0
	Taxes less subsidies	86.4	-	-	-	86.4	89.4	-	- 0	_	89.4	90.5	-	-	-	90.5
	Total	442.5	29.1	21.4	47.5	540.5	564.0	29.9	23.9	57.7	675.6	563.3	30.7	23.9	57.7	675.6

### Appendix Table 2 Operating expenditure - total for years 2018/19 -2030/31 (\$m)

# APPENDIX 2 OPERATING PHASE IMPACTS – MEDIUM SCENARIO

						GR	P impact (\$	m)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	2.9	23.5	33.4	34.4	47.9	35.6	34.7	37.1	38.0	45.1	41.6	54.3	66.9	38.1
Production Induced	0.4	3.1	3.2	3.4	3.6	3.1	3.3	3.3	3.5	3.8	4.1	4.6	5.6	3.5
Consumption Induced	0.8	3.3	3.5	3.7	3.9	3.3	3.4	3.4	3.6	4.0	4.3	4.8	5.6	3.7
Total Kangaroo Island	4.1	29.9	40.0	41.4	55.4	42.0	41.4	43.8	45.1	52.8	49.9	63.7	78.0	45.2
Rest of South Australia														
Production Induced	0.6	2.5	2.6	2.9	2.9	2.5	2.8	2.6	2.7	3.2	6.3	3.5	4.4	3.0
Consumption Induced	1.0	4.3	4.5	4.7	5.0	4.2	4.5	4.4	4.7	5.2	6.2	6.1	7.2	4.8
Total Rest of South Australia	1.6	6.8	7.0	7.6	7.8	6.7	7.3	7.0	7.4	8.4	12.5	9.6	11.6	7.8
Rest of Australia														
Production Induced	0.5	1.7	1.8	1.9	2.1	1.6	1.6	1.6	1.7	2.0	2.3	2.3	2.7	1.8
Consumption Induced	0.5	2.3	2.5	2.6	2.8	2.3	2.4	2.4	2.5	2.9	3.3	3.4	4.0	2.6
Total Rest of Australia	1.0	4.1	4.3	4.4	4.8	3.9	4.1	4.0	4.2	4.8	5.6	5.7	6.7	4.4
Australia				6										
Direct	2.9	23.5	33.4	34.4	47.9	35.6	34.7	37.1	38.0	45.1	41.6	54.3	66.9	38.1
Production Induced	1.5	7.3	7.6	8.2	8.5	7.2	7.8	7.5	7.9	8.9	12.7	10.4	12.7	8.3
Consumption Induced	2.3	10.0	10.4	11.0	11.6	9.8	10.3	10.3	10.9	12.1	13.8	14.3	16.8	11.0
Total Australia	6.6	40.7	51.4	53.5	68.1	52.6	52.8	54.8	56.7	66.1	68.0	79.0	96.3	57.4

Appendix Table 3 Operating phase impacts, medium scenario, gross regional/state/domestic product, 2018/19 to 2030/31 (\$m)

						Employ	ment i mpa	ct (fte)						
-	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	40	161	165	169	175	145	148	146	151	165	171	188	214	156.9
Production Induced	6	41	42	45	49	41	42	42	43	47	50	56	68	44.0
Consumption Induced	6	26	27	28	30	25	26	26	27	29	31	34	39	27.2
Total Kangaroo Island	52	228	234	242	253	210	216	213	221	241	252	278	322	228.0
Rest of South Australia														
Production Induced	3	10	10	12	11	9	11	10	10	12	32	12	15	12.1
Consumption Induced	3	9	10	11	10	9	10	9	9	11	20	12	13	10.5
Total Rest of South Australia	6	19	20	23	21	18	21	19	19	23	52	24	29	22.6
Rest of Australia														
Production Induced	1	3	3	2	3	2	2	2	2	2	-2	3	3	2.0
Consumption Induced	2	11	11	11	12	10	10	10	11	12	14	14	16	11.0
Total Rest of Australia	3	13	14	14	15	12	12	12	13	14	12	17	19	13.0
Australia														
Direct	40	161	165	169	175	145	148	146	151	165	171	188	214	156.9
Production Induced	9	54	55	59	63	52	55	53	55	62	80	72	86	58.1
Consumption Induced	12	46	48	50	52	43	46	45	46	52	65	59	68	48.7
Total Australia	61	261	268	278	290	240	249	244	253	278	316	319	369	263.7

Appendix Table 4 Operating phase impacts, medium scenario, employment, 2018/19 to 2030/31 (fte)

						House	nold Income	e (\$m)						
-	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	2.9	11.7	12.3	12.8	13.6	11.4	11.9	12.0	12.7	14.1	14.9	16.8	19.4	12.8
Production Induced	0.3	2.2	2.3	2.4	2.6	2.3	2.4	2.4	2.5	2.7	3.0	3.3	4.1	2.5
Consumption Induced	0.3	1.4	1.5	1.6	1.7	1.4	1.5	1.5	1.6	1.7	1.8	2.0	2.4	1.6
Total Kangaroo Island	3.5	15.4	16.0	16.8	17.8	15.1	15.8	15.9	16.8	18.5	19.7	22.1	25.9	16.9
Rest of South Australia														
Production Induced	0.4	1.9	1.9	2.2	2.2	1.9	2.1	2.0	2.1	2.4	4.7	2.7	3.3	2.3
Consumption Induced	0.5	2.0	2.1	2.2	2.3	2.0	2.1	2.1	2.2	2.5	2.8	2.9	3.4	2.2
Total Rest of South Australia	0.9	3.9	4.0	4.4	4.5	3.9	4.2	4.1	4.3	4.9	7.5	5.6	6.7	4.5
Rest of Australia														
Production Induced	0.2	0.9	0.9	0.9	1.0	0.8	0.8	0.8	0.9	1.0	1.0	1.2	1.4	0.9
Consumption Induced	0.3	1.1	1.2	1.2	1.3	1.1	1.2	1.1	1.2	1.4	1.6	1.6	1.9	1.2
Total Rest of Australia	0.5	2.0	2.1	2.1	2.3	1.9	2.0	2.0	2.1	2.4	2.6	2.8	3.3	2.2
Australia														
Direct	2.9	11.7	12.3	12.8	13.6	11.4	11.9	12.0	12.7	14.1	14.9	16.8	19.4	12.8
Production Induced	0.9	4.9	5.1	5.5	5.9	5.0	5.4	5.2	5.5	6.2	8.7	7.2	8.8	5.7
Consumption Induced	1.1	4.6	4.8	5.0	5.3	4.5	4.7	4.7	5.0	5.5	6.2	6.6	7.7	5.0
Total Australia	4.9	21.2	22.2	23.4	24.7	20.9	22.0	21.9	23.1	25.8	29.8	30.5	35.9	23.6

Appendix Table 5 Operating phase impacts, medium scenario, household income, 2018/19 to 2030/31 (\$m)

# APPENDIX 3 OPERATING PHASE IMPACTS – LOW SCENARIO

						GR	P impact (\$	m)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	2.7	17.1	25.2	26.1	37.0	27.2	26.4	28.4	29.0	34.5	30.8	41.7	51.3	29.0
Production Induced	0.4	2.9	3.0	3.2	3.4	3.0	3.2	3.1	3.3	3.6	3.9	4.3	5.3	3.3
Consumption Induced	0.7	3.1	3.2	3.4	3.5	3.1	3.3	3.2	3.4	3.7	4.0	4.4	5.2	3.4
Sub total	3.9	23.1	31.3	32.7	43.9	33.2	32.8	34.7	35.8	41.8	38.7	50.4	61.8	35.7
Rest of South Australia														
Production Induced	0.6	2.4	2.4	2.8	2.7	2.4	2.7	2.5	2.6	3.1	6.2	3.3	4.2	2.9
Consumption Induced	1.0	4.0	4.1	4.4	4.6	4.0	4.2	4.2	4.4	4.9	5.9	5.7	6.7	4.5
Sub total	1.5	6.4	6.6	7.2	7.3	6.3	6.9	6.6	7.0	7.9	12.0	9.0	10.9	7.4
Rest of Australia														
Production Induced	0.4	1.6	1.7	1.7	1.9	1.5	1.5	1.5	1.5	1.8	2.1	2.1	2.4	1.7
Consumption Induced	0.5	2.2	2.3	2.4	2.5	2.2	2.3	2.3	2.4	2.7	3.1	3.1	3.7	2.4
Sub total	0.9	3.8	3.9	4.1	4.4	3.6	3.8	3.7	3.9	4.4	5.2	5.2	6.1	4.1
Total Impact														
Direct	2.7	17.1	25.2	26.1	37.0	27.2	26.4	28.4	29.0	34.5	30.8	41.7	51.3	29.0
Production Induced	1.4	6.9	7.1	7.6	7.9	6.8	7.3	7.1	7.5	8.4	12.1	9.7	11.9	7.8
Consumption Induced	2.2	9.3	9.6	10.1	10.6	9.2	9.8	9.7	10.3	11.3	13.0	13.3	15.6	10.3
Total	6.3	33.3	41.9	43.9	55.6	43.2	43.5	45.1	46.7	54.2	55.9	64.7	78.8	47.2

Appendix Table 6 Operating phase impacts, low scenario, gross regional/state/domestic product, 2018/19 to 2030/31 (\$m)

						Employ	ment impa	ct (fte)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	38	149	151	155	159	136	140	137	143	152	159	173	197	145.3
Production Induced	6	38	39	42	45	38	40	39	41	44	47	52	64	40.9
Consumption Induced	6	25	25	26	27	23	24	24	25	27	29	31	36	25.3
Sub total	50	212	215	223	231	197	204	200	208	223	235	256	297	211.6
Rest of South Australia														
Production Induced	3	9	10	11	10	9	11	9	10	12	32	12	15	11.8
Consumption Induced	3	9	9	10	10	8	10	9	9	11	20	11	13	10.1
Sub total	6	18	19	21	20	18	20	18	19	23	51	23	27	21.8
Rest of Australia														
Production Induced	1	3	3	2	3	2	1	2	2	2	-3	3	3	1.8
Consumption Induced	2	10	10	11	11	9	10	10	10	11	13	13	15	10.3
Sub total	3	12	13	13	14	11	11	11	12	13	11	16	17	12.1
Total Impact														
Direct	38	149	151	155	159	136	140	137	143	152	159	173	197	145.3
Production Induced	9	50	52	55	58	49	52	50	52	58	76	67	81	54.5
Consumption Induced	11	43	44	47	48	41	44	42	44	49	62	55	64	45.7
Total	59	243	247	257	265	226	235	230	239	258	297	295	342	245.5

Appendix Table 7 Operating phase impacts, low scenario, employment, 2018/19 to 2030/31 (fte)

						House	nold Income	e (\$m)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	2.7	10.9	11.2	11.8	12.3	10.7	11.3	11.3	12.0	13.0	13.9	15.4	17.9	11.9
Production Induced	0.3	2.1	2.1	2.3	2.5	2.2	2.3	2.3	2.4	2.6	2.8	3.1	3.9	2.4
Consumption Induced	0.3	1.3	1.4	1.4	1.5	1.3	1.4	1.4	1.5	1.6	1.7	1.9	2.2	1.5
Sub total	3.4	14.3	14.7	15.5	16.3	14.2	14.9	14.9	15.8	17.2	18.4	20.4	24.0	15.7
Rest of South Australia														
Production Induced	0.4	1.8	1.8	2.1	2.1	1.8	2.0	1.9	2.0	2.3	4.6	2.6	3.2	2.2
Consumption Induced	0.5	1.9	2.0	2.1	2.2	1.9	2.0	2.0	2.1	2.3	2.6	2.7	3.2	2.1
Sub total	0.9	3.7	3.8	4.1	4.2	3.7	4.0	3.8	4.1	4.6	7.2	5.2	6.4	4.3
Rest of Australia														
Production Induced	0.2	0.8	0.9	0.9	1.0	0.8	0.8	0.8	0.8	1.0	1.0	1.1	1.3	0.9
Consumption Induced	0.2	1.0	1.1	1.1	1.2	1.0	1.1	1.1	1.1	1.3	1.5	1.5	1.8	1.2
Sub total	0.4	1.9	1.9	2.0	2.2	1.8	1.9	1.9	2.0	2.2	2.5	2.6	3.1	2.0
Total Impact														
Direct	2.7	10.9	11.2	11.8	12.3	10.7	11.3	11.3	12.0	13.0	13.9	15.4	17.9	11.9
Production Induced	0.9	4.7	4.8	5.2	5.5	4.7	5.1	4.9	5.2	5.9	8.4	6.8	8.4	5.4
Consumption Induced	1.0	4.3	4.4	4.6	4.9	4.2	4.5	4.4	4.7	5.1	5.8	6.1	7.1	4.7
Total	4.7	19.8	20.5	21.6	22.7	19.7	20.8	20.6	21.9	24.0	28.1	28.3	33.4	22.0

Appendix Table 8 Operating phase impacts, low scenario, household income, 2018/19 to 2030/31 (\$m)

# APPENDIX 4 OPERATING PHASE IMPACTS – HIGH SCENARIO

						GR	P impact (\$	m)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	3.0	23.0	33.2	34.1	47.7	35.3	34.4	36.8	37.7	44.8	41.2	54.0	66.4	37.8
Production Induced	0.4	3.2	3.3	3.5	3.7	3.2	3.4	3.4	3.6	3.9	4.2	4.7	5.8	3.6
Consumption Induced	0.8	3.7	3.8	4.0	4.2	3.7	3.9	3.9	4.1	4.5	4.8	5.3	6.3	4.1
Sub total	4.3	29.9	40.3	41.7	55.6	42.2	41.7	44.1	45.4	53.1	50.3	64.0	78.4	45.5
Rest of South Australia														
Production Induced	0.6	2.6	2.6	3.0	3.0	2.6	2.9	2.7	2.8	3.3	6.4	3.6	4.5	3.1
Consumption Induced	1.0	4.7	4.9	5.2	5.4	4.7	5.0	4.9	5.2	5.7	6.8	6.7	8.0	5.2
Sub total	1.6	7.3	7.5	8.2	8.3	7.2	7.9	7.6	8.0	9.0	13.2	10.4	12.5	8.4
Rest of Australia														
Production Induced	0.5	1.7	1.8	1.9	2.1	1.6	1.6	1.6	1.7	2.0	2.3	2.3	2.7	1.8
Consumption Induced	0.6	2.5	2.6	2.7	2.9	2.5	2.6	2.6	2.7	3.1	3.6	3.6	4.3	2.8
Sub total	1.0	4.3	4.5	4.6	5.0	4.1	4.3	4.2	4.4	5.0	5.8	5.9	7.0	4.6
Total Impact														
Direct	3.0	23.0	33.2	34.1	47.7	35.3	34.4	36.8	37.7	44.8	41.2	54.0	66.4	37.8
Production Induced	1.5	7.5	7.8	8.4	8.7	7.4	8.0	7.7	8.1	9.2	12.9	10.7	13.0	8.5
Consumption Induced	2.4	11.0	11.3	11.9	12.6	10.8	11.5	11.4	12.1	13.2	15.1	15.7	18.5	12.1
Total	6.9	41.4	52.3	54.4	69.0	53.5	53.8	55.9	57.9	67.2	69.3	80.3	97.9	58.5

Appendix Table 9 Operating phase impacts, high scenario, gross regional/state/domestic product, 2018/19 to 2030/31 (\$m)

						Employ	ment i mpa	ct (fte)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	42	181	183	189	194	164	170	166	173	185	194	211	241	176.4
Production Induced	6	42	43	46	50	42	43	43	44	48	52	58	70	45.2
Consumption Induced	6	29	30	31	32	28	29	29	30	32	34	38	44	30.3
Sub total	55	252	257	266	276	234	242	238	248	266	280	306	356	251.8
Rest of South Australia														
Production Induced	3	10	11	12	12	10	12	10	11	13	32	13	16	12.8
Consumption Induced	3	11	11	12	11	10	11	10	11	13	22	13	15	11.9
Sub total	6	21	22	24	23	20	23	21	22	26	55	26	31	24.7
Rest of Australia														
Production Induced	1	3	3	2	3	2	1	2	2	2	-3	3	3	1.9
Consumption Induced	2	11	12	12	13	11	11	11	11	13	15	14	17	11.8
Sub total	3	14	15	14	16	13	13	13	13	15	12	18	20	13.6
Total Impact														
Direct	42	181	183	189	194	164	170	166	173	185	194	211	241	176.4
Production Induced	10	55	57	61	65	54	57	55	57	63	81	74	89	59.8
Consumption Induced	12	51	53	55	57	49	52	50	52	57	72	65	76	54.0
Total	64	288	293	304	315	267	278	271	283	306	347	350	407	290.2

Appendix Table 10 Operating phase impacts, high scenario, employment, 2018/19 to 2030/31 (fte)

						House	nold Incom	e (\$m)						
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	An. Average
Kangaroo Island														
Direct	3.0	13.2	13.6	14.3	15.0	13.0	13.7	13.7	14.5	15.8	16.9	18.8	21.9	14.4
Production Induced	0.3	2.3	2.3	2.5	2.7	2.3	2.5	2.5	2.6	2.8	3.1	3.4	4.2	2.6
Consumption Induced	0.4	1.6	1.6	1.7	1.8	1.6	1.7	1.7	1.8	1.9	2.1	2.3	2.7	1.7
Sub total	3.7	17.1	17.6	18.6	19.5	16.9	17.8	17.8	18.9	20.5	22.0	24.5	28.8	18.7
Rest of South Australia														
Production Induced	0.4	1.9	2.0	2.2	2.3	1.9	2.2	2.0	2.1	2.5	4.8	2.8	3.5	2.4
Consumption Induced	0.5	2.2	2.3	2.5	2.6	2.2	2.4	2.3	2.5	2.7	3.1	3.2	3.8	2.5
Sub total	0.9	4.2	4.3	4.7	4.8	4.2	4.5	4.4	4.6	5.2	7.9	6.0	7.2	4.8
Rest of Australia														
Production Induced	0.2	0.9	0.9	0.9	1.0	0.8	0.8	0.8	0.9	1.0	1.0	1.2	1.4	0.9
Consumption Induced	0.3	1.2	1.2	1.3	1.4	1.2	1.2	1.2	1.3	1.5	1.7	1.7	2.0	1.3
Sub total	0.5	2.1	2.2	2.2	2.4	2.0	2.1	2.1	2.2	2.5	2.7	2.9	3.4	2.2
Total Impact														
Direct	3.0	13.2	13.6	14.3	15.0	13.0	13.7	13.7	14.5	15.8	16.9	18.8	21.9	14.4
Production Induced	1.0	5.1	5.3	5.7	6.0	5.1	5.5	5.3	5.6	6.4	8.9	7.4	9.1	5.9
Consumption Induced	1.1	5.0	5.2	5.5	5.8	5.0	5.3	5.2	5.5	6.1	6.8	7.2	8.5	5.6
Total	5.1	23.3	24.1	25.5	26.8	23.0	24.4	24.2	25.7	28.2	32.6	33.4	39.4	25.8

Appendix Table 11 Operating phase impacts, high scenario, household income, 2018/19 to 2030/31 (\$m)

## APPENDIX 5 COMPARATIVE ECONOMIC CONTRIBUTION BY LAND USE

Appendix Table 12 Comparative economic contribution by land use

	Managage	ed Land <sup>c</sup>	Gross Region	al Product	Employ	ment (fte)	Household	Income
SECTOR	(ha)	(%)	(\$m)	(\$/ha)	(no)	(no/'000 ha)	(\$m)	(\$/ha)
Agriculture, forestry & fishing								
Agriculture	140,078	73.8%	80	569	540	3.9	31	220
Forestry & Logging (exisiting) <sup>a</sup>	18,100	9.5%	0	0	0	0.0	0	0
Other Agricultural Industries <sup>b</sup>	244	0.1%	13	52,500	76	312.1	8	31,395
Land not used for agricultural production	31,421	16.6%	-	-	-	-		-
Total Agriculture, forestry & fishing	189,842	100.0%	93	488	616	3.2	39	203
KIPT Direct Economic Impact (estimated)								
Average annual operating phase impacts, years 1-5								
Low activity scenario	18,100	9.5%	27	1,465	150	8.3	11	628
Medium activity scenario	18,100	9.5%	35	1,931	163	9.0	12	683
High activity scenario	18,100	9.5%	35	1,916	182	10.1	14	763

<sup>a</sup> Plantable forestry area provided by KIPT.

<sup>b</sup> Aquaculture, Fishing, Hunting & Trapping and Agriculture, Forestry & Fishing Support Services.

<sup>c</sup> Based on the Kangaroo Island NRM region for 2014-15.

Source: KIPT, ABS (2016), EconSearch analysis

# APPENDIX 6 BASE ASSUMPTIONS FOR ACTIVITY SCENARIOS

Appendix Table 13 Base assumptions for activity scenarios

Relation to data items			Metric used						
Cash flows statement	Income statement	Input workings	Detailed expenditure items adjusted	Description	Low	Med	High	Low (۵%	High (∆%
item name	item name	item name			(value)	(value)	(value)	from Med)	from Med)
Timber sales revenue/	Annual revenue	-	Timber sales revenue, Land sales	Tonnes needed to	1,959	2,449	2,449	80%	100%
Land sales proceeds/ Port revenue			proceeds, Port revenue	be moved					
Timber costs	Harvest Preparation	Havesting Costs	Finance, Repairs and Maintenance,	Harvesters	8.7	10.9	10.9	80%	100%
			Fuel, Floatwork, Labour, Insurance,	required					
			OH&S - training and PPE, Admin,						
			Other (power, banking, office etc)						
	Haulage	Haulage costs	Fuel, Tyres, Servicing and repairs	Loads per day	65	82	82	79%	100%
	Other pre export	Log export	Loading from log pile, Carting from	Number of log	2.2	2.7	2.7	80%	100%
	costs		Log pile to ship (Semi trailers),	stackers					
			Stevedoring crane loading,						
			Fumigation, Clean site and loading						
			area (dust supression and						
			sweeping), Other management						
		Chip export	Shaping chip and moving to	Loader operator	1,959	2,449	2,449	80%	100%
			reclaimer, Reclaimer and conveyor,	for chip pile					
			Ship loading, Fumigation, Clean						
			site and loading area (dust						
			supression and sweeping), Other						
			management						
Silvicultural and land	Planting /	Planting /	Replant weed control, Planting,	Replanting (fte)	2.7	2.2	3.4	125%	156%
management costs	Replanting	Replanting	Infilling of failed trees (12 months						
			later), Employment						
			Ripping and Mounding	Rippermounding	0.4	0.3	0.5	124%	155%
			Spray planting rows, Post plant	Insecticide (fte)	1.6	1.3	2.0	124%	156%
			weed control, Pest control						
			Fertiliser, Fert application	Fertilizer (fte)	0.3	0.3	0.3	100%	100%
Port cost	Port Operating Costs	Port operating	Operational staffing, Other costs of	Average of Log &	980.6	1225.9	1225.9	80%	100%
		costs	operations, Corporate costs	Chip export metrics					

Source: KIPT

# APPENDIX 7 AN OVERVIEW OF ECONOMIC IMPACT ANALYSIS USING THE I-O METHOD

Economic impact analysis based on an input-output (I-O) model provides a comprehensive economic framework that is extremely useful in the resource planning process. Broadly, there are two ways in which the I-O method can be used.

First, the I-O model provides a numerical picture of the size and shape of an economy and its essential features. The I-O model can be used to describe some of the important features of an economy, the interrelationships between sectors and the relative importance of the individual sectors.

Second, I-O analysis provides a standard approach for the estimation of the economic impact of a particular activity. The I-O model is used to calculate industry multipliers that can then be applied to various development or change scenarios.

### The input-output database

Input-output analysis, as an accounting system of inter-industry transactions, is based on the notion that no industry exists in isolation. This assumes, within any economy, each firm depends on the existence of other firms to purchase inputs from, or sell products to, for further processing. The firms also depend on final consumers of the product and labour inputs to production. An I-O database is a convenient way to illustrate the purchases and sales of goods and services taking place in an economy at a given point in time.

As noted above, I-O models provide a numerical picture of the size and shape of the economy. Products produced in the economy are aggregated into a number of groups of industries and the transactions between them recorded in the transactions table. The rows and columns of the I-O table can be interpreted in the following way:

- The rows of the I-O table illustrate sales for intermediate usage (i.e. to other firms in the region) and for final demand (e.g. household consumption, exports or capital formation).
- The columns of the I-O table illustrate purchases of intermediate inputs (i.e. from other firms in the region), imported goods and services and purchases of primary inputs (i.e. labour, land and capital).
- Each item is shown as a purchase by one sector and a sale by another, thus constructing two sides of a double accounting schedule.

In summary, the I-O model can be used to describe some of the important features of a state or regional economy, the interrelationships between sectors and the relative importance of the individual sectors. The model is also used for the calculation of sector multipliers and the estimation of economic impacts arising from some change in the economy.

### Using input-output analysis for estimation of economic impacts

The I-O model conceives the economy of the region as being divided up into a number of sectors and this allows the analyst to trace expenditure flows. To illustrate this, consider the example of a vineyard that, in the course of its operation, purchases goods and services from other sectors. These goods and services would include fertiliser, chemicals, transport services, and, of course, labour. The direct employment created by the vineyard is regarded in the model as an expenditure flow into the household sector, which is one of several non-industrial sectors recognised in the I-O model.

Upon receiving expenditure by the vineyard, the other sectors in the regional economy engage in their own expenditures. For example, as a consequence of winning a contract for work with vineyard, a spraying contractor buys materials from its suppliers and labour from its own employees. Suppliers and employees in turn engage in further expenditure, and so on. These indirect and induced (or flow-on) effects<sup>30</sup>, as they are called, are part of the impact of the vineyard on the regional economy. They must be added to the direct effects (which are expenditures made in immediate support of the vineyard itself) in order to arrive at a measure of the total impact of the vineyard.

It may be thought that these flow-on effects (or impacts) go on indefinitely and that their amount adds up without limit. The presence of leakages, however, prevents this from occurring. In the context of the impact on a regional economy, an important leakage is expenditure on imports, that is, products or services that originate from outside the region, state or country (e.g. machinery).

Thus, some of the expenditure by the vineyard (i.e. expenditure on imports to the region) is lost to the regional economy. Consequently, the flow-on effects get smaller and smaller in successive expenditure rounds due to this and other leakages. Hence the total expenditure created in the regional economy is limited in amount, and so (in principle) it can be measured.

Using I-O analysis for estimation of regional economic impacts requires a great deal of information. The analyst needs to know the magnitude of various expenditures and where they occur. Also needed is information on how the sectors receiving this expenditure share their expenditures among the various sectors from whom they buy, and so on, for the further expenditure rounds.

In applying the I-O model to economic impact analysis, the standard procedure is to determine the direct or first-round expenditures only. No attempt is made to pursue such inquiries on expenditure in subsequent rounds, not even, for example, to trace the effects in the regional economy on household expenditures by vineyard employees on food, clothing, entertainment, and so on, as it is impracticable to measure these effects for an individual case, here the vineyard.

<sup>&</sup>lt;sup>30</sup> A glossary of I-O terminology is provided in Appendix 3.

The I-O model is instead based on a set of assumptions about constant and uniform proportions of expenditure. If households in general in the regional economy spend, for example, 13.3 per cent of their income on food and non-alcoholic beverages, it is assumed that those working in vineyards do likewise. Indeed, the effects of all expenditure rounds after the first are calculated by using such standard proportions (i.e. multiplier calculations). Once a transactions table has been compiled, simple mathematical procedures can be applied to derive multipliers for each sector in the economy.

### Input-output multipliers

Input-output multipliers are an indication of the strength of the linkages between a particular sector and the rest of the state or regional economy. As well, they can be used to estimate the impact of a change in that particular sector on the rest of the economy.

Detailed explanations on calculating I-O multipliers, including the underlying assumptions, are provided in any regional economics or I-O analysis textbook (see, for example, Jensen and West (1986)). They are calculated through a routine set of mathematical operations based on coefficients derived from the I-O transactions model, as outlined below.

The transactions table may be represented by a series of equations thus:

$X_1 = X_{11} + X_{12} + \dots$	$+X_{1n}+Y_1$
$X_2 = X_{21} + X_{22} + \dots$	$\dots + X_{2n} + Y_2$
$X_n = X_{n1} + X_{n2} + \dots$	$\dots + X_{nn} + Y_n$

where  $X_i$  = total output of intermediate sector *i* (row totals);

- $X_{ij}$  = output of sector *i* purchased by sector *j* (elements of the intermediate quadrant); and
- $Y_j$  = total final demand for the output of sector *i*.

It is possible, by dividing the elements of the columns of the transactions table by the respective column totals to derive coefficients, which represent more clearly the purchasing pattern of each sector. These coefficients, termed 'direct' or 'I-O' coefficients, are normally denoted as aij, and represent the direct or first round requirements from the output of each sector following an increase in output of any sector.

In equation terms the model becomes:

$$\begin{split} X_1 &= a_{11}X_1 + a_{12}X_2 + \dots + a_{1n}X_n + Y_1 \\ X_2 &= a_{21}X_1 + a_{22}X_2 + \dots + a_{2n}X_n + Y_2 \\ X_n &= a_{n1}X_{11} + a_{n2}X_2 + \dots + a_{nn}X_n + Y_n \end{split}$$

where  $a_{ij}$  (the direct coefficient ) =  $X_{ij}/X_j$ . This may be represented in matrix terms:

X = AX + Y

where  $A = [a_{ij}]$ , the matrix of direct coefficients.

The previous equation can be extended to:

(I-A)X = Y

where (I-A) is termed the Leontief matrix,

or  $X = (I - A)^{-1} Y$ 

where  $(I-A)^{-1}$  is termed the 'general solution', the 'Leontief inverse' or simply the inverse of the open model.

The general solution is often represented by:

 $Z = (I-A)^{-1} = [z_{ij}]$ 

The I-O table can be 'closed' with respect to certain elements of the table. Closure involves the transfer of items from the exogenous portions of the table (final demand and primary input quadrants) to the endogenous section of the table (intermediate quadrant). This implies that the analyst considers that the transferred item is related more to the level of local activity than to external influences. Closure of I-O tables with respect to households is common and has been adopted in this project.

The 'closed' direct coefficients matrix may be referred to as  $A^*$ . The inverse of the Leontief matrix formed from  $A^*$  is given by:

$$Z^* = (I - A^*)^{-1} = [z^*_{ij}]$$

Z<sup>\*</sup> is referred to as the 'closed inverse' matrix.

A multiplier is essentially a measurement of the impact of an economic stimulus. In the case of I-O multipliers the stimulus is normally assumed to be an increase of one dollar in sales to final demand by a sector. The impact in terms of output, contribution to gross regional product, household income and employment can be identified in the categories discussed below.

(i) The initial impact: refers to the assumed dollar increase in sales. It is the stimulus or the cause of the impacts. It is the unity base of the output multiplier and provides the identity matrix of the Leontief matrix. Associated directly with this dollar increase in output is an own-sector increase in household income (wages and salaries, drawings by owner operators etc.) used in the production of that dollar. This is the household income coefficient *h<sub>j</sub>*. Household income, together with other value added (OVA), provide the total gross regional product from the production of that dollar of output. The gross regional product coefficient is denoted *v<sub>j</sub>*. Associated also will be an own-sector increase in employment, represented by the size of the employment coefficient. This employment



coefficient  $e_j$  represents an employment/output ratio and is usually calculated as 'employment per million dollars of output'.

- (ii) The first round impact: refers to the effect of the first round of purchases by the sector providing the additional dollar of output. In the case of the output multiplier this is shown by the direct coefficients matrix  $[a_{ij}]$ . The disaggregated effects are given by individual  $a_{ij}$  coefficients and the total first-round effect by  $\sum a_{ij}$ . First-round household income effects are calculated by multiplying the first-round output effects by the appropriate household income coefficient  $(h_j)$ . Similarly, the first-round gross regional product and employment effects are calculated by multiplying the first-round output effects by the appropriate gross regional product  $(v_j)$  and employment  $(e_j)$  coefficients.
- (iii) Industrial-support impacts. This term is applied to 'second and subsequent round' effects as successive waves of output increases occur in the economy to provide industrial support, as a response to the original dollar increase in sales to final demand. The term excludes any increases caused by increased household consumption. Output effects are calculated from the open Z inverse, as a measure of industrial response to the first-round effects. The industrial-support output requirements are calculated as the elements of the columns of the Z inverse, less the initial dollar stimulus and the first-round effects. The industrial support household income, gross regional product and employment effects are defined as the output effects multiplied by the respective household income, gross regional product and employment coefficients. The first-round and industrial-support impacts are together termed the production-induced impacts.
- (iv) Consumption-induced impacts: are defined as those induced by increased household income associated with the original dollar stimulus in output. The consumption-induced output effects are calculated in disaggregated form as the difference between the corresponding elements in the open and closed inverse (i.e.  $z^*_{ij} z_{ij}$ , and in total as  $\Sigma(z^*_{ij} z_{ij})$ . The consumption-induced household income, gross regional product and employment effects are simply the output effects multiplied by the respective household income, gross regional product and employment coefficients.
- (v) Flow-on impacts: are calculated as total impact less the initial impact. This allows for the separation of 'cause and effect' factors in the multipliers. The cause of the impact is given by the initial impact (the original dollar increase in sales to final demand), and the effect is represented by the first-round, industrial-support and consumption-induced effects, which together constitute the flow-on effects.

It should be noted that household income, gross regional product and employment multipliers are parallel concepts, differing only by their respective coefficients  $h_i$ ,  $v_i$  and  $e_i$ .

The output multipliers are calculated on a 'per unit of initial effect' basis (i.e. output responses to a one dollar change in output). Household income, gross regional product and employment multipliers, as described above, refer to changes in household income per initial change in output, changes to gross regional product per initial change in output and changes in employment per initial change in output. These multipliers are conventionally converted to ratios, expressing a 'per unit' measurement, and described as Type I and Type II ratios. For example, with respect to employment: Type I employment ratio = [initial + first round + industrial support]/initial and

Type II employment ratio = [initial + production induced + consumption induced]/initial Appendix Table 3.1 The structure of input-output multipliers for sector  $i^{a}$ 

Impacts	General formula
Output multipliers (\$)	
Initial	1
First-round	$\sum_{i} a_{ij}$
Industrial-support	$\sum_i z_{ij}$ -1- $\sum_i a_{ij}$
Consumption-induced	$\sum_{i} \mathbf{z}^*_{ij} - \sum_{i} \mathbf{z}_{ij}$
Total	$\sum_{i} z^*_{ij}$
Flow-on	Σ <sub>i</sub> z* <sub>ij</sub> -1
Household Income multipliers (\$)	
Initial	hj
First-round	$\Sigma_i a_{ij} h_i$
Industrial-support	$\sum_i z_{ij} h_i - h_j - \sum_i a_{ij} h_i$
Consumption-induced	$\sum_{i} \mathbf{z}^*_{ij} \mathbf{h}_i \cdot \sum_{i} \mathbf{z}_{ij} \mathbf{h}_i$
Total	$\sum_{i} z^*_{ij} h_i$
Flow-on	$\sum_{i} z^*_{ij} h_{i} h_{j}$
Gross regional product multipliers (\$)	
Initial	Vj
First-round	$\sum_i a_{ij} V_i$
Industrial-support	$\sum_i z_{ij} v_i - v_j - \sum_i a_{ij} v_i$
Consumption-induced	$\sum_{i} \mathbf{z}^*_{ij} \mathbf{v}_i - \sum_{i} \mathbf{z}_{ij} \mathbf{v}_i$
Total	$\sum_{i} z^*_{ij} v_i$
Flow-on	$\sum_{i} z^*_{ij} v_i - v_j$
Employment multipliers (full time equivalents)	
Initial	ej
First-round	$\Sigma_i a_{ij} e_i$
Industrial-support	$\sum_{i} z_{ij} e_{i} - e_{j} - \sum_{i} a_{ij} e_{i}$
Consumption-induced	$\sum_{i} \mathbf{z}^*_{ij} \mathbf{e}_i \cdot \sum_{i} \mathbf{z}_{ij} \mathbf{e}_i$
Total	$\sum_{i} \mathbf{z}^{*}_{ij} \mathbf{e}_{i}$
Flow-on	$\sum_{i} \mathbf{z}^*_{ij} \mathbf{e}_{i} \mathbf{e}_{j}$

<sup>a</sup> In a DECON model, Z<sup>\*</sup> (the 'closed inverse' matrix), includes a population and an unemployed row and column (see below for details).

#### **Model assumptions**

There are a number of important assumptions in the I-O model that are relevant in interpreting the analytical results.



- Industries in the model have a linear production function, which implies constant returns to scale and fixed input proportions.
- Another model assumption is that firms within a sector are homogeneous, which implies they produce a fixed set of products that are not produced by any other sector and that the input structure of the firms are the same. Thus it is preferable to have as many sectors as possible specified in the models and the standard models for this study were compiled with 78 sectors.
- The model is a static model that does not take account of the dynamic processes involved in the adjustment to an external change, such as a permanent change in natural resources management.

### Extending the standard economic impact model as a DECON model

Based on work undertaken by EconSearch (2009 and 2010a) and consistent with Mangan and Phibbs (1989), the I-O model developed for this project was extended as demographic-economic (DECON) model. The two key characteristics of the DECON model, when compared with a standard economic model, are as follows.

- 1. The introduction of a population 'sector' (or row and column in the model) makes it possible to estimate the impact on local population levels of employment growth or decline.
- The introduction of an unemployed 'sector' makes it possible to account for the consumption-induced impact of the unemployed in response to economic growth or decline.

### The population 'sector'

The introduction of a population 'sector' to the standard I-O model allows for the calculation of population multipliers. These multipliers measure the flow-on population impact resulting from an initial population change attributable to employment growth or decline in a particular sector of the regional economy.

Calculation of population multipliers is made possible by inclusion of a population row and column in the 'closed' direct coefficients matrix of the I-O model.

Population row: the population coefficient (pj) for sector j of the DECON model is represented as:

 $p_j = -rho_j * e_j * family size_j$ 

where *rho<sub>j</sub>* = the proportion of employees in sector *j* who remain in the region after they lose their job (negative employment impact) or the proportion of new jobs in sector *j* filled by previously unemployed locals (positive employment impact);

 $e_j$  = the employment coefficient for sector *j*; and

family size<sub>j</sub> = average family size for sector j.

**Population column**: the population column of the DECON model is designed to account for growth or decline in those sectors of the economy that are primarily population-driven (i.e. influenced by the size of the population) rather than market-driven (i.e. dependent upon monetary transactions). Clearly, many of the services provided by the public sector fit this description and, for the purpose of this analysis, it was assumed that the following intermediate sectors were primarily population-driven:

- public administration and defence;
- education;
- health and community services; and
- cultural and recreational services.

Thus, the non-market coefficient for sector j of the DECON model is represented as expenditure on that non-market service (by governments) in \$million per head of population.

The population multiplier for sector *j* is represented as:  $z_{pj}^* / p_{pj}$ 

- where  $z_{pj}^* = \text{coefficient of the 'closed inverse' matrix in the population row for sector } j;$ and
  - $p_{pj}$  = coefficient of the direct coefficients matrix in the population row for sector *j*.

Sources of local data for the population sector of the DECON models used in this project included the following.

- rho: little or no published data are available to assist with estimation of this variable, particularly at a regional level. The DECON models have been constructed to enable the analyst to estimate this variable on the basis of the availability superior data or assumptions.
- Family size: in order to estimate average family size by industry, relevant data were extracted from the Australian Bureau of Statistics 2006 Census of Population and Housing using the TableBuilder database. These data were modified by the consultants in order to ensure consistency with the specification and conventions of the I-O models.

### The unemployed 'sector'

As outlined above, the introduction of an unemployed 'sector' to the standard I-O model makes it possible to account for the consumption-induced impact of the unemployed in response to economic growth or decline.

Through the inclusion of an unemployed row and column in the 'closed' direct coefficients matrix of the standard I-O model it is possible to calculate Type III multipliers (for output, gross regional product, household income and employment).



The key point to note is that, in the situation where at least some of the unemployed remain in a region after losing their job (negative employment impact) or some of the new jobs in a region are filled by previously unemployed locals (positive employment impact), Type III multipliers will be smaller than the more frequently used Type II multipliers.

**Unemployed row**: the unemployed coefficient  $(u_j)$  for sector j of the DECON model is represented as:

 $u_j = -\mathbf{rho}_j * (1 - \mathbf{ess}_j) * \mathbf{e}_j$ 

where *rho<sub>j</sub>* = the proportion of employees in sector *j* who remain in the region after they lose their job (negative employment impact) or the proportion of new jobs in sector *j* filled by previously unemployed locals (positive employment impact);

*ess<sub>j</sub>* = the proportion of employed in sector *j* who are not eligible for welfare benefits when they lose their job; *and* 

 $e_j$  = the employment coefficient for sector *j*.

**Unemployed column**: the unemployed column of the DECON model is an approximation of total consumption expenditure and the consumption pattern of the unemployed. It is represented as dollars per unemployed person rather than \$million for the region as a whole, as is the case for the household expenditure column in a standard I-O model.

Sources of local (i.e. state and regional) data for the unemployed sector of the DECON models used in this study included the following.

- ess: in order to estimate the proportion of employed by industry who are not eligible for welfare benefits when they lose their job, relevant data were were extracted from the Australian Bureau of Statistics 2006 Census of Population and Housing using the TableBuilder database. These data were modified by the consultants in order to ensure consistency with the specification and conventions of the I-O models.
- Unemployed consumption: total consumption expenditure by the unemployed was based on an estimate of the Newstart Allowance whilst the pattern of consumption expenditure was derived from household income quintiles in the 2003/04 Household Expenditure Survey (ABS 2006).

### Incorporating a tourism demand profile in the I-O model

Tourism expenditure is a measure of the value of sales of goods and services to visitors to the state or region. The following method and data sources were used to estimate tourism expenditure by industry sector for the region.

- The primary data were sourced from Tourism Research Australia (TRA).
- Base datasets included total tourism expenditure by TRA tourism region and average expenditure profiles, by region, across a range of goods and services (e.g. food and drink, fuel, shopping, etc.).



- Estimates were available for domestic day, domestic overnight and international visitor expenditure.
- The first adjustment to the base data was the development of a concordance between the TRA tourism regions and I-O model regions and the allocation of these base data to the relevant I-O model region. These allocations were based, in turn, on an ABS concordance between TRA tourism regions and SLAs.
- The second adjustment to the base data was the application of a more detailed expenditure breakdown from the ABS Australian National Accounts: Tourism Satellite Account for both domestic and international visitor expenditure (ABS 2010d).
- The third adjustment to the base data was the conversion of tourism expenditure estimates from purchasers' to basic prices (i.e. reallocation of net taxes (taxes minus subsidies) and marketing and transport margins) to make the data consistent with accounting conventions used in the national, state and regional I-O models. Purchasers' to basic price ratios for tourism expenditure categories were derived from ABS data.
- The final adjustment to the base data was the allocation of the tourism expenditure data in basic prices to the relevant input-output sectors (intermediate sectors, taxes less subsidies or imports) in which the expenditure occurred, thus compiling a profile of sales to final demand. This process was undertaken for each type of tourism expenditure (domestic day, domestic overnight and international visitor) and the results aggregated to form a single tourism demand profile. Profiles were developed at the state and regional levels.

### Constructing a RISE v4.22 economic impact model

In the final model construction stage the data described above were incorporated into a *Microsoft Excel®* spreadsheet based economic impact model for the region and state (i.e. *RISE v4.22*)<sup>31</sup>. This model allows for description of the structure of the economy. It can also be used for the estimation of economic impacts over time in response to the introduction of a new industry or a change in the final demand for the output of one or many sectors. Model assumptions can be modified to account for:

- price changes between the model construction year (2015/16) and the base year for the analysis;
- labour productivity change over time (as above and for the subsequent years);
- the level of regional migration (e.g. for a positive employment impact, the proportion of new jobs filled by previously unemployed locals).

<sup>&</sup>lt;sup>31</sup> For further details on the use and application of this type of model see EconSearch (2017a).

Appendix O2 – Impact of KIPT Development on Kangaroo Island Gross Regional Product – BDO EconSearch



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Via email: peter.lockett@kipt.com.au

Peter Lockett Kangaroo Island Plantation Timbers Ltd Suite 805 Aurora House 147 Pirie Street Adelaide SA 5000

14 December 2018 Ref: ES1839

Dear Peter,

### IMPACT OF KIPT DEVELOPMENT ON KANGAROO ISLAND GROSS REGIONAL PRODUCT

This letter presents an estimate of the time it would take the Kangaroo Island economy to grow to match the impact of the KIPT development. This calculation depends on three principal factors: (i) the impact of the KIPT Smith Bay Wharf development on the KI economy; (ii) the size of the KI economy; and (iii) the assumed rate of growth of the KI economy in the absence of the KIPT development.

- (i) Estimates of the impact of the KIPT development were prepared by BDO EconSearch for Kangaroo Island Plantation Timbers with results presented in the October 2017 report 'Economic Impact of the Smith Bay Wharf'. The average annual contribution to gross regional product (GRP) over the first 13 years of operation was estimated to be \$45.2 million (2017 dollars). This was under the 'medium' scenario.
- (ii) **The size of the KI economy** (as measured by gross regional product) was estimated in the abovementioned report to be \$261 million (2017 dollars).
- (iii) The rate of growth of the KI economy was assumed to be aligned to average growth rate in the SA economy. This is a reasonable assumption, particularly in the absence of major investments on the Island. We have based our calculation on the 5-year average for growth in South Australian gross state product published by the Australian Bureau of Statistics. The annual rate of economic growth in SA for the 5 years to 2017/18 was 2.4% in nominal terms and 0.6% in real terms (adjusted for inflation).

At a real rate of growth of 0.6%/annum, it would take approximately 29 years for the KI economy to match the impact of the KIPT Smith Bay Wharf development.

ES1838

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Please don't hesitate to contact me further if you require elaboration on the above calculation.

Yours sincerely

**BDO EconSearch** 

Julian Mumin

Julian Morison Director

Appendix O3 – Cost Benefit Analysis of the Smith Bay Wharf Development – BDO EconSearch

# COST BENEFIT ANALYSIS OF THE SMITH BAY WHARF DEVELOPMENT

A Report to Kangaroo Island Plantation Timbers

14 December 2018

Prepared by

### **BDO EconSearch**

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## **ABBREVIATIONS**

ABS	Australian Bureau of Statistics
BCR	benefit-cost ratio
CBA	cost benefit analysis
fte	full time equivalent
IRR	internal rate of return
КІ	Kangaroo Island
KIPT	Kangaroo Island Plantation Timbers
NPV	net present value
SA	South Australia



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## **EXECUTIVE SUMMARY**

### Introduction

Kangaroo Island Plantation Timbers (KIPT) is proposing to construct a deep water wharf at Smith Bay. The major components of the proposed project are:

- a deep water port and export facility with capacity to export up to 0.72 mtpa of timber,
- a long-term sustainable timber harvesting operation.

In 2017 BDO EconSearch previously competed an Economic Impact Study of the Smith Bay Wharf proposed by KIPT (EconSearch 2017).

The following Cost Benefit Analysis (CBA) is being undertaken as a component of the Environmental Impact Assessment process requested by South Australia's Minister for Planning as a result of the declaration of KIPT's proposal a major development under s.46 of the *Development Act 1993* (SA).

### **Cost Benefit Analysis**

The cost benefit analysis evaluated the net benefit of KIPT's Smith Bay Wharf development compared to the base case:

• **Base Case:** Under the base case it was assumed that approval for a wharf and associated export infrastructure would be provided and that the development would take place at a different location. Under advice from KIPT data on this alternative site w based on a development at Cape Dutton. In addition, to accommodate the change of site the development would be delayed by 4 years. As a result of the delay overall yield would be reduced by about twenty percent. Further costs would be incurred to manage the forest to ensure a commercial yield. Such costs would include thinning of the forest and removal of the thinned trees.

An alternative base case in which development at Smith Bay was not approved was also considered. Under this alternative scenario the export facilities would not be developed and the forest would be sold off, the trees removed and the land converted to agriculture. However, the costs of remediating the land to a condition suitable for farming were estimated to be between 10,000/ha and \$20,000/ha of forest. This greatly exceeds the value of cleared land which is estimated to be worth between \$2,000/ha and \$3,000/ha. In addition, further difficulties in managing the remediation would include the relocation of around 15,000 koalas. After considering both the high costs and these other difficulties it was decided not to continue with this as a reasonable base case.

• Development Case: The development is undertaken with wharf and associated construction being undertaken in 2018/19 and exports of logs and chips beginning in 2019/20. Relevant development costs from 2016/17 and 2017/18 are incorporated into the analysis. All data on costs and production were provided by KIPT.

The analysis used a discount rate of 6 per cent and a 15-year period of analysis. The results have been expressed in terms of three evaluation criteria, the net present value (NPV), the internal rate of return (IRR) and the benefit cost ratio (BCR). The results indicate that, according to the three evaluation criteria used, the development would increase net social benefit and is preferred to the base case. The results attributable to the Smith Bay Wharf development are NPV of \$118.6 million, BCR of 2.2 and IRR of 68 per cent.



### Table ES-1 Results of cost benefit analysis

	Decision Rule (preferred to base case if satisfied)	Overall result (15 year period)
Net Present Value (NPV)	lf >\$0.0	\$118.6 million
Benefit Cost Ratio (BCR)	lf >1.0	2.2
Internal Rate of Return (IRR)	lf >6%	68%

Source: BDO EconSearch analysis

Sensitivity testing was undertaken separately on both the discount rate and the value of the timber sales revenue.

The results of the sensitivity testing on the discount rate are provided in Table ES-2 below.

### Table ES-2Results of varying discount rate

	Discount rate		
	4%	6%	8%
Net Present Value (NPV)	\$137.8 million	\$118.6 million	\$102.5 million
Benefit Cost Ratio (BCR)	2.2	2.2	2.1
Internal Rate of Return (IRR)	68%	68%	68%

Source: BDO EconSearch analysis

The results of the sensitivity testing on the value of the timber sales revenue are provided in Table ES-3 below.

### Table ES-3 Results of varying the value of timber revenue

	Timber sales revenue		
	-20%	100%	+20%
Net Present Value (NPV)	\$77.1 million	\$118.6 million	\$160.1 million
Benefit Cost Ratio (BCR)	1.8	2.2	2.6
Internal Rate of Return (IRR)	48%	68%	87%

Source: BDO EconSearch analysis

The results of this sensitivity testing indicate that according to the three evaluation criteria used, the development at Smith Bay would increase net social benefits and is preferred to the base case under each of the discount rates used and also if the value of the timber sales revenue is increased or decreased by 20 per cent.



## 1. INTRODUCTION

Kangaroo Island Plantation Timbers (KIPT) is proposing to construct a deep water wharf at Smith Bay. The major components of the proposed project are:

- a deep water port and export facility with capacity to export up to 0.72 mtpa of timber,
- a long-term sustainable timber harvesting operation.

In 2017 BDO EconSearch competed an Economic Impact Study of the Smith Bay Wharf proposed by KIPT (EconSearch (2017).

The following Cost Benefit Analysis (CBA) is being undertaken as a component of the Environmental Impact Assessment process requested by South Australia's Minister for Planning as a result of the declaration of KIPT's proposal a major development under s.46 of the *Development Act 1993* (SA).



## 2. METHOD OF ANALYSIS AND DATA

### 2.1. Purpose and Scope of Cost Benefit Analysis

A key objective of this study was to undertake a cost benefit analysis (CBA) to determine the net benefit of the development. The proposed development was compared against a base case scenario, as described in Table 2-1. The base case and proposed development option are detailed in the following sections.

### Table 2-1 Alternative options for the cost benefit analysis

Option	Description
Base Case	Under the base case it was assumed that approval for a wharf and associated export infrastructure would be provided and that the development would take place at a different location. Under advice from KIPT data on this alternative site were based on a development at Cape Dutton. In addition, to accommodate the change of site the development would be delayed by 4 years. As a result of the delay, overall yield of the forestry operation would be reduced by about twenty per cent. Further costs would be incurred to manage the forest to ensure a commercial yield. Such costs would include thinning of the forest and removal of the thinned trees.
	An alternative base case in which development at Smith Bay was not approved was also considered. Under this alternative scenario, the export facilities would not be developed and the forest would be sold off, the trees removed and the land converted to agriculture. However, the costs of remediating the land to a condition suitable for farming were estimated to be between \$10,000/ha and \$20,000/ha of forest. This greatly exceeds the value of cleared land which is estimated to be worth between \$2,000/ha and \$3,000/ha. In addition, further difficulties in managing the remediation would include the relocation of around 15,000 koalas. After considering both the high costs and these other difficulties it was decided not to continue with this as a reasonable base case.
Development Case	The development is undertaken with wharf and associated construction being undertaken in 2018/19 and exports of logs and chips beginning in 2019/20. Relevant development costs from 2016/17 and 2017/18 are incorporated into the analysis. All data on costs and production were provided by KIPT.

### 2.2. Method of Analysis

The cost benefit analysis conducted for this project conforms to South Australian and Commonwealth Government guidelines for conducting evaluations of public sector projects (Department of Treasury and Finance (2008) and Department of Finance and Administration (2006).Note that this is a private sector project that requires no public funding. However, there are implications for the broader community that can be considered within the broader CBA framework.

The starting point for the economic analysis was to develop the 'base case' scenario, that is, the benchmark against which the development was compared.


Given that costs and benefits were specified in real terms (i.e. constant 2017 dollars), future values were converted to present values by applying a discount rate of 6 per cent. The choice of discount rate is consistent with the rate commonly used by the South Australian Government in these type of analyses (DPMC 2016).

The economic analysis was conducted over a 15-year period and results were expressed in terms of net benefits, that is, the incremental benefits and costs of the Development Case relative to those generated by the Base Case. The evaluation criteria employed for this analysis are described below.

• Net present value (NPV) - discounted development benefits less discounted development costs. Under this decision rule the development is considered to be potentially viable if the NPV is greater than zero. The NPV for the development (Dev) was calculated as an incremental NPV, using the standard formulation:

$$NPV_{Dev} = PV(Benefit_{Dev} - Benefit_{Base \ Case}) - PV(Cost_{Dev} - Cost_{Base \ Case})$$

- Internal rate of return (IRR) the discount rate at which the NPV of the development is equal to zero. Under this decision rule the development is considered to be potentially viable if the IRR is greater than the benchmark discount rate (i.e. 6 per cent).
- Benefit cost ratio (BCR) the ratio of the present value of benefits to the present value of costs. Under this decision rule the development is considered to be potentially viable if the BCR is greater than one. The ratio was expressed as:

$$BCR_{Dev} = \frac{PV(Benefit_{Dev} - Benefit_{Base \ Case})}{PV(Cost_{Dev} - Cost_{Base \ Case})}$$

The evaluation criteria in the cost benefit analysis quantify the net effect of the project on the community as a whole, relative to the base case. This means that all agents affected by the project need to be separately identified with their costs and benefits quantified under the base case and the scenarios under consideration. Often the base case includes some alternative use of the resource under consideration, rather than just 'doing nothing'. The results describe the difference between the costs and benefits under each scenario compared to the base case, treating each agent equally. Agents typically include the businesses undertaking the development, third-party funders, government, local residents and businesses, visitors to the area and anyone else affected. For example, in this case there are benefits that accrue to various business owners on Kangaroo Island and costs that accrue to local residents and visitors (see Table 2-3). Results for each criteria can vary widely so a table of results from a varied range of analyses in Australia is included below for context (Table 2-2).



#### Table 2-2 Results from other cost benefit analyses in Australia

Name	Description	NPV	BCR	IRR
Cross-RDC Impact Assessment and Performance Reporting Update (AgTrans Research et. al. 2016)	Combined CBA of 167 project clusters completed between 2010 and 2015 across 15 RDCs.	\$4.9b	4.5	
Clare Valley Sport & Recreation Precinct - Business Case (CGVC 2017)	CBA of a proposed project to construct a sport and recreation precinct.	\$7.7m	1.7	13%
Economic Analysis of Eutypa Dieback in Coonawarra (EconSearch 2014)	CBA of various Eutypa management options to identify the option with the highest net benefit to the community.	\$19m	1.4	
Economic Aspects of the Zero	Wattle Range Council Resource Recovery Facilities	\$0	-	
(three case studies) (EconSearch et. al. 2014)	District Council of Cleve Waste Transfer and Recycling Facility	\$19,000	1.4	
	Regional construction and demolition (C&D) resource recovery facility	\$3.4m	11.5	

### 2.3. Costs and Benefits

The costs and benefits of the development were measured using a 'with' and 'without' project framework, that is, quantification of the incremental changes associated with the option compared to the Base Case. The method, data sources and assumptions used to quantify these values are described below. Consideration was given to those benefits and costs likely to occur over a 15-year period. The major economic costs and benefits of the project are listed in Table 2-3 along with the agent(s) they are incident on.

#### Table 2-3 Costs and benefits in the scope of the cost benefit analysis

Item	Cost or Benefit	Agent	Description
Base Case			
Income from export of logs and chips	Benefit	Exporter	Direct increase in revenue for the region
Income from the export of non-KIPT forestry shippers	Benefit	Exporter	Direct increase in revenue for the region
Income from non-forestry freight tasks		Exporter	Direct increase in revenue for the region



Item	Cost or Benefit	Agent	Description
Residual value of forests		Forest owner	
Expenditure on forest and port infrastructure	Cost	KIPT, Exporter and Developer	Capital costs incurred
Ongoing expenditure on forest and port businesses	Cost	KIPT, Exporter and Developer	Includes harvest preparation, harvesting, haulage and port operating costs as well as forest maintenance during the 4 year delay in gaining development approval
Environmental Costs	Cost	KI Population and Visitors	Costs of increased air pollution, greenhouse gases and noise due to increased haulage of logs and chips from the forests to the port facility
Road Accident Costs	Cost	KI Population and Visitors	Increase in road accidents due to increased heavy vehicle traffic on roads from the forests to the port facility
Development Case			
Income from export of logs and chips	Benefit	Exporter	Direct increase in revenue for the region
Income from the export of non-KIPT forestry shippers	Benefit	Exporter	Direct increase in revenue for the region
Income from non-forestry freight tasks		Exporter	Direct increase in revenue for the region
Residual value of forests		Forest owner	
Expenditure on forest and port infrastructure	Cost	KIP, Exporter and Developer	Capital costs incurred
Ongoing expenditure on forest and port businesses	Cost	KIP, Exporter and Developer	Includes harvest preparation, harvesting, haulage and port operating costs
Environmental Costs	Cost	KI Population and Visitors	Costs of increased air pollution, greenhouse gases and noise due to increased haulage of logs and chips from the forests to the port facility
Road Accident Costs	Cost	KI Population and Visitors	Increase in road accidents due to increased heavy vehicle traffic on roads from the forests to the port facility



### 2.4. Data and Assumptions

#### **Construction costs**

For the base case total construction costs are expected to be around \$47.3 million (excluding contingencies) and will occur between 2019/20 and 2020/21 (Table 2-4). These construction costs are based on a development at Cape Dutton with data provided by KIPT.

 Table 2-4
 Base case construction cost and time profile (\$'000)

Expenditure Category	2018/19	2019/20	2020/21	TOTAL
Floating Wharf		5,918	3,335	9,253
Barge restraints and moring dolphins			5,455	5,455
Dredging			2,282	2,282
Installation Causeway			3,778	3,778
Detailed Design and project management			2,375	2,375
Other land based incl civil works & roads			24,123	24,123
TOTAL		5918	41,348	47,266

For the development case, total construction costs are expected to be around \$29.4 million (excluding contingencies) and will occur between 2017/18 and 2018/19 (Table 2-5).

#### Table 2-5Development case construction cost and time profile (\$'000)

Expenditure Category	2016/17	2017/18	2018/19	TOTAL	
Floating Wharf		5,918	3,335	92,53	
Barge restraints and moring dolphins			5,455	5,455	
Dredging			2,282	2,282	
Installation Causeway			3,778	3,778	
Detailed Design and project management			2,375	2,375	
Other land based incl civil works & roads			6,288	6,288	
TOTAL		5,918	23,513	29,431	

#### Income

Once the port is operational, income from exports of timber as either logs or wood chips as well as timber from non KIPT forestry shippers and other non-forestry freight tasks is forecast to increase from \$40.5 million to \$89.0 million across the 15-year evaluation period.

Under the base case there is a 4-year delay in the exports. In addition, the income from the export of logs and wood chips is reduced by 20 per cent to reflect the reduced forest harvesting yield due to thinning. To accommodate both the delay in the start of harvesting and the rotation cycle, the rate of harvesting and



subsequent volume of wood harvested and timber sales revenue gained are increased by 25 per cent in each of the last 4 years of the period of analysis.

#### Operation

Operating costs include harvest preparation, harvesting haulage, pre-export costs, commissions, port operating costs, planting and replanting and land management and maintenance of infrastructure. These costs are forecast to increase from \$23.4 million to \$44.4 million across the 15-year evaluation period.

Under the base case, there is a delay of 4 years in the operating costs. In addition, these costs are reduced by 20 per cent to represent the reduction in forest yield. Further, there is an expenditure of \$1,000 per hectare for each of the 4 years of delay to represent the costs of thinning and disposal of thinned timber. This expense is considered necessary to ensure a commercial yield.

#### Non-market social costs

The extra heavy vehicle traffic dues to the operation of the port is expected to have both environmental effects and to increase the likelihood of traffic accidents. The former category includes air pollution, greenhouse gases and noise and has been estimated according to the methods of the Australian Transport Council (2006).

Estimation of the possible costs from increased traffic accidents due to the extra movements of heavy vehicles from the forest to the wharf has been undertaken according to the methods of the Australian Transport and Infrastructure Council (2016).

#### Residual value of forest capital

It is assumed that the residual value of forest capital at the end of the 15-year period of analysis is the same as it was at the start of the period, i.e. its value has grown at the same rate as changes in the discount rate.

Under the base case the residual value at the end of the 15-year evaluation period is reduced by 20 per cent to represent the reduced value due to thinning.



# 3. COST BENEFIT ANALYSIS RESULTS

The primary focus of the cost benefit analysis in this study was the costs and benefits that accrue as a result of the development. That is, the cost benefit analysis was used to determine whether the development would increase net social benefits relative to the Base Case.

The results of the analysis have been expressed in terms of three evaluation criteria, the net present value (NPV), the internal rate of return (IRR) and the benefit cost ratio (BCR). The NPV is a measure of the aggregate, annual net benefits (i.e. benefits - costs) of the development over a 15-year period, discounted (i.e. expressed as a present value) using a discount rate of 6 per cent. If the NPV for a scenario is positive, then the scenario is preferred to the Base Case. The BCR is a ratio of the present value of benefits to the present value of costs over 15 years and the IRR is the discount rate at which the NPV of the development equals zero after 15 years. While the impact analysis illustrates the economic activity arising from the proposed investment, the CBA shows whether or not the proposed investment represents a more efficient allocation of resources. The results of the CBA are presented in Table 3-1.

#### Table 3-1 Results of cost benefit analysis

	Decision Rule (preferred to base case if satisfied)	Overall result (15 year period)
Net Present Value (NPV)	lf >\$0.0	\$118.6 million
Benefit Cost Ratio (BCR)	lf >1.0	2.2
Internal Rate of Return (IRR)	lf >6%	68%

Source: BDO EconSearch analysis

The results indicate that, according to the three evaluation criteria used, the overall development would increase net social benefit and is preferred to the base case.

- The NPV of \$118.6.0 million indicates that, relative to the Base Case, the development will generate a net benefit to the community of \$118.6 million over a 15-year period. The decision rule is satisfied as the NPV is greater than zero.
- The BCR of 2.2 indicates, in a broad sense, that for each dollar invested, \$2.20 will be returned over the life of the project. For a project to be viable, the BCR must be greater than 1.0.
- The IRR provides a measure for the rate of return to capital invested, here estimated to be 68 per cent. The decision rule for a project to be viable is that the IRR be greater than the discount rate which, for this project and projects of this kind is 6 per cent.

Sensitivity testing was undertaken separately on both the discount rate and the value of the timber sales revenue.



#### Table 3-2 Results of varying discount rate

	Discount rate									
	4%	6%	8%							
Net Present Value (NPV)	\$137.8 million	\$118.6 million	\$102.5 million							
Benefit Cost Ratio (BCR)	2.2	2.2	2.1							
Internal Rate of Return (IRR)	68%	68%	68%							

Source: BDO EconSearch analysis

The results of the sensitivity testing on the value of the timber sales revenue are provided in Table ES.3 below.

#### Table 3-3 Results of varying the value of timber sales

	Timber sales revenue								
	-20%	100%	+20%						
Net Present Value (NPV)	\$77.1 million	\$118.6 million	\$160.1 million						
Benefit Cost Ratio (BCR)	1.8	2.2	2.6						
Internal Rate of Return (IRR)	48%	68%	87%						

Source: BDO EconSearch analysis

These results of this sensitivity testing indicate that according to the three evaluation criteria used, the development at Smith Bay would increase net social benefits and is preferred to the base case under each of the discount rates used and also if the value of the timber sales revenue is increased or decreased by 20 per cent.



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#### Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.



## APPENDIX 1 DETAILED CBA MODEL

#### Appendix Table 1-1 Detailed

**Detailed CBA model** 

		2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Pre	sent Value (\$'000)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
BASE CASE																
Benefits																
Income	200,554	0	0	0	0	0	0	0	32,412	37,437	38,164	63,194	48,646	49,606	51,489	52,488
Flow-on GOS																
Forest Residual Value	20,169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45,600
Total Benefits	220,723	0	0	0	0	0	0	0	32,412	37,437	38,164	63,194	48,646	49,606	51,489	98,088
Costs																
Construction	90,199	57,000	0	0	0	0	5,918	40,821	0	0	0	0	0	0	0	0
Operating and maintenance costs	113,053	931	1,361	860	860	860	860	860	19,598	20,581	21,566	30,462	25,483	26,635	26,718	28,289
Haulage Other Enviromental	320	0	0	0	0	0	0	0	59	63	63	101	76	76	76	76
Haulage Accident	67	0	0	0	0	0	0	0	14	15	15	19	15	15	15	15
Total Costs	203,252	57,931	1,361	860	860	860	6,778	41,681	19,598	20,581	21,566	30,462	25,483	26,635	26,718	28,289
MEDIUM SCENARIO																
Benefits																
Income	413,696	0	0	0	40,515	46,796	47,704	63,389	48,842	49,803	51,912	52,912	62,066	63,279	74,167	88,986
Flow-on GOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Residual Value	25,211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57,000
Total Benefits	438,907	0	0	0	40,515	46,796	47,704	63,389	48,842	49,803	51,912	52,912	62,066	63,279	74,167	145,986
Costs																
Construction	83,726	57,000	6,645	22,986	0	0	0	0	0	0	0	0	0	0	0	0
Operating and maintenance costs	218,088	931	1,361	2,512	23,421	24,735	26,194	29,434	24,352	25,654	25,503	26,922	30,945	36,644	37,343	44,355
Haulage Other Enviromental	893	0	0	0	103	110	110	142	107	107	107	107	125	125	145	183
Haulage Accident	152	0	0	0	18	19	19	24	18	18	18	18	21	21	25	29
Total Costs	302,859	57,931	8,006	25,498	23,542	24,864	26,323	29,600	24,477	25,779	25,628	27,047	31,092	36,791	37,512	44,567
Incremental Benefits	218,184	0	0	0	40,515	46,796	47,704	63,389	16,431	12,366	13,749	-10,282	13,420	13,673	22,678	47,899
Incremental Costs	99,607	0	6,645	24,638	22,682	24,004	19,545	-12,081	4,878	5,198	4,061	-3,415	5,609	10,156	10,794	16,278
Net Benefit (NPV)	118,576	0	-6,645	-24,638	17,833	22,793	28,159	75,470	11,552	7,169	9,688	-6,867	7,811	3,517	11,884	31,620
BCR	2.2															
IRR	68%															
Discount Rate	6%															

Source: BDO EconSearch analysis