

BELL BAY

# pulp mill project

## IMPACT ASSESSMENT



for assessment under the

*Environment Protection Biodiversity  
Conservation Act 1999*



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## Executive Summary

Gunns Limited (Gunns) proposes to develop a bleached Kraft pulp mill and associated infrastructure in Northern Tasmania. The project requires consideration under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On the basis of comprehensive expert studies undertaken during the assessment of the project, Gunns expects no significant impacts on relevant matters of national environmental significance.

# 1. Introduction

## 1.1 The Project

Gunns Limited (Gunns) proposes to develop an elemental chlorine free bleached Kraft pulp mill, and associated infrastructure, in north-east Tasmania. The pulp mill is proposed to be established on a site between the eastern bank of the Tamar River, across from the settlement of Rowella, and the East Tamar Highway. The pulp mill site is located within the Bell Bay major industrial zone, south of George Town.

Other key features of the project include:

- a wharf for the delivery of chemicals and materials and the export of pulp by sea vessel;
- a waste disposal facility, water storage dam and possible quarry on the eastern side of the East Tamar Highway, opposite from the pulp mill;
- an effluent outfall pipeline and diffuser which will dispose of treated effluent offshore of Five Mile Bluff;
- a worker's accommodation facility in George Town if required; and
- a water supply pipeline from Lake Trevallyn, near Launceston, to the local water storage reservoir.

The capital cost of the project is approximately \$1.5bn. The mill will incorporate best available technology and set new world standards for pulp mill design.

Maps detailing the location of the Pulp Mill and Ancillary infrastructure are included as Attachments 1 and 2.

Pulp is a processed fibre produced from wood that can be used for making paper and other products. The primary wood source for this project will be plantation-grown eucalypts, native forest eucalypts, and a small proportion of plantation pine. No old growth logs will be used by the pulp mill.

## 1.2 Purpose of the Document

This document provides information in relation to the following controlling provisions under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).;

- Sections 18 and 18A - Listed Threatened Species and Communities
- Sections 20 and 20A - Listed Migratory Species
- Sections 23 and 24A - Commonwealth Marine Environment

This document has been prepared to describe the values of, and assess the potential impacts of the proposal on the matters of national environmental significance protected by these controlling provisions (which are referred to throughout this document as 'matters of national environmental significance'). It is based upon extensive environmental investigations and analysis which have been undertaken by Gunns' expert advisers.

In addition to the specific investigations and reports which have formed the basis of this assessment document, Gunns has also engaged experts to investigate and report on a wide range of other environmental, economic and social aspects of the project for the primary purpose of seeking relevant approvals under Tasmanian law. All of the investigations and assessments of the project, including those which have formed the basis for this assessment document, are described at section 3.2 and listed at section 10. Sections 5 and 6 also contain a descriptions of the investigations and assessments which are relevant to the assessment of the impacts of the Project on the matters of national environment significance in those sections.

The document also provides a range of other background information, including a general overview of the proposal and the environmental history of the proponent.

The document includes only general information on wood supply for the mill, as the impact of forestry operations in Tasmania has not been included in the referral of this action.

The exhibition of this document will provide an opportunity for public comment.

There is no relationship between the assessment of the Project under the EPBC Act (the purpose of this document) and the Tasmanian assessment process.

### 1.3 The Public Consultation Process

The action has been determined to be a controlled action under the EPBC Act, and requires assessment by Preliminary Documentation (EPBC. ref: EPBC2007/3385). Under Section 95(2) of the EPBC Act, public comment is invited on the proposed action.

Comments in respect of the Preliminary Documentation on the proposed action must be received by 5.00pm Tuesday 5<sup>th</sup> June 2007. Comments are to be directed to:

Gunns Limited Pulp Mill Project,  
PO Box 572,  
Launceston TAS 7250.

Or electronically emailed to [pulpmill@gunns.com.au](mailto:pulpmill@gunns.com.au)

All written comments received will be treated as public documents unless confidentiality is requested. All written comments received will be taken into account in assessing the proposal.

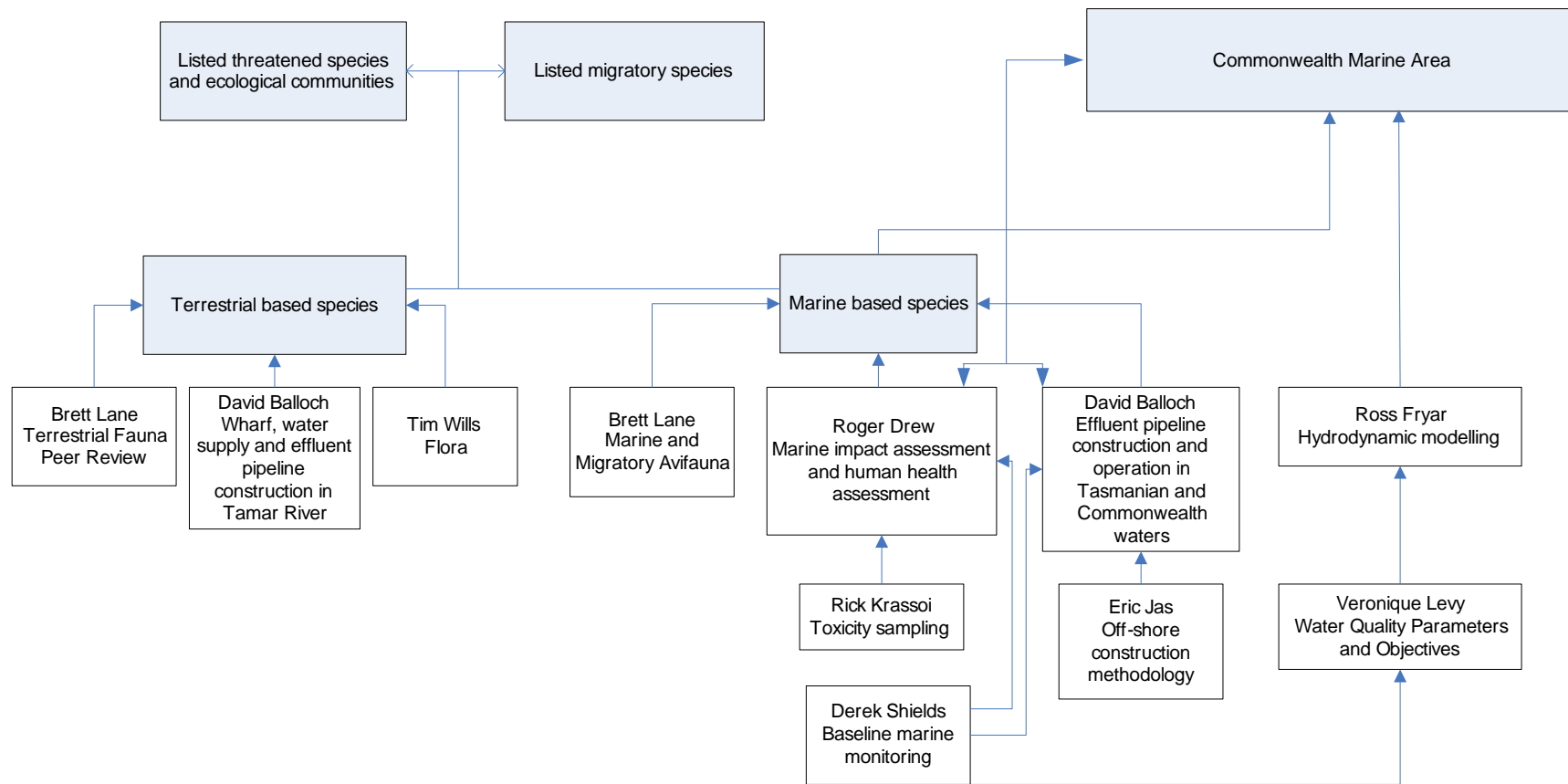
### 1.4 The Format of this Document

This document has been prepared for the sole purpose of describing the values of, and assessing the potential impacts of the Project on the relevant matters of national environmental significance.

Background information on the Project, including the assessment process and analysis conducted by Gunns, is contained in sections 2, 3 and 4.

The impact of the Project on matters of national environmental significance are described in section 5 (Listed Threatened Species and Communities / Listed Migratory Species) and section 6 (Commonwealth Marine Area). Where appropriate, the relevant assessment contained in section 5 and section 6 are cross referenced to supporting studies listed in section 10. An outline of the supporting studies, and how they relate to these controlling provisions, is detailed in Figure 1-1.

Cumulative impact assessment and overall conclusions are provided in sections 8 and 9.



**Figure 1-1: Controlling provisions and their supporting studies.**

## 1.5 Company Profile

### 1.5.1 Background

Gunns is an integrated forest products company operating predominantly in Tasmania, Australia. Gunns owns over 204,000 hectares of freehold land (Permanent Estate) in Tasmania and manages in excess of another 69,000 hectares of land (Semi-Permanent Estate), resulting in over 273,000 hectares of total land estate under Company management.



CAPTION: Gunns Limited was founded in 1875 by brothers John and Thomas Gunn and is one of Australia's oldest companies

Gunns:

- operates six hardwood sawmills and three major timber processing centres in Tasmania producing sawn timber as well as a range of "value added" products such as parquetry, mouldings and furniture components;
- owns and operates three jarrah sawmills, one processing and one distribution centre in Western Australia;
- operates Tasmania's two veneer factories and a panel veneer plant;
- operates a veneer mill in New Zealand; and
- supplies domestic markets throughout Australia and exports a wide range of manufactured timber products overseas.

Gunns also operates four woodchip processing and export facilities in Tasmania, exporting hardwood and softwood woodchips produced from sawmill off cuts and pulpwood from plantation and native forest harvesting operations.

Gunns Plantations Limited is a wholly owned subsidiary of Gunns and offers investment in agribusiness schemes (timber, wine and walnuts) to the public via the release of annual product disclosure statements for its Managed Investment Schemes (MIS). In addition to establishing plantations using MIS funds, Gunns establishes plantations in its own right (100% funded) and also in joint ventures with several of its Japanese customers. Seedlings for plantation development are grown at the Company's nursery at Somerset near Burnie in North-West Tasmania.

In 2003 Gunns purchased Tamar Ridge Wineries in North East Tasmania which has enabled further expansion of the group's managed investment program.

As well as its forestry operations the company operates seven hardware and building supply stores in Tasmania and two specialist timber stores, with wholesale timber outlets in most Australian capital cities. Through the group's Tasmanian based construction company, Hinman, Wright and Manser, Gunns is involved in the construction industry.

### 1.5.2 Overview of Gunns Environmental Management and Record of Performance

Gunns has a significant focus on responsible environmental management. Gunns recognises its obligations to protect significant environmental values and to be cognisant of community requirements.

Proper environmental management is seen as vital to the maintenance of Gunns' forestry business. Gunns' objectives are to:

1. Fully utilise the Forest Management Area's potential to grow and supply forest products;
2. Maintain the area's significant environmental values; and
3. Foster broad-based government and community support.

Gunns' forest management systems are conducted in accordance with the Tasmanian Forest Practices Code and accredited to the International Environmental Standard ISO 14001 and the Australian Forestry Standard (AFS). In November 2003, following an 18 month process to ensure sustainability of its forest management practices, Gunns obtained AFS certification (AS4708 – Formal Australian Standard). Gunns undergoes independent AFS and ISO 14001 surveillance audits twice a year to monitor compliance with the standards. Continual compliance with the AFS and continuous improvements in forest operations, processes and practices were observed at all surveillance audits throughout the Gunns regions.

As a major exporter of forest products, it is critical to Gunns for the AFS to be recognised in the international marketplace. A significant international endorsement of the AFS was achieved in October 2004 when mutual recognition was granted under the Programme for Endorsement of Forest Certification (PEFC). PEFC is the world's largest forest certification framework with over 191 million hectares of forest certified globally. As a consequence, Gunns can demonstrate that our forest management activities meet the highest international environment, economic and social standards.

In order to demonstrate to customers the direct linkage of processed products originating from AFS/PEFC certified forests, in November 2004 the Company achieved accreditation to AS4707 Chain of Custody Standard. AS4707 is the national benchmark for independent verification to guarantee a traceback system from the finished product to the forest. Gunns is the first Company to supply forest products under the AFS and PEFC label.

Gunns Sustainable Forest Management Systems (SFMS) aim to ensure that Gunns approach to forest management is ecologically, socially and economically sustainable and promotes continuous improvement in these areas. AFS certification is an integral component of the SFMS.



AFS certification is assessed through compliance with the following overarching criteria:



The AFS encompasses both a performance and systems based approach to sustainable forest management, and as such it involves a requirement to quantify progress against goals and targets. In line with this, a range of performance indicators were developed to measure performance against all criteria of the AFS.

The role of indicators is to:

- Highlight key forest management issues;
- Show the status of performance at a single point in time;
- Measure and monitor changes over time;
- Provide a mechanism for reporting to stakeholders.

Performance based indicators provide a mechanism by which Gunns can monitor the outcomes of our forest management decisions, encourage public participation in forest planning and thereby enable continuous learning and improvement. Gunns reports annually on our forest management performance within the Sustainable Forest Management Report, available on the Gunns web site, [www.gunns.com.au/index/downloads/2005-2006\\_sfm\\_report.pdf](http://www.gunns.com.au/index/downloads/2005-2006_sfm_report.pdf)

### 1.6 Overview of the Proposed Pulp Mill

In the production of pulp, woodchips (mechanically chipped from the wood source) undergo a series of processes including screening and cooking to separate the cellulose fibre from the water and natural glues (lignin). Pulp is then bleached, dried and bailed ready for sale.

The project includes ancillary infrastructure for:

- the supply of water and energy;
- the storage and transport of primary materials required for the mill's operation, and of the pulp and other materials produced; and
- the treatment and disposal of waste materials.

The project consists of eight major infrastructure components:

- A pulp mill at Bell Bay;
- A wharf facility at Bell Bay;
- A landfill adjacent to the pulp mill;
- A quarry adjacent to the pulp mill;
- A water reservoir adjacent to the pulp mill;
- A water supply pipeline from Trevallyn Dam, near Launceston, to the pulp mill;
- An effluent pipeline from the pulp mill to Five Mile Bluff, including an ocean outfall to Bass Strait; and
- A possible workers' accommodation facility at George Town.

The proposed mill will, in the initial stages, produce approximately 820,000 air-dried tonnes (ADt) of pulp per year, and will have the capacity to produce up to 1.1m ADt of pulp for domestic and international markets.

The mill will contribute to the sustainability of Tasmania's forestry industry and the economy of Tasmania (and therefore Australia) by introducing a value adding process that would otherwise be undertaken overseas.

## 2. Project Objectives and Justification

### 2.1 Project Objectives

Gunns believes that the development of a pulp mill is needed to provide a commercially sustainable forest industry in Tasmania. The project will provide downstream, value-adding processing of forestry product in Tasmania resulting in further employment opportunities. The project addresses the Tasmanian and Australian Government's strategy of increased value adding to Australia's forest products.

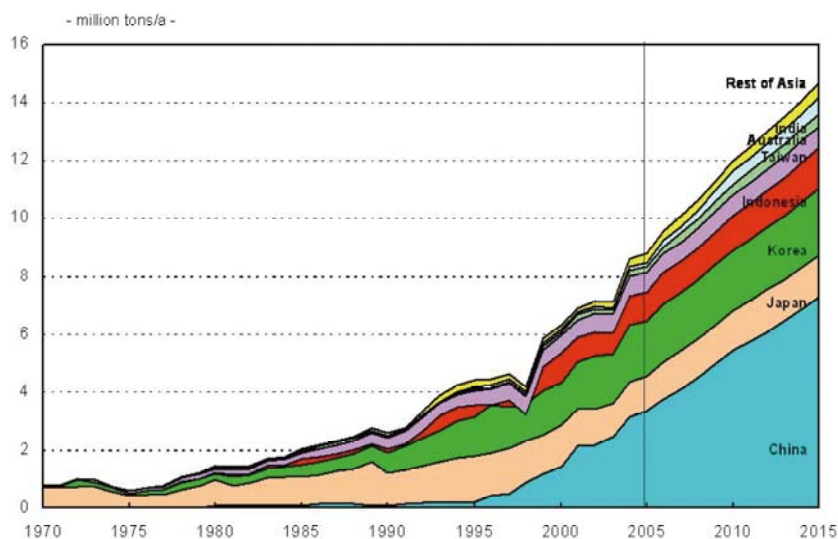
### 2.2 Project Timeframe

Gunns will be responsible for the construction, commissioning and operation of the project. If approved expeditiously, construction could start in the second half of 2007. The duration of construction works is estimated to be 26 months, with commissioning of the mill occurring in early 2010.

The project will have a notional life of at least 30 years.

### 2.3 Project Justification – Market Demand and Supply

There is a significant market opportunity for pulp sales in the Asia Pacific region as well as in the traditional markets of Europe and North America. Production of paper and paperboard in Europe reached a record level of 103.1 million tonnes in 2004, an increase of 4.1% over 2003. Over the next five years, global demand for paper will grow strongly, with the Asia Pacific region expected to be a major contributor to this growth. For example, China currently consumes over 55 million tonnes of paper each year, with consumption growing at over 8% per annum.



**Figure 2-1: Demand for Hardwood Pulp in Asia Pacific 1970-2015**

As demand for paper rises, and as more production capacity comes on line, world demand for market traded pulp (the raw material for paper manufacture) will increase to over 48 million tonnes per annum (of which around half will be hardwood pulp). The growth in demand will occur particularly in the Asia Pacific region.

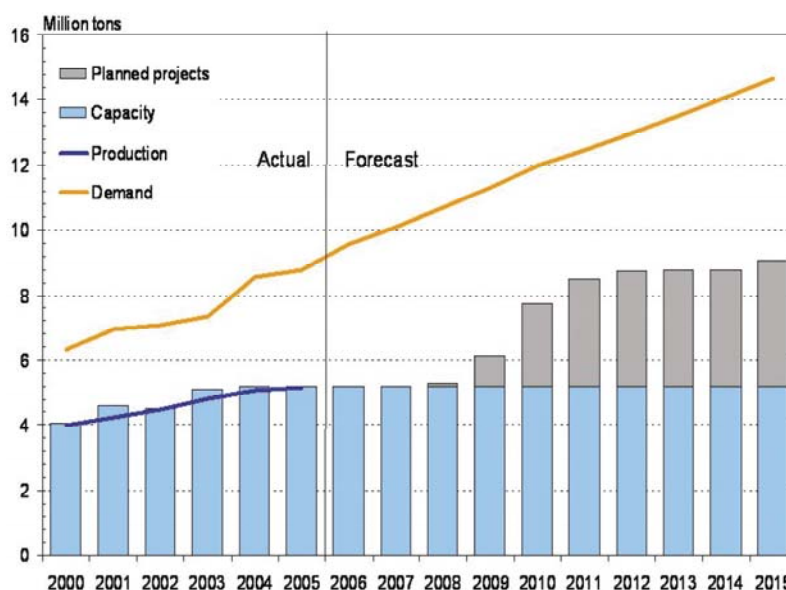
In 2003, Asia represented approximately 37% of total world demand for bleached hardwood Kraft pulp (BHKP). China, Korea and Japan were the major consumers in this region, accounting for three-quarters of total demand. International analysts, Jaakko Pöyry, have forecast that the demand for market BHKP in China will grow at a rate of 8.5% per annum to 2015. The rest of the Asia Pacific region, excluding Japan, is expected to grow at 4.5% per annum (see Figure 2-1).

In terms of supply, Tasmania is well placed to meet some of the anticipated demand for pulp. Tasmania's forest resources make it a competitive supplier due to its location and quality of raw materials. Pulpwood available from Tasmania's maturing hardwood plantations will increase four-fold over the next 12 years. The plantation estate is expanding in Tasmania and throughout Australia, consistent with the National Forest Policy Statement, Regional Forests Agreements (RFA) and the Plantations 2020 vision.

The Bell Bay pulp mill will help commercially sustain the forest industry in Tasmania by providing greater financial returns to the industry than would otherwise be achieved by exporting increased woodchip tonnages.

On the international market, plantation woodchips fetch around \$90 per green tonne (\$360 per tonne fibre) compared to around \$800 ADt for pulp. Up to four green tonnes of woodchips are required to make one ADt of pulp, so the value add is more than two fold.

Overall demand in the Asia Pacific region alone for bleached hardwood Kraft pulp is projected to grow to 11 million tonnes by 2010. This growth will exceed projected supply capacity within the region (see Figure 2-2).



**Figure 2-2: Hardwood Pulp Supply/Demand Balance in Asia Pacific**

Strong demand for pulp is expected from paper manufacturers, within the Asian region and to a lesser extent outside it. To take full advantage of this opportunity, Australian manufacturers will need to compete on a global scale, with all components of the value chain being optimised to capture the growing international market. Mill capacities need to be large to exploit the economies of scale necessary for success in the global market.

Competitors to Australia in world markets include suppliers from Indonesia, and North and South America. Large capacity expansions proposed in Brazil, Uruguay and Chile are also expected to influence global supply but still fall far short of expected growth in demand.

#### 2.4 Project Justification – Economic Factors

A major new investment project will be particularly beneficial to Tasmania because it can build on the State's competitive advantages in terms of resource endowments and proximity to markets, and can provide the opportunity for further development. An examination of Tasmania's pattern of exports shows it is relatively more reliant on exports than Australia as a whole, and the composition is skewed towards lower value end commodities.

Value adding and the production of more complex differentiated products will be important for Tasmania's future economic growth in a number of ways, including that they:

- increase prices secured by Tasmanian producers for goods sold, which directly increases the State's economic activity (GSP);
- result in less sensitivity to exchange rate fluctuations and price competition than the simpler commodity product (woodchips);
- involve employment of more highly skilled personnel in both product development and manufacturing;
- generate economy-wide spill overs through more extensive linkages between firms (suppliers, competitors), leading edge customers, and research institutions; and
- open the State to a wider range of international customers allowing producers to market further down stream.

After many years of low growth relative to the mainland States, partly due to a lower level of investment, the Tasmanian community on average has lower incomes than those enjoyed in the rest of Australia. While Tasmania's economic performance has improved in recent years, this will need to be further grown if the relative living standards of the State are to be enhanced and match those in mainland States.

The Bell Bay bleached Kraft pulp mill will constitute the largest-ever investment by the private sector in Tasmania, and the largest-ever investment within the forestry sector in Australia. The project has been granted Major Project Facilitation status by the Commonwealth Government.

At around \$1.5 billion in capital expenditure, the proposed pulp mill will represent a significant opportunity for the State's economy to grow through value-adding, in a sustainable way, to one of its most valuable and renewable natural resources. By

converting exports of woodchips into exports of pulp, the project offers the prospect of playing a catalytic role in moving the Tasmanian economy up the value chain. Significant economic benefits will accrue to the State's community.

As the mill will have a pervasive economic impact on many businesses throughout Tasmania, its aggregate effects can be estimated only using complex computer equilibrium modelling. The Centre for Policy Studies at Monash University operates the most comprehensive economic model in Australia, Monash Multi-Regional Forecasting (MMRF-Green). The model is highly regarded by economists as robust, and provides credible results. Gunns engaged the Centre for Policy Studies to model the impacts of the Bell Bay mill on the Tasmanian economy and the national economy.

The key economic impacts of the pulp mill at Bell Bay, as modeled by MMRF-Green, are summarised below.

Table 2-1: Key economic impacts.

Measure	Impact of Bell Bay mill (2007-2030) <sup>a</sup>	Percentage growth above base case projections in 2030
NPV <sup>b</sup> of Gross Domestic (State) Product impacts (\$billion) <sup>c</sup>		
Australia	\$3.8 billion	+0.03%
Tasmania	\$6.7 billion	+2.5%
NPV of investment impacts (\$billion)		
Australia	\$2.3 billion	+0.02%
Tasmania	\$3.1 billion	+2.2%
NPV of consumption impacts (\$billion)		
Australia	\$2.7 billion	+0.04%
Tasmania	\$3.3 billion	+2.6%

Overall, the modelling shows that the pulp mill will yield substantial positive benefits to Tasmania and to Australia in the form of greater economic activity and employment.

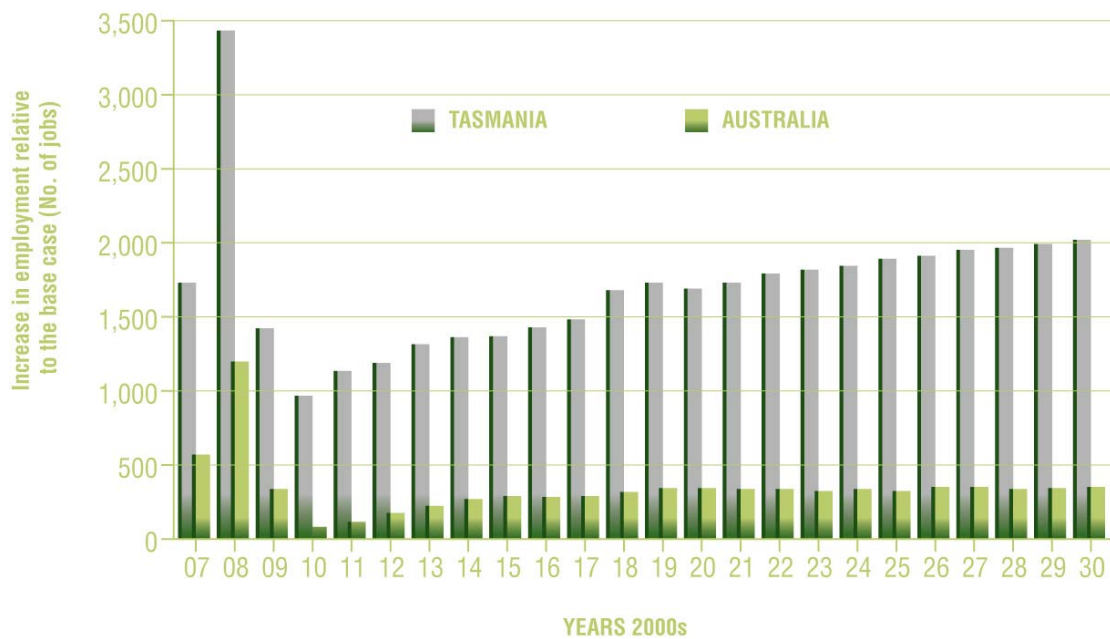
During the operating phase, there are substantial investment, production and employment impacts. The major factors driving these economic impacts are:

- the net increase in exports generated by the mill — that is, the increase in then value of exported pulp relative to the value of the woodchip exports that the pulp exports have replaced;
- the flow-on industry growth generated by the sustained increase in demand for Tasmanian goods and services;
- the replacement of pulp imports with pulp produced domestically at the mill; and
- the sale of surplus power and renewable energy certificates (RECs) provided by biomass electricity generation at the mill.

During the construction phase there will be further stimuli provided to the economy through higher investment and employment activity, both directly in the George Town area and more broadly because of the range of suppliers Gunns will use.

As would be expected, particularly for a relatively small State such as Tasmania, the economic impacts of the mill are far more pronounced at the State level than at the national level. The pulp mill essentially draws resources — capital and labour — away from the mainland Australian economy and towards Tasmania.

**Figure 2-3 Impact of Bell Bay Pulp Mill — Employment**



In Tasmania, under MMRF-Green modelling, employment sees its greatest increase over the base case in 2008. Approximately 3,400 more jobs would be expected in Tasmania in 2008 than would otherwise have been the case if the mill were not constructed. On average during the operational phase of the mill, employment in Tasmania would be expected to increase by 1,617 more jobs than would otherwise have been the case. Employment in Tasmania is expected to grow throughout the operating phase of the mill up to around 2,000 additional jobs in Tasmania because of the pulp mill.

In short, the construction and operation of the pulp mill will bring significant positive economic benefits to the local, regional, State and national economies. Economic modelling shows that the proposed pulp mill will have a very substantial positive impact on Tasmania and Australia in the form of greater economic activity and employment. It will raise the level of investment in Tasmania, which is essential if economic growth is to be lifted and living standards are to be improved. It will move the State's production and export profiles away from raw commodity exports and simple manufacturing and towards more sophisticated value added products.

## 2.5 Project Justification – Environmental Factors

### **Sustainable Forest Management**

Gunns Limited is committed to Sustainable Forest Management that is environmentally sound, economically viable and socially desirable through the application of the following principles;

- Forest Management shall be conducted in a systematic manner and based on recognised environmental standards.
- Maximising economic value of all forest products in order to enhance long term social and economic benefits.
- Forest Management shall recognise community and cultural values and strive to foster good relations.

Gunns performance in relation to Sustainable Forest Management is independently verified and reported in order to ensure continuous improvement.

### **Greenhouse Gas Reduction**

As the pulp mill will generate its own electricity and be capable of exporting surplus electricity onto the electrical grid, the operation of the pulp mill will result in a very significant reduction of greenhouse gas emissions. This has been confirmed by Pacific Air & Environment, one of Australia's leading meteorological and climate consultancies, who were requested by Gunns to undertake an independent assessment of greenhouse gas emissions from the pulp mill.

The assessment undertaken by Pacific Air & Environment was based on methodologies outlined in:

- the World Resources Institute/World Business Council for Sustainable Development (WRI/WBCSD) *Greenhouse Gas Protocol*;
- the Australian Greenhouse Office *Factors and Methods Workbook*; and
- the International Council of Forest and Paper Association's *Calculation Tools for Estimating Greenhouse Gas Emissions from Pulp and Paper Mills*.

Importantly, the greenhouse gas assessment considered:

- direct emissions associated with the pulp mill itself. These included emissions associated with the generation of electricity, heat and steam, physical or chemical processing, transportation of materials, products, wastes and employees, and fugitive emissions;
- indirect emissions that account for greenhouse gas emissions from the generation of purchased electricity; and
- other indirect emissions which are a consequence of the pulp mill but arise from sources that are not owned or controlled by Gunns. These included various transport scenarios, and natural gas extraction used in the lime kiln, recovery boiler and NCG incinerator.

The greenhouse gas assessment concluded that the operations of the pulp mill will reduce Gunns' net greenhouse gas emissions by approximately 1.3 million tonnes CO<sub>2-e</sub> per annum (assuming the pulp mill is producing pulp to its full capacity of 1.1 million ADt of pulp per annum).

Significant factors contributing to this large reduction are:

- The proposed pulp mill will reduce the amount of shipping traffic required for Gunns' products, as the woodchip volumes that are presently being exported overseas by Gunns will now be processed into pulp at the Bell Bay pulp mill; and
- The pulp mill will produce surplus electricity from combined heat and power systems that are fuelled by biomass. Biomass combustion is carbon neutral as the biomass sequesters atmospheric carbon, which is released when these biomass fuels are burned. The bulk of electricity displaced by the proposed pulp mill will be fossil-fuel based.

### **Liquid Natural Gas (LNG) as a Log Truck Fuel**

Gunns has been investigating the option of producing LNG and using it to fuel the log transport vehicles that supply its processing plants. The establishment of the pulp mill will provide Gunns with an ideal opportunity to progress this and produce LNG in Tasmania as:

- The log transport operations that will supply the mill with 3.2 to 4.0 million tonnes of pulpwood are very heavy consumers of diesel fuel and could be converted to utilise LNG;
- These trucks will return to the same delivery point several times per day which makes refueling from a single dispensing facility practicable;
- Natural gas (the source of LNG) will be available on site;
- The major direct cost of converting natural gas to LNG is power and this will be available in excess on site at a very economic rate from the very substantial power generation plant; and
- With the pulp mill providing the base off-take volumes additional LNG can be produced and transported to Gunns two other woodchip export facilities in the state.

Gunns estimates that within 5 years of the pulp mill commencing operation all trucks servicing its sites will be converted to LNG. This will represent a reduction in the usage of 27 million litres diesel fuel per year from Gunns' operations alone. The environmental benefits to the community from a reduction of this magnitude are very significant. Such a change would also make a further significant reduction in greenhouse gas emissions within the state.

LNG sourced from the production facility at the pulp mill could be supplied to a host of other transport operators within the state and some could be converted to Compressed Natural Gas (CNG) for use in the major bus fleets operating within the state and other applications.

In summary the pulp mill will provide a unique opportunity to introduce the benefits of LNG and CNG to transport operations within Tasmania and thereby providing very worthwhile environmental and economic benefits.

### **Energy Production**

The pulp mill will utilise water currently allocated to Hydro Tasmania for power generation. Hydro Tasmania would generate 0.9 megawatts of electrical power with this water flow. Utilising the same volume of water the pulp mill will generate a total of 180 megawatts. Of this, the mill will use 90 megawatts, and supply 90 megawatts into the national electricity grid. The surplus of electricity supplied into the grid is more than

enough for both industry and domestic use for the greater Launceston area (as defined by post codes 7248, 7249, and 7250). The mill will be eligible for Renewable Energy Certificates (RECs) because it will be using biomass, including waste wood, for steam generation, and will therefore conform to the *Commonwealth's Renewable Energy Act 2000*.

## 2.6 Project Justification – Social and Cultural Factors

In addition to the key measures of economic benefits, more tangible benefits to the local communities and to Tasmania generally include:

- An additional 2,187 direct and indirect jobs in Tasmania averaged during the construction phase and peaking at 3,400 in 2008;
- On average, an additional 1,617 direct and indirect jobs during operation to a peak of about 2,000 jobs;
- Development of training courses with TAFE and other institutes for accelerated training programs to address skills shortages. Of the 292 operational jobs, 60% will require additional training;

If the pulp mill goes ahead, consumption is expected to increase at both a national and State level. This occurs as increases in production in the pulp industry lead to higher investment and employment levels in this sector. In subsequent rounds of economic impacts, production also increases in other industries. This in turn generates further increases in total investment and employment and therefore increased household disposable income, which is the sum of wages, dividends (including from Gunns), and government transfer payments, less direct income tax.

Gunns will implement a number of management strategies including:

- Workforce training initiatives; and
- Preferentially sourcing employment and services in Tasmania.

## 2.7 Consequences of not Proceeding

The alternative to establishing a pulp mill is a 'do nothing' option, that is, continue to export woodchips to international pulp mills for processing, and forego the social, community, environmental and economic costs and benefits associated with the pulp mill and associated infrastructure.

If the project does not proceed, a number of consequences flow:

- Gunns will continue to export woodchips to international clients. Up to 5 million tonnes of woodchips are exported by Gunns each year for pulp processing overseas, from where the pulp is sold to paper mills.
- There would be no change in the volume of forest harvested. Gunns' harvesting strategy is independent of the decision to process the wood downstream.

- None of the above-mentioned economic benefits would be realised. Tasmania's employment profile would remain unchanged, as Gunns would continue to export woodchips.
- The expected stimulus would not be provided to Tasmanian industry and economic growth because there would not be additional activity or a change from the status quo.
- After a negative experience with this project and the previous decision on the proposed Wesley Vale pulp mill in the 80s, it would seem very unlikely that any other investor would develop a major investment proposal in this industry again. The prospects of adding value to Tasmania's greatest natural resource would therefore appear limited as Gunns would commit their resource to alternative projects offshore.
- The present gap between living standards in Tasmania and those on the mainland might again widen over time. Tasmania remains a small and open economy. Adding value to its principal natural resource, in a responsible and ecologically sustainable way, would offer a pathway to building continued economic growth. While other industries, such as tourism, will continue to develop, they do not offer such a potential for wealth creation and for increasing living standards in a sustainable way.
- While Tasmania may, due to the skills of its workforce, have some advantages in other high value activities, it will be difficult to attract investment in many of these areas in competition with States such as Victoria and New South Wales.

Clearly, the success of the pulp mill project represents a significant opportunity for value-adding activity that will provide long run growth for Tasmania.

## 3. Project Assessment Framework

### 3.1 Site Selection Framework

As part of pre feasibility investigations for the pulp mill, and for subsequent studies undertaken for the Draft IIS, a number of site and route selection decisions were made in relation to the project. These included the location of the pulp mill, transport routes, the water supply pipeline, the effluent pipeline (including ocean outfall), the port facility, and other related infrastructure.

Gunns considered economic, social, environmental and planning aspects of two sites then under consideration, at Bell Bay and at Hampshire. Both sites are located adjacent to existing woodchip mills operated by Gunns. For each category, a simple summation of preferred and least preferred indicators was made to determine the overall preference.

A comprehensive description of the site selection process, and a comparison of the environmental, social, economic and strategic planning considerations for each site is contained in section 10 of Volume 1 of the Draft IIS. The outcome of this comparison is summarised in Table 3-1.

**Table 3-1: Summary of Assessment Outcomes**

Option	Economic Considerations	Environmental Considerations	Social Considerations	Strategic Planning Considerations
Bell Bay	Preferred	Equally Preferred	Preferred	Preferred
Hampshire		Equally Preferred		

Based on the overall assessment, the Bell Bay site was considered the preferred location.

Transport played a major role in determining Bell Bay as the preferred site. One of the main issues identified for the Hampshire site was the considerable increase in the volume of logs that would be required to supply the pulp mill's operation.

The Hampshire chip mill currently processes up to 1.2 million tonnes per year of wood, consequently while log traffic in the area is already established, there would need to be a threefold increase in wood volume to meet the needs of a 1 million ADt per year pulp mill. A large proportion of the increase could be moved by rail but, nonetheless, there would be a significant increase in log truck traffic from areas where rail transport is uneconomical or where rail does not exist. A large number of additional log trucks would have to pass along the Bass Highway and through the towns of Burnie and Ridgley, with consequent environmental and social impacts on the surrounding area.

In addition, Hampshire is located approximately 35 kilometres inland from the nearest port at Burnie, making it impossible to develop an integrated port and pulp mill facility. All pulp produced at the site would need to be transported by road to Burnie, where an upgraded warehouse/wharf facility would have been needed. In addition to the increase

in log truck movements to service the pulp mill at this location, there would be no net decrease in truck movements from the site, as pulp trucks would replace the current chip truck movements to Burnie.

Site or option assessments were also undertaken for the water supply options; water supply pipeline; wharf facility; effluent pipeline; ocean outfall; possible workers' accommodation facility; location and construction technology for a water supply pipeline crossing of the Tamar River; and landfill.

### 3.2 The Impact Assessment Process

In June 2004, Gunns commissioned a feasibility study for a pulp mill in northern Tasmania. The study was undertaken by pulp mill consultancy Poyry (then known as Jaakko Poyry). Based on the initial feasibility study, a pre-engineering study was commissioned for the design of a cost-effective, state-of-the-art, single line pulp mill based on available wood resources.

In November 2004, the Tasmanian government declared the project to be a Project of State Significance, and appointed the Resource Planning and Development Commission (RPDC) to undertake an assessment of the Project. In December 2004, the Project was first referred to the Commonwealth Minister for Environment under the EPBC Act, listing two possible locations of the Project as either Bell Bay or Hampshire.

In late 2004 and early 2005, Gunns undertook the site selection process outlined in section 3.1 of this document. In February 2005, Gunns selected the Bell Bay site as the location for the Bell Bay Pulp Mill and commenced detailed environmental investigations of the potential impacts of the Project in the vicinity of the Bell Bay location.

In August 2005, the first referral under the EPBC Act was withdrawn, and a new referral of the Bell Bay location only was made to the Commonwealth Environment Minister.

The Draft IIS, prepared to meet the Final Scope Guidelines published by the RPDC, was placed on public exhibition in July 2006 for 10 weeks. Fifty supporting studies, written by consultants engaged by Gunns, were included in the Draft IIS. A list of the expert reports contained in the Draft IIS is provided at Section 10.

During the public exhibition period, over 700 public submissions were made to the Draft IIS, including a comprehensive submission from the Tasmanian Government. The RPDC commissioned independent reviews of the information in the Draft IIS, including reports by Beca AMEC, Uni Quest Pty Ltd, CSIRO Marine and Atmospheric Research, Farley Consulting Group and URS Forestry. In addition, the RPDC requested further information from Gunns in October 2006.

Gunns referred the request for further information from the RPDC, the key public submissions, the Tasmanian Government submission, and the RPDC's consultant reports to its independent experts for response. In most cases, the issues were referred to the author of the supporting study in the Draft IIS.

However, in order to respond appropriately to particular issues raised in the submissions, Gunns initiated a peer review of the some aspects of the impact

assessment prepared for the Draft IIS, and engaged new independent expert reports to address concerns raised in submissions.

The peer review and additional experts were:

<b>Name of expert</b>	<b>Area of expertise</b>
Mr Tim Offor	Social impact assessment
Mr Brett Lane	Terrestrial fauna and marine and migratory avifauna
Mr Rob de Fegely	Pulpwood supply
Mr David Balloch	Estuarine and marine construction and operational impact assessment
Dr Roger Drew	Marine toxicological risk assessment
Dr Veronique Levy	Water quality parameters and objectives for hydrodynamic modelling
Mr Edward Bechberger	Integrated chemical plant technology

The work undertaken for the social impact assessment and marine and migratory avifauna included fieldwork, and the work undertaken for the marine toxicological risk assessment included new laboratory investigations. The reports by the other peer review and additional experts were desk-top investigations.

The Supplementary Information is comprised of 21 reports (including those reports from the peer review and additional experts) responding to the issues raised by the public, the RPDC, the Tasmanian Government submission and in the RPDC's consultant reports on the Draft IIS.

The key issues raised in the public exhibition and RPDC consultant reports related to the air emissions from the Project, and the adequacy of the marine impact assessment.

In relation to the public submissions relating to air emissions, Pacific Air & Environment prepared an extensive response to submissions which is contained in Mr Robin Ormerod's report which is contained in the Supplementary Information.

In relation to the marine impact assessment, Gunns commissioned the following experts to prepare new material which forms part of the Supplementary Information:

<b>Name of expert</b>	<b>Additional work</b>
Dr Roger Drew	Marine toxicological risk assessment report
Mr David Balloch	Estuarine and marine construction and operational impact assessment report
Dr Veronique Levy	Water quality parameters and objectives for hydrodynamic modelling report
Mr Ross Fryar	Revised hydrodynamic modelling report
Dr Rick Krasso	Acute and sub-lethal toxicity testing
Mr Brett Lane	Marine and migratory avifauna report

Following Gunns' withdrawal from the RPDC assessment process, on 14 March 2007 Gunns published the Supplementary Information on its website ([www.gunnspulpmill.com.au](http://www.gunnspulpmill.com.au)). As outlined in Gunns' referral dated March 2007, the Tasmanian assessment of the Project will be under the *Pulp Mill Assessment Act 2007*.

The relationship between the material published as part of the Draft IIS and the material in the Supplementary Information is described in the Summary of Supplementary Information:

[http://www.gunnspulpmill.com.au/iis/supp/summary\\_of\\_supplementary\\_information.pdf](http://www.gunnspulpmill.com.au/iis/supp/summary_of_supplementary_information.pdf)

A diagram of the independent experts whose reports for the Draft IIS and the Supplementary Information address the relevant controlling provisions is contained at Figure 1-1. Section 5 and section 6 each contain:

- a description of the reports which assess the impacts of the Project on the controlling provisions, and provides links to those reports,
- a summary of the findings of the relevant expert reports, and
- a description of the mitigation measures to ensure that the Projects avoids or minimises impacts on the controlling provisions.

In preparing the Draft IIS and the Supplementary Information, Gunns has undertaken a thorough and comprehensive assessment of the impacts of the Project, and an extensive public exhibition, consultation and submission process.

### 3.3 The Risk Assessment Process of the Pulp mill

#### 3.3.1 Methodology

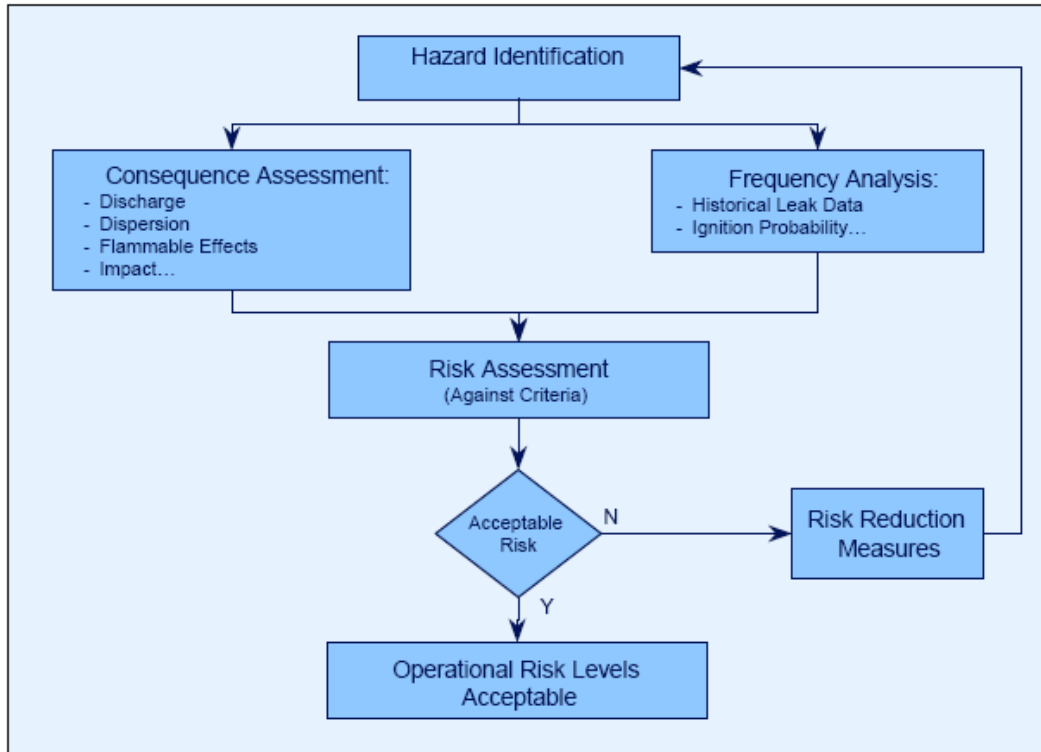
This section summarises the preliminary hazard analysis undertaken of the project. A full description of the hazard analysis is contained in section 5, Volume 2, of the Draft IIS.

The hazard analysis of the project was based on a HAZID workshop undertaken by representatives of Gunns, GHD-Qest and Jaakko Poyry on 29 August 2005, and is consistent with:

- Australian Risk Management Standard AS 4360:2004;
- Control of Major Hazard Facilities National Standard [NOHSC 1014:2002] and National Code of Practice [NOHSC 2016:1996]; and
- *Dangerous Substances (Safe Handling) Act 2005* (Tas).

A separate hazard analysis was also undertaken of the effluent disposal pipeline, which also accords with the Australian Standards referred to above.

**Figure 3-1 Hazard analysis**



The hazard analysis consisted of the following key steps:

(i) Hazard identification, primarily associated with the storage and use of chemicals and dangerous goods associated with the project.

(ii) Consequence analysis for hazards which have potential environmental, property or human health impacts. The objectives of this analysis were to determine relevant toxic and flammable inventories, analyse a representative set of release scenarios, and determine the potential consequence of each release scenario (focussing on off-site fatalities).

The consequences of interest were:

- for explosions, overpressure of over 7 kPa outside the boundary of the pulp mill site;
- for fire, a radiant heat level of 4.7 kW/m<sup>2</sup> outside the boundary of the pulp mill site; and
- for toxic releases, a concentration in the atmosphere which exceeds ERPG 3.

(iii) Frequency analysis to determine the magnitude of risk associated with an off-site hazard.

(iv) Assessment of consequences against risk criteria to determine if there is a meaningful off-site consequence or not.

### 3.3.2 Agreed outcomes

The outcomes of the workshop are summarised in Table 3-2 below:

**Table 3-2: Actions Identified and agreed in the HAZID Workshop**

Action No	Area	Description	Responsible
1	Chemical Plant	Model a chlorine release from the chemical plant to determine the maximum distance for the worst-case chlorine release. Inventory is 60 kg, at just above atmospheric pressure.	Covered in this report
2	Chemical Plant	Ensure spills from pipe bridges are contained and drained to effluent.	Gunns
3	Chemical Plant	Model dispersion of worst case ClO <sub>2</sub> release. The worst case is vaporising from a pool after tank rupture (600m <sup>3</sup> volume at 10 g/l). Also model release of 0.4kg of ClO <sub>2</sub> vapour.	Covered in this report
4	Fibre Line, including chip storage and screening	Ensure design of screening plant avoids areas in which dust can build up, as dust presents a fire and explosion risk.	Gunns
5	Electrical substation / HV Connections	Ensure there is protection on site access road to protect power lines from damage from run away trucks/vehicles.	Gunns
6	Wharf	Provide adequate pumping capacity at the wharf to ensure that all products can be pumped to the chemical plant. The ship's pumps may not be sufficient.	Gunns

Consequence modelling for the release of chlorine and chlorine dioxide under scenarios 1 and 3 was undertaken for worst-case scenarios to establish the distance from the chemical plant where ERPG 3 values for these chemicals would be achieved. The outcomes of this consequence modelling are summarised in Table 3-3 below:

**Table 3-3: Consequence Distance for Hazards Short Listed in the HAZID Workshop as Potentially Having Offsite Impact**

Scenario	Distance to ERPG 3 (m)
Release of 60 kg of chlorine. (See action 1 in Table 3-2)	490
ClO <sub>2</sub> vaporising from pool after tank rupture. (See action 3 in Table 3-2)	200
Release of 0.4 kg of ClO <sub>2</sub> . (See action 3 in Table 3-2)	350

Because these distances are within the boundary of the pulp mill site, ERPG 3 values will be achieved off-site under each of the three scenarios.

The potential for damage to the electricity transmission lines which traverse the site were considered to be negligible.

### 3.3.3 Control measures and conclusions

Based on the outcomes of the hazard analysis, a series of control measures were identified for the chemical plant, pulp mill process areas, effluent treatment plant, contaminated storm water storage pond, waste disposal facility, and gas, water supply and effluent outfall pipelines. These are described at <http://www.gunnspulpmill.com.au/iis/V2/V2b.pdf>.

A number of specific outcomes of the HAZID were identified which need to be addressed as part of the detailed design of the project:

- ensure spills from pipe bridges are contained and drained to the effluent treatment plant in high risk areas;
- ensure the chip screening plant is designed to minimise dust build-up, as the dust was identified as being a high fire and explosion risk; and
- ensure power lines on the site access road are protected from damage in the event of motor vehicle accidents.

It was also decided that adequate pumping capacity should be installed at the wharf to ensure that all chemical deliveries could be delivered to the chemical plant.

It was acknowledged that a formal HAZOP would be required for the Alinta Bell Bay metering station and Gunns' meter and pressure reduction station. This would be undertaken as part of the detailed design of the project.

### 3.3.4 Transport assessment

The preliminary hazard analysis also considered risks associated with the transportation of dangerous substances and wastes by vehicle, and the transportation of pulp by sea vessel.

While there were no significant risks associated with either transport scenario, recommendations were made regarding the design of the road access to the pulp mill site, the use of tarpaulins on waste transportation vehicles and wharf design.

Further information is available at <http://www.gunnspulpmill.com.au/iis/V2/V2b.pdf>.

### 3.3.5 Effluent disposal pipeline

A separate preliminary hazard analysis was also undertaken of the effluent disposal pipeline. This assessment considered threats to the pipeline from existing infrastructure, construction activities, actions of third parties, and potential risks to the residents of George Town. This assessment is included in [http://www.gunnspulpmill.com.au/iis/V15/V15\\_A45.pdf](http://www.gunnspulpmill.com.au/iis/V15/V15_A45.pdf).

The analysis identified a number of credible threats to the surrounding environment and third party services between the pulp mill site and the proposed ocean outfall at Five Mile Bluff. These are summarised in Table 3-4 below:

**Table 3-4: Risk Assessment in accordance with AS 2885 and HB 105**

<b>Risk Assessment in accordance with AS 2885 and HB 105</b>			
<b>Pipeline Sections</b>	<b>T1 – Industrial / suburban</b>	<b>R2 – semi Rural</b>	<b>S - submarine</b>
Kilometre point (kp)	0 – 12	12 – 18.6	18.6 – 22
Identified Threats (Pre-Defined)	24	13	1
External Interference Protection	12	2	0
Protection by design	1	0	0
Failure Analysis	1	0	0
Risk Evaluation and Rank	1	0	0
Risk Management	1	0	0

The toxic effects of the effluent in the event of a rupture of the pipeline were also considered. It was concluded that there would be no significant environmental effects in such an event because:

- sanitary sewage will be disinfected before being mixed with the process effluent at the effluent treatment plant. Consequently, the hygienic quality of this waste was considered acceptable; and
- the effluent will not be toxic to aquatic flora and fauna, nor to humans.

Nevertheless a number of risk mitigation measures are proposed:

- pressure gauges and valves will be installed along the pipeline to enable continuous monitoring of pipeline pressure, and enable a prompt response to pipeline rupture;
- the pipeline will be constructed of corrosion-resistant materials, such as HDPE or glass fibre reinforced plastic;
- the proposed alignment avoids hills and significant rises. This will reduce pressure and volume outflows in the unlikely event of a rupture of the pipeline;
- the detailed design of the pipeline will be based on a hydraulic pressure line analysis in all possible steady and non-steady state hydro-mechanical conditions associated with the pipeline operations. Based on this analysis, systems to mitigate or eliminate excessive pressure surges, hammering, formation of vacuum, and gas accumulations will be designed and installed; and
- an Operational and Maintenance Management Plan will be prepared and implemented. This will include routine patrols, a 'Dial Before You Dig' service, annual consultations with landowners, utilities and George Town Council, and emergency response training and readiness.

## 4. Description of the Proposal

### 4.1 Overview

#### 4.1.1 Site Location

The pulp mill site is adjacent to the eastern bank of the Tamar River, and south-east of Bell Bay. It is proposed to develop the pulp mill (including chemical plant) and wharf on a site approximately 750 metres north-west of Gunns' existing Tamar woodchip mills and west of the existing railway line, which runs south of the East Tamar Highway.

The pulp mill site is located within the Bell Bay major industrial zone, which stretches along the eastern shore of the Tamar River from Long Reach in the south to the outskirts of George Town to the north.

Industries currently operating in the vicinity of the Pulp Mill Site include:

- The aluminium smelter operated by Rio Tinto;
- The TEMCO metallurgical plant;
- The Bell Bay gas fired power station;
- The EKA Granules aluminium powder plant;
- The FEA sawmilling facility, woodchip mill and export facility;
- The Artec woodchip mill and export facility;
- The SVP vinyl products plant; and
- The Gunns woodchip export facilities.

The pulp mill site is predominantly freehold land owned by Comalco, and is approximately 624 ha.

The waste disposal facility, water storage dam and quarry (if required) are proposed to be developed on land to the east of the East Tamar Highway, across from the pulp mill site.

Maps detailing the location of the Pulp Mill and ancillary infrastructure are included as Attachments 1 and 2.

#### 4.1.2 Mill Technology

The proposed mill will use the Kraft process for producing pulp. The Kraft process is considered a very efficient process, as the wood residues removed from the wood fibres are burnt in a recovery boiler to generate the mill's steam and power requirements. This process also regenerates the chemicals used in the pulping process so they can be reused. As a result, the mill only requires small quantities of make-up pulping chemicals.

The bleaching process will be Elemental Chlorine Free (ECF). The primary bleaching chemical will be chlorine dioxide, but other bleaching chemicals include, but are not limited to, oxygen, hydrochloric acid and hydrogen peroxide.

#### 4.1.3 Mill Capacity

The mill will have to be of world scale for it to be financially viable, so the output of the mill will be in the range of 820,000 to 1,100,000 ADT of pulp per annum, depending on pulping efficiencies and the fibre yield of the wood used in the mill. The output can be achieved based on the existing volume of woodchips available for export.

#### 4.1.4 Mill Emission Guidelines

The pulp mill has been designed to meet environmental and technological best practices as outlined in the Tasmanian Government's "*Environmental Emission Limit Guidelines for any New Bleached Eucalypt Kraft Pulp Mill in Tasmania*"<sup>12</sup> (the emission guidelines).

While the project mostly conforms with the emission guidelines, the following should be noted:

- in-stack NO<sub>x</sub> emissions in the main stack do not comply with the values recommended by the emission guidelines. However, off-site design criterion for NO<sub>x</sub> are complied with, so the environmental effects of this non-compliance are considered negligible;
- the main stack does not confirm the recommendation that stacks be 2.5 times higher than the height of nearby buildings. However, the air dispersion modelling took account of the plume downwash potential of nearby buildings and demonstrated that the stack height is sufficient to achieve acceptable ground level concentrations of emission constituents; and
- the proposed integrated chemical plant technology does not conform with the emission guidelines. However, Gunns believes the proposed technology is sufficiently proven by operating data from similar plants overseas to warrant consideration.

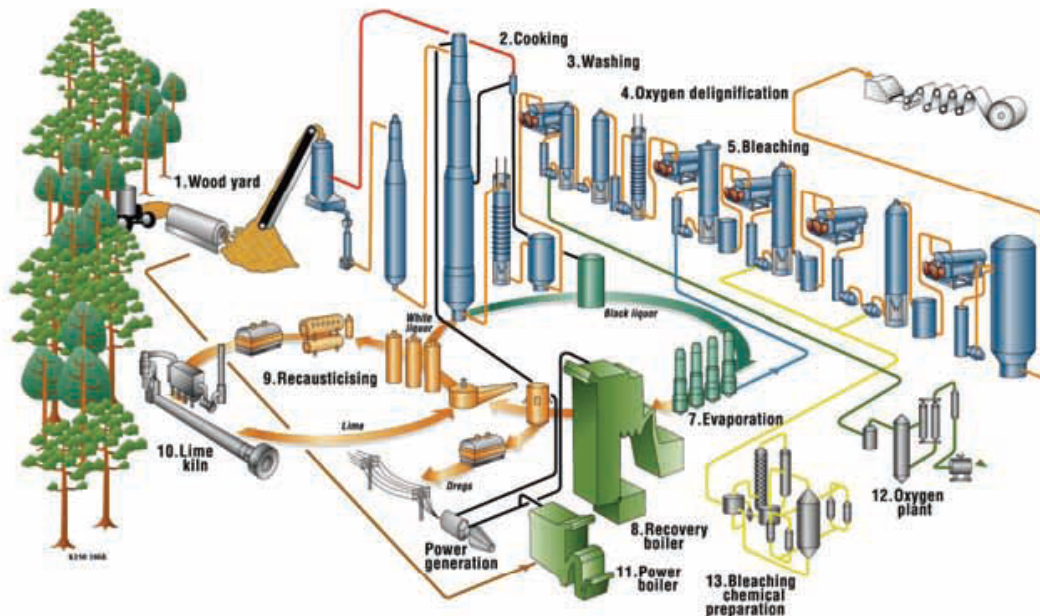
This overview presumes that Pacific Are and Environment's comments about likely conversion errors in some of the design criterion in the emission guidelines are accepted.

#### 4.1.5 Pulp Mill Main Components

The main components of the pulp mill are:

- wood yard and chip handling (existing);
- fibre line (all departments for cooking, de-knotting, washing, oxygen delignification, screening, bleaching and drying of the pulp);
- chemical recovery department (including evaporation, recovery boiler, recausticising, lime kiln);
- power plant (including power boiler, and power generation);
- chemical plant;
- odorous gas collection and destruction system, water treatment system; and
- effluent treatment system.

A simplified process flow diagram is provided below:



More detailed information on the pulp mill process technology can be found in the following links to the supplementary information:

- [http://www.gunnspulpmill.com.au/iis/supp/kari\\_tuominen\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/kari_tuominen_ews.pdf)
- [http://www.gunnspulpmill.com.au/iis/supp/esa\\_vakkilainen\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/esa_vakkilainen_ews.pdf)
- [http://www.gunnspulpmill.com.au/iis/supp/hannu\\_jappinen\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/hannu_jappinen_ews.pdf)

## 4.2 Phases and Timing

### 4.2.1 Processing Plant Construction Phase

The construction phase of the processing plant is expected to take a total of 26 months and will comprise of:

<u>Work Activity</u>	<u>Time (months)</u>
Bulk earthworks	6
Construction & erection	18
Commissioning and Trials	2
Total	26

### 4.2.2 Rehabilitation

The land based infrastructure rehabilitation plans will involve:

- correct placement of topsoil over the excavation and easement;
- cultivation, which may involve deep ripping for compaction relief, to provide a suitable seed bed;
- placement of erosion control materials and fertiliser application, if required;

- seed with an appropriate seed mix commensurate with the existing environment, with the exception of large trees or species with invasive root systems which will be excluded from the pipeline easements; and
- regular inspections for weed control and erosion management if required. This would be part of ongoing management strategy for these easements/areas.

The pulp mill and landfill sites will be rehabilitated and landscaped to enhance and maintain the visual aesthetics.

Rehabilitation of the water based infrastructure, including the Tamar River water supply crossing, Wharf, Donovans Bay effluent pipeline crossing and the effluent outfall pipeline, will involve biological assessment of these areas before commencement and at intervals after completion of construction to determine rate of regeneration of these minor areas of disturbance.

#### 4.2.3 Operation Phase

The operational phase of the pulp mill is expected to commence in late 2009. From this time operations are expected to be on a twenty four hours per day seven day week basis with shutdowns for essential maintenance only. Gunns plans are for 350 operational days per year and 15 days for plant maintenance that cannot be conducted during operations. The 350 days operational may not be achieved in the first 1 to 2 years of operation due to plant “teething” problems.

Given the nature, scale and significant capital cost of the technology pulp mills tend to continue running for many decades. Gunns’ expectations are for the Bell Bay mill to operate for at least 30 years with significant capital upgrades planned during this period to ensure the mill continues to utilise modern technology and remains competitive.

#### 4.2.4 Decommissioning

Given the operation phase is expected to continue for at least 30 years, and most probably a much longer period, plans for decommissioning have yet to be prepared.

### 4.3 Chemicals

Gunns intends to outsource the ownership and operation of the chemical plant to an organisation with the appropriate experience and expertise in operating such plants. This plant will comply with relevant Tasmanian dangerous goods and hazard minimisation requirements of such a facility. The key dangerous goods legislation in Tasmania are: the *Dangerous Goods Act 1998*, *Dangerous Goods (Road and Rail Transport) Regulations 1998*, *Dangerous Goods (General) Regulations 1998* and the *Dangerous Substances (Safe Handling) Act 2005*.

#### 4.3.1 Chemical Purchases

Table 4-1 provides a summary of the major chemicals and other raw material deliveries expected under Gunns’ preferred chemical plant technology option.

**Table 4-1 Major Chemical and Raw Material Purchases**

<u>Material</u>	<u>Tonnes/annum @100%</u>	<u>Source</u>
Salt	50,000	Ship from SA or WA
Sodium hydroxide	5,000	Ship to Hobart, truck to site
Sodium sulphate	9,000	Ship from Asia
Hydrogen peroxide	2,200	Ship to Bell Bay, truck to site
Sand	3,000	Local by truck
Limestone	25,000	Local by truck
Burnt lime	7,000	Local by truck
Magnesium sulphate	250	Ship to Bell Bay, truck to site
Urea	1,550	Ship to Bell Bay, truck to site
Aluminium sulphate	1,100	Ship to Bell Bay, truck to site
Baling wire	1,340	Ship to Bell Bay, truck to site

#### 4.3.2 Chemical Production on Site for Merchant Sales

Gunns' preferred chemical plant technology option is likely to also involve the production of solid sodium chlorate (20,000 to 50,000 tonnes per annum) additional to the pulp mill requirements which will be sold into the mainland and Asian markets.

#### 4.3.3 Chemical Production on Site for on Site Use

Under the Gunns' preferred chemical plant technology option the major chemicals produced on site for subsequent use in the pulping and bleaching processes are:

<u>Chemical</u>	<u>Tonnes/annum @100%</u>
Chlorine dioxide	14,000
Sodium hydroxide	21,000
Hydrochloric acid	19,000
Oxygen	28,000

#### 4.3.4 Chemical Storage

Under the Gunns' preferred chemical plant technology option the major chemicals stored on site and expected maximum storage volumes are:

<u>Chemical</u>	<u>Storage tonnes @100%</u>
Salt	30,000
Sodium sulphate	6,000
Chlorine dioxide	20
Sodium hydroxide	200
Hydrochloric acid	50
Oxygen	60

#### 4.3.5 Preliminary Chemical Hazard Analysis

A preliminary hazard analysis for the chemical plant has been prepared. The methodology employed was consistent with the following regulations and standards:

- Australian Risk Management Standard (AS4360:2004);

- Control of Major Hazard Facilities National Standard (NOHSC:1014(2002)) and National Code of Practice (NOHSC:2016(1996)); and
- *Dangerous Substances (Safe Handling) Act 2005* (This Act will be the Major Hazardous Facilities Regulations for Tasmania. The Act has been passed by both Houses of Parliament and given the Royal Assent, but has not come into force).

The HAZID workshop associated with the chemical plant identified:

- The need to model chlorine release from the chemical plant to determine the maximum impact distance for the worst case chlorine release. Worst case was identified as an inventory of 60kg, at just above atmospheric pressure. This was done and the consequence distance as potentially having impact offsite is 490m; and
- The need to model dispersion of worst case chlorine dioxide release which is based on a tank rupture of 600m<sup>3</sup> volume at 10g/l. Also modeled release of 0.4kg of ClO<sub>2</sub> vapour. This was done and the consequence distance for the ruptured tank is 200m and for the release of chlorine dioxide is 350m.

The nearest possible public access areas being the railway line to Bell Bay Industrial Area, East Tamar Highway to Georgetown and navigable areas of the Tamar Estuary are greater than 500 metres from the chemical plant. Therefore no impact to public accessible areas adjacent to the chemical plant.

Further information on the chemical plant is available at:

[http://www.gunnspulpmill.com.au/iis/supp/edward\\_bechberger\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/edward_bechberger_ews.pdf)

#### 4.4 Waste Management

##### 4.4.1 Solid Waste Management

The pulp mill is estimated to produce up to 49,000 tonnes of non-hazardous waste per year, comprising up to 48,000 tonnes of process waste and approximately 760 tonnes of putrescible (domestic) waste. A landfill is proposed to be constructed in the northeast corner of the site, east of the East Tamar Highway (see Figure 4-2). A new landfill facility is required as the closest existing municipal landfill at George Town is too small and is facing closure. The landfill will not become a public facility. The disposal procedures will comply with the regulatory requirements for such material as further described in the Tasmanian Environmental Management and Pollution Control (Waste Management) Regulations 2000, *Land Use Planning and Approvals Act 1993* (LUPAA), *Environmental Management and Pollution Control Act 1994* (EMPCA), State Policy on Water Quality Management 1997 and Classification and Management of Contaminated Soil for Disposal (Bulletin 105).

The location for the new landfill was selected after a review of a number of alternative locations. The selected site has previously been identified by the (then) Department of Environment and Land Management as a potential major industrial landfill.

Gunns will continue to research and review opportunities for beneficial reuse of process waste (as fertiliser and/or soil conditioner on plantations or as a raw material for cement production), and, as a fundamental principle, will maximise reuse to the extent that economic and environmental benefits and costs allow.

During the construction and operation of the proposed mill, a range of waste types will be generated. Waste types are detailed in Table 4-2 following.

**Table 4-2: Waste Types**

<b>Waste type</b>	<b>Waste classification</b>	<b>Approximate maximum quantity per year</b>
Solid waste – domestic type	Putrescible	760 t/y (5,040 m <sup>3</sup> /y)
Solid waste – boiler ash	Controlled waste	8,500t/y (11,000m <sup>3</sup> /y)
Solid waste - green liquor process dregs, slaker sands and lime kiln electrostatic precipitator dust	Controlled waste	40,000 t/y (40,000 m <sup>3</sup> /y)
<b>TOTAL:</b>		<b>49,000 t/year (56,000 m<sup>3</sup>/year),</b>

All hazardous waste (lubrication and hydraulic oils, used electrical equipment and various maintenance chemicals and materials) will be transported to an established landfill approved for that purpose. The likely disposal area for hazardous waste will be the existing facilities at Dulverton or Port Latta. The disposal procedures will comply with the regulatory requirements for such material as further described in the Tasmanian Environmental Management and Pollution Control (Waste Management) Regulations 2000.

#### 4.4.2 Effluent Treatment

The mill will be designed to minimise effluent discharge and maximise the use of recycled water. Due to the recycling focus, the mill will utilise significantly less water per tonne of pulp produced, in the order of 13.5 ggalitres per year, than existing mills. Significant sections of the bleach plant water system will be partially closed, with bleach plant filtrate from various bleaching stages recycled back through the fibre line and the recovery process. This will reduce the volume of water that will be required to operate the plant, and impurities carried in these streams will be burnt in the recovery boiler. Water conservation measures are quantified further in section 4.5.2.

Effluent will be treated in the effluent treatment plant before being discharged into Bass Strait through the proposed effluent disposal pipeline (see Figure 4-3). On an average monthly basis, approximately 64,000 tonnes/day of treated effluent will be discharged approximately 2.7km off-shore, near Five Mile Bluff. The plant will consist of a modern primary and secondary treatment facility, with the biological treatment featuring an extended aeration activated sludge process, following an integrated anoxic chlorate removal stage which effectively converts the chlorate to harmless chloride. Tertiary effluent treatment is not considered appropriate as there is potential for aluminium toxicity in the marine environment by the release of flocculating agents that contain this element. The State environmental agency has indicated its preference for secondary treatment only and that tertiary treatment is not accepted modern technology (AMT).

Gunns considers that a completely closed cycle Kraft mill, and even a closed cycle bleach plant, are not yet technically proven or economically viable technologies.

Further information on effluent treatment is available at:  
[http://www.gunnspulpmill.com.au/iis/supp/hannu\\_jappinen\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/hannu_jappinen_ews.pdf)

## 4.5 Water Supply

### 4.5.1 Water Supply Pipeline Operation

Water is proposed to be supplied to the pulp mill site through a water supply pipeline from Lake Trevallyn near Launceston (see attachment 1). The water will be supplied by Hydro Tasmania from the South Esk, Great Lake System from volumes that would otherwise have been used by Hydro Tasmania in producing power through the Trevallyn Power Station, and is not an additional allocation. The mill water off-take will have no impact on the environmental flows through the Launceston Cataract Gorge. The off take will represent approximately 1% of the flow into Lake Trevallyn.

Gunns considers the utilisation of this water by the pulp mill is environmentally appropriate as Hydro Tasmania currently generates 0.9 megawatts of electrical power with this water flow whereas the pulp mill will generate a total of 180 megawatts, use 90 megawatts, and supply 90 into the national electricity grid. The surplus of electricity supplied into the grid is more than enough for both industry and domestic use for the greater Launceston area (as defined by post codes 7248, 7249, and 7250).

The water off take will be metered and charged to Gunns on a per unit basis which will provide the appropriate incentive for conservation.

The option of taking water from the outlet of the Trevallyn Power Station was considered in detail but was dismissed due to:

- The tailrace from the power station is inhabited by the Australian Grayling *Prototroctes maraena* which is a EPBC Act listed species. It was considered that the installation and operation of a water off take facility at this location may have had an adverse impact on the species; and
- The location of a water off take facility at this location would have required the installation of a weir to maintain supply volumes during low tides and this would have had an impact on the overall capacity of the power station.

This proposed water supply regime will include the construction and operation of:

- a raw water pump station near Lake Trevallyn; and
- a pipeline from the pump station to the local water reservoir on the Pulp Mill Site.

Most of the water supply pipeline will be located within road reserves and on private property. The pipeline will cross the Tamar River and a number of other creeks and road intersections.

Gunns proposes to construct a local water reservoir to the east of the pulp mill, with sufficient capacity to store at least three days' water supply. A backup water supply from Curries River Dam may also be developed, which could involve the construction and use of a water supply pipeline from the mill to the Esk Water treatment plant located approximately 6km to the north-west.

Gunns currently anticipates that the pulp mill will require approximately 26GL of water per annum.

#### 4.5.2 Water Recycling and Conservation

More water will be recycled than is normal practice for pulp mills globally. On average, pulp mills consume 40m<sup>3</sup> of fresh water per tonne of pulp produced. The Bell Bay pulp mill, because of its recycling focus, will use only 23.5m<sup>3</sup> per tonne. This represents a saving of over 40% (or 13.5 gegalitres per year) compared with existing mills.

In addition the bleaching plant will be designed so that filtrate from the EOP stage (oxygen and peroxide added at the alkali extraction bleaching stage) can, in the future if research and developments progress successfully, be recycled back as washing liquor on the last press.

Gunns is currently undertaking an assessment to investigate further options for water conservation in the pulp mill.

#### 4.6 Energy Supply

Modern kraft pulp mills source their major energy requirements from the lignin and extractives in the pulpwood raw material. This is burnt in the recovery boiler to produce steam and then, by utilising some of the steam energy, electricity is produced. Kraft pulp mills are generally self sufficient in respect to energy requirements. Gunns' pulp mill will take the electricity generation phase even further by utilising significant volumes of supplementary biomass to fuel a power boiler producing additional steam for electricity generation.

The mill's recovery and power boilers will provide steam to drive a turbine to power the mill, with surplus being sold into the Tasmanian electricity grid. The total peak capacity will be approximately 215 MW, of which up to 120 MW (or an average of 90 MW) will be surplus to mill requirements and be available for sale. The mill will be eligible for Renewable Energy Certificates (RECs) because it will be using biomass, including waste wood, for steam generation, and will therefore conform to the *Commonwealth's Renewable Energy Act 2000*.

#### 4.7 Construction

Clearing and construction for the water supply and effluent pipelines will have localised impacts and create a noticeable visual impact in some areas. These will be short term as the pipeline will be buried and all easements will be rehabilitated consistent with the surrounding land uses.

Lake Trevallyn will need to be lowered for a week to install the pump suction but this will be coordinated with the regular cleaning of the power station trash racks. The pipeline will cross, via underground tunnel, the West Tamar Highway and the Trevallyn power station. This avoids closing the roads and interfering with the land of an urban dwelling. The Tamar River crossing will be conducted by wet jetting which causes a short term suspended sediment plume in the river as the mud surrounding the pipeline is

fluidised. This has been modeled and the effects carefully evaluated. There may be some localised impacts on fish species over the week of the wet-jetting operations. There are seven major road crossings by the pipelines which will require temporary road closure and excavation.

The water supply pipeline crosses a range of vegetation communities, including native vegetation and pasture, as well as existing easements. Exact areas of vegetation communities affected will depend on the final route and micro-siting of the pipeline. No EPBC Act listed ecological communities or flora species will be impacted by construction activities.

Clearing and construction at the Pulp Mill Site will have restricted visual impact, due to screening native vegetation present along the East Tamar Highway. Visual impact may be most applicable from sites on the Tamar River and from the western shore of the Tamar River, due to the elevated nature of the site and the wharf facility. Construction activities will have localised and permanent impacts on vegetation. No EPBC Act listed ecological communities or flora species will be impacted by construction activities.

Further discussion on key impacts of construction activities on EPBC Act listed Threatened, Marine and Migratory species is included within section 5.

## 4.8 Transport

### 4.8.1 Context

The transport volumes associated with the pulp mill are largely associated with the intake of the main raw material, pulpwood, in the form of logs and woodchip. However as the Gunns' existing export pulpwood facility at Bell Bay are already exporting the bulk of the resource that will be processed into pulp the increase in transport activity is much less significant than would otherwise have been the case. The products produced by the mill and the major chemical inputs will be transported by ship via the wharf facility and will have no impact on road transport activity.

### 4.8.2 Overview

The projected annual supply capacity projections of the collective wood resource available to Gunns within each notional forest management region confirms that the available pulpwood resource in north-eastern Tasmania (the existing catchment for the current Gunns' export woodchip facilities at Bell Bay) could almost satisfy pulp mill requirements into the future (85%) with only a small increment on top of existing haulage and no change in forest practices.

### 4.8.3 Road Operational Phase

Gunns' preference, based on the relative economics of the various options, is to use rail wherever possible for the transport of wood to the Bell Bay mill that is sourced from areas outside the traditional northeast catchment. Changes in freight movements arising from Gunns' preferred operational strategy to utilise the rail network for some long-haul freight of wood from outside the northeastern catchment (the 'anticipated strategy') will not have any substantial adverse impacts on Tasmania's road network. In fact, the

adoption of the preferred operational strategy will result in an overall decrease in log truck movements across Tasmania. On some roads, there will be limited localised increases that are well within road design specifications. The use of the rail network will be dependent on the success of negotiations between government agencies and the rail operator to ensure that the associated infrastructure is capable of being utilised.

Further information on transport issues for the pulp mill is available at [http://www.gunnspulpmill.com.au/iis/supp/keith\\_midson\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/keith_midson_ews.pdf)

Fauna mortality on roads is a common occurrence in Tasmania, owing to comparatively high populations of small to medium sized mammal and the presence of native vegetation areas within close proximity to roads. It is estimated by the Department of Tourism, Arts and the Environment that millions of native animals are killed, orphaned or injured on Tasmanian roads each year. The transport activities associated with the pulp mill are unlikely to impact significantly on numbers of roadkill.

#### 4.8.4 Wharf Facility

Pulp is proposed to be shipped from a new wharf facility to be constructed adjacent to the pulp mill in the Tamar River (see attached plan of the Pulp Mill Site). The berth will have a depth of approximately 12 metres. The preferred design comprises a complete suspended structure on piles, connected to the shore by trestle structures.

The wharf has been designed to reduce impacts on river flows, so that hydrodynamic conditions resulting from wharf emplacement are unlikely to cause erosion and scour of the estuarine bed upstream and downstream of the wharf.

During construction, vibratory hammers, which are not known to cause acoustic damage to fish, will be used to drive the piles to refusal, prior to using hydraulic hammers to proof the piles into bedrock. The hydraulic impact hammer equipment proposed to be used by Gunns is state-of-the-art and has a number of noise reduction measures in-built. Used in conjunction with a monocast nylon hammer noise cushion, impact hammer noise will limit the area of the sound field within which acoustic damage to fish may occur (see also the discussion of noise impacts in the Tamar River during construction in section 5.11.6).

## 5 Listed threatened species and ecological communities and listed marine and migratory species

### 5.1 Overview

Prior to assessment it was considered that the Bell Bay Pulp Mill may impact on listed threatened species, ecological communities and listed marine and migratory species through:

- The construction of the pulp mill, associated infrastructure, water supply and effluent pipelines and workers accommodation facility,
- The discharge of treated effluent through the marine outfall pipeline and diffuser, and
- The discharge of air emissions.

Gunns has undertaken thorough assessments of the existing environment, and possible construction and operational impacts. The assessments have found that there will not be a significant impact on the listed threatened species, ecological communities and listed marine and migratory species.

### 5.2 Introduction

There are three categories of listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- Listed threatened species (extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent);
- Listed migratory species; and
- Listed marine species.

An individual species may be listed under one or more of these categories.

While the controlling provisions relate to listed threatened species and ecological communities and listed migratory species, an assessment of the impacts on listed marine species is relevant to the impacts on the Commonwealth marine area. Therefore, this section of the document details species listed under all three categories of the EPBC Act which may be impacted upon by the Project.

Species which are listed as threatened under the EPBC Act and have been recorded or are predicted to occur within or adjacent to the Project Area are listed in Table 5-1. Further information is provided in sections 5.5 and 5.6 on the occurrence of these species within the Project Area. Potential impacts on these species and mitigation measures are discussed in sections 5.10 and 5.11.

Species listed Marine and/or Migratory under the EPBC Act are discussed in section 5.7, with potential impacts and mitigation measures in section 5.12.

In this document, the following defined terms are used:

- “Pulp Mill Site” means the site on the Tamar River at Bell Bay, adjacent to the existing Tamar woodchip facility, upon which the pulp mill, chemical plant, local water reservoir, quarry and solid waste facility will be constructed, and
- “Project Area” means the Pulp Mill Site, the effluent and water supply pipelines, and the workers accommodation facility.

**Table 5-1: EPBC Act listed species that occur or predicted to occur within or adjacent to the Project Area**

<b>Common Name</b>	<b>Scientific Name</b>	<b>EPBC ACT Status</b>
<b>Flora</b>		
Northern Leek Orchid	<i>Prasophyllum secutum</i>	Endangered
Sand Grass Tree	<i>Xanthorrhoea arenaria</i>	Vulnerable
Shiny Grass Tree	<i>Xanthorrhoea bracteata</i>	Endangered
Tailed Spider Orchid	<i>Caladenia caudata</i>	Vulnerable
South Esk Heath	<i>Epacris exserta</i>	Endangered
Clover Glycine	<i>Glycine latrobeana</i>	Vulnerable
<b>Amphibians</b>		
Green and Gold Frog	<i>Litoria raniformis</i>	Vulnerable
<b>Mammals</b>		
Tasmanian Devil	<i>Sarcophilus harissi</i>	Vulnerable
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	Vulnerable
Eastern Barred Bandicoot	<i>Perameles gunnii gunnii</i>	Vulnerable
<b>Birds</b>		
Wedge-tailed Eagle (Tasmanian)	<i>Aquila audax fleayi</i>	Endangered
Swift Parrot	<i>Lathamus discolor</i>	Endangered
Masked Owl	<i>Tyto novaehollandiae castanops</i>	#
<b>Invertebrates</b>		
Giant Freshwater Crayfish	<i>Astacopsis gouldi</i>	Vulnerable
Mt Arthur Burrowing Crayfish	<i>Engaeus orramakunna</i>	Vulnerable
<b>Freshwater Fish</b>		
Australian Grayling	<i>Prototroctes maraena</i>	Vulnerable
<b>Marine Mammals</b>		
Southern Right Whale	<i>Eubalaena australis</i>	Endangered
Humpback Whale	<i>Megaptera novaengliae</i>	Endangered
Fin Whale	<i>Balaenoptera physalus</i>	Vulnerable
Sei Whale	<i>Balaenoptera borealis</i>	Vulnerable
Blue Whale	<i>Balaenoptera musculus</i>	Endangered
Southern Elephant Seal	<i>Mirounga leonine macqauriensis</i>	Vulnerable
Australian Sea Lion	<i>Neophoca cinerea</i>	Vulnerable
<b>Marine Birds</b>		
Black-browed Albatross*	<i>Thalassarche melanophris s.l.</i>	Vulnerable
Buller's Albatross*	<i>Thalassarche bulleri</i>	Vulnerable
Shy Albatross*	<i>Thalassarche cauta s.l.</i>	Vulnerable
Wandering Albatross*	<i>Diomedea exulans s.l.</i>	Vulnerable
Northern Giant-Petrel	<i>Macronectes hallii</i>	Vulnerable
Southern Giant-Petrel	<i>Macronectes giganteus</i>	Endangered
<b>Sharks</b>		
Great White Shark	<i>Carcharodon carcharias</i>	Vulnerable
Grey Nurse Shark	<i>Carcharias taurus</i>	Vulnerable
<b>Marine Reptiles</b>		
Loggerhead Turtle	<i>Caretta caretta</i>	Endangered
Green Turtle	<i>Chelonia mydas</i>	Vulnerable
Hawksbill Turtle	<i>Eretmochelys imbricata</i>	Vulnerable
Leatherback Turtle	<i>Dermochelys coriacea</i>	Vulnerable

# Currently nominated for listing under the EPBC Act

\* Albatross classifications have changed recently, refer section 5.6.7

## 5.3 Methodology

### 5.3.1 Desktop review

A detailed desktop review was undertaken to compile a list of threatened flora and fauna species that may occur within the Project Area.

The desktop review for the flora assessment included TASVEG mapping, the fully interactive version of GTSpot database, the Threatened Flora CD (all of which are maintained by DPIW), the EPBC Act Protected Matters Search Tool and reports and materials relevant to the project, species and area. These resources were investigated within a 5km radius of the Project Area.

The desktop review for the terrestrial fauna assessment included the fully interactive version of GTSpot database, the EPBC Act Protected Matters Search Tool, the DPIW Threatened Species Section database, the Birds Australia Atlas of Australian Birds, the Threatened Fauna Manual (maintained by the Forest Practices Authority) and reports and materials relevant to the project, species and area. These resources were investigated within a 5km radius of the Project Area.

The desktop review for the Marine and Migratory Avifauna assessment included the EPBC Act Protected Matters Search Tool, Birddata (Birds Australia Atlas of Australian Birds online database) and reports and materials relevant to the project, species and area, including the Draft IIS terrestrial fauna report Appendix 30 Volume 13. The study area consisted of the entire Tamar Estuary and foreshore, the northern coast of Tasmania from Tenth Island to West Head and an arc approximately 12km offshore between these points.

A literature review was undertaken for marine and freshwater species that occur in the vicinity of the ocean outfall pipeline and within a 1km radius of the diffuser location, the wharf and the Tamar River crossing site.

### 5.3.2 Field surveys

The total area surveyed for terrestrial flora and fauna values was approximately 1061ha. This area included:

- An area of 471ha at the Pulp Mill Site, which encompassed all areas proposed for infrastructure and surrounding areas of native vegetation;
- An area of 227ha at the effluent outfall site, which was significantly reduced, due to engineering and survey results indicating significant vegetation and cultural values;
- Approximately 84ha along the effluent pipeline route, which generally followed road corridors or reserves, and was generally 50m wide, but in some areas as narrow as 20m;
- Approximately 261ha along the water supply pipeline, which was variable in width and included a number of alternatives for the alignment and Tamar River crossing; and
- Approximately 18ha at the workers accommodation facility.

It is important to note that the survey areas were much larger than the area which will be disturbed by the development, which is up to 310ha across all areas of development, of which approximately 200ha is native vegetation and the balance constituting cleared land and easements. The larger survey area was adopted to enable exploring of options, depending on values identified and ensuring that values in the vicinity of the Project Area were identified to enable appropriate management.

A total of 151 person days was spent undertaking comprehensive flora surveys, threatened species assessments, ecological vegetation community mapping and taking qualitative notes regarding vegetation condition. Surveys were undertaken in autumn/winter 2005 and again in spring 2005 in order to document seasonal variations in flora and to ensure spring flowering species were recorded and documented.

Comprehensive fauna assessments were undertaken at various locations across the survey areas during late summer, autumn, winter and spring 2005. These assessments consisted of detailed habitat assessments and fauna trapping, observation, identification and recording. An assessment and search for eagle nests was conducted autumn 2005 and a follow-up survey for the masked owl conducted in winter 2006. A peer review of the fauna report, involving a brief site visit, was conducted in spring 2006.

The assessment of marine and migratory avifauna involved a site inspection of the coastline during spring 2006.

A field survey of an area within a 1km radius of the diffuser location was undertaken in April 2005, to determine the existing marine benthic infauna, epibenthic fauna and flora and fish populations at the site, including community types and species diversity. A field survey of the wharf site and neighbouring bays was undertaken to characterise the marine communities, seabed habitats and sediment conditions that occur at the wharf site. Near the Tamar River crossing, the riverbed was filmed and 6 benthic infauna grab samples were taken along the crossing route.

The expert studies include:

Flora

- Flora survey and assessment, prepared by GHD and presented at Appendix 29 Volume 12  
[http://www.gunnspulpmill.com.au/iis/V12/V12\\_A29.pdf](http://www.gunnspulpmill.com.au/iis/V12/V12_A29.pdf) and Tim Will's witness statement in the Supplementary Information  
[http://www.gunnspulpmill.com.au/iis/supp/tim\\_wills\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/tim_wills_ews.pdf)

Fauna

- Fauna survey and assessment, prepared by GHD and presented at Appendix 30 Volume 13  
[http://www.gunnspulpmill.com.au/iis/V13/V13\\_A30.pdf](http://www.gunnspulpmill.com.au/iis/V13/V13_A30.pdf)
- Peer review of the fauna survey and assessment, prepared by Brett Lane and Associates and presented at Attachment 2 of Brett Lane's witness statement  
[http://www.gunnspulpmill.com.au/iis/supp/brett\\_lane\\_att\\_2.pdf](http://www.gunnspulpmill.com.au/iis/supp/brett_lane_att_2.pdf)
- Marine and migratory avifauna effects statement  
[http://www.gunnspulpmill.com.au/iis/supp/brett\\_lane\\_att\\_3.pdf](http://www.gunnspulpmill.com.au/iis/supp/brett_lane_att_3.pdf)

## Marine

- A marine biological and pollutant survey at the proposed pulp mill site, prepared by Aquenal and presented in Appendix 24, Volume 11 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V11/V11\\_A24.pdf](http://www.gunnspulpmill.com.au/iis/V11/V11_A24.pdf)
- Two pre-operational marine ecological surveys, prepared by Aquenal, the second of which is presented in Appendix 27 of Volume 11 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V11/V11\\_A27.pdf](http://www.gunnspulpmill.com.au/iis/V11/V11_A27.pdf)
- A marine biological and sediment survey at the proposed wharf site, prepared by Aquenal and presented in Appendix 25, Volume 11 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V11/V11\\_A25.pdf](http://www.gunnspulpmill.com.au/iis/V11/V11_A25.pdf)
- Aquatic Environmental Investigation for the Proposed Tamar River Crossing for the Water Supply Pipeline, prepared by Aquenal and presented in Appendix 26, Volume 11 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V11/V11\\_A26.pdf](http://www.gunnspulpmill.com.au/iis/V11/V11_A26.pdf)
- Four hydrodynamic modelling assessments, prepared by GHD and presented in Appendix 63 of Volume 18 of the Draft IIS (ocean outfall location)  
[http://www.gunnspulpmill.com.au/iis/V18/V18\\_A63.pdf](http://www.gunnspulpmill.com.au/iis/V18/V18_A63.pdf) and Appendix 64 of Volume 18 of the Draft IIS (wharf facility)  
[http://www.gunnspulpmill.com.au/iis/V18/V18\\_A64.pdf](http://www.gunnspulpmill.com.au/iis/V18/V18_A64.pdf) and Ross Fryar's witness statement in the Supplementary Information  
[http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_ews.pdf) and  
[http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_att\\_2.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_att_2.pdf) and  
[http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_att\\_3.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_att_3.pdf)
- Two toxicity assessments of effluent samples prepared by Ecotox and presented at Appendices 58 and 59 of Volume 17 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V17/V17\\_A58.pdf](http://www.gunnspulpmill.com.au/iis/V17/V17_A58.pdf) and  
[http://www.gunnspulpmill.com.au/iis/V17/V17\\_A59.pdf](http://www.gunnspulpmill.com.au/iis/V17/V17_A59.pdf)
- Two reports on the impacts of chlorate on algae species prepared by Ecotox and one presented at Appendix 60 of Volume 17 of the Draft IIS and the second presented at Attachment 2 to Rick Krassoi's witness statement in the Supplementary Information  
[http://www.gunnspulpmill.com.au/iis/V17/V17\\_A60.pdf](http://www.gunnspulpmill.com.au/iis/V17/V17_A60.pdf) and  
[http://www.gunnspulpmill.com.au/iis/supp/rick\\_krassoi\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/rick_krassoi_ews.pdf)
- Marine construction methodology report prepared by Atteris and presented in Eric Jas' witness statement in the Supplementary Information  
[http://www.gunnspulpmill.com.au/iis/supp/eric\\_jas\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/eric_jas_ews.pdf)
- Human health risk assessment of Bell Bay Pulp Mill Effluent, prepared by Toxikos and presented in Appendix 22 of Volume 10 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V10/V10\\_A22.pdf](http://www.gunnspulpmill.com.au/iis/V10/V10_A22.pdf)
- Commentary on Bell Bay Effluent and impact on nearby seal colonies Appendix 23 Volume 10 of the Draft IIS  
[http://www.gunnspulpmill.com.au/iis/V10/V10\\_A23.pdf](http://www.gunnspulpmill.com.au/iis/V10/V10_A23.pdf)
- Ecotoxicological marine impact assessment prepared by Toxikos and presented at Attachment 2 of Roger Drew's witness statement in the Supplementary Information  
[http://www.gunnspulpmill.com.au/iis/supp/roger\\_drew\\_att\\_2.pdf](http://www.gunnspulpmill.com.au/iis/supp/roger_drew_att_2.pdf)
- Tamar River crossing installation, Wharf construction, Donovan's Bay crossing installation, marine construction and marine operational impact assessment prepared by EnviroGulf Consulting and presented at Appendices 2-6 of David Balloch's witness statement in the Supplementary Information  
[http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_2.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_2.pdf) and  
[http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_3.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_3.pdf) and  
[http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_4.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_4.pdf) and

[http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_5.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_5.pdf) and  
[http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_6.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_6.pdf)

## 5.4 Existing environment

### 5.4.1 Regional and national context

The Pulp Mill Site is located at Bell Bay, adjacent to the Tamar River Estuary, which flows into Bass Strait. The water supply pipeline runs from Trevallyn Dam in Launceston to the Pulp Mill Site and the effluent pipeline from Bell Bay to the northern coast near Five Mile Bluff. The workers accommodation facility is located to the south of George Town. These areas are located within the Ben Lomond IBRA Region (IBRA 4).

The treated effluent will discharge into Bass Strait, west of Five Mile Bluff, via a 200m long diffuser and 2.74km long ocean outfall pipeline. The area forms part of the Boags marine bioregion. A number of estuaries, including the Tamar River Estuary, enter the marine environment near the outfall site and provide nursery and breeding grounds for coastal and migratory fish.

### 5.4.2 Vegetation Communities

The Pulp Mill Site is dominated by *Eucalyptus amygdalina* forest on dolerite, with smaller and localised areas of coastal *E. amygdalina* forest, shrubby *E. ovata* – *E. viminalis* forest, *Allocasuarina verticillata* forest, *Melaleuca ericifolia* coastal swamp forest and *Notelaea* – *Pomaderris* – *Beyeria* forest. Smaller areas of other vegetation communities are also present. The Pulp Mill Site is transected by several easements including the Esk Water pipeline, railway line, powerlines and is dissected by numerous tracks. The Pulp Mill Site has been disturbed in the past by fire and logging, although is relatively free of weed species. Twelve flora species of state significance have been recorded on the Pulp Mill Site.

The water supply pipeline from Trevallyn Dam to the Pulp Mill Site intersects areas of native vegetation, agricultural land and easements. Condition of the vegetation varies significantly along the alignment. Eleven flora species of state significance have been recorded along the alignment.

The effluent pipeline from the Pulp Mill Site to Five Mile Bluff intersects areas of native vegetation, agricultural land and easements. Condition of the vegetation varies significantly along the alignment. Eleven flora species of state significance have been recorded along the alignment.

The workers accommodation facility contains highly degraded native vegetation and a high level of weed infestation. Less than 1ha of the state listed vegetation community, *Melaleuca ericifolia* swamp scrub, is present. No species of national or state significance have been recorded at the site.

## 5.5 Listed Ecological Communities and Threatened Flora Species

### 5.5.1 Ecological Communities

There are no nationally listed ecological communities within or in the vicinity of the project area.

### 5.5.2 Flora

Due to taxonomic difficulties in identification and differentiation between *Xanthorrhoea bracteata* and *X. arenaria*, these species have been grouped together and are collectively referred to as *Xanthorrhoea aff. bracteata*.

*Xanthorrhoea aff. bracteata* occurs in nine separate patches on at least five of the east-west orientated, stabilised dunes which occur at the effluent outfall area. It was also recorded on Aerodrome Rd adjacent to the effluent pipeline route. Population size was difficult to estimate, owing to the absence of flowering material, making it difficult to differentiate from the common *X. australis*. However, the population size has been conservatively estimated to be at least 1,000 plants.

*Prasophyllum secutum* was last recorded in the vicinity of the effluent pipeline route in 1971, and has not been recorded since, and was not found during field surveys. The recorded locality for this species is outside the Project Area. This species only flowers after fire and due to the absence of fire it is difficult to assess the likelihood that this species still occurs in the area. Habitat for this species is dense coastal swales of coastal sand dunes near the coast, consistent with the vegetation communities occurring throughout the local area. It is assumed therefore that the species persists in the local area.

There is potential habitat for three further nationally listed species within the Project Area, these being; *Caladenia caudata*, *Epacris exserta* and *Glycine latrobeana*. None of which were recorded during field surveys.

*Caladenia caudata* occurs in heathy and grassy open eucalypt forest and woodland on the northern and east coast of Tasmania. This species flowers during spring usually in the initial years following fire, but may also flower sporadically in the absence of fire. Intensive spring surveys were conducted, however this species was not recorded. Owing to the presence of large areas of potentially suitable habitat and the absence of fire it is considered possible that the species may be present within the Project Area.

*Glycine latrobeana* and *Epacris exserta* both occur in dry sclerophyll forest and woodland. Neither species were recorded during field surveys. These species are generally distinctive even when not flowering, and therefore it is considered unlikely that they are present.

No other listed threatened flora species are expected to occur within the Project Area.

## 5.6 Listed Threatened Fauna Species

### 5.6.1 Amphibians

The green and gold frog has previously been recorded within 500m of the Project Area. It is found in well vegetated permanent and temporary freshwater waterbodies (ponds, dams and wetlands). Suitable, but not optimal, habitat for this species is located at the effluent outfall site and some of the drainage lines and wetland areas along the water supply pipeline route. This species was not located during field surveys despite call-back and searches of suitable habitat. However, a peer review of this fauna assessment has noted that the call-back activities may not have been adequate, due to timing and duration, to definitively locate the species. It is therefore considered possible that this species may occur within the Project Area.

### 5.6.2 Terrestrial mammals

The Tasmanian devil, spotted-tailed quoll and eastern barred bandicoot were not located during field surveys, despite targeted trapping. However they have been previously recorded within 500m of the Project Area. There is an abundance of suitable habitat for all of these species within and adjacent to the Project Area, and it is likely that these species occur there.

### 5.6.3 Terrestrial Birds

The wedge-tailed eagle (Tasmanian) is an endemic species recorded throughout Tasmania. A nest of the wedge-tailed eagle is located in a gully approximately 900m from the solid waste disposal site and is separated from the Project Area by a significant ridgeline. No suitable nesting habitat was located within areas to be impacted by the Project, although other habitats are potentially suitable for foraging.

The masked owl is proposed for listing under the EPBC Act, and has been included in the assessment for this reason. While a potential sighting of this species was recorded at the Pulp Mill Site, further investigative work utilising call-back and nest tree searching failed to confirm the presence of the species at the site. The majority of the Project Area does not contain potential roosting and/or breeding habitat due to the lack of large trees with well developed hollows. Limited areas of the Pulp Mill Site do support potential nesting habitat, mainly on the steeper slopes and riparian areas facing the Tamar River.

The swift parrot breeds in Tasmania from September to April, and are associated predominantly with Tasmanian blue gum in dry sclerophyll woodlands and forests on the south east coast of the state. Scattered individuals and small groups are occasionally recorded along the northern coast during migrations between southern Tasmania and the south-eastern Australian mainland, with the occasional breeding site in the north. In the north of the state suitable foraging habitat is dry forest and woodland containing *E. globulus* or *E. ovata*. Nesting habitat is identified as mature trees on upper slopes and ridges in dry sclerophyll forest. This species was not recorded during field surveys. The Project Area does not contain suitable nesting habitat for this species, although it does contain approximately 11.4 ha of *E. ovata* forest which will be impacted and may periodically be utilised as a foraging resource.

#### 5.6.4 Invertebrates

The Giant freshwater crayfish and Mt Arthur burrowing crayfish have been recorded within 5km of the Project Area, however the Project Area is outside the known range of both species. The giant freshwater crayfish is not known from the Tamar River catchment and the Mt Arthur burrowing crayfish is only known from approximately 300 square km area centred on Mt Arthur well to the east of the Project Area.

#### 5.6.5 Freshwater Fish

The Australian grayling is recorded in coastal streams and rivers around Tasmania, including the Pipers River and Great Forester River near Bridport, and occurs in the Tamar River. It is unlikely that this species occurs in the vicinity of the marine ocean outfall due to the distance between the diffuser location and the nearest estuary.

#### 5.6.6 Marine Species

Thirteen listed threatened species under the EPBC Act, including whales, seals, sea lions and turtles, may possibly occur in the nearshore or offshore marine waters adjacent to Five Mile Beach.

The shallow inshore waters of the northern Tasmanian coast in the vicinity of Five Mile Bluff form part of an area frequently visited by some species of whales. For example, humpback whale (*Megaptera novaeangliae*) sightings occur for northern and return migration, accompanied by calves, and require nearshore resting areas in preparation for their return to the Southern Ocean. Occasional sightings are reported in the lower Tamar Estuary.

Southern right whales (*Eubalaena australis*) with newborn calves have been sighted offshore and within 2km of the coast, taking advantage of sheltered bays for newborn calves to develop prior to undertaken open ocean migration. Occasional sightings are reported in the lower Tamar Estuary. A number of other species periodically migrate through Bass Strait waters between winter and spring, including the fin whale (*Balaenoptera physalus*), the sei whale (*Balaenoptera borealis*) and the blue whale (*Balaenoptera musculus*).

Occasional sightings of Australian sea lions (*Neophoca cinerea*), which are a listed threatened species under the EPBC Act, are made in Bass Strait, but mainly in the western sector. The Southern elephant seal (*Mirounga leonine macquariensis*) has been signed on haul-out sites on offshore islands such as Albatross Island in the Hunter Island Group. However, there are no known breeding colonies of these species on the Tasmanian northern coast.

While not an EPBC Act listed threatened or migratory species, the Australian fur seal (*Arctocephalus pusillus*) is a listed marine species and of conservation significance. All known breeding colonies for the Australian fur seal are located on the islands of Bass Strait. The nearest colony of Australian fur seal to the ocean outfall is located at Tenth Island, which is a nature reserve approximately 12km to the east of the ocean outfall.

Four listed threatened marine turtle species (Loggerhead turtle (*Caretta caretta*), Green turtle (*Chelonia mydas*), Hawksbill turtle (*Eretmochelys imbricata*) and Leatherback turtle

(*Dermochelys coriacea*) are known to occur in Bass Strait, with occasional coastal sightings. However, none of the turtles breed on the Tasmanian coastline.

The great white shark (*Carcharodon carcharias*) and grey nurse shark (*Carcharias Taurus*) are both listed threatened species under the EPBC Act. The grey nurse shark occurs predominately around the Australian mainland and is rare in Tasmania, while the great white shark is more common in Tasmania and has been recorded along the north coast. Juvenile great white sharks occur in shallow water around Tasmania in spring, while adults occur occasionally all year round. There is also a Shark Refuge area in the Tamar River, which covers the entire Tamar River Estuary from a line between Low Head and West Head in the north to the end of the estuary at Launceston in the south, in which there are restrictions on fishing activities.

### 5.6.7 Marine Birds

Four species of albatross and two species of giant-petrel which are listed as threatened, marine and migratory species under the EPBC Act have been predicted to occur in the study area. These species are considered in section 5.7 (Listed Marine and Migratory Species).

Albatross classification changes have occurred recently. For the purposes of this assessment the old species names have been used, and include the new species in the following table 5-2.

Table 5-2: Albatross classifications

<b>Old species (e.g. Christidis &amp; Boles 1994)</b>	<b>New species (per EPBC Act 1999)</b>
Wandering Albatross <i>Diomedea exulans</i>	Amsterdam Albatross <i>Diomedea amsterdamensis</i> Antipodean Albatross <i>Diomedea antipodensis</i> Gibson's Albatross <i>Diomedea gibsoni</i> Tristan Albatross <i>Diomedea dabbanena</i>
Royal Albatross <i>Diomedea epomophora</i>	Southern Royal Albatross <i>Diomedea epomophora</i> Northern Royal Albatross <i>Diomedea sanfordi</i>
Black-browed Albatross <i>Diomedea melanophris</i>	<i>Black-browed</i> Albatross <i>Thalassarche melanophris</i> Campbell Albatross <i>Thalassarche impavida</i>
Shy Albatross <i>Diomedea cauta</i>	Shy Albatross <i>Thalassarche cauta</i> Salvin's Albatross <i>Thalassarche salvini</i>

No other listed threatened fauna species are expected to occur within the Project Area.

### 5.7 Listed Marine and Migratory Species

The Tamar estuary is considered an important site for shorebirds and seabirds. These birds have broadly been grouped together, as they are considered to be under similar influence from physical and biological processes, and utilise similar resources.

Seventy four EPBC Act listed marine and/or migratory avifauna species, including the previously mentioned swift parrot, albatrosses and giant-petrels, have been recorded or are predicted to occur within the study area. Of these species twenty four were recorded

during field surveys. A white bellied sea eagle nest, a species listed marine and migratory under the EPBC Act, has recently been recorded approximately 400m to the east of the water supply pipeline route near Dilston.

Forty avifauna species listed as migratory have been recorded within the study area (a subset of species defined above). Of these species, twenty one are listed as migratory under JAMBA or CAMBA and the remaining seventeen listed under the Bonn Convention.

Six marine mammal and shark species listed as migratory species under the EPBC Act are likely to occur in the nearshore or offshore waters adjacent to Five Mile Beach: Southern Right Whale, Humpback Whale, Fin Whale, Sei Whale, Blue Whale and Great White Shark. The majority of whale species utilise Bass Strait primarily as a migratory route, where whale migrations predominantly occur during the months of winter to spring. The Tasmanian north coast may be a birthing ground for the Southern right whale, as newborn calves have been sighted offshore and within 2km of the coast, taking advantage of sheltered bays for newborn calves to develop prior to undertaken open ocean migration. Great white shark juveniles occur in shallow water around Tasmania in spring, while adults occur occasionally all year round. All of these species are also listed threatened species under the EPBC Act and included in section 5.6.6.

There are thirty eight listed marine mammal and fish species which have the potential to occur in the vicinity of the effluent pipeline and diffuser.

A table of all species listed as marine or migratory with the potential to occur within the Project Area or in the vicinity of the effluent pipeline and diffuser is provided in Appendix A.

## 5.8 Invasive species

The terrestrial fauna survey noted numerous introduced fauna species located or predicted within the Project Area, including feral cats, rabbits, starlings, blackbirds, sparrows, kookaburra and European goldfinch. It is not expected that the project will favour any of these species in areas of native vegetation.

The mosquito fish (*Gambusia holbrooki*) has been recorded from within the Tamar River. To avoid the inadvertent relocation, the jet trenching machine will be washed free of mud, silt and vegetation prior to removal from the crossing site to another location.

The Pacific oyster (*Crassostrea gigas*), has well established populations within Donovans Bay, along the effluent pipeline route. Construction disturbance of the intertidal areas may create new habitat and it is expected that this species will recolonise and re-establish viable populations on the rock surfaces of the restored shoreline. This is a successful species and there is little that can be done to prevent this from occurring. Overall, no change in the status and distribution of Pacific oysters is envisaged. The reinstated rocky shoreline will again be colonised by this invasive species.

The polychaete worm (*Boccardia sp.*), is known to be present (from one observation) in Donovans Bay and lower Tamar River estuary. There is already evidence of substantial transport and movement of sediments throughout the Tamar Estuary. Therefore, it would

be expected that there is a relatively continuous creation of new habitat and that the disturbance resulting from the cross-bay construction is unlikely to create any particular new environment that may allow for colonisation of this marine pest. Overall, the risk of spreading this invasive polychaete worm is considered low.

Ricegrass has been recorded from Donovans Bay and the lower reaches of the Tamar River. To avoid inadvertent relocation, the jet trenching machine will be washed free of mud, silt and vegetation prior to removal from the crossing site to another location (EWS Woodward). Specific construction related advice on management will be sought from the Tasmanian Department of Primary Industries and Water Rice Grass Management Team.

The only introduced species recorded in the vicinity of the ocean outfall is the New Zealand half crab (*Petrolisthes elongates*), although approximately 25 introduced marine species have been recorded across the north coast of Tasmania.

General terrestrial weed species and *Phytophthora cinnamomi* are discussed in section 5.15.

## 5.9 Impact assessment and management

### 5.9.1 Vegetation clearance and Habitat Fragmentation

The estimated area which will be disturbed by the development is up to 310ha, of which approximately 200ha is native vegetation and the balance constituting cleared land and easements. Areas of land at the Pulp Mill Site and Workers Accommodation Facility will remain cleared for development, while the pipeline routes and effluent outfall site will be rehabilitated with vegetation commensurate with the existing environment, with the exception of large trees or species with invasive root systems, which will be excluded from the pipeline easements. A slashed access track will be maintained along the pipeline routes.

The Pulp Mill Site is already substantially fragmented through the clearing or slashing of native vegetation for the transmission line easement, firebreaks, roads, tracks, gas pipeline, Esk water pipeline and a railway. Construction of the Pulp Mill will further fragment the local landscape. A network of reserves, totaling 150ha, (map available at attachment 3) has been proposed across the site which will reduce fragmentation and maintain habitat connectivity across the site. This reserve network will be maintained in perpetuity and will capture a range of vegetation and habitat types across the landscape, as well as encompassing both Aboriginal and historic heritage values.

The water supply pipeline and effluent pipeline routes traverse vegetation of varying condition, much of which is already highly fragmented. No significant increase in habitat fragmentation is expected as a result of pipeline construction.

The Workers Accommodation Facility site is highly degraded and fragmented, clearing and construction activities are not expected to cause significant habitat fragmentation.

## 5.10 Species Specific Mitigation to Address Potential Impacts on Listed Ecological Communities and Threatened Flora Species

### 5.10.1 Ecological Communities

There are no nationally listed ecological communities within or in the vicinity of the project area. Accordingly, no impacts on these communities are anticipated.

### 5.10.2 Flora

#### ***Xanthorrhoea aff. bracteata***

Significant populations of this species are located at the effluent outfall area.

#### *Potential Impacts:*

Optimisation of the pipeline alignment and construction methodology has ensured that the majority of the population of this species will not be impacted (see Section 5.13 Refinement of Project Design). There is, as a consequence, only potential for direct impact on a single individual located adjacent to the effluent pipeline route.

There is a potential for an indirect impact on this species through the introduction or spread of the pathogen *Phytophthora cinnamomi*, to which *Xanthorrhoea sp.* are highly vulnerable.

#### *Mitigation:*

- A suitably qualified and/or trained person will mark out on the ground the location of the *Xanthorrhoea aff. bracteata* on the effluent pipeline route. This site will be protected from disturbance, through micro-siting of the pipeline.
- Micro-siting and tunneling of the effluent pipeline at the outfall site will be undertaken to prevent impacts (see section 5.13).
- Prevent accidental loss or damage to native vegetation, through clear indication (ie flagging) of the areas to be cleared.
- Preventing the spread and reducing the impact of *Phytophthora cinnamomi* (section 5.15).

#### ***Prasophyllum secutum, Caladenia caudata, Epacris exserta and Glycine latrobeana***

*Prasophyllum secutum* was last recorded in the vicinity of the pipeline outfall some 36 years ago, and has not been recorded since. The recorded locality for this species is outside the Project Area and will not be impacted. The remaining three species were not located during field surveys, nor previously recorded within the Project Area.

#### *Potential Impacts:*

Based on known information, a potential impact on these species is considered unlikely.

#### *Mitigation:*

- Prevent accidental loss or damage to native vegetation, through clear indication (ie flagging) of the areas to be cleared.

## 5.11 Species Specific Mitigation to Address Potential Impacts on Threatened Fauna Species

### 5.11.1 Amphibians

#### **Green and gold frog**

Potentially suitable habitat for this species is located along the water supply pipeline route and at the effluent outfall area.

#### *Potential Impacts:*

The potential impact on this species is through habitat disturbance. This impact may not occur depending on final micro-siting of the pipelines.

#### *Mitigation:*

- A suitably qualified and/or trained person will assess areas of potentially suitable habitat prior to clearing activities. Where practicable, micro-siting of the pipeline disturbance area will prevent impacts on areas of potentially suitable habitat.

### 5.11.2 Terrestrial Mammals

#### **Tasmanian devil, Spotted-tailed quoll and Eastern barred bandicoot**

Suitable habitat for these species occurs throughout the Project Area.

#### *Potential Impacts:*

Potential temporary impacts on these species are possible during clearing activities. Given the mobile nature of these species it is expected that these species will move away from disturbance into surrounding undisturbed areas.

Trenching for pipeline construction has the potential to impact on individuals of these species through them becoming trapped in open trenches and unable to escape.

#### *Mitigation:*

- Prevent accidental loss or damage to native vegetation, through clear (ie flagging) of the areas to be cleared.
- Allowing fauna access to vegetated areas of the site, through site selection of fencing location aimed at maintaining fauna habitat corridors.
- Open trenches will be constructed with trench ramps and trench plugs to enable fauna to escape. Trenches will be checked for fauna at intervals during the day and first thing in the morning. Trapped fauna will be removed from the trench by trained personnel.
- With the exception of access tracks and roads, the pipeline alignments and effluent outfall area will be rehabilitated and revegetated with vegetation commensurate with the existing environment. Large trees or species with invasive root systems will, however, be excluded from the pipeline easements.
- Provision of a network of reserves totaling 150ha across the Pulp Mill Site, see section 5.9.1.

### 5.11.3 Terrestrial Birds

#### **Wedge-tailed eagle**

A wedge-tailed eagle nest is located approximately 900m from the closest boundary of the solid waste disposal site, well down in a gully and separated by a significant ridgeline.

#### *Potential Impacts:*

Tasmanian wedge-tailed eagles are sensitive to disturbance when nesting and may desert a nest site if disturbance exceeds tolerance levels. Breeding season restrictions are applied to potentially disturbing activities, including forestry, quarry and construction operations, if these activities are to occur within 500m or 1km if the activity is in line of sight of the nest.

No impacts are anticipated on the breeding of this species, given the distance to the nest site (900m) and the nest not being located within line of sight of the Project Area.

Other areas are potentially suitable for foraging, however based on the large territory size impacts on this species are considered unlikely.

#### *Mitigation:*

- Prevent accidental loss or damage to native vegetation and habitat, through clear indication (ie flagging) of the areas to be cleared.
- Allowing fauna access to vegetated areas of the site, through site selection of fencing aimed at maintaining fauna habitat corridors.
- Provision of a network of reserves totaling 150ha across the Pulp Mill Site (see section 5.9.1).
- With the exception of access tracks and roads, the pipeline alignments and effluent outfall area will be rehabilitated and revegetated with vegetation commensurate with the existing environment. Large trees or species with invasive root systems will, however, be excluded from the pipeline easements.
- In the unlikely event that a nest is located during clearing or construction activities operations within 500m or 1km line of sight will stop, with breeding season exclusion buffers applied, between August and January inclusive, and appropriate nest management prescriptions applied in consultation with relative authorities.

#### **Swift parrot**

The swift parrot occurs in the broader Tamar River areas occasionally and is usually not dependant on forests and woodlands in northern Tasmania.

#### *Potential Impacts:*

Approximately 11.4 ha of potential foraging habitat, *E. ovata* forest and woodland, will be impacted by the project. However it is expected that this forest removal will have minimal impact on the species.

#### *Mitigation:*

- Prevent accidental loss or damage to native vegetation and habitat, through clear indication (ie flagging) of the areas to be cleared.
- Provision of offsets for state threatened vegetation communities (*E. ovata* forest and woodland is a state listed threatened vegetation community). An offset that is three

times the area that will be cleared (ie 34.2 ha) is proposed for this vegetation community which will be reserved and protected within the northern region.

### **Masked owl**

Suitable habitat for this species is located within the Project Area.

#### *Potential Impacts:*

Potential impact on this species is through the removal/clearing of potential nesting trees. Micro-siting of the Project Area along the pipeline routes may avoid or reduce impacts.

#### *Mitigation:*

- Prevent accidental loss or damage to native vegetation and habitat, through clear indication (ie flagging) of the areas to be cleared.
- Where practicable and safe to do so large trees with hollows will be maintained adjacent to pipeline routes, with placement of the route to micro-sited avoid large trees.
- A pre-clearing check of trees with nesting hollows will be undertaken by suitably trained personnel for signs of use by species such as the masked owl. If an active nest is located the tree will be maintained and pipeline construction activities delayed until young have fledged.
- Provision of a network of reserves totaling 150ha across the Pulp Mill Site (see section 5.9.1).
- With the exception of access tracks and roads, the pipeline alignments and effluent outfall area will be rehabilitated and revegetated with vegetation commensurate with the existing environment. Large trees or species with invasive root systems will, however, be excluded from the pipeline easements

#### 5.11.4 Invertebrates

No listed invertebrate species are likely to be impacted by the project.

#### 5.11.5 Freshwater Fish

### **Australian Grayling**

Suitable habitat for this species occurs in the Tamar River, although the area within the Tamar River to be disturbed for the water supply pipeline and wharf are very small, and are not in locations which are considered to constitute optimal foraging or breeding habitat for the Australian Grayling. The Australian Grayling spawns in freshwater areas in late spring / early summer, with larvae swept to sea and returned as whitebait 4-5 months later.

#### *Potential Impacts:*

Possible impacts on freshwater fish, including the Australian Grayling, arise from construction of the water supply pipeline and the wharf, in the Tamar River. Construction may result in a loss of fish habitat, the physical change of fish habitats from sediment deposition and loss or degradation of fish intertidal habitat, changes in water quality, indirect impacts on fish food resources, and construction generated underwater noise.

The assessment of construction impacts found that none of these impacts will be significant. In relation to migratory fish in the lower Tamar River, the very short term, intermittent and relatively low to moderate increases in total suspended solids concentration and turbidity are not expected to interrupt fish migration.

Construction will be staged over 12 months – the first 5 months will be largely bulk earthworks, with the remaining 7 months comprising construction of the wharf deck, bridges and mooring. Even if the Australian Grayling's migration run coincides with the construction period, the species is unlikely to be affected by increases in TSS concentrations.

It is also unlikely to be affected by construction-generated noise from wharf construction (the key noise-generating construction activity in the Tamar River). Vibratory pile driving, which precedes hydraulic pile driving and has significantly lower noise-generation (approximately 160dB re 1uPa at 1m), may cause fish to vacate the immediate area of the pile. Acoustic damage to fish is only likely to occur at levels of 208dB or more, which is higher than the noise to be generated by the hydraulic impact hammers (which is expected to be approximately 190dB re 1 uPa at 1m). The acoustic disturbance zone will encompass only a 215m radius of the wharf construction area, which leave 80% of the river cross section available to migrating fish to avoid noise impacts. Free swimming estuarine fish are able to avoid the sound field surrounding pile-driving should the noise levels be perceived as threatening or potentially damaging. Upon cessation of wharf construction activities, displaced fish are expected to return to the wharf area.

*Mitigation:*

- The Project has been designed to avoid impacts on the Australian Grayling, both in the Tamar River, but also in the Pipers River. The first water supply option was abandoned partly due to the impacts on the Australian Grayling in the Pipers River, and the option to take water from the Trevallyn Power Station tailrace was abandoned partly to avoid impacts on the Australian Grayling in the upper reaches of the Tamar River (see section 4.5.1).
- During construction, vibratory hammers, which are not known to cause acoustic damage to fish, will be used to drive the piles to refusal, prior to using hydraulic hammers to proof the piles into bedrock. The hydraulic impact hammer equipment proposed to be used by Gunns is state-of-the-art and has a number of noise reduction measures in-built. Used in conjunction with a monocast nylon hammer noise cushion, impact hammer noise will limit the area of the sound field within which acoustic disturbance to fish may occur (to approximately 215m radius of the pile).
- If pile-driving operations for the wharf construction indicate that there is acoustic damage to fish, bubble curtains may be used to reduce underwater noise.

5.11.6 Marine and Estuarine Species

Potential impact on marine and estuarine species arise from construction of the water supply and effluent pipelines, the wharf in the Tamar River, the installation of the effluent outfall in the marine environment, and from the discharge of treated effluent through the effluent pipeline into the marine environment.

## Construction in the Tamar River

### *Potential Impacts:*

Impacts on the Australian Grayling, a listed threatened species in the Tamar River, is discussed at section 5.11.5 above. Aquatic mammals such as whales, dolphins and seals are not expected to be present in the upper Tamar Estuary, but may be present in the lower Tamar Estuary. Construction may result in temporary and localised deteriorated water quality, possible vessel collisions with fauna and construction generated underwater noise.

The assessment of construction impacts found that none of these impacts would be significant on listed threatened species. Marine mammals which enter the lower Tamar Estuary will have been exposed to pre-existing physical disturbances, in particular noise and visual by boating traffic in the industrialised area of the lower estuary. No significant deterioration of water quality is expected as a result of the effluent and water supply pipeline crossings or the wharf, as the suspended sediment impacts will be localised and temporary. The vessel collision risk for dolphins and seals is considered low, however due to lower manoeuvrability, whales are at greater risk of vessel collision. Vessel speeds will be lower during manoeuvring operations (1-2 knots) and no impacts with any whales have been reported at speeds of up to 4.5 knots.

Pile driving operations for wharf construction by hydraulic impact hammers will be the greatest noise-generating activity, of approximately 190dB re 1uPa at 1m. As acoustic damage to whales is not likely to occur at noise levels below about 230-240dB re 1uPa at 1-2m, acoustic damage to whales caused by pile driving operations is considered unlikely.

Acoustic damage is unlikely to occur in dolphins even in close proximity to the piles (eg within 5m) – indeed dolphins themselves generate echolocation clicks which have high source levels ranging from 220 to 230dB re 1uPa at 1m. Also, given their mobility, dolphins are expected to avoid the direct vicinity of active area pile-driving operations. Acoustic damage to seals is unlikely, as a report indicated that seals were not affected by a sonar operating at a noise level of 232dB re 1uPa at 1m. Acoustic disturbance of whales may occur within 215m of the construction area, but disturbance is unlikely for seals or dolphins. In any event, pile-driving will cease when whales are observed within a 1km safety zone, and seals within a 0.5km safety zone of the noise-generating area.

### *Mitigation:*

- Visual monitoring will be implemented for marine mammals near the construction area to minimise any risk from underwater noise and vessel strike. A 2km radius alert zone for whales will be implemented, with a 1km radius safety zone, within which noise-generating activities will be ceased if a whale approaches.
- A 1km radius alert zone for seals and dolphins will be implemented, with a 0.5km radius safety zone, within which noise-generating activities will be ceased if a seal or dolphin approaches.
- During construction, vibratory hammers will be used to drive the piles to refusal, prior to using hydraulic hammers to proof the piles into bedrock. The hydraulic impact hammer equipment proposed to be used by Gunns is state-of-the-art and has a number of noise reduction measures in-built. Used in conjunction with a monocast nylon hammer noise cushion, impact hammer noise will limit the area of the sound field within which acoustic disturbance may occur.

## **Operation impacts in the Tamar River**

### *Potential Impacts:*

The hydrodynamic modelling shows that only very low concentrations of treated effluent are likely to reach the mouth of the Tamar River, and therefore it is highly unlikely that there will be any impacts from the treated effluent on species in the Tamar River.

## **Construction of the ocean outfall and diffuser**

### *Potential Impacts:*

Construction of the ocean outfall pipeline and diffuser may result in changes to water quality, vessel-marine mammal collision and construction generated underwater noise.

The assessment of construction impacts found that none of these impacts would be significant on listed threatened species. A detailed description of the assessment of construction impacts on the marine environment generally is at section 6.5 of this document.

In summary, the assessment found that noise from construction will have a highly localised but temporary impact on marine fish and that acoustic damage to fish, turtles, dolphins, seals and large cetaceans is most unlikely. Acoustic disturbance may occur in fish, turtles and whales. However the zone of potential avoidance for fish and turtles is no more than a 25 metre radius from the noise-generating activity. Gunns will undertake visual monitoring for whales to avoid risks from noise behavioural disturbance and vessel strike.

### *Mitigation:*

- Visual monitoring will be implemented for marine mammals near the construction area to minimise any risk from underwater noise and vessel strike. A 1km radius alert zone for whales will be implemented, with a 0.5km radius safety zone, within which noise-generating activities will be ceased if a whale approaches.

## **Operation of the ocean outfall**

### *Potential Impacts:*

The discharge of treated effluent may impact on listed threatened species through changes to their habitat or diet.

An assessment of the impacts of the treated effluent on water quality, sediments, fish and invertebrates found that the primary productivity of the surrounding ecosystem will be unaltered. A detailed description of the assessment of operation impacts on the marine environment generally is at section 6.4 of this document.

The assessment shows that the treated effluent will not alter the existing primary productivity of the surrounding ecosystem, and will not cause direct toxicity to organisms. The assessment of the impact of treated effluent on listed threatened species was undertaken, and none of the listed threatened species were found to be especially responsive to any of the constituents in the proposed effluent. Therefore it is unlikely that any threatened species will be adversely affected by the discharge of effluent.

As none of the listed threatened species are expected to spend a significant length of their lives in the vicinity of the ocean outfall, a species of conservation significance was chosen as an indicator species in an assessment of the impact of dioxins on mammals. A specific assessment of the Australian fur seal (listed marine species), of which there is a colony approximately 12km from the diffuser location, was undertaken as a key species in the assessment of the impacts of dioxins in the treated effluent. The Australian fur seal is at the top of the food chain, is relatively sedentary and spends the majority of its reproductive life in the area and will therefore be more highly exposed to the effluent constituents through its diet. The dioxin assessment found that adverse effects are not anticipated. Further information about the dioxin assessment is located at section 6.4.5.

A dioxin assessment was also undertaken on the Little Penguin (listed marine species) and the White-bellied sea eagle (listed threatened species). The Little Penguin was selected because it feeds on fish and squid that eat invertebrates which are in contact with sediment, and sea eagles are at the top of the food chain and theoretically have the potential to accumulate higher body burdens of dioxins than other birds. The assessment found that adverse impact are not anticipated. Further information about the dioxin assessment is located at section 6.4.5.

As the assessment shows that there are no acute or sub-lethal impacts from treated effluent diluted 10 times, and no adverse impacts from treated effluent diluted 100 times (which occurs within 70-100m of the diffuser), there is unlikely to be a significant impact on any listed threatened species.

*Mitigation:*

- Treated effluent levels will be measured and monitored in the effluent treatment plant prior to its disposal via the effluent pipeline and diffuser.
- Treated effluent dispersion monitoring, and monitoring of the long-term impacts of treated effluent on the marine environment will be undertaken.

5.11.7 Marine Birds

Potential impacts and mitigation for these species are covered in section 5.12 Listed Marine and Migratory Species.

5.12 Listed Marine and Migratory Species

5.12.1 Avifauna

Seventy four species listed as marine and/or migratory are predicted to occur or have been recorded within the study area.

*Potential Impacts:*

No significant habitat for these species will be removed or impacted due to the construction of the project.

The installation of the effluent pipeline on the shoreline on the northern coast of Tasmania has the potential to temporarily impact breeding shorebirds if they are utilising

the area at the time of construction. Due to engineering and the need to operate when the ocean conditions are favourable, construction activities for the outfall are anticipated to occur during the drier and more settled times of the year, December through to April. This coincides with the breeding season for many shorebirds. It is considered unlikely, however, given the exposed nature of the shoreline where the effluent pipeline crosses the shore that birds will be utilising the area and there are no previously recorded localities of breeding birds in the area.

A specific literature review of the white-bellied sea eagle and little penguin was undertaken as sentinel species in the assessment of the impacts of the constituents of effluent, including dioxins, which found that adverse effects are not anticipated. As impacts were not expected in these species, no adverse impacts are anticipated in other species.

A white bellied sea eagle nest has been recorded approximately 400m from the water supply pipeline route near Dilston. While this species is not as susceptible to disturbance during nesting as the wedge-tailed eagle, noise and activity from construction activities have the potential to disturb breeding birds. Breeding season restrictions are applied to potentially disturbing activities, including forestry, quarry and construction operations, if these activities are to occur within 500m or 1km if the activity is in line of sight of the nest.

As construction activities for the pipeline will occur within 400m of the nest site, breeding season exclusion areas will be required.

*Mitigation:*

- A pre-construction check of the shoreline for breeding shorebirds will be undertaken for a distance of 200m on either side of the construction zone. In the event that a nest is located they will be clearly marked and construction activities kept on the other side of the pipeline alignment from the breeding birds.
- The beach profile will be restored to its original shape after construction.
- To ensure no disturbance to breeding sea eagles at the recorded nest site. No construction activities on the water supply pipeline will be undertaken within 500m or 1km line of sight of the nest site during the breeding season (August to January inclusive), if the nest is active.

5.12.2 Marine-based migratory species

All of the marine-based migratory species are also listed threatened species under the EPBC Act. Impacts and mitigation measures for these species are listed under Marine Species section 5.11.6.

5.13 Refinement of the Project Design

Refinement of the project design has occurred throughout the planning process in response to natural and cultural values located during field surveys and assessments.

One such refinement relevant to the management and mitigation of EPBC Act listed threatened species is the redesigning of the effluent pipeline construction methodology

to avoid a significant population of the listed threatened species *Xanthorrhoea bracteata* and *X. arenaria* (collectively referred to as *Xanthorrhoea aff. bracteata*).

*Xanthorrhoea aff. bracteata* occurs in nine separate patches on at least five of the east-west orientated, stabilised dunes which occur at the effluent outfall area. These areas contain significant populations of the species conservatively estimated to be in excess of 1000 plants. Initial planning for the construction of the effluent pipeline outfall was planned to involve the excavation of the northern most dune to enable the pipeline to be pulled offshore. This would have resulted in significant disturbance to a large number of individuals of this species.

Subsequent to survey and location of this species engineering options were sought with the aim of reducing or minimising this impact. As a result, and at considerable additional cost, boring will be undertaken under the dune where the *X. aff. bracteata* is located to completely prevent disturbance. In addition the access track to this site has been specifically located to avoid all localities of the species. Consequently due to this refinement there will be no direct impacts of this species at the effluent pipeline outfall site.

#### 5.14 General impacts construction and operation

##### 5.14.1 Dust

The air quality assessment identified that dust will be the main pollutant arising from the construction of the pulp mill. Dust suppression measures are proposed to be implemented as part of the environmental management plan for the project. Provided these requirements are complied with, and based on the conservative modeling assumptions used in the construction air modeling assessment, it was concluded that dust emissions (modeled as PM10) would not exceed the design criterion prescribed by the *Environmental Protection Policy (Air Quality) 2004* (Air Quality EPP) at any sensitive receptors.

Research suggests that high levels of airborne dust particles may inhibit plant photosynthesis and potentially negatively influence the reproductive capacity of certain plant species. There is therefore potential for a negative impact on plant species within the vicinity (<100m) of the construction area.

The construction methodology, ie boring, to be utilised in the immediate vicinity of the only located listed threatened flora species *Xanthorrhoea aff. bracteata* is expected to result in limited dust emissions and therefore minimal impact on the species.

##### 5.14.2 Terrestrial Noise

Noise can impact fauna by impeding communication, masking the sounds of predators and increasing stress, and in the extreme case cause hearing loss. Impacts vary between species and individuals. Behavioural changes caused by noise may alter survival and reproduction due to relocation from favourable habitat at the noise source, and change in time spent feeding. However, the nature of the Project Area and area surrounding is such that if noise disturbance causes relocation, there is surrounding habitat of similar character.

Anecdotal evidence from species observations around the existing chip mills, directly adjacent to the Pulp Mill Site, suggests that many species will habituate. A large range of mammal, bird and reptile species have been observed within the chip mill site.

It is expected that the noise from construction and operation of the pulp mill will cause temporary impact to fauna. No significant breeding or foraging habitat for any EPBC Act listed species has been identified within the Pulp Mill Site and as a consequence it is not expected that any species will be significantly effected by noise at the site.

Further information on terrestrial noise can be found at [http://www.gunnspulpmill.com.au/iis/V9/V9\\_A18.pdf](http://www.gunnspulpmill.com.au/iis/V9/V9_A18.pdf).

The underwater noise impacts associated with construction are assessed in sections 5.11., 5.11.6 and 6.5 of this document.

#### 5.14.3 Air Emissions

Air emissions are principally regulated by Tasmanian laws and policies, and are not directly regulated by the EPBC Act. While exhaustive and thorough air quality investigations have been undertaken on behalf of Gunns for the purpose of complying with Tasmanian environmental assessment requirements, a brief overview of air quality impacts are include here for completeness.

The air quality assessment identified that dust will be the main pollutant arising from the construction of the pulp mill (see section 5.14.1). Operational discharges to the atmosphere are principally comprised of nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), particulate matter, inorganic chlorinated compounds, total reduced sulphur (TRS) and very small amounts of dioxins. The emission of these and other compounds were modeled by two firms of consultants by using The Air Pollution Model, or TAPM, which has been developed by the CSIRO. The modeling results were then validated against 12 months of air quality data recorded from an air quality monitoring station installed by Gunns at Rowella.

The general conclusions from the operational air quality assessment are:

- emissions from the pulp mill will have a very small impact on the air quality indicators that are currently measured at Ti Tree Bend and Rowella;
- the assimilative capacity of the Tamar Valley airshed will not be compromised by emissions from the pulp mill, and that the cumulative emission of constituents to the atmosphere from the pulp mill and other industries in Bell Bay fall well below the criteria specified in the Air Quality EPP;
- the effects of the pulp mill emissions on airborne particle (and other pollutants) levels in Launceston will be very small; and
- odorous emissions will meet the stringent TRS guidelines contained in the 'Recommended environmental emission limit guidelines for any new bleached kraft pulp mill in Tasmania' (2004) (Pulp Mill Guidelines) in populated areas. The TRS guideline value will only be exceeded very rarely (between 11 and 50 years), mainly over the Tamar estuary and the hills to the east of the pulp mill site.

The predicted ground level concentrations for dioxins emitted from the pulp mill were predicted to be two or more orders of magnitude lower than the criterion prescribed by the Air Quality EPP.

No impacts on EPBC Act listed flora or fauna is expected from air emissions.

Further information on air emissions can be found at:

[http://www.gunnspulpmill.com.au/iis/supp/robin\\_ormerod\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/robin_ormerod_ews.pdf).

#### 5.14.4 Effluent composition

Detailed information on the effluent composition and potential impacts on the marine environment is included in section 6.4. In summary, the treated effluent is not expected to have adverse impacts on the marine environment, including EPBC Act listed species and the Commonwealth marine area.

### 5.15 Potential indirect impacts and management

#### 5.15.1 Introduction and spread of *Phytophthora cinnamomi*

*Phytophthora cinnamomi* is an aggressive, microscopic, lethal pathogen that causes the roots of susceptible species to rot. *Xanthorrhoea aff. bracteata* is highly susceptible to infection by *Phytophthora cinnamomi*. Introduction and spread can be accelerated in a number of ways, including the introduction of infected soil.

Best practice guidelines will be adopted, with application of the *Phytophthora cinnamomi* Management Guidelines produced by Tasmanian Department of Primary Industries and Water. These Management Guidelines include a series of measures prevent the introduction and minimise the spread of this pathogen, including vehicle washdown hygiene procedures to ensure no relocation of potentially infected soil.

Due to the implementation of hygiene procedures, consistent with best practice guidelines, no impacts are expected from *Phytophthora cinnamomi*.

#### 5.15.2 Introduction and spread of environmental weeds

Numerous weed species have been recorded within the Project Area, with the highest densities at the Workers Accommodation Facility site and at various locations along the water and effluent pipeline routes. Vehicle washdown hygiene procedures, detailed previously for *Phytophthora cinnamomi* management will minimise the spread of weeds. In addition the rehabilitation procedures for the pipeline routes will include localised weed management prescriptions, where required.

### 5.16 Key findings and commitments

The construction and operation of the pulp mill will not result in significant impacts on species listed as Threatened, Marine or Migratory under the EPBC Act.

Key mitigation measures to prevent and minimise impacts of construction and operation activities on species listed under the EPBC Act include:

#### 5.16.1 Land-based construction

##### **Construction All Sites**

- Prevent accidental loss or damage to native vegetation, through clear indication (ie flagging) of the areas to be cleared.
- Preventing the spread and reducing the impact of *Phytophthora cinnamomi* through application of State Guidelines for *Phytophthora cinnamomi* management.
- Allowing fauna access to vegetated areas of the site, through site selection of fencing location aimed at maintaining fauna habitat corridors.
- Open trenches will be constructed with trench ramps and trench plugs to enable fauna to escape. Trenches will be checked for fauna at intervals during the day and first thing in the morning. Trapped fauna will be removed from the trench by trained personnel.
- Provision of offsets for state threatened vegetation communities to maintain potential foraging habitat for the swift parrot (*E. ovata* forest and woodland is a state listed threatened vegetation community). A three times offset is proposed for this vegetation community, ie 34.2 ha will be reserved and protected within the northern region.
- Where practicable and safe to do so large trees with hollows suitable for use by species such as the masked owl will be maintained adjacent to pipeline routes, with placement of the route to micro-sited avoid large trees.
- A pre-clearing check of trees with nesting hollows will be undertaken by suitably trained personnel for signs of use by species such as the masked owl. If an active nest is located the tree will be maintained and pipeline construction activities delayed until young have fledged.
- In the unlikely event that an eagle nest is located during clearing or construction activities operations within 500m or 1km line of sight will stop, with breeding season exclusion buffers applied, between August and January inclusive, and appropriate nest management prescriptions applied in consultation with relative authorities.

##### **Pulp Mill Site**

- Provision of a network of reserves totaling 150ha across the Pulp Mill Site.

##### **Water Supply Pipeline, Effluent Pipeline and Outfall Site**

- To ensure no disturbance to breeding white bellied sea eagles at the recorded nest site. No construction activities on the water supply pipeline will be undertaken within 500m or 1km line of sight of the nest site during the breeding season (August to January inclusive), if the nest is active.
- A suitably qualified and/or trained person will mark out on the ground the location of the *Xanthorrhoea aff. bracteata* on the effluent pipeline route. This site will be protected from disturbance, through micro-siting of the pipeline.
- Micro-siting and tunneling of the effluent pipeline at the outfall site will be undertaken to prevent impacts on *Xanthorrhoea aff. bracteata*.
- A suitably qualified and/or trained person will assess areas of potentially suitable habitat for the green and gold frog prior to clearing activities. Where practicable, micro-siting of the pipeline disturbance area will prevent impacts on areas of potentially suitable habitat.

- A pre-construction check of the shoreline at the effluent outfall site for breeding shorebirds will be undertaken for a distance of 200m on either side of the construction zone. In the event that a nest is located they will be clearly marked and construction activities kept on the other side of the pipeline alignment from the breeding birds.
- The beach profile will be restored to its original shape after construction.
- With the exception of access tracks and roads, the pipeline alignments and effluent outfall area will be rehabilitated and revegetated with vegetation commensurate with the existing environment. Large trees or species with invasive root systems will, however, be excluded from the pipeline easements.

#### 5.16.2 Ocean and Tamar River based Construction Activities

- If impact pile-driving operations for the wharf construction indicate that there is acoustic damage to fish, bubble curtains may be used to reduce underwater noise.
- For construction activities in the Tamar River visual monitoring will be implemented for marine mammals near the construction area to minimise any risk from underwater noise and vessel strike. A 2km radius alert zone for whales will be implemented, with a 1km radius safety zone, within which noise-generating activities will be ceased if a whale approaches. A reason for not halting construction activities for whales in the alert zone is that continuing construction noise may ensure whales move out of the area rather than encroaching the safety zone. If a whale approaches within 500m of a construction vessel, the vessel will reduce speed or stop to avoid potential for collision.
- For construction activities in the Tamar River a 1km radius alert zone for seals and dolphins will be implemented, with a 0.5km radius safety zone, within which noise-generating activities will be ceased if a seal or dolphin approaches.
- For construction activities at the ocean outfall site a visual monitoring will be implemented for marine mammals near the construction area to minimise any risk from underwater noise and vessel strike. A 1km radius alert zone for whales will be implemented, with a 0.5km radius safety zone, within which noise-generating activities will be ceased if a whale approaches. The 1km radius alert zone is a reduced distance from the typical 3km visual zone typically applied to marine seismic surveying, due to the more benign nature of the construction noise required for the Project.

#### 5.16.3 Operational Activities

- Key constituent concentrations within the treated effluent will be measured and monitored in the effluent treatment plant prior to its disposal via the effluent pipeline and diffuser.
- Treated effluent dispersion monitoring, and monitoring of the long-term impacts of treated effluent on the marine environment will be undertaken.

## 6. The Commonwealth Marine Area

### 6.1 Overview

The Bell Bay Pulp Mill may impact on Commonwealth marine areas through:

- the construction and installation of an approximately 2.7km long effluent outfall pipeline and 200m-long diffuser, and
- the discharge of treated effluent through the effluent outfall pipeline and diffuser.

The end of the diffuser is located approximately 2.5km landward from the boundary of the Commonwealth marine area. A map detailing the location of the effluent pipeline, diffuser and the Commonwealth marine area is included in attachment 4.

A thorough assessment of the possible construction and operational impacts on the marine environment has been undertaken. The assessment of construction impacts shows that impacts on the Commonwealth marine area are localised, short term and not significant.

For the operation of the pulp mill, hydrodynamic studies undertaken to assess the dispersal of the treated effluent indicate that the treated effluent will be highly diluted when it reaches the Commonwealth marine area – the minimum dilution is predicted to be 9,000 times the discharge concentration (that is, 1/9,000th of its discharge concentration, or 1:9,000 dilution). The median dilution (occurring 50% of the time) is predicted to be at least 16,000 times the discharge concentration. As the marine impact assessment shows that there is no significant impact on marine flora, fauna, sediment or water quality within a 1:100 dilution body of water, it is expected that there will be no significant impact on the Commonwealth marine area.

### 6.2 Methodology

A number of studies were commissioned to assess issues arising from the construction and operation of the Project on Commonwealth marine areas, including:

- to prevent significant impacts from the construction of the effluent pipeline;
- to protect the ecosystem in the vicinity of the diffuser from significant impacts;
- to protect listed threatened and migratory species from negative impacts from treated effluent;
- to protect the ecosystem in the area of the diffuser from acute and sub-lethal impacts from the treated effluent discharge;
- to ensure acceptable levels of dispersion of the treated effluent from the diffuser; and
- to ensure interim water quality objectives are met within an acceptable distance of the diffuser and recommend an acceptable sized mixing zone.

The expert studies include:

#### Surveys

- A marine biological and pollutant survey at the proposed pulp mill site, prepared by Aquenal and presented in Appendix 24, Volume 11 of the Draft IIS [http://www.gunnspulpmill.com.au/iis/V11/V11\\_A24.pdf](http://www.gunnspulpmill.com.au/iis/V11/V11_A24.pdf)
- Two pre-operational marine ecological surveys, prepared by Aquenal, the second of which is presented in Appendix 27 of Volume 11 of the Draft IIS [http://www.gunnspulpmill.com.au/iis/V11/V11\\_A27.pdf](http://www.gunnspulpmill.com.au/iis/V11/V11_A27.pdf)

#### Modelling

- Three hydrodynamic modelling assessments, prepared by GHD and presented in Appendix 63 of Volume 18 of the Draft IIS [http://www.gunnspulpmill.com.au/iis/V18/V18\\_A63.pdf](http://www.gunnspulpmill.com.au/iis/V18/V18_A63.pdf) and Ross Fryar's witness statement in the Supplementary Information [http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_ews.pdf) and [http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_att\\_2.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_att_2.pdf) and [http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_att\\_3.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_att_3.pdf)

#### Effluent toxicity

- Two toxicity assessments of effluent samples prepared by Ecotox and presented at Appendices 58 and 59 of Volume 17 of the Draft IIS [http://www.gunnspulpmill.com.au/iis/V17/V17\\_A58.pdf](http://www.gunnspulpmill.com.au/iis/V17/V17_A58.pdf) and [http://www.gunnspulpmill.com.au/iis/V17/V17\\_A59.pdf](http://www.gunnspulpmill.com.au/iis/V17/V17_A59.pdf)
- Two reports on the impacts of chlorate on algae species prepared by Ecotox and one presented at Appendix 60 of Volume 17 of the Draft IIS and the second presented at Attachment 2 to Rick Krasso's witness statement in the Supplementary Information [http://www.gunnspulpmill.com.au/iis/V17/V17\\_A60.pdf](http://www.gunnspulpmill.com.au/iis/V17/V17_A60.pdf) and [http://www.gunnspulpmill.com.au/iis/supp/rick\\_krasso\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/rick_krasso_ews.pdf)

#### Construction methodology

- Marine construction methodology report prepared by Atteris and presented in Eric Jas' witness statement in the Supplementary Information [http://www.gunnspulpmill.com.au/iis/supp/eric\\_jas\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/eric_jas_ews.pdf)

#### Impact assessment on marine environment and humans

- Human health risk assessment of Bell Bay Pulp Mill Effluent, prepared by Toxikos and presented in Appendix 22 of Volume 10 of the Draft IIS [http://www.gunnspulpmill.com.au/iis/V10/V10\\_A22.pdf](http://www.gunnspulpmill.com.au/iis/V10/V10_A22.pdf)
- Commentary on Bell Bay Effluent and impact on nearby seal colonies Appendix 23 Volume 10 of the Draft IIS [http://www.gunnspulpmill.com.au/iis/V10/V10\\_A23.pdf](http://www.gunnspulpmill.com.au/iis/V10/V10_A23.pdf)
- Ecotoxicological marine impact assessment prepared by Toxikos and presented at Attachment 2 of Roger Drew's witness statement in the Supplementary Information [http://www.gunnspulpmill.com.au/iis/supp/roger\\_drew\\_att\\_2.pdf](http://www.gunnspulpmill.com.au/iis/supp/roger_drew_att_2.pdf)

- Marine construction and marine operational impact assessment prepared by EnviroGulf Consulting and presented at Appendices 5 & 6 of David Balloch's witness statement in the Supplementary Information [http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_5.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_5.pdf) and [http://www.gunnspulpmill.com.au/iis/supp/david\\_balloch\\_app\\_6.pdf](http://www.gunnspulpmill.com.au/iis/supp/david_balloch_app_6.pdf)

A flowchart of the studies undertaken, and their relationship to other studies, is presented in Figure 6-1.

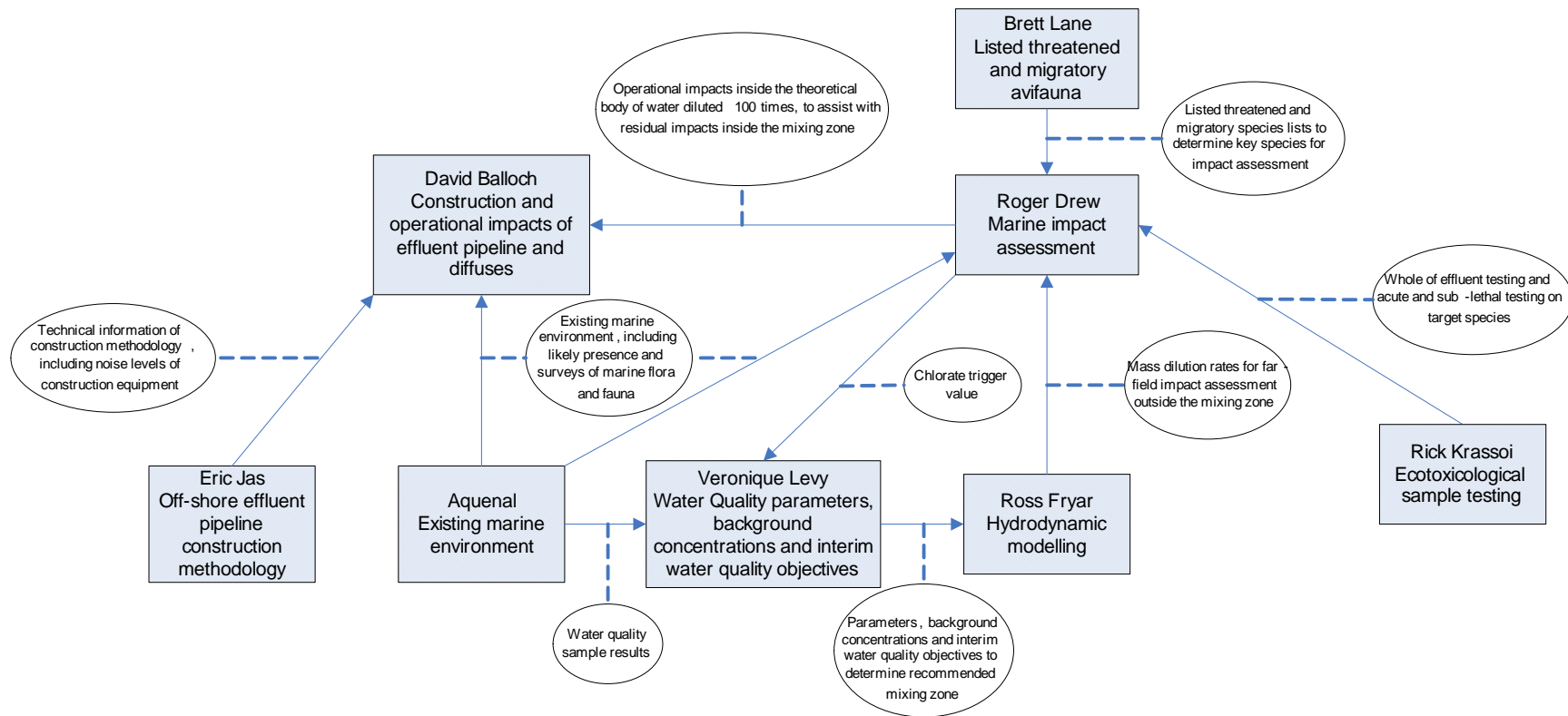


Figure 6-1: Commonwealth marine area assessment flowchart.

## 6.3 Existing Environment

### 6.3.1 Nearshore currents at the diffuser location

Bass Strait is a high energy hydrodynamic environment and storms are frequent. The wave climate offshore of Five Mile Bluff and in the vicinity of the marine outfall reflects predominantly local, wave-generated waves. The average tidal-induced current is 0.08m/s offshore of Five Mile Bluff, with a superimposed wave-driven current for much of the time.

Near the seabed in the vicinity of the diffuser, the current velocity is estimated at 0.03m/s. The area is also affected by wave-induced orbital velocities, which attenuate with depth. Thus during storms, significant wave-induced orbital velocities may increase water velocities near the seabed.

### 6.3.2 Existing background conditions

Water, sediment and biota samples were taken to determine pollutant levels in the vicinity of the outfall site.

Water samples were assessed against the ANZECC & ARMCANZ guidelines for Marine Waters. The guidelines do not signify threshold levels of pollution since there is no certainty that significant impacts will occur above the guidelines. Instead, the guideline provides certainty that there will be no significant impact on water resource values if the guideline is achieved. Generally, the 95% level of species protection is used because a 95% level of protection should be sufficient to protect the ecosystem provided keystone species are considered. Significant conservatism is embedded in the derivation of the guidelines, which is why they are not used as fine dividing lines between no impact and an adverse impact – instead they are used as trigger values for further investigation.

However, in assessing water quality, 99% level of species protection was used, which represents the most conservative of the ANZECC/ARMCANZ guidelines produced. Levels of copper and zinc exceeded the guidelines for protection of 99% of species in aquatic ecosystems, but only in 6 and 5 samples respectively of the 16 samples taken.

Levels of aluminium, iron and zinc exceeded guideline values for protection of aquaculture and seafood consumption, which for zinc is even more conservative than the 99% level of species protection in the ANZECC/ARMCANZ guidelines. The zinc aquaculture and seafood consumption guideline was exceeded in 11 of the 16 samples collected. For aluminium, 6 of 16 samples exceeded the guideline, whereas for iron only 3 of 16 samples exceeded the guideline.

Boron levels exceeded the guideline for recreational water quality and were in the range of 5-6 times higher than the recreational guideline value. The detection level for cobalt and chromium was above the 99% guideline values, but did not exceed the 95% level of species protection.

Sediment samples were assessed against the ANZECC & ARMCANZ guidelines as there are few reliable data on sediment toxicity for Australian environments from which independent sediment quality guidelines can be derived. Levels of cadmium and arsenic

exceeded the sediment quality guideline. Only one sample of cadmium exceeded the guideline, and the guideline was only slightly exceeded. Arsenic values were elevated on the western side of the diffuser location, which may indicate some elevated background levels of contaminants.

Biota samples were assessed against the Joint Australia New Zealand Food Standards Code, and levels of zinc in several fish exceeded the median and 90% percentile 'Generally Expected Levels'. However, some of the Generally Expected Levels, including the zinc level, did not incorporate Tasmanian data and therefore may not be entirely appropriate to be applied to the region.

These results, and pre-operational background monitoring results, will be used to confirm background concentrations of all relevant pollutants in the water quality objectives set under the Tasmanian State Policy on Water Quality Management, described further at section 6.4.3 below.

### 6.3.3 Marine habitats and biota

The species discussed in this section are the species identified in the marine surveys. During the marine surveys undertaken for Gunns, no EPBC Act listed threatened or migratory species were identified.

The area in the vicinity of the effluent pipeline and diffuser forms part of the Boags marine bioregion. A number of estuaries, including the Tamar River Estuary, enter the marine environment near the diffuser location and provide nursery and breeding grounds for migratory fish.

Along the pipeline route, the seabed is sandy, low profile reef, medium profile reef and mixed sand/low profile reef. Plant communities consists mainly of algae with some limited areas of seagrass, with the dominant algal species recorded being red foliose algae (Rhodophyta), followed by green algae (Chlorophyta) and isolated brown algae (Phaeophyta).

Sponges were also recorded within a 1km radius of the diffuser, with highest cover recorded being ascidian *Polycarpa viridus*.

The intertidal zone species close to the shore crossing site include polychaetes, molluscs and crustaceans, with amphipods dominating the biota.

A total of 109 invertebrate families were recorded within a 1km radius of the diffuser location. The Gunns Screw Shell (*Gazameda gunnii*), a species listed as vulnerable under the *Threatened Species Protection Act 1995* (Tas), was found within a 1km radius of the diffuser location. No other benthic infauna species identified from the survey are listed as threatened or protected.

Fish likely to occur in the area of the ocean outfall include a mixture of pelagic, reef and demersal fish. While the outfall site is located approximately 15km from the nearest estuary, it is possible that some migratory fish species that move between freshwater and the ocean also occur periodically in the area.

#### 6.3.4 Threatened species

A description of the listed threatened and migratory species in the vicinity of the Project Area is included in section 5.

#### 6.3.5 Other species of conservation significance

The Gunns screw shell (*Gazameda gunnii*) is present on sandy seabed in the vicinity of the outfall, and is listed as threatened under the *Threatened Species Protection Act 1995* (Tas).

The Australian fur seal (*Arctocephalus pusillus*) is not protected under Tasmanian legislation or the EPBC Act but is considered of conservation significance. A colony of Australian fur seal is located on Tenth Island, which is approximately 12km from the diffuser location.

There are a number of species protected under the *Living Marine Resources Management Act 1995* (Tas) which occur in northern Tasmania, including 10 species of keyhole limpets of the superfamily Fissurellacea, 4 species of limpets of the superfamily Patellacea, 3 species of pulmonate limpets and siphons of the superfamily Siphonariacea, 19 species of pipefishes, pipehorses, seahorses and seadragons of the family Syngnathidae, the Australian handfish (*Brachionichthys* sp. 2), a many-rayed threefin (*Forsterygion varium*) and a Basking Shark (*Cetorhinus maximus*).

#### 6.3.6 Commercial and recreational fisheries

There is very little commercial fishing in the vicinity of the outfall.

The only nearshore commercial fishery operating in the vicinity of the outfall is seasonal beach seining for migrating Australian salmon at the beaches either side of Five Mile Bluff and Stony Head.

There are no trawling grounds or aquaculture sites in the vicinity of the outfall.

#### 6.3.7 Marine and protected areas

There are no marine parks or conservation areas in the vicinity of the outfall. The nearest conservation area is the Tenth Island Nature Reserve located approximately 12km to the east of the outfall. This Reserve supports a breeding colony of the Australia fur seal (*Arctocephalus pusillus doriferus*) of between 500 – 750 individuals.

There is a Shark Refuge in the Tamar River between Low Head and West Head in the north, and to the end of the estuary at Launceston in the south. Within the Shark Refuge, there are restrictions on fishing activities.

#### 6.3.8 Port/River Operations

The Port of Launceston is located along the northern reaches of the Tamar River at Bell Bay and is Tasmania's largest international port. It handled over 5.25 million mass tonnes of cargo in 2002/2003, an increase of 12% on the previous year.

The existing Gunns Tamar woodchip mills use two active berths to load export woodchips. Ships are loaded by conveyor feeding directly from the woodchip mill. The Tamar woodchip facility has exported up to 2.6 million GMT of woodchips per annum. Gunns conducts periodic surveys of the riverbed adjacent to the berths. A recent survey indicated that the wharf and chipmill operations do not have a significant negative impact on the macrobenthic communities in the vicinity.

## 6.4 Potential Impacts

### 6.4.1 Mill treated effluent characteristics

In addition to the treated effluent from the effluent treatment plant, both chip mill effluent and stormwater will be discharged from the ocean outfall. On an average monthly basis, approximately 64,000 tonnes/day of treated effluent will be discharged from the ocean outfall (not including stormwater (designed for the 1 in 10 year flood of 13280kl/d) and effluent from the chip mill (based on current data, designed at 2400kl/d)).

The key parameters for measuring pulp mill performance, and the monthly average discharge limits of treated effluent at the point of discharge, are presented in table 6-1.

**Table 6-1: Discharge limits of treated effluent at point of discharge.**

Parameter	Effluent load			Effluent concentration (mg/L bar Ph and colour)		
	Kg/ADt	Kg/d	t/d	Mean	Min	Max
pH (pH units)	0.41	-	-	6.5	6.0	8.5
TDS	38.5	121,009	121	2,253	1,800	2,600
TSS	0.41	1,275	1.3	20	5	30
BOD5	0.22	688	0.69	11	5	30
COD	0.9	23,010	23	466	220	650
AOX	0.14	436	0.44	6.8	4.0	9.0
Chlorate	0.19	119	0.119	1.9	1.0	3.7
Colour (mg Pt/L)	10	31,429	31.4	493	400	650
Total nitrogen	0.08	255	65	2.5	1	5
Nitrates	-	-	-	0.98	0.49	1.93
Nitrites	-	-	-	0	0	0.02
Ammonia	-	-	-	0.02	0.01	0.05
Organic nitrogen	-	-	-	1.5	0.5	3.0
Total Phosphorus (P)	0.02	51	30	0.8	0.5	1.8
Inorganic P	-	-	-	0.50	0.3	1.0
Organic P	-	-	-	0.30	0.2	0.8
PCDD/PCDF	< LOR	< LOR	< LOR	-	-	-

The Bell Bay Pulp Mill effluent key parameter concentrations are lower than or meet discharge limits under the emission guidelines, the US EPA guidelines and EU/IPPC guidelines, and are similar to or lower than discharges at other modern pulp mills. Further information about effluent treatment and quality can be found at [http://www.gunnspulpmill.com.au/iis/supp/hannu\\_jappinen\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/hannu_jappinen_ews.pdf)

As discussed at Section 6.4.6, the treated effluent is not toxic to listed threatened or migratory species, and will not have a significant impact on the Commonwealth marine area.

The treated effluent is a similar colour to weak tea, and has a low density and lower salinity than seawater. As a result, it will create a positively buoyant plume that will rise rapidly to the sea surface. Once at the surface, the plume disperses laterally in the direction of superimposed surface currents, and any fine particles in the treated effluent will slowly settle over a wide area (conservatively estimated to be 10km<sup>2</sup>). While some of the settling particles will reach the Commonwealth marine area, the effluent will be so dilute, and the settling rates are predicted to be so small, that no significant impact is expected on Commonwealth marine areas.

#### 6.4.2 Hydrodynamic modelling of treated effluent discharges

Hydrodynamic modelling was undertaken to predict the dispersion and dilution of effluent after its release from the outfall. The model encompasses all of Bass Strait, and is conservative because it does not model the mixing force of waves or the decay of effluent constituents in the marine environment.

While the diffuser will release the effluent on the seabed approximately 26m below sea level, the model simulates the release of the effluent at the surface level to best represent the buoyancy of the effluent.

The model represents the wind, tide and currents in Bass Strait, and takes account of background concentrations of pollutants already in Bass Strait.

Further information on the hydrodynamic modelling can be found at:  
[http://www.gunnspulpmill.com.au/iis/supp/ross\\_fryar\\_ews.pdf](http://www.gunnspulpmill.com.au/iis/supp/ross_fryar_ews.pdf).

#### 6.4.3 Compliance with water quality standards

Interim water quality trigger values have been calculated using the processes outlined by ANZECC & ARMCANZ guidelines to define the extent of a 'mixing zone'.

The Tasmanian State Policy on Water Quality Management defines a 'mixing zone' as an area of receiving waters around a point of discharge within which it is recognised that the water quality trigger values for the receiving waters may not be achieved. Outside the 'mixing zone', it is expected that the low concentrations of diluted effluent constituents will not cause chronic or sub-lethal toxicity to living organisms in the local ecosystem.

The recommended mixing zone is presented as a range – between 500m x 500m and 800m x 800m, depending on the assumed background concentration of chlorate in the receiving waters.

#### 6.4.4 Accumulation and dispersion of pollutants

The hydrodynamic model results indicate that effluent concentration levels reach equilibrium after 30 days, and that no increases in pollutant concentrations occur after 30 days. This means that the effluent concentrations in Bass Strait do not increase on the effluent concentrations after 30 days of discharge.

The modelling indicates effluent outside the mixing zone is highly diluted, and the dispersing treated effluent plumes tend to be transported along the northern Tasmanian coast (in both directions) and not directly out to sea and Commonwealth waters. Although the diluted effluent plumes are transported along the coast, effluent dilutions are still very high.

For example, at Five Mile Bluff, the predicted minimum dilution (which is the 'worst case' showing maximum predicted effluent concentrations at a specific location) is between 3,000 to 5,000 times the discharge flow rate. The median dilution (achieved for 50% of the time) is between 16,000 to 17,000 times the discharge concentration.

In the medium and longer term, the dispersing diluted treated effluent will reach offshore Bass Strait and Commonwealth waters, albeit at very high dilutions. For example, at the boundary of Commonwealth waters, the predicted minimum dilution is between 9,000 to 10,000 times the discharge concentration. The median dilution is greater than 16,000 times the discharge concentration.

An assessment of discharged particle components of the treated effluent found the particles are very fine and have low settling velocities. The effluent treatment plant is designed to capture suspended solids that have a particle settling rate of more than 0.5m/hr. The total suspended solids released to the marine environment are primarily solids (principally live and dead bacteria but also very fine lignin fibres). The average particle size diameter is less than 50 micron.

The modelling estimated that particulates might settle to a depth of 0.047mm/year over the seabed. However, this estimate is conservative, as it does not account for the decay of the organic particulate matter, the likely slower settling rates than used in the calculations, nor removal of the particulates by organism consumption and burial.

The issue of substances adsorbed to particulates and potentially affecting marine organisms in sediment has been addressed in the marine impact assessment. Dioxins are arguably the substances of most concern and toxicity. For these substances a specific assessment was undertaken of the sediment concentrations of dioxins assuming the concentration in water was 1% of that in the discharged effluent. Importantly the assessment was undertaken assuming the water concentration was at steady state with other environmental compartments. In other words at a time when the particulates have been able to accumulate and be at steady state between input from effluent discharge and dispersion by currents. As dioxins and furans are hydrophobic they provide an indicator of other effluent constituents which may be absorbed by particulates. The assessment found that the predicted dioxin accumulation in sediment is approximately 35 times less than the Canadian sediment guideline for protection of most sensitive plants and animals living in or near sediment. With respect to the US EPA sediment quality guidelines, the predicted sediment steady state 1:100 dilution levels are about

2,500 times less than the low risk guidelines for sensitive fish. Given that dilutions of effluent much higher than 100 times occur within 70-100 metres of the diffuser and sediment concentrations associated with such dilutions will be correspondingly lower, the small amount of dioxin discharged in effluent will have no impact on the marine ecology.

#### 6.4.5 Ecotoxicological assessment of the treated effluent

The ecotoxicological marine impact assessment was undertaken in a theoretical body of water filled with effluent diluted 100 times (1:100 dilution), and answers the very conservative question “What are the impacts on the marine environment if the effluent was only diluted 100 times and was always at that concentration?”. The modelling shows that a 1:100 dilution is reached within 70 – 100 metres of the diffuser. Therefore, the theoretical 1:100 dilution, within which the impacts of effluent on the marine environment were assessed, occurs well within the recommended mixing zone, and approximately 2.4kms from the nearest boundary of the Commonwealth marine area. By the time the effluent reaches the Commonwealth marine area, it is expected to be at least 1:9,000 dilution.

The assessment was undertaken of the treated effluent 1:100 dilution against ANZECC & ARMCANZ guidelines. Of the 59 constituents of the effluent for which there are guidelines, only 3 had concentrations above the guidelines – aluminium, chlorate and monochloroacetic acid.

There is likely to be no environmental impact from aluminium because the ANZECC guideline for aluminium is conservative, which is revealed by the fact that the current background level of aluminium in the vicinity of the diffuser is 20 times higher than the ANZECC guideline. Furthermore, aquatic toxicity of aluminium is pH dependent and the receiving water in the vicinity of the diffuser has pH levels at which there has been no effect on sensitive life stages of fish.

The level of monochloroacetic acid was only marginally above the guideline level and the effluent concentration of this substance was very conservatively estimated. Given these factors, which together with its ready biodegradability, monochloroacetic acid in the effluent is unlikely to have an adverse impact on the marine environment.

An environmental guideline value for chlorate was derived by Toxikos using species sensitivity distribution and results of commissioned tests with Australian brown algae. Compliance with the environmental guideline value will be achieved with dilution of the effluent 670 times, which will occur within the recommended mixing zone, and consequently within Tasmanian state waters. It is unlikely the effluent will cause adverse impacts on algae, as the buoyancy of the effluent in seawater results in it rising quickly to the surface, and the effluent is sufficiently dilute when it reaches the seabed so that the concentrations of effluent constituents are well below their biological effect thresholds.

Many studies indicate that if treated effluent is diluted 100 times or more (ie 1:100 dilution), there is no impact on fish or invertebrates, including reproductive effects. In fact, Canadian Guidelines states that a pulp mill does not have to conduct a fish survey if the concentration of the effluent is less than 1% (ie 1:100 dilution) within 250m of the

discharge of effluent in water. Modelling shows that the 1:100 dilution will occur within 70-100m of the diffuser.

Bird species are also unlikely to be impacted by effluent constituents, as the treated effluent that reaches intertidal zones that may be visited by migratory waders or other birds which feed on crustaceans is extremely dilute (at least 5,000 times its discharge concentrations). Therefore direct acute or chronic toxic effects are unlikely on the birds themselves or the organisms on which they feed.

Whole of effluent testing was also undertaken to evaluate acute, sub-lethal and chronic endpoints in a number of aquatic species. Effluent samples were taken from two overseas mills with similar mill engineering processes. The whole of effluent testing showed no toxicity to any tested organism in effluent diluted 10 times (ie 1:10 dilution). Therefore no toxicity impacts are expected at the much greater dilutions occurring in the Commonwealth marine area.

Despite the low levels of dioxins and furans which are predicted to be in the effluent, a quantitative impact assessment for dioxins on fish, aquatic birds and mammals was undertaken. The assessment found that the theoretical small amount of dioxins and furans that could occur in the effluent would not adversely affect local fish, aquatic birds or mammals. Impacts on significant species is discussed in more detail at 6.4.6 below. An assessment was also undertaken of the impact of dioxins on sediment, fish and molluscs. The assessment concluded that within the 1:100 dilution, there are unlikely to be impacts on marine biota, fish or invertebrates. Consequently impacts on the Commonwealth marine area, where significantly higher dilutions will be achieved, are highly unlikely.

#### 6.4.6 Effects of discharges on significant species

As outlined in section 5, the surveys in the vicinity of the effluent pipeline and diffuser did not locate any EPBC Act listed species. A literature review indicated that none of the species protected under the EPBC Act or the *Threatened Species Protection Act 1995* (Tas) were especially sensitive to any of the constituents of the effluent.

As discussed above at section 6.4.5, the effluent constituents are unlikely to impact on invertebrates, fish or birds, including any listed threatened species.

In addition to the general effects of the effluent constituents, a specific assessment for the impacts of dioxins on key species was undertaken. The Australian fur seal was selected as the key marine mammal species, as they are at the top of the food chain, are relatively sedentary and spend the majority of their reproductive lives in the area and therefore will be more highly exposed to the effluent constituents through their diet. While not an EPBC Act listed threatened or migratory species, the Australian fur seal is of conservation significance, and is the species most likely to be affected by the treated effluent discharge. The assessment first considered the level of toxicity equivalents to dioxins and furans in the fish diet of seals. The assessment found that the total toxicity equivalent in fish was less than the US EPA and Environment Canada guideline values established to protect sensitive fish, as well as birds and mammals that eat fish. The total amount of toxicity equivalent ingested by the seals were below the level of intake set to protect species. Therefore, adverse effects are not anticipated on the Australian

fur seal, and therefore other marine mammals with less exposure to dioxins are also expected to be unaffected.

Similarly, the Little Penguin (listed Marine species) and White-bellied sea eagle (listed Migratory species) were selected as key species for a dioxin assessment on avifauna. Little Penguins feed on fish and squid that eat invertebrates which are in contact with sediment and sea eagles are at the top of the food chain and theoretically have the potential to accumulate higher body burdens of dioxins than other birds. The amount of toxicity equivalent ingested by the Little Penguin and White-bellied sea eagle is well below the level of intake set to protect those species. The assessment showed that adverse effects on the Little Penguin and White-bellied sea eagle are unlikely, and therefore other birds are unlikely to be affected by dioxins.

The results of the assessment of the impact of effluent constituents, including the dioxin impact assessment, together with the results of the whole of effluent testing for chronic and sub-lethal impacts, leads to the conclusion that the treated effluent will not adversely impact the survival, breeding and migration of fish, marine mammals, birds or other organisms in Tasmanian waters. As no adverse impacts are expected within Tasmanian waters, there are no adverse impacts expected in the Commonwealth marine area, where effluent dilutions are predicted to be significantly greater. The assessment found that the existing primary productivity of the surrounding ecosystem will be unaltered, which together with a lack of direct toxicity to organisms, indicates ecological community structures and species diversity are unlikely to be adversely changed by the effluent.

#### 6.4.7 Effects of discharges on fisheries

The hydrodynamic modelling indicates that the effluent will have undergone substantial dilution (between 3,000 – 17,000 times) before it reaches Five Mile Bluff, which is the closest commercial fishing area. Given that the assessment of the effluent constituents shows that effluent at a 100 time dilution is unlikely to cause adverse marine impacts, adverse impacts on fisheries are also unlikely.

### 6.5 Construction

All construction impacts will be within Tasmanian waters, with the closest disturbance some 2.5km from Commonwealth marine waters. Given the temporary and localised nature of construction activities, no impacts are anticipated on the Commonwealth marine area.

#### 6.5.1 Construction footprint

The construction of the trench for the effluent pipeline will directly impact on 15m either side of the trench alignment. The trench spoil will be replaced or backfilled after pipeline installation. Direct sediment disturbance and lateral sedimentation from the temporary trench caused by construction will be localised and transient in nature. The total area of directly disturbed and lateral sedimentation of soft seabed is approximately 3.1ha, which is 3.2% of the total area of similar unaffected soft seabed in the area. The total area of directly disturbed and lateral sedimentation of hard seabed is approximately 5.34ha, which is 3% of the total area of similar unaffected hard seabed in the area.

The results for the environmental suite of metals and metalloids showed average concentrations that were below the ANZECC/ARMCANZ low-level Interim Sediment Quality Guidelines trigger values apart from slightly elevated concentrations of arsenic in 4 samples (average 24.25mg/kg dry weight, compared to the ANZECC/ARMCANZ trigger value for arsenic of 20mg/kg dry weight). This indicates that nearshore and offshore marine sediments are essentially uncontaminated, so there is little risk of contaminant release from resuspended bed sediments. Intermittent suspended sediment plumes are expected to be localised to the area of active construction, short lived and dispersed in the direction of bottom currents.

#### 6.5.2 Benthic habitats and marine flora

The impact on marine benthic habitats constitute an impact on between 3-4% of similar unaffected soft and hard seabed habitat available in the area, and is therefore assessed as not significant.

In the high-energy, hydrodynamic nearshore environment, marine flora is restricted to passing phytoplankton in the water column and benthic algae attached to hard substrata. Further offshore, occasional patches of seagrass occur in the vicinity of the pipeline route. None of the marine flora species in the vicinity of the diffuser are protected under the EPBC Act. Impacts on marine flora will not be significant, as the suspended sediment plumes will be localised and transient and therefore are insufficient to reduce significantly photosynthetic activity or affect phytoplankton growth or activity, only small amounts of algae will be directly affected by construction and should recover within 1-3 years and up to 5 years, and seagrass is generally absent along the pipeline route, save for a small patch on sand overlying a section of low profile reef about 2.5km offshore.

#### 6.5.3 Macroinvertebrates

No significant impacts on macroinvertebrates are expected because of the small area of benthic habitat disturbed by construction, and the localised impacts of suspended sediment plumes. The only macroinvertebrate species of conservation significance is the Gunns screw shell – there are no EPBC Act protected species in the vicinity of the pipeline or diffuser.

#### 6.5.4 Fish

Impacts on fish species generally are expected to be not significant, as the loss of fish benthic habitat will be small (although reef-attached fish species on the small area of reef impacted by construction may take up to 5 years to recover to pre-construction levels) and suspended sediment impacts will only affect water quality for a short time and will not result in behavioural avoidance.

The highest construction-generated noise will be associated with the pontoon-mounted, hydraulic backhoe dredge, which has an estimated average noise source level (when excavating in hard seabed) of 180dB re 1uPa at 1m, which is similar to the noise generated by a container ship. As acoustic damage to fish only occur at levels above 220dB, acoustic damage is most unlikely. Avoidance by fish occurs at approximately 160-180dB, so marine construction activity is likely to have a localised but temporary impact on fish. The zone of potential avoidance is approximately 25m radius from the construction noise source.

Any short-term fish avoidance will be reversible and fish displaced by construction activity and noise are expected to return. The zone of avoidance for fish will not extend into the Commonwealth marine area.

#### 6.5.5 Dolphins

Dolphins are unlikely to be significantly affected by construction of the effluent pipeline and diffuser, as water quality impacts and impacts on the food resource (fish) are not significant. The principal potential impact is from underwater noise. This potential impact has been assessed as not significant, due to dolphins high-frequency hearing thresholds, high maneuverability and opportunity to readily avoid the sound field generated by marine construction. Behavioural avoidance is also unlikely, as threshold disturbance levels in the literature show that disturbance starts at between 192 – 201dB, which is above the estimate excavator noise generation of 180dB.

#### 6.5.6 Seals

Seals are also unlikely to be significantly affected by construction generated underwater noise, either through acoustic damage or behavioural avoidance. Previous studies have shown that ship and boat noise do not have strong effects on seals that are in the water, and seals are highly mobile and can enter and leave the noise-affected areas at will.

#### 6.5.7 Sea Turtles

Sea turtles are unlikely to be significantly affected by vessel strike, due to the low hull speeds of operating marine construction vessels. The threshold for behavioural avoidance has been assumed as 160dB, so the zone of potential avoidance is approximately 22m radius from the construction noise source. The zone of potential avoidance for sea turtles will not extend into the Commonwealth marine area.

#### 6.5.8 Cetaceans

Large cetaceans (whales) are unlikely to be affected by the highly localised and temporary deterioration of water quality due to the presence of suspended sediment plumes. Acoustic damage to large cetaceans is unlikely as physical damage occurs at 230 – 240 dB, while the noise source levels are estimated to be 180dB. Visual monitoring for marine mammals will be undertaken near the ocean outfall construction area to minimise any risk from underwater noise behavioural disturbance and vessel strike, based on the Commonwealth seismic guidelines. A trained observer will scan the sea surface for whale presence within a 1km radius alert zone. This is less than the normal 3km radius required by the Commonwealth seismic guidelines due to the more benign nature of the construction noise associated with the pipeline installation. If a whale enters a 500m radius safety zone, noise-generating construction activities will be shut-down and marine vessels will stop to avoid the potential for collision. A 1km radius from any point along the pipeline alignment will not extend into the Commonwealth marine area.

#### 6.5.9 Noise impacts on Avifauna

The potential impacts of acoustic disturbance on avifauna are not expected to be significant. Noise impacts on the Little Penguin, which is a listed Marine species under the EPBC Act, were assessed as not significant, as penguins are expected to avoid any construction noise.

#### 6.5.10 Marine conservation areas and fishing

Marine conservation areas, such as the Tenth Island Nature Reserve approximately 12km east of the construction area, are unlikely to be significantly affected by any noise or other construction impacts.

Commercial and recreational fishing may be temporarily impacted by construction exclusion zones. The impacts on seasonal Australian salmon fishery near Five Mile Bluff is assessed as not significant where the salmon congregate. Most marine construction will likely occur late spring to autumn and not during the winter months when salmon are migrating out of the Tamar Estuary.

Following construction, the seabed will be reinstated along the pipeline alignment to the pre-construction topographic profile to avoid changes in coastal hydrodynamic processes and seabed morphology.

#### 6.5.11 Shipping Operations

There may be a minor nuisance arising from temporary exclusion zones to shipping and small boat traffic that will be applied around active marine construction areas (approximately 1km by 1km). This may require a minor deviation offshore or shorewards to avoid the moving exclusion zone.

There is expected to be no impact to shipping operations in Commonwealth waters.

### 6.6 Management Measures

#### 6.6.1 Design Considerations

The entire mill has been designed using current best practice techniques.

Most relevant to the impacts on Commonwealth marine areas is the design of the effluent treatment plant. The effluent treatment plant will feature the following main operations:

- pre-treatment, primary clarification and stabilisation of the raw effluent quality to remove coarse impurities, control effluent pH, remove suspended solids and level down the variability of raw effluent quality. These stages are necessary to safeguard the highest possible performance of the biological treatment process of the effluent;
- an emergency basin to prevent the potential shock loads from jeopardizing biological effluent purification process in the secondary treatment stage;

- a secondary treatment stage, where most of the dissolved organic matter and certain inorganic constituents in the raw effluent are removed by a sequence of an anoxic reactor (chlorate removal), selector basins and the final aeration basin (COD and residual toxicity removal); and
- two secondary clarifiers, in which the final effluent is clarified before being discharged into a surge basin and pumped through the effluent outfall pipeline.

The effluent treatment plant components are designed to cope with the daily variability of effluent loads, such that the final loads to Bass Strait are virtually constant and change only slowly as a function of longer term protection levels.

Construction of the effluent pipeline and diffuser has been designed to avoid significant impacts on Commonwealth marine areas and the ecosystem in the vicinity of the pipeline and diffuser. In particular:

- the pontoon-mounted hydraulic backhoe dredge excavator selected as the preferred construction methodology generates the lowest amount of suspended silt and minimises the amount of seabed directly disturbed compared to conventional marine dredgers;
- the hydraulic backhoe dredge excavator generates less underwater noise than conventional marine dredgers which reduces the size of the construction-imposed sound field;
- minimum clearing of seabed habitat is required for the diffuser, which has been relocated from sandy seabed to low-profile reef to avoid impacts on the Tasmanian protected Gunns screw shell, and
- high- and medium-profile reef will be avoided where possible to avoid direct impacts on the more diverse benthic algal and macroinvertebrate assemblages.

#### 6.6.2 Additional Studies and Baseline Monitoring

In addition to any conditions imposed on an approval granted under the EPBC Act or by the Tasmanian Government under any permit issued under the *Pulp Mill Act 2007* (Tas), Gunns will undertake treated effluent dispersion monitoring, and monitoring of the long-term impacts of treated effluent on the marine environment.

#### 6.7 Further Studies and Baseline Monitoring

As described in section 7.6, Gunns is in the final stages of preparing a survey design for 2.5 years pre-operational monitoring of the marine environment. The survey will include chemical analyses of sediments, fish, flora and water, sediment particle size and an assessment of the species diversity and populations of benthic organisms.

## 6.8 Conclusions

The key activities which may impact on the Commonwealth marine area are the construction and installation of the effluent pipeline and diffuser, and the disposal of treated effluent from the pulp mill via the pipeline and diffuser.

The assessment found that construction is not likely to have a significant impact on EPBC Act listed species or on the Commonwealth marine area. The main construction activities will occur more than 2.5km from the boundary of Tasmanian waters and the Commonwealth marine area. While construction generated-noise has the potential to disturb some species, the radius of the acoustic disturbance area is very small for fish and turtles, and visual monitoring for larger marine species will occur to avoid noise and vessel-collision impacts. Other impacts, such as increased suspended solids and impacts on the marine habitats, have been assessed as not significant due to the minimal localised nature of the impact, which are not expected to reach the Commonwealth marine area.

A thorough assessment of the impacts of the treated effluent on all aspects of the marine environment has been undertaken. The assessment shows that no adverse impacts are expected within a very short distance of the diffuser location, which is well within Tasmanian waters. When the treated effluent eventually reaches the Commonwealth marine area, it is extremely dilute (over 9,000 times). Therefore, no adverse impacts are expected on the Commonwealth marine area.

## 7. Environmental Management Plan Framework

### 7.1 Overview of the Environmental Management Plan Framework (EMPF)

The Bell Bay Alliance system of management is the Safety, Health, Environment and Quality Management System (SHEQ). It provides a framework that will be used by Gunns to ensure that the pulp mill project is designed in a way that minimises its environmental impacts and maximises worker and contractor safety and health. The Environmental Management Plan framework is an integral part of this system.

### 7.2 Purpose and Development of the EMPF

The overall responsibility for the SHEQ lies with the Bell Bay Alliance Leadership Team (ALT) for construction and the Gunns Managing Director for operations.

The Bell Bay Alliance System manages the design and construction phases.

The John Holland Group as construction party to the Bell Bay Alliance has an established accredited management system to ISO14001.

Gunns also has Environmental Management System accredited to ISO14001 for “Gunns Forest Product Pty Ltd” (comprising Tasmanian forest operations for harvesting and reforestation activities and existing chip mills). This business unit operates under a more prescriptive Safety and Health Management System based on the requirements of ‘SafetyMAP – Initial Level” and ‘Injury MAP Level 1”. SafetyMAP is an audit tool based on Victorian Workplace requirements, and has significant commonality with the requirements of AS4801:2001.

In summary the design and construction phase of the pulp mill will be under the umbrella of John Holland Group Environmental Management and Safety Systems whilst Gunns during the two year construction phase shall develop the Operational EMS to ISO14001 standard and the Safety/Health System to AS 4801 standard or similar.

### 7.3 Key elements of the EMPF

The key elements are :

- Standard Management System Procedures associated with ISO14001; and
- Standard Generic Process Procedures under John Holland Group umbrella which include:
  - Air Quality and Dust Control;
  - Erosion and Sediment Management;
  - Noise and Vibration Control;
  - Flora and Fauna;
  - Waste Management and Minimisation;
  - Culture and Heritage;
  - Hazardous Materials Management;
  - Land Contamination; and
  - Environmental Forms and associated Checklists.

### 7.4 Environmental Management Objectives

The environmental management objectives in order of priority are:

- Develop a culture where safety, good housekeeping, caring for our environment is second nature;
- Develop an organisation structure for construction phase and later operations identifying roles, responsibilities, and key performance objectives which must include safety, health and environmental measures;
- Systematically identify hazards and potential impacts and consequences;
- Evaluate the risks from identified hazards against screening criteria, taking into account the likelihood of occurrence and severity of the consequences. Compare these to targets set for the project;
- Implement management measures to eliminate the risk or reduce it to acceptable levels. Measures can include reducing the probability of occurrence and/or the consequences of the hazard. Management measures include reducing the probability of occurrence and/or the consequences of the hazard;
- Establish recovery preparedness measures (including emergency procedures) as well as restoration and compensation procedures;
- Develop a comprehensive training system; and
- Carry out regular auditing to confirm 'that we are doing what we say' and ensure that any deficiencies are closed in a timely manner.

## 7.5 Environmental Management Documentation

### 7.5.1 Construction Environmental Management Plans

Other than generic procedures detailed under Key Elements Section there are special procedures/area plans tailored for Tasmanian conditions and legislative requirements for this project:

- Traffic Management Plan;
- Acid Sulphate Soils;
- Phytophthora cinnamomi Management Strategy;
- Weed Management;
- Minimisation of Disturbance;
- Erosion and Sediment Management;
- Stripping Vegetation;
- Soil Return;
- Site Preparation;
- Stripped Vegetation Return;
- Revegetation – native;
- Revegetation – exotic;
- Monitoring and Maintenance – subsidence, rocks, weeds, access;
- Water Crossings;
- Hydrostatic Testing;
- Access Tracks;
- Bell Bay Environmental Monitoring Program;
- Visual Monitoring Protocols for Marine Mammals Wharf and Ocean outfall; and
- Special Area Plans including:
  - Trevallyn Nature Reserve;
  - Lake Trevallyn Pump Station;
  - Balance/Control Tank – Reatta Rd;
  - Tamar River Crossing;
  - Dilston Wetland;
  - Donovans Bay Rehabilitation Plan;
  - Quarry Site Rehabilitation Plan;
  - Quarry Site Rehabilitation Plan;
  - Mill Landfill Rehab Plan;
  - Pulp Mill Site Perimeter;
  - Coastal Crossing Rehabilitation Plan;and
  - Mill Landscaping Plan.

Each of these procedures/plans has the following general structure:

- Introduction – outlining key environmental issue and need for specific management control;
- Key Risk Areas – outlining potential environmental effects;
- Performance Objectives;
- Management Actions;
- Monitoring and Reporting; and
- Corrective Action Process.

### 7.5.2 Operational Management Plans

These plans will be developed in line with ISO14001 requirements during the two year construction period for auditing and accreditation during the first year of plant operations.

### 7.5.3 Audit Schedule

Following is the proposed audit schedule:-

Description	Type	Timing	Reference
Pulp Mill Design	External	At completion of detailed design phase.	Emission Guidelines
Management System - Construction	External management system audit/verification of JHG EMS	Prior to start of construction.	SHEQ – MS
	Internal regular checks by appropriate Supervisors	During construction.	
	Internal – reviewing checklists, non conformance and improvement opportunities	During construction - weekly audits by Environmental Field Officer	
Management Procedures – Special Procedures and Special Area Plans	Internal	Frequency depends on risk and construction duration	Against procedure/plan requirements.
Major Contractors	Internal	Frequency depends on risk and construction duration	Against the major contractors Management System and Site Specific Environmental Management Plan.
Management System – Operating Plant	External	Initial accreditation audit then six monthly audits of EMS to ISO14001 and Safety under AS4801 or similar.	Gunns SHEQ

## 7.6 Baseline Monitoring Program

Gunns during the preparation of the Draft Integrated Impact Statement conducted the following environmental investigations which provided baseline data for the Draft IIS:

- Measurement of background sound levels in and around Rowella which is the nearest residential area to the mill;
- Sampling and detailed chemical testing of soil, surface and ground water samples collected from the mill and landfill sites;
- Extensive biological assessment and chemical analyses of a range of water, sediment, fish, and algae samples from Bass Strait in the vicinity of the proposed outfall. The analyses was extensive and included analytes such as dioxins, furans, pesticides, PCB, chemical compounds associated with softwood processing, trace metals, nutrients etc; and
- Installation of an ambient air quality monitoring station at Rowella to continuously monitor basic meteorological data as well as sulphur dioxide, nitrogen dioxide, particulates and total reducible sulphur levels.

The monitoring has been extended and is continuing in the form of pilot monitoring.

Monitoring specific to construction covers the following areas:

- Daily turbidity and dissolved oxygen monitoring up and downstream of the following construction activities:
  - Water supply pipeline across Tamar River
  - Wharf structure
  - Effluent pipeline across Donovans Bay
  - Outfall structure into Bass Strait.
- Assessment of potential nutrient and metal release into marine/estuarine waters during above activities;
- Utilisation of trained Cetacean spotters during wharf and outfall construction activities; and
- Biological assessments pre and post of the various construction activities outlined above to gauge recovery of the small impact zones.

A comprehensive pre and post environmental program is under preparation for review and approval by various government agencies.

The program covers the following topics:

- Atmospheric Monitoring Programs
  - Ambient Air Quality Standards
  - Meteorology
  - Chemical and Particulate Parameter Monitoring
  - Odour Monitoring
  - Point Source Emissions
  - Noise and Vibration Monitoring
- Terrestrial Monitoring Program
  - Groundwater
  - Surface Water
  - Soils

- Effluent Monitoring
  - Effluent Treatment System Quality and Quantity
  - Receiving Environment – Bass Strait Ecological Survey and Chemical, Physical and Biological Monitoring.
- Specific Construction Activity Monitoring Program
  - Nuisance Dust: mill, linear infrastructure installation.
  - Aquatic:landbased linear infrastructure, and estuary – Tamar and Donovans Bay crossing, Wharf and Bass Strait.
  - Cultural Heritage, Flora/Fauna.
- Management and Reporting
  - Environmental Auditing
  - Environmental Incident Reporting
  - Commissioning
  - Annual Reporting
  - Interim reporting and liaison with environmental agencies
  - Quality control and assurance programs

## 8. Residual and Cumulative Impact Assessment

The Pulp Mill Site is located in the Bell Bay Major Industrial Zone, adjacent to the existing Gunns Tamar woodchip facility. The Pulp Mill Site is in an area where there are other heavy industries, including the Port of Launceston, the Bell Bay Power Station, the TEMCO metallurgical plant, EKA Granules aluminium powder plant, Rio Tinto aluminium smelter, and the SVP vinyl products plant.

The water supply and effluent pipeline routes largely follow existing easements for the South Esk water supply pipeline and the Tasmanian natural gas pipeline. The Basslink underground transmission cable is approximately 300m west of the proposed effluent pipeline shore crossing, and the TNGP pipeline crosses the shore to the east of Five Mile Bluff.

The assessment of the construction impacts of the Project indicates that any impacts will be short-term.

The key potential operational impacts of the Project are air emissions and treated effluent discharge.

While air emissions are not relevant to the assessment of this action under the EPBC Act, very low levels of air pollutants will be emitted into the surrounding Tamar Valley airshed (see Section 5.4.13). There is ample airshed capacity to absorb emissions from the mill, and the health risk assessment undertaken by Gunns' experts concludes that emissions from the pulp mill will not constitute a health risk. However, the assessment recommended further investigations to evaluate the cumulative effect of industries in the vicinity of Bell Bay on the health of residents at George Town.

There are no other ocean outfall locations in the vicinity of the Project's effluent pipeline and diffuser location. Therefore an assessment of the cumulative toxic effects with existing discharges to sea in the vicinity of the diffuser was not required. However, background concentrations in the receiving waters were considered in the impact assessment. The potential for additive, synergistic or antagonistic effects on marine organisms from the mixture of substances in the treated effluent was assessed through whole of effluent testing, which found that there was no toxicity to any tested organism at effluent diluted 10 or more times.

The assessment of the impacts of the treated effluent conclude that cumulative impacts are unlikely, as effluent concentration levels reach equilibrium after 30 days, and that no increases in pollutant concentrations occur after 30 days. In addition, discharged particle components of the treated effluent are very fine and have low settling velocities. Estimates of particulate matter discharge equate to 1.28m<sup>3</sup>/day or 466m<sup>3</sup>/year. A conservatively small estimate of the area over which particulate might settle is 10km<sup>2</sup>, which would result in a depth of 0.047mm/year over that area. Consequently, impacts arising from sediment deposition are not considered significant.

## 9. Overall Conclusions

Gunns Limited (Gunns) proposes to develop a bleached Kraft pulp mill and associated infrastructure in Northern Tasmania. The project requires assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The controlling provisions of the EPBC Act in relation to this project are;

- Sections 18 and 18A - Listed Threatened Species and Communities;
- Sections 20 and 20A - Listed Migratory Species; and
- Sections 23 and 24A - Commonwealth Marine Environment.

This document has described the values of, and provided an assessment of the potential impacts of the pulp mill on the matters of national environmental significance protected by these controlling provisions. In addition, it has detailed mitigation measures to be implemented during the construction and operational phases of the pulp mill to ensure no significant impact on matters of national significance. This document has been based upon extensive environmental investigations and analysis which have been undertaken by Gunns' expert advisers.

On the basis of comprehensive expert studies undertaken during the assessment of the project, Gunns expects no significant impacts on relevant matters of national environmental significance.

## 10. Information Sources and Attachments

### 10.1 References

Draft IIS – available at <http://www.gunnspulpmill.com.au/iis/default.htm>

Volume 1A	Gunns	<ul style="list-style-type: none"><li>• Legislative Framework</li><li>• Justification for the Project and Consequences of not Proceeding</li><li>• Regional Environment</li></ul>
Volume 1B	Gunns	<ul style="list-style-type: none"><li>• Public Consultation</li><li>• Project Description</li><li>• New Infrastructure and Off-site Ancillary Facilities</li><li>• Major Construction Phase Activities</li><li>• Major Commissioning Phase Activities</li></ul>
Volume 2A	Gunns	<ul style="list-style-type: none"><li>• Site Selection for the Pulp Mill</li><li>• Existing Environment – Pulp Mill Site</li><li>• Impact Assessment Methodology – Pulp Mill Site</li><li>• Potential Environmental Impacts and Management Measures – Pulp Mill Site</li></ul>
Volume 2B	Gunns	<ul style="list-style-type: none"><li>• Risk Assessment – Pulp Mill Site</li><li>• Potential Economic Impacts and Management Measures – Pulp Mill Site</li><li>• Potential Social and Community Impacts and Management Measures – Pulp Mill Site</li><li>• Summary of Triple Bottom Line Assessment – Pulp Mill Site</li><li>• Description of the Proposed Wharf Facility</li><li>• Potential Environmental Impacts and Management Measures – Wharf Facility</li><li>• Description of the Landfill (Solid Waste Disposal Facility) Quarry and Water Reservoir</li><li>• Potential Environmental Impacts and Management Measures – Landfill, Quarry and Water Reservoir</li></ul>
Volume 3A	Gunns	<ul style="list-style-type: none"><li>• Detailed Description of the Water Supply Pipeline</li><li>• Existing Environment – Water Supply Pipeline</li><li>• Impact Assessment Methodology – Water Supply Pipeline</li><li>• Potential Environmental Impacts and Management Measures – Water Supply Pipeline</li><li>• Summary of Triple Bottom Line Assessment</li></ul>

			<ul style="list-style-type: none"> <li>– Water Supply Pipeline</li> <li>• Overview of the Effluent Pipeline</li> <li>• Detailed Description – Effluent Pipeline</li> <li>• Existing Environment – Effluent Pipeline</li> <li>• Potential Environmental Impacts and Management Measures – Effluent Pipeline</li> <li>• Summary of Triple Bottom Line Assessment – Effluent Pipeline</li> <li>• Introduction to the Workers Accommodation Facility</li> <li>• Detailed Description – Workers Accommodation Facility</li> </ul>
Volume 3B		Gunns	
			<ul style="list-style-type: none"> <li>• Existing Environment – Workers Accommodation Facility</li> <li>• Potential Environmental Impacts and Management Measures – Workers Accommodation Facility</li> <li>• Summary of Triple Bottom Line Assessment – Workers Accommodation Facility</li> <li>• Safety, Health, Environment and Quality Management System (SHEQ-MS)</li> <li>• Environmental Management Plans</li> <li>• Monitoring Plan</li> <li>• Conclusion</li> <li>• Commitments</li> <li>• Cross Reference Guidelines</li> <li>• Referral</li> <li>• Final Scope Guidelines</li> <li>• Development of New Environmental Guidelines Volume 1</li> <li>• Development of New Environmental Emission Limit Guidelines Volume 2</li> <li>• Other Legislation</li> <li>• Main Report</li> <li>• Drawings</li> <li>• Annexes</li> <li>• Social Impact Assessment Report</li> <li>• Consultation Report</li> <li>• Environment and Community Group Interview Report</li> <li>• Historic Heritage Reports</li> <li>• Indigenous Heritage Report</li> <li>• Economic Report</li> <li>• Air Quality Assessment Pulp Mill Emissions</li> <li>• Air Quality Construction</li> <li>• Pulp Mill Noise Report</li> <li>• Pacific Air Report</li> </ul>
Volume 4		Gunns	
Volume 5	App 1	GHD	
Volume 5	App 2	EPBC	
Volume 5	App 3	RPDC	
Volume 5	App 4	RPDC	
Volume 5	App 5	RPDC	
Volume 5	App 6	GHD	
Volume 6	App 7	Jaakko Poyry	
Volume 7	App 8	Jaakko Poyry	
Volume 7	App 9	Jaakko Poyry	
Volume 8	App 10	GHD	
Volume 8	App 11	GHD	
Volume 8	App 12	GHD	
Volume 8	App 13	Archaeological Services Tasmania	
Volume 8	App 14	Tim Stone	
Volume 8	App 15	Allen Consulting Group	
Volume 9	App 16	GHD	
Volume 9	App 17	GHD	
Volume 9	App 18	GHD	
Volume 9	App 19	PAE	

Volume 9	App 20	GHD	• Greenhouse Gas Emissions
Volume 10	App 21	Toxikos	• Air Emissions Report
Volume 10	App 22	Toxikos	• Human Health Risk Assessment Bell Bay Pulp Mill Effluent
Volume 10	App 23	Toxikos	• Comment on Bell Bay Effluent and Potential Impact on nearby Seal Colonies Report
Volume 11	App 24	Aquenal	• Marine Outfall Report
Volume 11	App 25	Aquenal	• Wharf Report
Volume 11	App 26	Aquenal	• Environmental Investigation at Proposed Tamar River Crossing for Water Supply Pipeline
Volume 11	App 27	Aquenal	• Marine Monitoring Spring 05
Volume 11	App 28	GHD	• Donovans Bay Assessment Report
Volume 12	App 29	GHD	• Flora Report
Volume 13	App 30	GHD	• Fauna Report
Volume 13	App 31	Gunns	• Effluent Pipeline Forest Practices Plan
Volume 13	App 32	Gunns	• Pulp Mill Forest Practices Plan
Volume 13	App 33	Gunns	• Water Pipeline Forest Practices Plan
Volume 13	App 34	Gunns	• Workers Accommodation Forest Practices Plan
Volume 13	App 35	Gunns	• Eagle Nest Search Report
Volume 13	App 36	ECO Tas	• Survey for Tasmanian Masked Owl on Proposed Pulp Mill Site
Volume 14	App 37	Pitt and Sherry	• Workers Accommodation Facility Report
Volume 14	App 38	Gunns	• Pulpwood Supply
Volume 14	App 39	Gunns	• Quarry Application Report
Volume 14	App 40	Gunns	• Subdivision Plan Report
Volume 14	App 41	GHD	• Soil Baseline 2006
Volume 14	App 42	GHD	• Lighting Assessment
Volume 14	App 43	GHD	• Transport Assessment
Volume 14	App 44	GHD	• Water Report – Concept Design for Water Supply from Lake Travallyn
Volume 15	App 45	Hargraves	• Effluent Pipeline and Design Basis
Volume 15	App 46	Hargraves	• Gas Pipeline Lateral and Station Report
Volume 15	App 47	Maunsell	• Bell Bay Pulp Mill Wharf Facility Report
Volume 15	App 48	GHD	• Preliminary Hazard Analysis
Volume 15	App 49	Orica	• Blasting Risk Analysis Report
Volume 16	App 50	Pitt and Sherry	• Four Mile Beach Dune Crossing Remediation and Revegetation
Volume 16	App 51	Pitt and Sherry	• Geomorphological Assessment Proposed Shoreline Crossing Area Effluent Pipeline
Volume 16	App 52	Atteris	• Ocean Outfall Conceptual Engineering Study
Volume 16	App 53	Pitt and Sherry	• Four Mile Beach Dune Crossing Geological Setting
Volume 16	App 54	Hargraves	• Donovans Bay Construction Management Plan
Volume 16	App 55	Pitt and Sherry	• Solid Waste Landfill Conceptual Design
Volume 16	App 56	Pitt and Sherry	• Water Supply Tamar River Crossing Pipeline Installation/DIER Water Pipeline Tamar

Volume	App 57	GHD	River Crossing
			<ul style="list-style-type: none"> <li>Operational Monitoring Program (this plan is provided in full in Volume 4 of the Draft IIS. This appendix has been left blank deliberately).</li> </ul>
Volume 17	App 58	Ecotox	<ul style="list-style-type: none"> <li>Toxicity Assessment of Pulp Mill Effluent Pine Pulping Campaign</li> </ul>
Volume 17	App 59	Ecotox	<ul style="list-style-type: none"> <li>Toxicity Assessment of a Pulp Mill Effluent for Proposed Tasmanian Pulp Mill</li> </ul>
Volume 17	App 60	Ecotox	<ul style="list-style-type: none"> <li>Chlorate Report – Brown Macro Alga</li> </ul>
Volume 18	App 61	BFP	<ul style="list-style-type: none"> <li>Onshore Geotechnical Investigation</li> </ul>
Volume 18	App 62	BFP	<ul style="list-style-type: none"> <li>Pulp Mill Geotechnical Investigation</li> </ul>
Volume 18	App 63	GHD	<ul style="list-style-type: none"> <li>Hydrodynamic Modelling Ocean Outfall</li> </ul>
Volume 18	App 64	GHD	<ul style="list-style-type: none"> <li>Hydrodynamic Modelling Wharf Outfall</li> </ul>

Supplementary Information – available at  
<http://www.gunnspulpmill.com.au/iis/default.htm>

Gunns	Summary of Supplementary Information Document
Mr Kari Tuominen	Overview of Pulp Mill Processes
Dr Esa Vakkilainen	Description of Recovery Systems
Mr Hannu Jappinen	Effluent Treatment and Emissions
Mr Edward Bechberger	Integrated Chemical Plant
Dr Veronique Levy	Water Quality Parameters and Objectives
Mr Ross Fryar	Hydrodynamic Modelling
Dr Rick Krasso	Toxicity Sampling
Mr Derek Shields	Review of Aquenal Monitoring Program
Dr Roger Drew	Marine Impact and Health Risk Assessment
Mr David Balloch	Estuarine and Marine Impact Assessment
Mr Robin Ormerod	Air Quality Assessment and Greenhouse Gas Emissions
Mr Greg Collins	Noise Assessment
Dr Roger Drew	Health Risk Assessment – Air Impacts
Mr Eric Jas	Effluent Outfall Design and Installation
Dr Michael Pollington	Shore Crossing Management and Rehabilitation
Dr Ian Woodward	Landfill Design and Tamar River Crossing
Dr Tim Wills	Flora
Mr Brett Lane	Terrestrial Fauna and Avifauna
Mr Tim Offor	Social Impact Assessment and Mitigation
Mr Robert de Fegely	Pulpwood Supply
Mr Keith Midson	Transport
Mr Jon Stanford	Economic Impact Assessment
Dr Tim Stone	Aboriginal Heritage

## 10.2 Attachments

These maps are attached at the end of this document as:

Attachment 1: Bell Bay Pulp Mill: Location Map

Attachment 2: Bell Bay Pulp Mill: Local Area Map

Attachment 3: Bell Bay Pulp Mill: Reserve Network

Attachment 4: Bell Bay Pulp Mill: Proximity of Effluent Outfall to the Commonwealth Marine Area.

## 11. Glossary and Abbreviations

### 11.1 Glossary

**Bonn Convention:** The Convention on the Conservation of Migratory Species of Wild Animals which aims to conserve terrestrial, marine and avian migratory species throughout their range. It is one of a small number of intergovernmental treaties concerned with the conservation of wildlife and wildlife habitats on a global scale.

**Matters of National Environmental Significance:** In this document refers to the controlling provisions of the EPBC Act, and includes Listed Threatened Species and Communities, Listed Migratory Species and Commonwealth Marine Environment.

**Project Area:** the Pulp Mill Site, the effluent and water supply pipelines, and the workers accommodation facility.

**Pulp Mill Site:** the site on the Tamar River at Bell Bay, adjacent to the existing Tamar woodchip facility, upon which the pulp mill, chemical plant, local water reservoir, quarry and solid waste facility will be constructed.

**Regional Forest Agreements:** 20-year plans for the conservation and sustainable management of Australia's native forests. There are 10 RFA's in four States: Western Australia, Victoria, Tasmania and New South Wales. The Agreements provide certainty for forest-based industries, forest-dependent communities and conservation. They are the result of years of scientific study, consultation and negotiation covering a diverse range of interests.

### 11.2 Abbreviations

ADt: Air dried tonne.

AFS: Australian Forestry Standard (AS4708 – Formal Australian Standard).

ANZECC: Australian and New Zealand Environment Conservation Council.

ARMCANZ: Agriculture and Resource Ministers Council of Australia and New Zealand.

BHKP: Bleached Hardwood Kraft Pulp.

CAMBA: China-Australia Migratory Bird Agreement.

Draft IIS: Draft Integrated Impact Statement.

DEW: Department of Environment and Water (Commonwealth).

DPIW: Department of Primary Industries and Water (Tas.).

DTAE: Department of Tourism, Arts and the Environment (Tas.).

ECF: Elemental Chlorine Free.

EPBC Act: *Environment Protection Biodiversity Conservation Act 1999.*

GSP: Gross State Product

IBRA 4: Interim Bioregionalisation of Australia version 4.

ISO14001: International Organisation for Standardisation 14001

JAMBA: Japan-Australia Migratory Bird Agreement

PEFC: Programme for Endorsement of Forest Certification.

RECs: Renewable Energy Certificates.

RFA: Regional Forest Agreement.

RPDC: Resource Planning and Development Commission (Tas.)

TASVEG: Tasmanian Vegetation Management Strategy.  
TSAP Act: *Tasmanian Threatened Species Protection Act 1995*.  
US EPA: United States Environmental Protection Authority.

## 12. Appendices

### Appendix A

#### EPBC Act listed Marine and Migratory Species with the potential to occur within the Project Area or in the vicinity of the effluent pipeline and diffuser.

Common name	Scientific name	EPBC Act listed Marine	EPBC Act listed Migratory
<b>Birds</b>			
Antarctic Prion	<i>Pachyptila desolata</i>	✓	
Arctic Jaeger	<i>Stercorarius parasiticus</i>	✓	✓
Australasian Gannet	<i>Morus serrator</i>	✓	
Australian Hobby	<i>Falco longipennis</i>		✓
Australian Pelican	<i>Pelecanus conspicillatus</i>	✓	
Bar-tailed Godwit	<i>Limosa lapponica</i>	✓	✓
Black-browed Albatross	<i>Thalassarche melanophris</i>	✓	✓
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>	✓	
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	✓	
Blue-winged Parrot	<i>Neophema chrysostoma</i>	✓	
Brown Falcon	<i>Falco berigora tasmanicus</i>		✓
Brown Goshawk	<i>Accipiter fasciatus</i>	✓	✓
Buller's Albatross	<i>Thalassarche bulleri</i>	✓	✓
Cape Petrel	<i>Daption capense</i>	✓	
Caspian Tern	<i>Sterna caspia</i>	✓	✓
Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	✓	✓
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>		✓
Common Diving-Petrel	<i>Pelecanoides urinatrix</i>	✓	
Common Greenshank	<i>Tringa nebularia</i>	✓	✓
Crested Tern	<i>Sterna bergii</i>	✓	✓
Curlew Sandpiper	<i>Calidris ferruginea</i>	✓	✓
Double-banded Plover	<i>Charadrius bicinctus</i>	✓	✓
Eastern Curlew	<i>Numenius madagascariensis</i>	✓	✓
Fairy Prion	<i>Pachyptila turtur</i>	✓	
Fairy Tern	<i>Sterna nereis</i>	✓	
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	✓	
Flame Robin	<i>Petroica phoenicea</i>	✓	
Fluttering Shearwater	<i>Puffinus gavia</i>	✓	
Forest Raven	<i>Corvus tasmanicus</i>	✓	
Great Skua	<i>Catharacta skua</i>	✓	
Grey Plover	<i>Pluvialis squatarola</i>	✓	✓
Grey-tailed Tattler	<i>Heteroscelus brevipes</i>	✓	✓
Hooded Plover	<i>Thinornis rubricollis</i>	✓	✓
Horsfield's Bronze-cuckoo	<i>Chrysococcyx basalis</i>	✓	
Latham's Snipe	<i>Gallinago hardwickii</i>	✓	✓
Little Egret	<i>Egretta garzetta</i>	✓	
Little Penguin	<i>Eudyptula minor</i>	✓	
Little Tern	<i>Sterna albifrons</i>	✓	✓
Musk Duck	<i>Biziura lobatus</i>	✓	

Common name	Scientific name	EPBC Act listed Marine	EPBC Act listed Migratory
<b>Birds</b>			
Northern Giant-Petrel	<i>Macronectes halli</i>	✓	✓
Pacific Golden Plover	<i>Pluvialis fulva</i>	✓	✓
Pacific Gull	<i>Larus pacificus</i>	✓	
Pallid Cuckoo	<i>Cuculus pallidus</i>	✓	
Peregrine Falcon	<i>Falco peregrinis</i>		✓
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	✓	
Purple Swamphen	<i>Porphyrio porphyrio</i>	✓	
Red Knot	<i>Calidris canutus</i>	✓	✓
Red-capped Plover	<i>Charadrius ruficapillus</i>	✓	✓
Red-necked Stint	<i>Calidris ruficollis</i>	✓	✓
Richard's Pipit	<i>Anthus novaeseelandiae</i>	✓	
Royal Albatross	<i>Diomedea epomophora</i>	✓	✓
Ruddy Turnstone	<i>Arenaria interpres</i>	✓	✓
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	✓	✓
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	✓	✓
Shining Bronze-cuckoo	<i>Chrysococcyx lucidus plagosus</i>	✓	
Short-tailed Shearwater	<i>Puffinus tenuirostris</i>	✓	✓
Shy Albatross	<i>Thalassarche cauta</i>	✓	✓
Silver Gull	<i>Larus novaehollandiae</i>	✓	
Silvereye	<i>Zosterops lateralis</i>	✓	
Slender-billed Prion	<i>Pachyptila belcheri</i>	✓	
Southern Boobook	<i>Ninox novaeseelandiae</i>	✓	
Southern Giant-Petrel	<i>Macronectes giganteus</i>	✓	✓
Swamp Harrier	<i>Circus approximans</i>		✓
Swift Parrot	<i>Lathamus discolor</i>	✓	
Terek Sandpiper	<i>Xenus cinerea</i>	✓	✓
Tree Martin	<i>Hirundo nigricans</i>	✓	
Wandering Albatross	<i>Diomedea exulans</i>	✓	✓
Welcome Swallow	<i>Hirundo neoxena</i>	✓	
Whimbrel	<i>Numenius phaeopus</i>	✓	✓
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	✓	✓
White-faced Storm-Petrel	<i>Pelagodroma marina</i>	✓	
White-fronted Tern	<i>Sterna striata</i>	✓	
White-throated Needletail	<i>Hirundapus caudacutus</i>	✓	✓
Yellow-nosed Albatross	<i>Thalassarche chlororhynchos</i>	✓	✓
<b>Mammals</b>			
Australian Fur Seal	<i>Arctocephalus pusillus</i>	✓	
Blue Whale	<i>Balaenoptera musculus</i>	✓	✓
Bottlenose Dolphin	<i>Tursiops truncatus</i>	✓	
Common Dolphin	<i>Delphinus delphis</i>	✓	
Fin Whale	<i>Balaenoptera physalus</i>		✓
Humpback Whale	<i>Megaptera novaeangliae</i>	✓	✓
Killer Whale	<i>Orcinus orca</i>	✓	
Long-finned Pilot Whale	<i>Globicephala melas</i>	✓	
Minke Whale	<i>Balaenoptera acutorostrata</i>	✓	
New Zealand Fur Seal	<i>Arctocephalus forsteri</i>	✓	

Common name	Scientific name	EPBC Act listed Marine	EPBC Act listed Migratory
<b>Mammals</b>			
Pygmy Right Whale	<i>Caperea marginata</i>	✓	
Risso's Dolphin	<i>Grampus griseus</i>	✓	
Sei Whale	<i>Balaenoptera borealis</i>		✓
Southern Right Whale	<i>Eubalaena australis</i>	✓	✓
<b>Sharks</b>			
Great White Shark	<i>Carcharodon carcharias</i>		✓
<b>Fish</b>			
Australian Long-snout Pipefish	<i>Vanacampus poecilolaemus</i>	✓	
Australian Smooth Pipefish	<i>Lissocampus caudalis</i>	✓	
Briggs' Crested Pipefish	<i>Histiogamphelus briggsii</i>	✓	
Bullneck Seahorse	<i>Hippocampus minotaur</i>	✓	
Deep-bodied Pipefish	<i>Kaupus costatus</i>	✓	
Eastern Potbelly Seahorse	<i>Hippocampus abdominalis</i>	✓	
Hairy Pipefish	<i>Urocampus carinirostris</i>	✓	
Half-banded Pipefish	<i>Mitotichthys semistriatus</i>	✓	
Javelin Pipefish	<i>Lissocampus runa</i>	✓	
Knife-snouted Pipefish	<i>Hypsognathus rostratus</i>	✓	
Leafy Seadragon	<i>Phycodurus eques</i>	✓	
Port Phillip Pipefish	<i>Vanacampus phillipi</i>	✓	
Pug-nosed Pipefish	<i>Pugnaso curtirostris</i>	✓	
Red Pipefish	<i>Notiocampus ruber</i>	✓	
Rhino Pipefish	<i>Histiogamphelus cristatus</i>	✓	
Ring-backed Pipefish	<i>Stipecampus cristatus</i>	✓	
Robust Spiny Pipehorse	<i>Solegnathus robustus</i>	✓	
Sawtooth Pipefish	<i>Maroubra perserrata</i>	✓	
Short-head Seahorse	<i>Hippocampus breviceps</i>	✓	
Spiny Pipehorse	<i>Solegnathus spinosissimus</i>	✓	
Spotted Pipefish	<i>Stigmatopora argus</i>	✓	
Trawl Pipefish	<i>Kimblaeus bassensis</i>	✓	
Tucker's Pipefish	<i>Mitotichthys tuckeri</i>	✓	
Upside-down Pipefish	<i>Heraldia nocturna</i>	✓	
Weedy Seadragon	<i>Phyllopteryx taeniolatus</i>	✓	
Wide-bodied Pipefish	<i>Stigmatopora nigra</i>	✓	