

## Gunns Limited – Bell Bay Pulp Mill Project

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**Document title:** Draft Integrated Impact Statement (IIS) and Appendices  
**Topic:**  
**Date received:** 17 July 2006  
**Agency/Division/Branch:**

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Approved by	Date

### Notes on completing proforma

#### General

- See detailed ‘notes for reviewers’ below table.
- Comments should be provided in three parts: Part A – key issues dot points; Part B - specific comments table; and Part C - comparison with guidelines table.
- The ‘Author’ column should include the reviewing agency, not individual names.
- A single comment proforma should be completed for each ‘topic’ being reviewed. Each should remain a separate document.
- The page number that should be used is the number shown on the page as if viewing a printed version of the document. Note that, when reviewing pdf documents on the computer screen, the page number in the bottom of the pdf window often does not correspond to the actual page number within the document.
- These notes and the ‘Notes for Reviewers’ at the end of the proforma should be deleted from the final document.

#### Style

- Statements should be used, rather than questions.
- The use of ‘must’ should generally be avoided. Where possible, comments should be phrased as positive suggestions/recommendations for additional information or for changes to the text. Suggest using phrases such as:
  - ‘More specific detail is requested in relation to...’;
  - ‘Additional information is requested...’;
  - ‘Justification should be provided in relation to...’;
  - ‘Suggest rewording this section as follows...’;
  - ‘It is suggested that...’; or
  - ‘It is recommended that...’.

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- Where additional mitigation measures are proposed, this should be worded as ‘It is recommended that the following additional mitigation measure/commitment be considered...’
- Formatting of comments should be minimised (ie where possible, avoid the use of tabs, bold text, italics, headings, etc).
- The personal pronoun (‘I’ or ‘we’) should be avoided.
- It should be noted that the comments will be publicly released by the RPDC, and should be worded appropriately for external distribution.
- Comments should be provided in order from Volume 1 through to Volume 4, and then Appendices/technical reports.

## **Part A - Summary of key issues**

- This section should contain a dot point summary of the key comments/issues.

## **Part B - Specific comments**

- This section should contain detailed comments on specific sections of the draft IIS and Appendices in tabular form.

<b>Volume/ Report</b>	<b>Section</b>	<b>Page</b>	<b>Comment</b>	<b>Author Agency</b>
	4.3 Dioxins	19-27	<p><u>Bioaccumulation of dioxins in seals</u></p> <p>In the Executive Summary Toxicos states that its impact assessment on <i>nearby seal colonies</i> is <i>restricted to the potential bioaccumulative effects of substances in the effluent</i>. However, despite extensive discussion and referencing <b>Toxicos fails to conclude or describe the risk to seals of bioaccumulating dioxins from exposure to the Bell Bay pulp mill effluent.</b> Toxicos references to biomagnification, the excretory capacity of seals and seal affinity for dioxins does not address the risk of bioaccumulation! Accurate information on the expected level of bioaccumulation of dioxins in seals is fundamental to assessing the impact on seals and its omission from the Toxicos report renders the discussion provided redundant.</p> <p>In order to understand the potential bioaccumulative effects of dioxins in effluent it is reasonable to expect a professional impact assessment to clearly and directly answer the following questions:</p> <ol style="list-style-type: none"> <li>1. What quantity of dioxin will be deposited into the environment over a period of time?</li> <li>2. Does seal food (fish <b>and</b> cephalopods) have the potential to bioaccumulate dioxins from the effluent and if so what level of accumulation is expected and what quantity of</li> </ol>	Wildlife and Marine section, DPIW

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			<p>fish will be affected?</p> <p>3. Do seals have the potential to bioaccumulate dioxins from contaminated fish in their diet?</p> <p>4. If so, what level of dioxin is expected to bioaccumulate in exposed seals over time?</p> <p>5. Based only on the previous information, what is the potential impact of the expected levels of dioxin in seals?</p> <p>Despite implying that bioaccumulation of dioxins in seals will not be significant and concluding that there will be no demonstrable impact on seals from bioaccumulation of dioxins in the effluent, Toxicos provides contradictory information by explaining that marine mammals <b>are</b> at risk of bioaccumulation from contaminated environments and by providing multiple references to studies and reports which <b>do</b> show that seals bioaccumulate dioxins as a result of exposure to pulp mill effluent:</p> <p>1. Ref. Toxicos section 4.3.4 final paragraph: <i>As is the case with fish, relatively high concentrations of dioxins in a local environment can result in higher concentrations of dioxins in marine mammals compared with those from pristine areas.</i></p> <p>2. Ref. Toxicos section 4.3.2 paragraph 12: ANZECC (2000) has nominated TCDD as being bioaccumulative.</p> <p>3. Ref. section 4.3.4 paragraph four: De Swart et al (1995) showed that harbour seals fed a diet of contaminated fish were <b>3.5 times more likely</b> to bioaccumulate TCDD.</p> <p>4. Ref. section 4.3.4 paragraph five: Addison et al (2005) and Addison and Ross (2001) showed a strong positive association between bioaccumulation of TCDD/F in harbour seals and exposure to six pulp mills. Seals exposed to the six pulp mills (Strait of Georgia) were <b>5-8 times more likely</b> to bioaccumulate TCDD than seals exposed to one sulphite mill which used mild chlorine bleaching (Quatisino Sound).</p> <p>5. Ref. section 4.3.4 paragraph two: Bignert et al (1989) reported <i>a study of four seal species from widely different areas around the Scandinavian Peninsula variously impacted by anthropogenic sources of dioxins.</i></p> <p>The preceding references and reports provide a weight of evidence that the potential for seals to bioaccumulate dioxins from exposure to pulp mill effluent is significant. Therefore the Toxicos implication is misleading and their conclusion false.</p> <p>Accurate information on the expected level of bioaccumulation of dioxins in seals potentially exposed to the Bell Bay pulp mill effluent is fundamental to this impact assessment and has not been provided by Toxicos.</p>	
	4.3.2 Dioxins	19-23	<u>Bioaccumulation of dioxins in fish</u>	Wildlife and

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			<p>Toxicos states that <i>dioxins are not significantly bioaccumulated by fish</i>. This statement is profoundly inaccurate, misleading and directly contradictory to references cited by Toxicos and Toxicos statements:</p> <ol style="list-style-type: none"> <li>1. Gatehouse 2004, referenced by Toxicos clearly states that dioxins bioaccumulate in fish and the marine mammals that eat them.</li> <li>2. Ref. section 4.3.2 paragraph thirteen: Toxicos explains that <i>very high local pollution in Homebush Bay of dioxin-contaminated wastes resulted in mean concentrations of TCDD from &lt;4 to 181 pg/g wet wt of fish depending on the species</i> (Thompson, 1992). Using the analytical detection limits provided by Toxicos in footnote eleven, this is up to 9 orders of magnitude higher than the ability of Australian Laboratories techniques to monitor this parameter in effluent and is therefore clearly significant.</li> <li>3. Ref. section 4.3.4 paragraph three: de Wit et al (1992) cited as reporting <i>geographical differences between dioxin/furan levels in fish could be linked to specific point sources of dioxins/furans</i>.</li> </ol>	Marine section, DPIW
	4.3.3	23	<p>The method used to determine the risk of bioaccumulation in fish is inappropriate. The measurability of increases of dioxin in one fish are irrelevant as the risk to seals from eating dioxin contaminated fish is not determined by the measurability of dioxin increases in fish. The risk to seals can only be determined by quantifying the expected absolute dioxin content of fish which comprise the diet of seals and summing the amount of bioaccumulation expected in a seal over a period of exposure.</p>	Wildlife and Marine section, DPIW
	4.3.1 Dioxin content of effluent, 1.2 Dilution zones and 1.3 Routes of exposure	19, 5, 6	<p><u>Concentration of effluent.</u></p> <p><b>Construct validity</b> is defined as the extent to which a measurement corresponds to the theoretical concepts (constructs) concerning the phenomenon under study (Last 2001). The use of <i>concentration of effluent</i> by Toxicos as a measurement for studying the risk of bioaccumulation in fish is not valid because the association it implies is false. The ‘real’ association between effluent and bioaccumulation is caused by fish exposure to dioxin containing particulate matter in sediment and suspension.</p> <p>Despite not using this measure, Toxicos does provide discussion in support of the real association (section 4.3.2 paragraph five): <i>the relationship between sediment concentration and fish tissue concentration is therefore more important than the relationship between water column concentration and fish tissue concentration</i>. In further support Toxicos explains that benthic-feeding fish consistently contain more dioxins than other fish because there is a strong association between <i>sediment concentration of dioxin and tissue concentration</i> of fish exposed to</p>	Wildlife and Marine section, DPIW

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			<p>sediment. <i>This is consistent with the fact that in polluted waterways around the world virtually all the dioxins partition into sediment.</i> For example, Thompson (1992) provides a valid association by using an appropriate measure: <i>Elevated dioxin levels found in fish, shellfish and sediments - in Australia relate to very high local pollution in Homebush Bay where large amounts (between 200-300 tonnes) of dioxin contaminated wastes were produced between 1949 and 1976 by industry on the banks of the bay.</i></p> <p>Whilst the mill designers Jaako Poyry provided Toxicos with <b>mass estimates of dioxins in the final discharged effluent</b>, and Toxicos has stated that dioxins have <i>very low water solubility</i> (Toxicos in reference to Gatehouse 2004), Toxicos has presented estimates of effluent <b>concentration</b> as the measure for assessing the impact on marine fauna. Effluent concentrations can be halved or doubled simply by removal or addition of diluents (water) however the total amount of dioxin deposited into the environment from effluent is dependant only on the quantity in a volume of effluent. The accumulation of dioxin-containing particulate matter that occurs as sediment when settled, or as a suspension in water when not settled, is therefore the <b>material</b> to which the risk of bioaccumulation by marine organisms should be measured.</p> <p>Information provided by Toxicos suggests a more suitable application for measuring the potential for bioaccumulation of dioxins in fish. Ref. section 4.3.2 paragraph seven: <i>Because biota-sediment accumulation factors are empirically determined they are particularly useful for chemicals such as dioxins which may be detectable in fish tissues and sediments but are difficult to detect or measure precisely in the water column.</i></p> <p>The assessment using effluent <i>concentration</i> by Toxicos is invalid and misleading and it is suggested that all conclusions based on this information are unsubstantiated.</p>	
	<p>4.3.2 and 4.3.4 Potential for bioaccumulation of dioxins by seals and fish</p>	<p>19-23 and 24-25</p>	<p><u>Biomagnification</u></p> <p>It is suggested that Toxicos has demonstrated a complete lack of understanding of the meaning of the term <b>biomagnification</b> and inappropriate use of the term has been used misleadingly to suggest dioxins do not significantly <b>bioaccumulate</b> in fish.</p> <p>The scope of the Toxicos assessment is defined in the first paragraph of their Executive Summary as being restricted to the <i>potential bioaccumulative effects of substances in the effluent</i> and their potential impact on nearby seal colonies.</p> <p>Bioaccumulation is defined as <b>a process by which a living organism concentrates a substance, such as chemical residues, from their environment.</b> It is suggested that Toxicos have inappropriately introduced the term biomagnification into their assessment. Biomagnification is defined as <b>a process in which there is an <u>increase in the concentration</u> of a pollutant in animals as related to their <u>position in the food chain</u></b>, and is independent of an animals'</p>	<p>Wildlife and Marine section, DPIW</p>

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			<p>potential to bioaccumulate a substance. For example <i>an absence of significant biomagnification between fish and their food</i> (Toxicos in reference Gatehouse 2004) does not preclude that fish have the potential to bioaccumulate chemicals from their food. Furthermore Toxicos, in reference to Gatehouse 2004 (section 4.3.4 paragraph ten) states <i>all BSAF for dioxins were much less than 1.0</i> however this <b>does not mean</b> that significant bioaccumulation has not occurred. If dioxin concentration in fish tissue is not higher than the concentration in sediment then <b>biomagnification</b> has not occurred however any BSAF result above zero means <b>bioaccumulation has occurred</b>.</p> <p>Therefore it is suggested that The Toxicos discussion referring to biomagnification is unsubstantiated, irrelevant and misleading to this assessment.</p>	
	1.2 Dilution zones	5	<p><u>Mixing zone.</u></p> <p>It is suggested that discussion on the effluent mixing zone is <b>speculative</b> and reference to <b>expert technical advice</b> has not been provided. Therefore the assessment of the risk of exposure to effluent in seawater is unsubstantiated (ref. section 4.3.1.Dioxin content in effluent and 4.3.3.Dioxin concentrations in fish near the effluent discharge).</p> <p>a) Toxicos states that the HHRA considers the potential for bioaccumulation by fish and is therefore the foundation for assessing the risk to seals that may also eat affected fish. This assessment is stated by Toxicos to have been based upon <i>assumed</i> (effluent) <i>dilutions</i> of 100 fold and an <i>estimated</i> mixing zone of 100 meter radius around the diffuser pipe. Two of the three references cited in the first sentence (pers. Comm. Gunns Pty Ltd and GHD, 2006) appear to be irrelevant to the citation. Detail provided on the Jaakko Poyry reference does not indicate an analysis of the size of the mixing zone has been included.</p> <p>b) Citation 4 states that hydrodynamic modeling <b>will</b> be undertaken by GHD to estimate the mixing zone – the absence of this information for the Toxicos assessment indicates that estimates used by Toxicos are speculative.</p> <p>c) Paragraph two discusses the direct effect of toxicity to organisms <i>at the edge of the DZ100 mixing zone</i>. <b>No reference</b> is provided to either eco-toxicological testing used to support the discussion or the <i>similar operating pulp mills</i> to allow the reader to assess. This discussion is irrelevant without substantiating references.</p>	Wildlife and Marine section, DPIW
	1.3 Routes of exposure	6-7	<p><u>Routes of exposure</u></p> <p>a) The second paragraph states that <i>the extent of accumulation in fish is determined by the average concentration to which the organism is exposed</i>. This statement is wholly incorrect and demonstrates a complete lack of understanding for the process of bioaccumulation! Further discussion by Toxicos on bioaccumulation in fish which has been built up this assumption is invalid and must be</p>	Wildlife and Marine section, DPIW

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			<p>disregarded.</p> <p>Bioaccumulation in fish is the process of <b>concentrating</b> chemical substances from the diet and the level of bioaccumulation reached is dependent upon <b>the absolute level of exposure to the substance</b>. The consumption of non-contaminated food by a fish which has already bioaccumulated a chemical <b>will not cause an averaging-down</b> of the substance in the fish.</p> <p>An assessment must be made of the potential for fish, which ultimately become seal food, to access chemicals in the effluent through the food chain and the quantity of bioaccumulating substances likely to be consumed during the life the fish.</p> <p><i>b)</i> The presence of bio accumulated toxins in cephalopods which comprise up to 20% of a seals diet have not been considered and may have a significant effect on exposure. For example, cephalopods could be a greater source of exposure to bioaccumulating substances than fish if their potential to bioaccumulate substances from the effluent was greater than 4 times the potential of fish.</p> <p><i>c)</i> Paragraph three discussed the risk of effluent toxicity to seals from direct exposure to unmixed effluent (i.e. within the mixing zone) and mixed effluent (DZ100). As previously highlighted, the size of the mixing zone expected is not known by Toxicos in this report and the toxicity testing results referred to as eco-toxicity testing are unsubstantiated. Therefore the conclusion by Toxicos that seals are unlikely to experience direct toxicity is only <b>speculation</b>.</p> <p>It is suggested that the risk of direct toxicity to seals is important and must be assessed based on accurate knowledge.</p>	
	2.1 and 2.2	7-9	<p><u>Chemicals of potential concern.</u></p> <p>The screening process which derives dioxin as a potential chemical of concern is <b>inconsistent</b> and <b>misleads</b> the reader on whether dioxin is <i>of concern</i>.</p> <p>The first paragraph states that dioxins were screened-in as a potential concern because of their <i>possibility to bioaccumulate</i> and a determination of <i>final effluent concentrations</i> (for the Bell Bay mill). However, the second paragraph states that the potential for bioaccumulation (of dioxins) by fish <i>is minimal</i>. Lastly, Toxicos states that dioxins were included because of <i>past association with old technology pulp mills and stakeholder interest</i>. Despite Toxicos stating that dioxins were included merely because of past association and stakeholder interest fifty percent of the Toxicos report on the specifics of chemicals of concern (8 of 16 pages) is dedicated to dioxins.</p> <p>A foundation for an assessment on the risk to seals from the effluent is necessarily based upon accurate knowledge and</p>	Wildlife and Marine section, DPIW

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			<p>reasonable estimates of effluent generation. Toxicos suggests that the content of the effluent has been estimated (ref: section 4.3.1 and section 4.3.2 paragraph one) and it reasonable to assume that it can be estimated with accuracy by the mill designers Jaakko Poyry.</p> <p>It is reasonable to expect that a professional toxicology assessment states clearly and accurately what the chemicals of concern are and bases further discussion <b>only</b> upon this foundation.</p>	
	3	9-10	<p><u>Seal colony Tenth Island.</u></p> <p>Useful discussion is provided by Toxicos on the geographical feeding pattern and diet of seals at Tenth Island. These factors are directly associated with the potential for exposure of seals to food containing bioaccumulated chemicals. However use of the maximum limits of diving depth and distance of foraging range to estimate risk of exposure is misleading because seals do not spend an equal proportion of time feeding across their range. Seals are known to spend a greater proportion of their time feeding close to their colony and less time further out. Given that the seal colony is only 12km from the outfall site a significantly greater proportion of time would be spent foraging in the area contaminated by effluent substances.</p> <p>To accurately estimate the risk of exposure to seals further information is needed on the proportion of time seals are expected to forage at different distances from the effluent outfall.</p>	Wildlife and Marine section, DPIW
	4.3	12-18	<p><u>Mercury and Cadmium</u></p> <p>Given the large uncertainty associated with current levels of exposure of mercury and cadmium stated by Toxicos it is suggested that due diligence has not been undertaken on these substances to understand the potential impact of additional exposure provided by the content of effluent.</p>	Wildlife and Marine section, DPIW
	4.3.2 and 1.2	22 and 6	<p><u>Unsubstantiated statements.</u></p> <ol style="list-style-type: none"> <li>1. Paragraph 13, on <i>face value the data appear at variance to other studies.</i></li> <li>2. Paragraph two: refers to eco-toxicological testing undertaken at similar operating pulp mills.</li> </ol> <p>References should be provided for these statements.</p>	Wildlife and Marine section, DPIW
	4.3.2	20	<p><u>Irrelevant information</u></p> <p>Toxicos discusses results of a study on the potential bioaccumulation of dioxins in mussels as an indication of the</p>	Wildlife and Marine section, DPIW



## Part C – Comparison with Guidelines

- This section should identify requirements of the IIS guidelines and emission limit guidelines that have not been satisfied in the draft IIS (in tabular form).

Guideline requirement	Comment	Author Agency
	The title suggests that all potential impacts on nearby seal colonies are being addressed in the report however only bioaccumulation and direct toxicity is discussed. Has due diligence been conducted on other potential impacts?	Wildlife and Marine section, DPIW

## Notes for reviewers of draft IIS

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### General

The Integrated Impact Statement (IIS) is the principal assessment document that will bring together the background, identify potential impacts, and document the proponent's avoidance, mitigation, management and offset measures with respect to those potential impacts. Supplementary reports form the appendices to the IIS.

The IIS must comply with the IIS guidelines prepared by the Resource Planning and Development Commission (RPDC). The RPDC IIS guidelines are available at:

[www.rpdc.tas.gov.au/projects\\_state\\_signif/pulp\\_mill/pm\\_docs/pm\\_reports\\_publications.htm](http://www.rpdc.tas.gov.au/projects_state_signif/pulp_mill/pm_docs/pm_reports_publications.htm)

Comments on the draft IIS should be consistent with those made previously on the IIS supplementary reports and earlier drafts of the IIS.

A reminder that the proposal must also comply with the Environmental Emission Limit Guidelines for any new Bleached Eucalypt Kraft Pulp Mill in Tasmania (the emission limit guidelines). These guidelines outline performance standards and accepted modern technology (AMT) for air emissions and emissions to the marine environment, as well as solid waste disposal guidelines, site suitability criteria and air and marine monitoring program requirements. The emission limit guidelines are also available at:

[www.rpdc.tas.gov.au/projects\\_state\\_signif/pulp\\_mill/pm\\_docs/pm\\_reports\\_publications.htm](http://www.rpdc.tas.gov.au/projects_state_signif/pulp_mill/pm_docs/pm_reports_publications.htm)

### Points to remember

When reviewing the draft IIS, reviewers should consider the following questions.

- Does the IIS address previous comments provided in relation to the IIS supplementary reports and earlier IIS drafts?
- Does the IIS appear to satisfy the requirements of the IIS guidelines? If not, what additional information may be required by the RPDC?
- Have all impacts been identified in the IIS (and in particular the key impacts)?
- Have the impacts identified been adequately assessed (and in particular the key impacts)? Is additional information or clarification required?
- Are the proposed avoidance/mitigation/offset measures contained in the IIS commitments considered satisfactory? Are the commitments worded specifically and unambiguously so that compliance can be legally enforced if necessary?
- Do you have any recommendations for additional mitigation measures that may be necessary for the impacts of the project to be acceptable?

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- Have all permits, licences or other approvals that would normally be required for the project to proceed been identified?
- For any such approvals for which your agency would normally be responsible, does the IIS contain sufficient information for you (and therefore the RPDC) to assess those matters you would normally assess, and to determine whether such an approval should be granted?