Gunns LIMITED
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Bell Bay Pulp Mill
Environmental Impact Management Plan (EIMP)
Module N: Remedial and Response Strategies

Prepared for the
Commonwealth Minister for the Environment, Heritage and the Arts
in accordance with approval EPBC 2007/3385

GNS-PLN-1000-1400-0019

16 December 2008

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Revision Status

Revision	Date	Revision Description	Prepared	Reviewed	Approved
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B	10 October 2008	For submission to DEWHA for review	IW	JD	CF
C	25 November 2008	For submission to DEWHA for review	IW	CF	CF
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E	10 December 2008	For submission to DEWHA for review	IW	CF	CF
F	16 December 2008	For submission to DEWHA for review	IW	CF	CF

1. OVERVIEW

1a. A description of the proposal and associated infrastructure

A description of the pulp mill project has been provided in EIMP Module A.

The activity to which this module relates is remedial and response strategies.

The approval requires that the EIMP must "*identify specific remedial management responses to be undertaken when trigger levels are exceeded or maximum limits are reached, so as to ensure no unacceptable environmental impacts on matters of national environmental significance. It is an operational objective of the pulp mill that trigger points and maximum limits are not to be reached*" (Schedule 2 of the approval).

Trigger levels are defined in the approval to be "*levels of specified parameters that, when reached, require the implementation of a response strategy within a specified timeframe as agreed by the Minister*".

The approval specifies six trigger levels:

- Concentration of dioxins and furans, chlorate and total chloroacetic acids in effluent
- Additional effluent contaminants, including nitrate, resin acid and colour
- Numbers of Tasmanian devils, quolls and Eastern barred bandicoots that may become trapped in pipeline excavation trenches
- Numbers of listed threatened species that may be victims of roadkill
- Underwater noise impacts on Australian grayling during pile driving for the construction of the wharf
- Underwater noise impacts on listed threatened and migratory marine species during construction of the wharf and ocean outfall.

The approval establishes four maximum limits:

- Volume of effluent that may be discharged
- Concentration of dioxins and furans, chlorate and total chloroacetic acids in effluent
- Additional effluent contaminants, including nitrate, resin acid and colour
- Concentration of dioxins and furans in benthic sediments.

Schedule 2 of the approval additionally specifies that maximum limits and trigger levels should be established for the receiving environment and in sentinel biota.

Remedial and response strategies that will be undertaken when the above trigger levels are exceeded or the above maximum limits are exceeded are described in modules of the EIMP relevant to those issues.

This Module N collates those remedial and response strategies into a single summary module.

1a.1 Purpose

On 4 October 2007, the Commonwealth Minister for the Environment and Water Resources approved the taking of an action under the *Environment Protection and Biodiversity Conservation Act 1999*, namely "to construct and operate a bleached Kraft pulp mill at Bell Bay, Tasmania, and associated infrastructure" (EPBC 2007/3385).

Condition 2 of the approval requires Gunns to develop and submit an Environmental Impact Management Plan (EIMP), the objective of which is to ensure that there are no adverse impacts on matters of national environmental significance as a result of the action.

The purpose of the EIMP, and the further investigations that are required in order to prepare some of its components, is to ensure that matters of national environmental significance are protected during the construction and operation of the pulp mill project.

The EIMP and those investigations are not a continuation or extension of the project's approval assessment process. The approval process concluded with the issue of approval EPBC 2007/3385 on 4 October 2007. The EIMP is designed to ensure that the conditions of the EPBC approval are satisfied.

This module of the EIMP addresses those conditions of the approval that are relevant to remedial and response strategies.

1a.2 Scope

The EIMP deals only with matters relevant to the EPBC approval. It does not deal with the much wider range of matters relevant to the State approval conditions other than those that are also relevant to the EPBC approval.

The staging of the project will be different for different elements of the project. For example, construction work on the mill site itself will commence before the construction of the ocean outfall commences.

Hence, in accordance with conditions 7 and 8, which recognise a sectional and staged approach, the EIMP development and approval has a modular structure.

This EIMP, Module N: Remedial and Response Strategies, should be read in conjunction with the other EIMP modules that have been prepared and submitted in accordance with the timing of the various stages of the project.

Module N is a collation of remedial and response strategies associated with trigger levels or maximum limits identified in the suite of EIMP modules. It therefore collates and summarises existing information rather than introducing new material.

Further information about the environmental management measures that will be implemented for the pulp mill project is available at www.gunnspulpmill.com.au.

1a.3 EIMP Structure

Schedule 2 of the EPBC 2007/3385 approval provides an outline for the EIMP (although the Schedule does not address all the permit conditions relating to the EIMP). The EIMP must set out specific issues and specific measures at each of the key preliminary phases of the project, these being:

- Preconstruction
- Construction
- Precommissioning.

The EIMP must also describe environmental management measures that will be implemented once the mill is operational, including:

- Ongoing monitoring
- Remedial and response strategies if trigger levels are likely to be exceeded or maximum target levels reached.

The operational phase modules of the EIMP describe trigger levels, maximum limits, response measures and a monitoring program to ensure protection of matters of National Environmental Significance from the operation of the mill.

The Department of Environment, Water, Heritage and the Arts (DEWHA) has specified that the EIMP structure must reflect the structure of Schedule 2 of the EPBC 2007/3385 approval.

These structural requirements overlay the project's staging, leading to the modular breakup shown in Table 1 that Gunns will adopt for EIMP preparation. Table 1 also shows the anticipated submission dates for each module. If these dates vary, DEWHA will be advised accordingly. As a matter of course, an updated Table 1 will be presented in each module of the EIMP.

Note that the original separation of the pipelines into the four modules and the solid waste disposal facility and reservoir into two modules (shown in Table 1) was based on the projected construction timetable at that time. Subsequent project delays and consequential changes to the construction timetable mean that the separation is no longer warranted. In addition, recent advice from DEWHA is that the approval conditions treat the effluent pipeline as a single action, which means that construction of any one element of the pipeline cannot proceed until all EIMP modules relating to it have been approved.

To minimise unnecessary duplication, EIMP Modules F, G, H and K have therefore been combined into a single module that will address those elements of the EIMP that are relevant to the water supply pipeline construction, effluent pipeline construction, shore crossing and ocean outfall construction. Similarly, EIMP Modules I and J have been combined into a single module that will address those elements of the EIMP that are relevant to the solid waste disposal facility and the reservoir.

Table 1: Modular elements of the EIMP and submission (or approval) dates

	Module	Estimated submission date	Gunns document number
	Overview		
A	EIMP Overview	Approved 01-Feb-08	GNS-PLN-1000-1400-0006
	Preconstruction and construction		
B	Vegetation clearing - mill site and wharf access	Approved 01-Feb-08	GNS-PLN-1000-1400-0007
C	Bulk earthworks mill site	Approved 31-Mar-08	GNS-PLN-1000-1400-0008
C1	Mill construction	Submitted 14-Jul-08	GNS-PLN-1000-1400-0022
D	Wharf construction	Submitted 10-Jul-08	GNS-PLN-1000-1400-0009
E	Accommodation facility construction	Approved 23-May-08	GNS-PLN-1000-1400-0010
F	Water supply pipeline construction	Submitted 11-Jul-08	GNS-PLN-1000-1400-0011
G	Shore crossing	Submitted 11-Jul-08	GNS-PLN-1000-1400-0011
H	Ocean outfall construction	Submitted 11-Jul-08	GNS-PLN-1000-1400-0011
I	Solid waste disposal construction	Submitted 21 Jul-08	GNS-PLN-1000-1400-0014
J	Local reservoir construction	Submitted 21-Jul-08	GNS-PLN-1000-1400-0014
K	Effluent pipeline construction	Submitted 11-Jul-08	GNS-PLN-1000-1400-0011
	Precommissioning		
L	Precommissioning management	Submitted 15-Aug-08	GNS-PLN-1000-1400-0017
	Ongoing monitoring		
M	Monitoring program	Submitted 2-Jul-08	GNS-PLN-1000-1400-0018
	Remedial and response strategies		
N	Remedial and response strategies	Submitted 22-Aug-08	GNS-PLN-1000-1400-0019
	Habitat measures		
O	Habitat offsets & reserves	Submitted 2-Jul-08	GNS-PLN-1000-1400-0020

Note that although the modules are labelled sequentially for convenience, as shown by the anticipated submission dates they have not been submitted in strict sequential order.

The detailed EIMP requirements are described in the separate EIMP Overview module. This EIMP Remedial and Response Strategies module should be read together with the EIMP Overview module. This EIMP module will also reference other previously approved modules where appropriate.

The EPBC 2007/3385 conditions addressed by each EIMP module are shown in Table 2.

Table 2: Modular elements of the EIMP and the EPBC 2007/3385 conditions they address

	Module	Conditions addressed	
	Overview		
A	EIMP Overview	1, 2, 6, 7, 8, 9, 10, 11, 12, 13, 20, 44, 45, 46, 47, 48	
	Preconstruction and construction	Preconstruction	Construction
B	Vegetation clearing - mill site and wharf access	14, 15, 17, 18, 20, 23, 25, 26	14, 15, 17, 18, 20, 23, 25, 26
C	Bulk earthworks mill site	14, 17, 18, 20, 23, 25, 26	14, 17, 18, 20, 23, 25, 26
C 1	Mill Construction	14, 17, 20, 23, 25, 26	14, 17, 20, 23, 25, 26
D	Wharf construction	14, 20, 27, 28, 29, 30	14, 20, 27, 28, 29, 30
E	Accommodation facility construction	14, 20, 23, 25	14, 20, 23, 25
F	Water supply pipeline construction	14, 20, 21, 22, 23, 25	14, 19, 20, 21, 23, 25
G	Dune crossing	14, 20, 23, 25, 27	14, 20, 23, 24, 25, 27
H	Ocean outfall construction	14, 20, 27, 28, 30, 38, 39	14, 20, 26, 27, 28, 30
I	Solid waste disposal construction	14, 17, 20, 23, 25	14, 17, 20, 23, 25, 26
J	Local reservoir construction	14, 17, 20, 23, 25	14, 17, 20, 23, 25, 26
K	Effluent pipeline construction	14, 20, 21, 23, 24, 25	14, 19, 20, 21, 22, 23, 24, 25
	Precommissioning		
L	Precommissioning management	3, 4, 9, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42	
	Ongoing monitoring		
M	Monitoring program	3, 4, 15, 31, 32, 33, 36, 37, 40, 41, 42, 43*	
	Remedial and response strategies		
N	Remedial and response strategies	3, 4, 5, 19, 26, 29, 30, 31, 32, 33, 39	
	Habitat measures		
O	Habitat offsets & reserves	15, 16, 17, 18	

*For completeness Module M also reiterates monitoring described in other modules relevant to conditions 15, 16, 17, 18, 19, 20, 22, 25, 26, 27, 29, 30, 31, 34, 35, 36 and 38

Module A Overview was the first module prepared and approved. Table 2 of that module listed the conditions which at that time were anticipated to be addressed by each of the succeeding modules. As those other modules have been developed, some changes to the allocation of conditions to modules emerged as being desirable to best reflect the scope and contents of each module and their relationship to the approval conditions. The changes from the Module A anticipated allocations are indicated in the above table. Additions are shown in dark blue and removals are shown in light grey. Module G has been renamed from Dune crossing to Shore crossing.

Note also that Module C1 has been added since Module A was finalised. Module C1 does not introduce any environmental issues not already addressed by Modules B and C but it is provided as an informative document to describe the pulp mill's buildings and structures.

This module follows the outline required by Schedule 2 of the conditions of approval.

The EIMP Overview Module A provides additional detail that demonstrates relationships between approval conditions, project elements, EIMP modules and EIMP components from various perspectives.

Appendix A provides an integrated summary of all those perspectives. Note that there have been some changes to the allocation of Schedule 2 issues to modules since Module A was approved. These changes emerged during the development of the modules as being desirable

to best reflect the scope and contents of each module and their relationship to the Schedule 2 issues.

The EIMP modules cover both the construction (B-K, O) and operational phases of the project (L, M, N), with module A being an overview of the EIMP.

All EIMP modules have been prepared and submitted to the Minister to achieve final approval under condition 7 of the approval by 5 January 2009. This date was extended from the original 4 October 2008 approval date by consent of the Minister in accordance with that condition.

The construction phase modules describe management measures that will be implemented to ensure that there are no significant impacts on matters of national Environmental Significance due to the construction of the pulp mill and associated infrastructure.

The operational phase modules describe trigger levels, maximum limits, response measures and a monitoring program to ensure that there are no significant impacts on matters of National Environmental Significance due to the operation of the pulp mill.

The operational phase modules also describe additional studies and investigations that will be undertaken to address residual risks and uncertainties identified by the Chief Scientist.

These studies and investigations are intended to further inform understanding of effluent characteristics and the design of the monitoring program. Gunns may also use the results of some of these studies and investigations to contribute to a request to the Minister to revise the trigger levels and maximum limits as provided for under condition 32.

The findings of the completed studies will need to be approved by the Department prior to commissioning commencing.

The results of the approved studies will need to be incorporated into the monitoring program (known as the Commonwealth Baseline and Operational Monitoring Plan, C-BOMP), or other documents as required, to the satisfaction of the Department prior to commissioning commencing. The results of background surveys being undertaken to inform the monitoring program will also be incorporated into the monitoring program.

An example of how the results of the further studies described in this module will influence the design of the final monitoring program is through the revision to and addition of sampling sites.

The hydrodynamic and sediment transport model required by condition 38 of the approval are central to the further studies and investigations described in this module. As required by condition 39 a range of responses are outlined in this module depending on the sediment deposition and effluent plume behaviour predicted by the hydrodynamic modelling study.

As with the other studies, the results of the hydrodynamic modelling will be used to inform the design of the monitoring program prior to commissioning commencing. In addition, if the result of the modelling study show that a more significant response than this are required, such as changing the design of the diffuser or implementing tertiary treatment, the Minister would then determine under condition 44 of the approval to request Gunns to revise the EIMP as necessary. On receipt of such a request Gunns would revise the EIMP and submit the revision to the Minister for approval.

1a.4 Relevant environmental commitments

Gunns' environmental commitments for the project as they relate to matters of Commonwealth interest are described in documents submitted to the Minister under the EPBC Act approval process:

- Preliminary Documentation: Gunns Limited Bell Bay Pulp Mill Project Impact Assessment under the *Environment Protection Biodiversity Conservation Act 1999*; and
- Response to Submissions: Gunns Limited Bell Bay Pulp Mill Project Response to Submissions under the *Environment Protection Biodiversity Conservation Act 1999*.

These commitments are described in section G of EIMP Module A.

Commitments relevant to the approval's specified trigger levels and maximum limits are:

- 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.
- 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.
- 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.
- 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.

1a.5 Relevant approval conditions and management measures

EPBC 2007/3385 approval conditions 3, 4, 5, 19, 26, 29, 30, 31, 32, 33, 39 specify that remedial and/or response strategies must be implemented if trigger levels are exceeded and/or maximum limits are reached. The trigger levels themselves are established in other modules (see Table 4 in section 1e).

Schedule 2 of EPBC 2007/3385 requires the EIMP to reflect commitments made by Gunns in its preliminary documentation and also in its response to public submissions. Schedule 2 also requires the EIMP to address issues and concerns raised by the (then) Department of the Environment and Water Resources in its Recommendation Report and also matters raised in the Chief Scientist's report to the Minister. The EIMP satisfies those requirements also.

1b. Identification of clear environmental objectives

Overarching environmental objectives for the project are to ensure that no adverse impacts occur on matters of national environmental significance, those matters being:

- World Heritage properties
- National heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining).

Matters relevant to the project are shown above in bold.

The specific objective of this module is:

- Collate remedial and response strategies that will be implemented if trigger levels are exceeded and/or maximum limits are reached.

1c. Identification of environmental indicators, and translation of objectives into agreed targets and performance measures

EIMP modules identify specific environmental objectives and associated performance measures relevant to the particular activities covered by them.

Some of those performance measures in turn have associated trigger levels.

For construction activities, examples of performance measures are:

- No harmful underwater noise levels in areas where the Australian Grayling (*Prototroctes maraena*) may be present.
- No harmful underwater noise levels in areas where whales, dolphins and seals may be present.

For operational activities, performance measures are defined by trigger levels and maximum limits. Ongoing monitoring against those trigger levels and maximum limits is required, including:

- Effluent monitoring
- Continuous monitoring of the effluent plume and its dispersion
- Sediment quality monitoring
- Sentinel biota monitoring
- Ecological surveys.

The determination of the trigger levels to be applied when the pulp mill is operating will be informed by monitoring undertaken during the Precommissioning phase, including:

- Chemical and ecotoxicological assessments
- Baseline monitoring of contaminants in sediments, water and biota.

1d. Design and implementation of an appropriate monitoring program

Refer to Module M Monitoring of this EIMP for a description of the monitoring program.

1e. Identification of, and commitment to, agreed trigger or response levels for key indicators

A number of the EPBC 2007/3385 approval conditions require the development of specified trigger levels that will be used to invoke response and remedial strategies to avoid approval conditions being breached and ensure that unacceptable environmental harm does not occur.

The EPBC 2007/3385 approval defines trigger levels to be: "*levels of specified parameters that, when reached, require the implementation of a response strategy within a specified timeframe as agreed by the Minister. Trigger levels will be below any maximum limits that are relevant to the trigger levels in question*".

Approval conditions specifying trigger levels are shown in Table 3.

Table 3: Approval conditions specifying trigger levels

Condition	Condition wording
3	The EIMP must include trigger points and maximum limits in relation to effluent discharge from the operation of the pulp mill as well as specific remedial management responses to be undertaken by Gunns Limited if trigger points are exceeded or maximum limits are reached. It shall be an operational objective of the pulp mill, and reflected in the EIMP, that trigger points, and maximum limits, are not to be reached.
5	If at any time during the taking of the action the trigger levels for effluent discharge in this approval, or in the EIMP, are exceeded, then Gunns Limited must immediately implement the response strategies in the EIMP, in accordance with stipulated timeframes.
19(d)	To minimise impacts during pipeline construction on the Tasmanian Devil, Spot-tailed quoll and Eastern Barred Bandicoot, and as part of the EIMP, Gunns Limited must: …(d) If at any time the number of fauna found in the trenches, reaches or exceeds the trigger levels defined in the EIMP, then response strategies must be implemented within the stipulated timeframes.
26(b)	To manage the risks to listed threatened species associated with roadkill, Gunns Limited must, in accordance with the EIMP: …(b) Monitor roadkill and implement response strategies, as necessary, in accordance with the EIMP if the number of road killed mammals exceeds the trigger levels in the EIMP.
29(c)	To minimise impacts on the Australian Grayling (*Prototroctes maraena)* Gunns Limited must put in place and implement, as part of the EIMP, measures including: …(c) If necessary, bubble curtains or other agreed response strategies must be implemented if trigger levels in the EIMP are exceeded.
30(c)	To minimise impacts on listed threatened and migratory marine species during construction of the wharf and the ocean outfall, Gunns Limited must put in place and implement, as part of the EIMP, measures, including: …(c) If necessary, bubble curtains or other agreed response strategies must be implemented if trigger levels in the EIMP are exceeded.
32	…Maximum limits and trigger levels on additional effluent contaminants (for example, nitrate, resin acid and colour) will also be developed in the EIMP in accordance with Schedule 2.
33	Prior to commissioning, trigger levels for effluent discharge for all phases of development must be included in the EIMP together with agreed response strategies and timeframes if trigger levels are exceeded or maximum limits reached.
39	In accordance with the EIMP, if the results of the modelling resulting from condition 38 indicate that effluent hydrodynamics and deposition will result in chemicals reaching trigger levels, Gunns Limited must implement approved response strategies, including, if necessary, changing the design and operation of the effluent pipeline and diffuser.

Condition	Condition wording
41(a)	In accordance with the EIMP, Gunns Limited must prepare and have approved by the Minister, prior to commencement of mill commissioning, strategies for monitoring the impacts of the mill effluent on the marine environment. These strategies must include but not necessarily be limited to: (a) Appropriate early warning of reaching trigger levels in Commonwealth waters.
Schedule 2	In addition, the EIMP must detail the arrangements for environmental management once the pulp mill is operational. These include: a. Ongoing monitoring; and b. The development of remedial and response strategies if monitoring shows trigger levels are likely to be exceeded or maximum target levels are to be reached.
	The plan must include but not necessarily be limited to: …e. Identification of, and commitment to, agreed trigger or response levels for key indicators; and f. Identification of specific remedial management responses to be undertaken when trigger point levels are exceeded, so as to ensure environmental targets and objectives will be achieved.
	The EIMP must address the management of all issues associated with protection of the Commonwealth marine environment, including: …c. Establish both maximum limits and trigger levels of pollutants in effluent discharge, in the receiving environment and in sentinel biota;
	The EIMP must establish the design and measures to implement an appropriate monitoring program to ensure there are no unacceptable impacts on matters of national environmental significance as a result of the action. The monitoring program must also identify and measure agreed trigger or response levels for key indicators.
	The EIMP must identify specific remedial management responses to be undertaken when trigger levels are exceeded or maximum limits are reached, so as to ensure no unacceptable environmental impacts on matters of national environmental significance. If necessary, remedial changes could include retrofitting of new technology, for example tertiary treatment of the effluent. It must be an operational objective of the pulp mill that trigger points, and maximum limits, are not to be reached.

The trigger levels that arise from the approval conditions described in Table 3 are shown in Table 4, together with the EIMP modules that address them.

Table 4: Trigger levels and the EIMP modules that deal with them

Trigger	Module
Concentration of dioxins and furans, chlorate and total chloroacetic acids in effluent	L
Additional effluent contaminants, including nitrate, resin acid and colour	L
Numbers of Tasmanian devils, quolls and Eastern barred bandicoots that may become trapped in pipeline excavation trenches	F-G-H-K
Numbers of listed threatened species that may be victims of roadkill	C, C1, I-J
Underwater noise impacts on Australian grayling during pile driving for the construction of the wharf	D
Underwater noise impacts on listed threatened and migratory marine species during construction of the wharf and ocean outfall	D, F-G-H-K

1f. Identification of specific remedial management responses to be undertaken when trigger point levels are exceeded

The EIMP must identify specific remedial and response strategies to be undertaken when trigger levels are exceeded or maximum limits are reached, so as to ensure no unacceptable environmental impacts on matters of national environmental significance.

It must be an operational objective of the pulp mill that trigger points, and maximum limits, are not to be reached.

Where relevant to the issues that they address, other modules have described remedial and response strategies.

A collation of these strategies is provided in this module, in section 6.

2. PRECONSTRUCTION

This issue has been addressed in other modules and is not relevant to this Module N, which is a collation module for remedial and response strategies from all those other modules.

3. CONSTRUCTION

This issue has been addressed in other modules and is not relevant to this Module N, which is a collation module for remedial and response strategies from all those other modules.

4. PRECOMMISSIONING

This issue has been addressed in other modules and is not relevant to this Module N, which is a collation module for remedial and response strategies from all those other modules.

5. ONGOING MONITORING

This issue has been addressed in other modules and is not relevant to this Module N, which is a collation module for remedial and response strategies from all those other modules.

6. REMEDIAL AND RESPONSE STRATEGIES

The remedial and response strategies described in EIMP modules relevant to trigger levels and maximum limits are collated in the following tables:

- Table 5: Remedial and response strategies for the construction phase of the pulp mill project (condition 19(d), 26(b), 29(c) and 30(c) responses to construction phase triggers)
- Table 6: Response strategies for a range of possible hydrodynamic modelling outcome scenarios (condition 39 responses to hydrodynamic modelling outcomes)
- Table 7: Remedial and response measures and response timeframes for effluent and receiving environment trigger levels (condition 3, 4 and 5 responses to condition 31, 32 and 33 and Schedule 2 trigger levels and maximum limits)
- Table 8: Examples of events that may cause trigger levels to be exceeded or maximum limits to be approached or exceeded, and likely response measures
- Table 9: Effluent weekly trigger levels and maximum limits for the Bell Bay pulp mill during commissioning and ramp-up phases (relating to condition 3, 4 and 5 responses to condition 32 and 33 trigger levels and maximum limits)
- Table 10: Effluent trigger levels and maximum limits for the Bell Bay pulp mill during normal operations (relating to condition 3, 4 and 5 responses to condition 32 and 33 trigger levels and maximum limits)
- Table 11: Water quality trigger levels and maximum limits for toxicants in Commonwealth waters (conditions 39 and 41)
- Table 12: Water quality trigger levels for stressors in Commonwealth waters (conditions 39 and 41)
- Table 13: Effect trigger levels for water chemistry, sediment chemistry, biota and ecological community indicators (condition 3, 4 and 5 responses to Schedule 2 trigger levels and maximum limits, and condition 41(a)).

Table 5: Remedial and response strategies for the construction phase of the pulp mill project (condition 19(d), 26(b), 29(c) and 30(c) responses to construction phase triggers)

<table>
<tr><th>Trigger issue</th><th>Applicable trigger approval condition</th><th>Applicable EIMP Module</th><th>Objectives</th><th>Trigger level</th><th>Remedial/response strategy</th><th>Timeframe</th><th>Monitoring</th></tr>
<tr><td>Numbers of Tasmanian devils, quolls and Eastern barred bandicoots that may become trapped in pipeline excavation trenches</td><td>19 (d)</td><td>F-G-H-K</td><td>Prevent Tasmanian Devils, Spot-tailed quolls and Eastern Barred Bandicoots from becoming trapped in a trench</td><td>A single Tasmanian devil, quoll or Eastern barred bandicoot becoming trapped in a pipeline excavation</td><td>When an animal is noted as trapped, work in the immediate vicinity (ie. 50 m) will stop immediately and the Site Supervisor will be notified.

Fauna trapped in trenches will be removed as soon as possible. No operations will commence or continue until fauna have been removed. Surviving fauna will be relocated to a suitable habitat by an ecologist trained in fauna handling procedures. Records will be kept of all live and dead fauna, including amphibians, removed from the trench.

Procedures will be immediately reviewed and the improved procedures implemented. These may include but are not limited to increasing the number or reducing the spacing of trench ramps and plugs.</td><td>If a trapped animal is found it will be removed as soon as possible.

The preventative measures will be reviewed within 12 hours of an animal being found trapped and enhanced within a further 24 hours if potential improvements are apparent.</td><td>Daily monitoring inspections of trenches by a suitably qualified person agreed to by DEWHA

Records kept of any fauna removed from trench

Records provided to DEWHA within three months of commencement of trench construction and progressively each month until all trenches have been filled

Summary of records provided to DEWHA in annual report</td></tr>
<tr><td>Numbers of listed threatened species that may be victims of roadkill</td><td>26 (b)</td><td>C, C1, I-J</td><td>Manage the risks to listed threatened species associated with roadkill</td><td>Zero roadkill</td><td>The following response strategy will be adopted from the start of vegetation clearing:

• Speed reductions from 60 km/hr to 40 km/hr will be imposed on the site access road from the East Tamar Highway and a 20 km/hr limit will be imposed on the mill construction site internal networks.

• Traffic counters will be installed on the pulp mill access road and the solid waste disposal facility access road.

• Pulp mill access roads will be monitored for roadkill and any roadkill carcasses will be removed to minimise risks of roadkill from carcass feeding.

• Car pooling and bus transport will be implemented to minimise construction worker vehicle movements associated with construction of the mill to achieve a 36% reduction in the construction worker traffic levels proposed in the Preliminary Documentation

• A daily bus service from George Town or Launceston (or both) will be implemented when construction workers travelling from either of those locations exceeds 50.

• Construction related heavy vehicle (ie. non-employee movement) traffic will be scheduled to minimise traffic during crepuscular periods (dawn and dusk) to minimise fauna roadkill.

• A feasibility study into the possibility of a cross-river ferry service for transportation of workers from the West Tamar to the site will be conducted.

• Site induction for all employees will include alerting them to the impact of roadkill and the need for care.

• Monitoring compliance with the above measures

Explanations will be provided to DEWHA for construction scheduling related variances, with significant non-scheduling related variations from the expected quarterly cumulative totals in the table at right to be addressed as necessary. Gunns will develop corrective measures and action plans to bring any such over-accumulation ‘back in line’ with the expected cumulative total, to ensure that the cap is not exceeded over the life of the construction project.</td><td>Start of construction</td><td>In order to demonstrate compliance with this commitment, Gunns will monitor and report quarterly on the cumulative construction worker vehicle entries to the pulp mill site. The table below shows the expected cumulative number of construction worker vehicle entries to the site as indicated in the Draft IIS and also the cumulative construction worker vehicle entries taking into account the 36% reduction commitment.

Expected quarterly cumulative totals of construction worker vehicle entries to the mill site

<table><tr><th rowspan="2">End of quarter</th><th>Project assessed expected cumulative total</th><th>Committed expected cumulative total</th></tr><tr><th>Draft IIS construction worker vehicle entries</th><th>36% reduction construction worker vehicle entries</th></tr><tr><td>Quarter 1</td><td>2,042</td><td>1,307</td></tr><tr><td>Quarter 2</td><td>11,669</td><td>7,468</td></tr><tr><td>Quarter 3</td><td>31,798</td><td>20,351</td></tr><tr><td>Quarter 4</td><td>65,930</td><td>42,195</td></tr><tr><td>Quarter 5</td><td>121,649</td><td>77,855</td></tr><tr><td>Quarter 6</td><td>198,761</td><td>127,207</td></tr><tr><td>Quarter 7</td><td>277,527</td><td>177,617</td></tr><tr><td>Quarter 8</td><td>306,699</td><td>196,288</td></tr><tr><td>Construction end</td><td>306,699</td><td>196,288</td></tr></table>
The 36% reduction commitment reduces the total number of construction worker vehicle entries allowed over the life of the construction project to 196,288.

In order to track progress against this cap, monthly averages and total cumulative data will be available for on-site review by the Independent Site Supervisor at any time, with cumulative data provided to DEWHA each quarter. Explanations will be provided to DEWHA for construction scheduling related variances, with significant non-scheduling related variations from the expected quarterly cumulative totals in the above table to be addressed as necessary.

Construction worker vehicle entries will be monitored using established procedures (a traffic counter on the pulp mill access road and construction worker site records) and reported.

Information obtained by this process will be used for:

• Monitoring adherence to speed limits

• Management feedback for temporal controls (e.g. diversion of traffic movements from crepuscular periods);</td></tr>
</table>

Trigger issue	Applicable trigger approval condition	Applicable EIMP Module	Objectives	Trigger level	Remedial/response strategy	Timeframe	Monitoring

							• Dissemination of actual performance against targets in relation to condition 26 (roadkill) will be provided on a regular basis to the construction workforce as a means of reinforcing our objectives and commitments for this issue; and
							• Preparation of quarterly reports to DEWHA including:
							  • Directional class/speed matrix;
							  • Total number of worker days (for construction activities) for the reporting period;
							  • Monitoring of construction worker vehicle entries
							  • Daily mean individuals transported by bus for the period from Launceston and George Town and
							  • Actual verses projected cumulative vehicle movements to the site (with passenger(s) relating to construction).
							Summary of records provided to DEWHA in annual report.

Underwater noise impacts on Australian grayling during pile driving for the construction of the wharf	29 (c)	D	No significant acoustic impacts on the Australian Grayling (*Prototroctes maraena*)	A cumulative sound exposure level of 195 dB re 1 μPa^2.sec at 500 m from piling activities	Based on the expert study (Appendix C of Module D), the trigger level will be a cumulative sound exposure level of 195 dB re 1 μPa^2.sec (which is a measure in decibels of the cumulative sound pressure referenced to 1 micropascal). Underwater noise from pile strikes will be measured at this distance to determine the typical noise level from a single pile strike. The cumulative sound loading (CSEL) at this distance will then be calculated from the relationship: $CSEL = RL + 10\log_{10}N$ where = the measured typical level of underwater noise from a single pile strike; and = the number of pile strikes in a typical 30 minute period of pile driving activity. A trigger level of CSEL = 195 dB re 1 μPa^2.sec at 500 m will be adopted. Before continuous pile driving commences, a small number of trial strikes will be undertaken to obtain a measure of RL, the noise level caused by a single pile strike at the trigger level distance of 500 m. This value of RL will then be used in the above equation to determine N, the maximum number of pile strikes per 30 minute period that can be made in the absence of bubble curtains without exceeding the trigger level cumulative sound exposure level (CSEL) of 195 dB at the 500 m distance. For operation purposes, the actual hammer rate limit will be set at 10% below this maximum allowable rate to provide a conservative margin. During the initial hammering, monitoring of the operational hammering will also be conducted to confirm the calculated CSEL at this rate. If the maximum allowable hammer rate needs to be exceeded due to the required pile driving program, bubble curtains will be installed and the above monitoring and calculations will be repeated to recalibrate the maximum allowable hammer rate. This new rate will be the maximum hammer rate that will not be exceeded in the presence of bubble curtains.	The hammering rate will be reduced if CSEL readings above 195 dB at 500 m are confirmed	Underwater noise will be monitored during the initial piling driving to validate the model predictions of the acoustic expert's study report. If measured values deviate significantly from the predictions, further advice will be taken from the study authors. The validation monitoring (which addresses condition 29(b) of the approval) will involve measuring underwater noise using a hydrophone lowered to mid-water depth at maximum interval distances of 100 m from the trial pile driving out to a distance of 500 m across the river (the direction and distance modelled in the study). Validation monitoring will be undertaken at both low tide and high tide. The monitoring findings will be compared with the study predictions (in particular Figure 17 of the report in Appendix C of Module D). In addition to this validation monitoring, underwater noise measurements will be undertaken with a hydrophone lowered to mid-water depth (at both low tide and high tide) at a location 500 m along the shore from the wharf site to enable an underwater noise trigger level at this location to be calibrated against pile hammering rate. This is the distance to the nearest creek that might be visited by Australian grayling.

Trigger issue	Applicable trigger approval condition	Applicable EIMP Module	Objectives	Trigger level	Remedial/response strategy	Timeframe	Monitoring
					If the pattern or method of pile driving changes significantly, the field measurements and CSEL calculations will be repeated. To account for potential changes in underwater noise transmission due to seasonal water conditions (eg. salinity and temperature), calibration measurements and calculations will be repeated once a month during the pile driving period. Any dead fish found floating or washed up in the vicinity of the pile driving area will be collected, photographed and recorded by the Site Environmental Officer. If any such fish are Australian grayling, the specimens will be sent to the State government's Animal Health Laboratory for determination of probable cause of death. If the probable cause of death is determined to be trauma potentially related to pile driving, the maximum allowable hammer rate will be reduced by 30% until a review of the trigger levels and management measures has been completed to the satisfaction of DEWHA.		
Underwater noise impacts on listed threatened and migratory marine species during construction of the wharf and ocean outfall	30 (c)	D, F-G-H-K	No marine mammal vessel strikes by vessels associated with construction of the wharf and ocean outfall. No harmful underwater noise levels in areas where whales, dolphins and seals may be present.	A whale enters the 1.0 km safety zone A seal or dolphin enters the 0.5 km safety zone.	A study of potential underwater noise from the outfall construction has been undertaken. The study findings and recommendations are summarised in section 2k.1 of Module F-G-H-K and the full report is provided in Appendix D of Module F-G-H-K. The study found that potential significant underwater noise impacts on listed threatened and migratory marine species may occur if a marine mammal is within 500 m during rock popping inside the temporary berm or within 200 m during sheet piling within the berm. These distances are based on a maximum noise level of 180 dB re 1 µPa msp, which is the level at which temporary threshold shift (TTS) occurs in cetaceans (the TTS of seals and fish is higher). TTS is where hearing sensitivity is temporarily reduced. Using conservative assumptions, this level is predicted to only be reached during sheet piling, at distances up to 200 m, or during rock popping inside the berm, at distances up to 500 m. A TTS in marine mammals will therefore be avoided by ceasing rock popping if they are within 500 m of that activity and ceasing sheet piling if they are within 200 m of that activity. Condition 30 of the approval requires construction activities to cease anyway if whales are in a safety zone within 1 km of noise-generating activities or if seals and dolphins are in a safety zone within 500 m of noise-generating activities. Those safety zones achieve the TTS avoidance and no additional management measures are considered necessary.	Noise generating activities will cease when a marine mammal enters an applicable safety zone	Ocean outfall noise monitoring In accordance with condition 30(b), underwater noise will be monitored during the first stages of construction to validate the model predictions of the noise modelling study (Appendix D). The validation monitoring will involve measuring underwater noise using a hydrophone lowered to mid-water depth at a distance of 500 m and 1000m away from the source of noise. Validation monitoring will be undertaken at both low tide and high tide. The monitoring findings will be compared with the study predictions. If measured values deviate significantly from the predictions, further advice will be taken from the study authors. If noise measured during validation exceeds 190dB re 1 µPa msp at 500m (the level at which TTS occurs in pinnipeds) or 180dB re 1 µPa msp at 1000m (the level at which TTS occurs in cetaceans) then the safety zones will immediately be extended accordingly so that construction that may cause underwater noise is suspended if a mammal is within a distance where TTS is possible. This will be achieved by recalibrating the underwater noise model using the measured underwater noise data, and using the revised underwater noise model to predict new safety zone distances and implementing those new safety zones. The new underwater model (if required) will be validated with underwater noise monitoring by hydrophone at the new predicted safety zone distances using the same method as the original validation monitoring. If the noise model requires recalibration and construction work cannot be suspended until that is complete and new safety zones are established, underwater noise from the construction will be measured at 50 m intervals outwards from the 500 m and 1000 m safety zones until a consistent measurement of less than 190 dB re 1 µPa msp and 180 dB re 1 µPa msp respectively is achieved. The distances at which those noise levels are not exceeded would temporarily be used as the safety zones, until the model is recalibrated and new safety zone distances are formally established. Ocean outfall Marine Mammal Observers At least one observer will be on duty at the ocean outfall site and solely dedicated to observing marine mammals at all times during any activity that could generate underwater noise. MMOs will be equipped with appropriate equipment (e.g. range finder binoculars, camera and recording documents) and will be sited at strategic vantage points on the shore or on board vessels, as is most appropriate for the circumstances. The observer location will be whatever is necessary on a particular day (and time of day) to observe the area around the outfall construction without obstruction or glare. Potential observer sites include on patrol vessels, on the berm (if constructed) and on shore.

Trigger issue	Applicable trigger approval condition	Applicable EIMP Module	Objectives	Trigger level	Remedial/response strategy	Timeframe	Monitoring
							MMOs will be in direct or radio contact with the person overseeing construction activities to enable communications regarding any whale, dolphin or seal observations. When construction activities that generate underwater noise are occurring at the outfall, regular visual surveillance at 10 to 15 minute intervals within the alert zones will be conducted. A trigger level of a single marine mammal entering the relevant safety zone will be adopted. A 2 km radius alert for whales will be implemented with a 1 km radius safety zone, within which underwater noise generating activities will be ceased if a whale approaches. A 1 km radius alert for seals and dolphins will be implemented with a 0.5 km radius safety zone, within which underwater noise generating activities will be ceased if a seal or dolphin approaches. Wharf Marine Mammal Observers At least one observer will be on duty at the wharf site and solely dedicated to observing marine mammals at all times during pile driving and any other activity that could generate significant underwater noise. At the start of each continuous pile driving period there will be gradual build-up in the hammering rate over at least a 10 minute period so that marine mammals have time to leave and/or avoid the area before the full hammering rate is reached. MMOs will be equipped with appropriate equipment (e.g. range finder binoculars, camera and recording documents) and will be sited at strategic vantage points on the shore or on board vessels, as is most appropriate for the circumstances. The observer height and location will be whatever is necessary on a particular day (and time of day) to observe the entrance to Long Reach (the arm of the estuary within which the wharf is located) without obstruction or glare. Potential observer sites include on patrol vessels, the wharf site itself, the nearby power station, the observation point at Bell Bay, the wharf at Bell Bay and at Rowella. MMOs will be in direct or radio contact with the person overseeing construction activities to enable communications regarding any whale, dolphin or seal observations. When construction activities that generate underwater noise are occurring at the wharf, regular visual surveillance at 10 to 15 minute intervals within the alert zones will be conducted. A trigger level of a single marine mammal entering the relevant safety zone will be adopted. A 2 km radius alert for whales will be implemented with a 1 km radius safety zone, within which underwater noise generating activities will be ceased if a whale approaches. A 1 km radius alert for seals and dolphins will be implemented with a 0.5 km radius safety zone, within which underwater noise generating activities will be ceased if a seal or dolphin approaches.

Table 6: Response strategies for a range of possible hydrodynamic modelling outcome scenarios (condition 39 responses to hydrodynamic modelling outcomes)

	Hydrodynamic modelling outcome scenario	Response strategy
1	Modelling predicts that the 95 percentile water concentration isopleth of a toxicant, or median water concentration isopleth of a non-toxicant, exceeds its applicable water quality objective in Commonwealth waters (commensurate with the water chemistry high level effect criterion defined in Table 13). These 95 and 50 percentile statistics are computed seasonally for annual simulations, or for the length of the simulation (e.g. monthly) for shorter simulations only capturing high or low energy conditions.	Redesign diffuser and/or develop a release regime linked to tides and/or temperature stratification (using the spill basin as volume buffer). If not successfully resolved by reiteration of modelling, establish a water quality monitoring site at the predicted exceedence location(s) and maintain ongoing monitoring. Subject to the findings of that monitoring, develop additional response strategies to the satisfaction of DEWHA.
2	Modelling predicts that the water concentration isopleth of a toxicant exceeds its applicable water quality objective in Commonwealth waters at any time during the simulation (commensurate with the water chemistry medium level effect criterion defined in Table 13).	Redesign diffuser and/or develop a release regime linked to tides and/or temperature stratification (using the spill basin as volume buffer). If not successfully resolved by reiteration of modelling, develop an engineering solution, which may include reduced production and/or tertiary treatment, to the satisfaction of DEWHA. Implement this solution if 6 months of operational monitoring confirms the predictions of the modelling.
3	Modelling predicts that over a 12 month period the maximum water concentration isopleth of chlorate will exceed its applicable water quality objective outside of the State permit's defined mixing zone within 1 metre of the seabed in any area where brown algae is present (commensurate with the biota medium level effect criterion described in Table 13).	Redesign diffuser and/or develop a release regime linked to tides and/or temperature stratification (using spill basin as volume buffer). If not successfully resolved by reiteration of modelling, establish a brown algae monitoring site at the predicted exceedence location(s) and maintain ongoing monitoring. Subject to the findings of that monitoring, develop additional response strategies to the satisfaction of DEWHA.
4	Modelling predicts a depositional zone(s) in Commonwealth waters at which the accumulation of particulates from the mill's effluent discharge over a 12 month period will cause a statistical difference of a toxicant concentration of more than one standard deviation relative to background (commensurate with the sediment chemistry medium level effect criterion defined in Table 13).	Establish a sediment and ecological monitoring site(s) at the predicted deposition zone(s). Maintain ongoing monitoring to confirm that the sediment concentration build-up or effects on biota do not exceed a medium level effect. Subject to the findings of that monitoring, develop additional response strategies to the satisfaction of DEWHA.
5	Modelling predicts a depositional zone(s) in Commonwealth waters at which the accumulation of particulates from the mill's effluent discharge over a 12 month modelling period will cause a statistical difference of a toxicant concentration of more than two standard deviations relative to background (commensurate with the sediment chemistry high level effect criterion defined in Table 13).	Establish a sediment and ecological monitoring site(s) at the predicted deposition zone(s). Develop an engineering solution, which may include reduced production and/or particulate removal by flocculation, to the satisfaction of DEWHA. Implement this solution if 12 months of operational monitoring confirms the predictions of the modelling of sediment concentration build up or 24 months of ecological monitoring confirms a high level effect on biota.
6	Modelling predicts a depositional zone(s) in Commonwealth waters at which the accumulation of particulates from the mill's effluent discharge over the life of the mill will cause the condition 42 sediment quality limit for dioxins and furans (850 pg TEQ/kg) to be exceeded (commensurate with the sediment chemistry high level effect criterion defined in Table 13).	Develop and implement an engineering solution, which may include reduced production and/or tertiary treatment, to the satisfaction of DEWHA within a timeframe agreed to by DEWHA.
7	Modelling identifies that a monitoring location(s) is not fit for purpose, which may include (but not be limited to) an Impact Location(s) not being located in the vicinity of predicted maximum concentrations or a Control Location(s) being exposed to predicted concentrations from the discharge above the laboratory detection limit.	Revise monitoring locations to the satisfaction of DEWHA.

Table 7: Remedial and response measures and response timeframes for effluent and receiving environment trigger levels (condition 3, 4 and 5 responses to condition 31, 32 and 33 and Schedule 2 trigger levels and maximum limits)

Trigger or maximum limit	Reference in this EIMP module for levels	Primary response if exceeded	Timing of primary response initiation	Secondary response if primary response fails	Timing of secondary response initiation
Commissioning and ramp-up phase effluent					
7-day and monthly trigger levels	Table 9	Undertake Root Cause Analysis and implement remedial measures. Continue to monitor real-time using statistical process tools with in-line parameters to confirm that they move back into control ranges.	Within 24 hours of 7-day or monthly result	Modify production until real-time, in-line parameters return to within control ranges. Inform DEWHA of the exceedance and of the action taken within 7 days.	Within 24 hours of subsequent 7-day or monthly result
Monthly maximum limits	Table 9	Undertake Root Cause Analysis and implement remedial measures. Modify production or process variables until subsequent monitoring activities confirms limit is satisfied.	Within 24 hours of monthly result	Modify production until the cause has been determined and rectified. Submit report on the problem and action taken to DEWHA within 14 days. Consider intensification of relevant monitoring activities in the receiving environment.	Within 24 hours of subsequent monthly result
Average monthly maximum volume limit	Condition 31	Reduce production until the daily effluent volumes are below the level that over a month will be less than the average monthly maximum limit.	Within 24 hours of average monthly result	Reduce production until the daily effluent volumes are below the level that over a month will be less than the average monthly maximum limit.	Within 24 hours of average monthly result
Operational phase effluent					
7-day tier 1 trigger	Table 10	Undertake Root Cause Analysis and implement remedial measures. Continue to monitor real-time using statistical process tools with in-line parameters to confirm that they move back into control ranges.	Within 24 hours of 7-day result	Implement tier 2 response.	Within 24 hours of subsequent 7-day result
7-day tier 2 trigger	Table 10	Modify production levels by up to a 50% reduction commensurate with the degree of the trigger level exceedence and/or modify process variables until real-time, in-line parameters return to within control ranges. Inform DEWHA of the second tier trigger exceedance and of the action taken, within 1 week of the exceedance result.	Within 24 hours of 7-day result	Detailed risk assessment. Determine if modifying production or process further will resolve issue if an identifiable cause(s) has not been determined and rectified. Submit report on the problem and action taken to DEWHA within 1 month.	Within 24 hours of subsequent 7-day result
Monthly trigger	Table 10	Undertake Root Cause Analysis and implement remedial measures. Continue to monitor real-time using statistical process tools with in-line parameters to confirm that they move back into control ranges.	Within 24 hours of monthly average result	Detailed risk assessment. Determine if modifying production or process further will resolve issue if an identifiable cause(s) has not been determined and rectified. Submit report on the problem and action taken to DEWHA within 1 month.	Within 24 hours of subsequent monthly average result
Monthly average maximum limit	Table 10	The pulp mill will not operate if the monthly average effluent concentrations exceed the maximum limits. This response will be enacted immediately the monthly monitoring program shows the pulp mill operated above the monthly maximum limits unless the primary cause of the exceedance is a specific event, such as an unexpected spike in concentrations, which occurs during the last weekly monitoring result for the month, and responses have been implemented to the satisfaction of DEWHA. In addition, the maximum limits for the monthly average effluent concentrations will be reduced for the following month in order to fully compensate for the exceedance. The mill will not recommence operating without the Minister's agreement.	Within 24 hours of monthly average result	The mill will not operate if in the month following the monthly exceedance (as a result of a specific event, such as an unexpected spike in concentrations) the exceedance has not been fully compensated. The mill will not operate if the mill exceeds the monthly average maximum limits for three months in any 12 month rolling period. The mill will not recommence operating without the Minister's agreement	Within 24 hours of relevant monthly average result
Average monthly maximum volume limit	Condition 31	Reduce production until the daily effluent volumes are below the level that over a month will be less than the average monthly maximum limit. Adjust measured concentrations of condition 32 parameters by dividing the actual contaminant loads discharged over that month by the average monthly maximum volume limit (64 ML/day), thereby ensuring that any compliance assessment with condition 32 limits is not distorted by dilution from the excess effluent volume.	Within 24 hours of average monthly result	Reduce production until the daily effluent volumes are below the level that over a month will be less than the average monthly maximum limit.	Within 24 hours of average monthly result

Trigger or maximum limit	Reference in this EIMP module for levels	Primary response if exceeded	Timing of primary response initiation	Secondary response if primary response fails	Timing of secondary response initiation
Receiving environment water chemistry, sediment chemistry, biota and ecological communities					
Low level effect	Table 13	Review C-BOMP design to ensure that effects are monitored.	For next sampling round	Continue to monitor.	Next sampling round
Medium level effect	Table 13 & Condition 39	*For all media:* Review C-BOMP design to ensure that effects are monitored → Characterise risk → Identify response options → Evaluate options → Advise DEWHA of proposed actions → Implement appropriate options → Monitor effectiveness of response.	Within 1 month of sampling result	Submit report to DEWHA on the ecological significance of effects and options available to mitigate impacts, if any, including the design and operation of the effluent pipeline and diffuser within 1 month.	Within 1 month of subsequent sampling round result
		Additionally for water chemistry toxicants: Implement a pulsed discharge regime (using temporary effluent storage in the spill basin) linked to tidal state so as to avoid discharge at slack water and monitor the effectiveness of this at the relevant Impact Location(s) with hourly sampling over at a full tidal cycle. If this does not bring water quality concentrations below trigger values at the following week's sampling, reduce production and hence discharge rates until hourly monitoring over a full tidal cycle confirms that trigger levels are no longer exceeded beyond the edge of the mixing zone.	Within 48 hours of sampling result		
High level effect	Table 13	*For all media:* Review C-BOMP design to ensure that effects are monitored → Characterise risk → Identify response options → Evaluate options → Advise DEWHA of proposed actions → Implement appropriate options → Consider program to identify potential causal agents applicable to operation of the mill. Monitor effectiveness of response for next monitoring cycle(s) or other nominated confirmation period.	Within 1 month of the next monitoring cycle or a nominated confirmation period.	Submit report to DEWHA within 1 month on the ecological significance of the observed effect(s), including where possible an assessment of cause (undesirable impacts could arise if maximum limits for water quality, sediment quality and/or biota are exceeded) and options available to mitigate the effect(s) if they can reasonably be attributed to the mill. The report will include an assessment of the potential efficacy of implementing tertiary treatment to resolve the issue, and where relevant a timetable for remediation of any undesirable impacts on matters of National Environmental Significance.	Within 1 month of subsequent sampling round result
		Additionally for water chemistry toxicants: Reduce production and hence discharge rates until hourly monitoring over a full tidal cycle confirms that trigger levels are no longer exceeded beyond the edge of the mixing zone.	Within 48 hours of sampling result		

Table 8: Examples of events that may cause trigger levels to be exceeded or maximum limits to be approached or exceeded, and likely response measures

Event	Response	Responsible department
TSS		
Too high hydraulic loading of secondary clarifiers	Reduce water consumption at the mill	Pulp mill departments
	Direct part of effluent to emergency spill basin	Effluent treatment plant
Poor quality of biomass (bulking)	Mitigate/Eliminate bulking sludge by: Controlling the variability of raw effluent quality Controlling COD-nutrient ratios Controlling oxygen concentration in the aeration Controlling of sludge age by controlling excess sludge flow Using polymers in secondary clarifier inflow	Effluent treatment plant
Too high sludge level in the secondary clarifier	Increase the return sludge flow and excess sludge flow	Effluent treatment plant
BOD5 and COD		
Too high BOD /COD load to aeration	Check and eliminate the possible spills at the mill	Pulp mill departments
	Direct part of effluent to emergency spill basin	Effluent treatment plant
High TSS in the effluent	TSS in the effluent increases the BOD as well, therefore reduce effluent TSS	See responses for TSS
Poor quality of biomass (bulking)	Mitigate/Eliminate bulking sludge by: Controlling the variability of raw effluent quality Controlling COD-nutrient ratios Controlling oxygen concentration in the aeration Controlling of sludge age by controlling excess sludge flow Using polymers in secondary clarifier inflow	Effluent treatment plant
Toxicity in effluent	Determine reason for toxicity and reduce it	Pulp mill departments
	If biomass activity has decreased decrease the load to the treatment plant by directing part of the effluent to the emergency spill basin to allow the biomass to recover	Effluent treatment plant
Too high raw effluent temperature	Eliminate the reason for high temperature	Pulp mill departments
	Decrease the load to the treatment plant to allow the treatment plant to recover. Methods are:	Pulp mill departments
	Operate reserve effluent heat exchanger	Pulp mill departments
	Direct part of effluent to emergency spill basin	Effluent treatment plant
Shortage of nutrients	Adjust the nutrient dose	Effluent treatment plant
Shortage of oxygen	Adjust the oxygen content in aeration	Effluent treatment plant
Excess use of defoaming agents	Defoaming agents reduce oxygen uptake and oxygen shortage may result, reduce defoaming agent use	Effluent treatment plant
Chlorate		
Too high chlorate at raw effluent	Lower the effluent load. Methods are:	
	Modify cooking and oxygen delignification parameters Modify bleach plant parameters	Pulp mill departments
	Direct part of effluent to emergency basin	Effluent treatment plant
	Improve oxygen control, in the chlorate removal stage and MBB stage	
	Check micronutrient (ferro ion) level in the raw effluent, adjust if required	
Poor quality of biomass	Revive biomass quality with lower load, check nutrient and oxygen dose	Effluent treatment plant
Total N		
Too high total N in raw effluent	Check and eliminate the reason at the pulp mill and at the effluent treatment plant	All departments
Too high total N at effluent	Correct the dose at effluent treatment plant	Effluent treatment plant

Event	Response	Responsible department
treatment plant	Can be part of TSS – reduce TSS	See responses for TSS
Total P		
Too high total P in raw effluent	Check and eliminate the reason at the pulp mill and at the ETP	All departments
Too high total P at effluent treatment plant	Correct the dose at effluent treatment plant	Effluent treatment plant
	Change sludge age through recycling rate	Effluent treatment plant
	Can be part of TSS – reduce TSS	See responses for TSS

Table 9: Effluent weekly trigger levels and maximum limits for the Bell Bay pulp mill during commissioning and ramp-up phases (relating to condition 3, 4 and 5 responses to condition 32 and 33 trigger levels and maximum limits)

Parameter	Units	Concentration limit or load limit*	Units	Trigger level 0 to 12 months from start-up
Dioxins and furans	pg TEQ/L	3.4	pg TEQ/L	2
Total chloroacetic acids	µg/L	237	µg/L	237
TSS	t/a	467	mg/L	100
BOD5 (total)	t/a	257	mg/L	25
Chlorate	t/month	7	mg/L	1.9
Total N	t/a	58	mg/L	8.0
Total P	t/a	19	mg/L	0.8

* Apart from dioxins and furans, chloroacetic acids and chlorate, at any particular month number M, the year-to-date limit will be calculated by multiplying the annual limit by (M/12). For chlorate, the monthly load limit applies in any month.

Table 10: Effluent trigger levels and maximum limits for the Bell Bay pulp mill during normal operations (relating to condition 3, 4 and 5 responses to condition 32 and 33 trigger levels and maximum limits)

Parameter	Units	7-day trigger level Tier 1	7-day trigger level Tier 2	Units	Monthly trigger value	Monthly average maximum limit
Dioxins & furans	pg TEQ/L	2	2	pg TEQ/L	2.0	3.4
Total chloroacetic acids	µg/L	237	237	µg/L	237	237
Total resin acids	mg/L	0.25	0.25	mg/L	N/A	0.08
TSS	mg/L	29	31	mg/L	(Not required)	20
BOD5 (total)	mg/L	14	15	mg/L	(Not required)	11
COD (total)	mg/L	583	608	mg/L	(Not required)	496
Chlorate	mg/L	4.1	4.3	mg/L	1.9	3.7
Colour	mg/L	691	728	mg/L	(Not required)	558
Total N	mg/L	3.50	3.78	mg/L	(Not required)	2.5
Total P	mg/L	1.07	1.20	mg/L	(Not required)	0.8
Nitrate (as N)	mg/L	1.79	1.93	mg/L	(Not required)	1.3

Table 11: Water quality trigger levels and maximum limits for toxicants in Commonwealth waters (conditions 39 and 41)

Chemical	Trigger value (TV) µg/L	Estimated maximum concentration at DV_{100} µg/L	Maximum limit µg/L	Ratio DV_{100}/TV	Notes
Aluminium	0.5	11	11	22	A low reliability marine guideline value of 0.5 µg/L was derived using the assessment factor approach. There are only three trophic levels represented in the ANZECC database and there is an insufficient spread of data to derive a 99% value. Speciation considerations are relevant with aluminium. Much of the aluminium will be colloidal and therefore biologically unavailable, while complexation with dissolved organics will also be appreciable. Bioavailable aluminium is likely to be much lower than the assumed concentration.
Chlorate	30	37	37	1.2	Using all available toxicity data for chlorate, the 99% species protection value is 3 µg/L but the reference data are biased by the inclusion of a NOEC of 5 µg/L for the European *Fucus vesiculosus*, a macroalgal species not found in Bass Strait. Excluding this species from the calculation gives a Bass Strait specific trigger value guideline of 30 µg/L.
Monochloroacetic acid (a chloroacetic acid)	0.58	0.74	0.74	1.3	A value of 0.58 µg/L is listed in the European Union risk assessment of monochloroacetic acid (EU 2005). Few marine toxicity data are available.
Trichloroacetic acid (a chloroacetic acid)	3	0.74	0.74	0.25	A value of 3 µg/L based on a freshwater test is shown in the Ontario 1994 guidelines.
Resin acids excluding dehydroabietic acid	52	2.5	2.5	0.05	From softwoods (pine) only. The only published guideline value 52 µg/L is based on freshwater species (Ontario 1994). It includes resin acids other than dehydroabietic acid.
Dehydroabietic acid (a resin acid)	13	0.5	0.5	0.04	From softwoods (pine) only. The Ontario 1994 value is 13 µg/L and is for freshwater species. No marine data are available but chronic NOEC values for freshwaters include a crustacean Daphnia magna (200 µg/L), rainbow trout (130 µg/L) and fathead minnow (240 µg/L) (Kamaya et al 2005). Using an assessment factor of 10 on the lowest NOEC yields the low reliability value of 13 µg/L.
Chlorophenols	2	0.05	0.05	0.025	Few marine data are available and guideline values were calculated using the application factor method. Low reliability values are based on freshwater data and are from 2 to 340 µg/L, depending on the compound.
Dioxins/furans	2 pg/L	0.034 pg/L	0.034 pg/L	0.017	Undetectable by current techniques which have a limit of reporting (LOR) of approximately 1 to 2 pg/L. The adopted trigger value is the current LOR.

Table 12: Water quality trigger levels for stressors in Commonwealth waters (conditions 39 and 41)

Chemical	Trigger value (TV) µg/L	Estimated maximum concentration at DV_{100} µg/L	Ratio DV_{100}/TV	Notes
Total nitrogen (N)	25	25	1	The trigger values are the default ANZECC values for marine waters in south-east Australia. Subject to DEWHA approval, these trigger values may be replaced by the 80th percentiles of the background data values once sufficient background data are available. The DV_{100} are based on the maximum limits in Table 10.
Total phosphorus (P)	120	8	0.07	
Nitrate (as N)	5	13	2.6	

Table 13: Effect trigger levels for water chemistry, sediment chemistry, biota and ecological community indicators (condition 3, 4 and 5 responses to Schedule 2 trigger levels and maximum limits, and condition 41(a))

	Trigger levels		
	Water chemistry	Sediment chemistry	Biota and ecological communities
Low level effect	• The time series trend of a toxicant at any Impact Location indicates that it is trending upward and may breach the applicable trigger value in Table 11.	• Statistically significant change in a tracer (total organic carbon, total nitrogen or carbon to nitrogen ratio) at any Location; or • Dioxin and furan concentrations in consecutive independent serial samples exceed 100 pg TEQ/kg at any Location in Commonwealth waters.	• Previously unobserved statistical change in fish abundance, algae and infauna abundance or infauna species richness at any Impact Location.
Medium level effect	• The maximum (100%ile) concentration of a toxicant at any Impact Location exceeds its applicable trigger value in Table 11. • Consecutive independent serial samples exceed a non-toxicant trigger value in Table 12 at any location in Commonwealth waters.	• Statistical difference of a toxicant at any Impact Location of more than 1 standard deviation relative to controls; or • Dioxin and furan concentrations in consecutive independent serial samples exceed 460 pg TEQ/kg at any Location in Commonwealth waters; or • Statistical increasing trend predicting dioxin and furan concentrations will exceed 850 pg TEQ/kg at any Location in Commonwealth waters.	• Statistical change (with at least 2 years of data) at any Impact Location as a percentage of control greater than 50% (fish abundance), 75% (algae and infauna abundance) or 25% (infauna species richness); or • Mean dioxin and furan concentration in fish flesh exceeds 0.7 pg TEQ/g fw.
High level effect	• Consecutive independent serial samples exceed a toxicant trigger value in Table 11 at any Impact Location.	• Statistical difference of a toxicant at any Impact Location of more than 2 standard deviations relative to controls; or • Statistical difference of a toxicant at any Location (other than Impact) of more than 1 standard deviation relative to controls; or • Dioxin and furan concentrations in consecutive independent serial samples exceed 850 pg TEQ/kg at any Location in Commonwealth waters.	• Statistical change (with at least 2 years of data) at any Location (other than Impact) as a percentage of control greater than 50% (fish abundance), 75% (algae and infauna abundance) or 25% (infauna species richness); or • Fish condition index exceeds critical effect size; or • Mean dioxin and furan concentration in fish flesh exceeds 7 pg TEQ/g fw.

Note: In this table, "Location" and "Impact Location" have the meanings described in the Commonwealth Baseline and Operational Monitoring Plan (EIMP Module M). Critical effect sizes for fish condition indices are also described in that document. "Independent serial samples" means samples taken in a temporal sequence but which are not autocorrelated – they may or may not be able to be sequential samples depending on the degree of temporal correlation.