

Appendix B

Summary of monitoring

Approval condition wording	Summary of monitoring strategy
<p>15</p> <p>To ensure effective monitoring of impacts on the Wedge-tailed Eagle - Tasmanian and as part of the EIMP, Gunns Limited must:</p> <p>a) With an appropriately qualified person, approved by the Department conduct monitoring checks on the Wedge-tailed Eagle nest known as #130 'Tippogoree Hills' in the second week of September and in the second week of November each year for five years, in accordance with the 'Forest Practices Authority, Fauna Technical Note Series - Eagle Nest Management.</p> <p>b) Provide results from the monitoring to the Department and to the Tasmanian Department of Primary Industries and Water within one month of each monitoring event and provide the information in the annual performance report against the EIMP.</p> <p>c) Should nest #130 'Tippogoree Hills' be abandoned during construction or in the first breeding season after the commencement of construction, Gunns Limited must, within six months of becoming aware of the abandonment, submit an offset response strategy to the Department for approval. The response strategy must provide for the protection of a minimum of 20 ha surrounding an eagle nest that is not protected in a 'formal reserve'. This response strategy and its timing must be included in the EIMP and detail a site description, connectivity with other habitats and mechanisms for long term protection, conservation and management. The Department may request that the response strategy be revised or amended before approval; any such request must be responded to within the time frame specified in the request.</p>	<p>Nest #130 will be monitored by inspection in the second week of September and November each year for 5 years. In addition to inspection monitoring of this known nest, monitoring inspections for unknown nests will be undertaken of vegetation prior to clearance.</p> <p>If nest #130 is abandoned as a result of construction activities, a 20 ha offset reserve will be established and inspection monitoring will measure the success of the protection measures in enhancing and maintaining the ecological value of this offset. Visual monitoring will be undertaken on an annual basis within this offset. Permanent monitoring photo points will be established within the offset area to enable documentation of its condition over time.</p>
<p>16</p> <p>To offset the loss of 200ha of land at the pulp mill site and as part of the EIMP, Gunns Limited must:</p> <p>a) Within 12 months of the date of this approval, develop in the EIMP the management strategies to rehabilitate an area of at least 200ha of potential habitat for the listed threatened species Tasmanian Devil (<i>Sarcophilus harrisii</i>); Spot-tailed Quoll - Tasmanian population (<i>Dasyurus maculatus maculatus</i>); Eastern Barred Bandicoot - Tasmanian (<i>Perameles gunnii gunnii</i>); Swift Parrot (<i>Lathamus discolor</i>); and Southern Bell Frog (<i>Litoria raniformis</i>).</p> <p>b) The EIMP must include details of the 200 ha offset to be rehabilitated, including a map, site description, connectivity with other habitats, appropriate buffer zones, a rehabilitation program and mechanisms for long-term protection, conservation and management.</p> <p>c) Implementation of the offset rehabilitation elements of the EIMP must commence within two years of the date of this approval.</p>	<p><u>Active rehabilitation monitoring</u></p> <p>During rehabilitation activities a 6 month monitoring schedule will be implemented. Permanent photo points will be established at suitable vantage points within the rehabilitation offset area, with photos taken on an annual basis. These photo points will enable documentation of rehabilitation over time and will be included in the annual report for review and reference for DEWHA.</p> <p><u>Long term monitoring</u></p> <p>Long term permanent monitoring plots will be established within the rehabilitation offset area, both in the extant plantation and native vegetation community areas. Whilst the final number and exact location of the plots will be determined during the detailed planning stage, it is estimated that a minimum of 20 plots will be established. Plots in the native vegetation area will be located to capture the range of extant vegetation communities, with plots within the plantation areas located to capture the range of the likely pre-disturbance vegetation communities. This will enable tracking of the condition and improvement of each area over time.</p> <p>These plots will be assessed using a quantified vegetation condition and fauna habitat assessment. The methodology will be based on that used to assess areas for their potential as habitat offsets.</p> <p>The methodology provides a condition score for the monitoring plot being assessed, and changes in the condition score over time will provide a means of tracking and assessing the improvement of vegetation and habitat condition.</p> <p>The monitoring methodology will incorporate relevant criteria used in the TASVEG <i>Vegetation Condition Manual (VCM)</i>⁸ and also incorporate some additional criteria (as detailed following) to more accurately reflect the vegetation types being assessed, the potential presence of threatened species and fauna habitat, a more detailed consideration of weeds and disease and a modified consideration of landscape context.</p> <p>Condition scores for the monitoring plots will be determined using (but not limited to) criteria drawn from the following, as appropriate and relevant to the condition of the plots (not all criteria will necessarily be used in any particular plot but the criteria used will remain consistent in any particular plot).</p>

⁸ Michaels, K. (2006), A Manual for Assessing Vegetation Condition in Tasmania, *Version 1.0*. Resource Management and Conservation, Department of Primary Industries, Water and Environment, Hobart.

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	<p>The criteria include:</p> <ul style="list-style-type: none"> • <i>Patch classification</i>: classification of vegetation according to TASVEG mapping units • <i>Floristic classification</i>: classification of vegetation according to the floristic communities present • <i>Large trees</i>: estimation of the number of large trees (alive and dead) • <i>Stocking</i>: the number of eucalypts present in relation to the stocking standards for the vegetation community • <i>Tree canopy cover</i>: estimation of the projective foliage cover of the tree canopy • <i>Understorey summary</i>: description of the composition of the understorey based on the observed number of species in different life form categories, including potential suitability as a fauna shelter site • <i>Weeds</i>: estimation of the total percentage weed (projected foliage) cover in the zone and the proportion of this cover due to high threat weeds • <i>Weed improvement factor</i>: estimation of the potential to improve the condition of a patch by control and/or elimination of identified weeds • <i>Recruitment</i>: assessment of the evidence of recruitment and its diversity • <i>Organic litter</i>: estimation of the percentage cover of the organic litter • <i>Logs</i>: estimation of the length of logs present • <i>Threatened flora</i>: adjustment to the total score if priority flora is identified from within or immediately adjacent to the monitoring plot • <i>Patch size</i>: assessment of the size and degree of disturbance of the patch of which the monitoring plot forms a part • <i>Neighbourhood</i>: assessment of the amount and configuration of native vegetation within the proximity of the monitoring plot • <i>Fauna habitat</i>: assessment of the habitat value within the monitoring plot, presence of suitable foraging, den or shelter sites, with particular focus on listed species • <i>Fauna presence</i>: recording of evidence of presence or utilisation within the monitoring plot, e.g. scats, prey remains or den sites, and incidental sightings of fauna species <p>These plots will be established prior to the commencement of rehabilitation activities and a 'before' assessment of these plots undertaken, to enable testing of the condition assessment methodology. Review and finalisation of the vegetation condition and fauna habitat assessment will be undertaken after this assessment, in consultation with DEWHA.</p> <p>It is possible that the plots located within the extant vegetation areas could form comparison sites for those same vegetation communities being rehabilitated from plantation. This will also be determined during the 'before' assessment of the plots.</p> <p>The assessment of these plots will be undertaken every two years after the completion of rehabilitation activities, for a minimum of 10 years. The monitoring requirements will be reassessed at this stage in consultation with DEWHA.</p> <p><u>Recovery trajectory toward TASVEG benchmarks</u></p> <p>The goal of the rehabilitation is to re-establish the likely pre-disturbance vegetation communities within the offset rehabilitation area. While final attainment of this goal is expected to take decades (and for some vegetation communities probably beyond the life of the pulp mill), progress towards it will be able to be tracked using "recovery trajectory" methods.</p> <p>Vegetation condition assessment scores will be determined for each of the monitoring plots and trends towards the TASVEG benchmark score of the</p>

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		<p>target vegetation type will be plotted for each of the condition criteria. The TASVEG benchmark score represents the average characteristics of a mature and apparently long-undisturbed state of the same vegetation type and were created using TASVEG vegetation community descriptions, existing literature, site data and input from vegetation scientists with expert knowledge of particular communities.</p> <p>Trends will not always be continuously upwards towards an ultimate objective. In some cases, such as understorey, in the early years of rehabilitation the score may exceed the final objective and then drop towards the objective as the community matures. The ultimate goal of the rehabilitation will be for all criteria to settle to a score that meets the definition of the target vegetation type.</p> <p>In addition to graphical tracking of the trends of individual criteria, a single overall index of the progress of the rehabilitation towards the target vegetation type will be calculated. It is anticipated that this will be by the use of a statistical similarity index but alternative indices may be determined to be more appropriate as results come to hand and experience is gained.</p> <p>The use of recovery trajectory analysis to track rehabilitation has not been undertaken in Tasmanian forests before, and it is therefore not possible to establish performance benchmarks (e.g. by nominating in advance a benchmark similarity index to be achieved in any particular year). Nevertheless, the application of trajectory analysis to this project will provide a useful measure of rehabilitation progress and it will also develop valuable experience that will be applicable to other rehabilitation projects in Tasmanian forests and also in cool temperate forests in Australia generally.</p> <p><u>Ongoing site inspections and surveys</u></p> <p>Site inspections by a qualified ecologist will also be conducted annually to visually inspect the offset area and identify any management or emergent issues, e.g. declared weed infestations, and ensure that the appropriate response strategy is determined and implemented.</p> <p>Detailed fauna surveys across the broader offset rehabilitation area will commence at the completion of the active rehabilitation program (estimated 2013) to track and establish progress toward milestones. These surveys will include a combination of targeted searches for fauna, including searching for scats, dens, evidence of foraging, spotlighting and use of hair tubes. Surveys will be designed and aim to determine the level of use, including whether fauna numbers are increasing or if there is evidence of successful breeding, more den sites etc. The exact methodology will be developed prior to the completion of the active rehabilitation program in consultation with DEWHA.</p> <p>If the 40 ha wedge-tailed eagle offset is established (due to nest #130 being abandoned as a result of pulp mill construction activities), visual monitoring will be undertaken on an annual basis within this offset. Permanent monitoring photo points will be established within the offset area to enable documentation of its condition over time.</p>
17	<p>To protect potential habitat for the listed threatened species : Tasmanian Devil: Spot-tailed Quoll - Tasmanian population; Eastern Barred Bandicoot - Tasmanian and, as part of the EIMP, Gunns Limited must:</p> <p>a) Within 12 months of the date of this approval, develop in the EIMP management strategies to establish a network of reserves totalling at least 150 ha within the Bell Bay pulp mill site;</p> <p>b) The EIMP must include details of the reserves at the site including a map, description of the flora and fauna, connectivity and mechanisms for long-term protection, conservation and management.</p>	<p>Site inspections by a qualified ecologist will be conducted annually to visually inspect the reserves and identify any management or emergent issues and may include strategic site photographs of any identified issues.</p> <p>There will be daily monitoring of construction activities on the pulp mill site, such as vegetation clearing and bulk earthworks, to ensure that there will be no disturbance to the reserve network.</p> <p>Permanent monitoring photo points will be established at suitable vantage points within the reserve areas to enable documentation of reserve condition over time. Photos will be taken on an annual basis, in line with the visual monitoring, and included in the annual report for review and reference for DEWHA.</p> <p>Any emergent issues (e.g. the appearance of an infestation of declared weed) will be identified and an appropriate response strategy will be determined and implemented, in consultation with DEWHA.</p>
18	<p>To protect potential habitat for the listed threatened species Swift Parrot and as part of the EIMP Gunns Limited must:</p> <p>a) Within 12 months of the date of this approval, confirm arrangements to establish a reserve of at least 34 ha of <i>Eucalyptus ovata</i> and/or <i>Eucalyptus globulus subsp. globulus</i> to maintain foraging habitat.</p> <p>b) Include details of the reserve including a map, description of the flora and fauna, appropriate buffer zones, connectivity and mechanisms for long-term production, conservation and management.</p> <p>c) The Department may request that the arrangements be revised or amended before approval; any such request must be responded to within the time frame specified in the request. The approved arrangements must be part of the EIMP and must be implemented.</p>	<p>Site inspections by a qualified ecologist will be conducted annually to visually inspect the reserves and identify any management or emergent issues and may include strategic site photographs of any identified issues. The visual inspection will include noting of general health and any recruitment of the reserve vegetation, e.g. <i>E. ovata</i> trees in the swift parrot reserve, and include any incidental sightings of fauna or evidence of fauna use e.g. scats, diggings etc.</p> <p>The swift parrot reserve site inspection will be timed to coincide with the presence of the swift parrot in Tasmania (August to February), to provide the opportunity for incidental sightings of bird use.</p> <p>Permanent monitoring photo points will be established at suitable vantage points within the reserve areas to enable documentation of reserve condition over time. Photos will be taken on an annual basis, in line with the visual monitoring, and included in the annual report for review and reference for DEWHA.</p> <p>Any emergent issues (e.g. the appearance of an infestation of declared weed) will be identified and an appropriate response strategy will be determined and implemented, in consultation with DEWHA.</p>

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19	<p>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:</p> <ol style="list-style-type: none"> Install trench ramps and trench plugs in open trenches to enable fauna to escape from the pipeline trench. Ensure that a suitably qualified person, agreed to by the Department, checks all open trenches for trapped fauna each morning. Surviving fauna are to be relocated to suitable habitat by an ecologist trained in fauna handling procedures. Records must be kept of all live and dead fauna, including amphibians, removed from the trench. These records must be provided to the Department within three months of commencement of trench construction and progressively each month until all trenches have been filled. 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. 	<p>Trenches will be checked first thing in the morning and at regular intervals during the day. Records will be kept of all live and dead fauna, including amphibians, removed from the trench and will be provided to DEWHA within three months of commencement of trench construction and progressively each month until all trenches have been filled.</p>
20	<p>Disturbance of vegetation at the site must be confined to the construction corridors of the pipelines and the pulp mill site and associated infrastructure and in accordance with the EIMP, including:</p> <ol style="list-style-type: none"> No disturbance must occur until such time as the relevant pre-construction and construction requirements of the EIMP have been approved by the Minister; All areas to be cleared must be clearly marked to prevent damage to listed species outside the project area; Access to project areas must be via established roads or access tracks located on areas that have been subject to flora and fauna surveys as required in the EIMP and described in the preliminary documentation. 	<p>Regular monitoring inspections and audits will be undertaken to ensure that disturbance is confined to the delineated work areas. Inspection will involve daily checks and recording of any non-conformance by date.</p>
22	<p>All areas of the pipeline corridors, with the exception of access tracks and roads, are to be progressively rehabilitated as each 10 km of pipeline is constructed and revegetated with endemic species sourced from local seed stocks with the aim of providing habitat for listed threatened species in the area.</p> <ol style="list-style-type: none"> Rehabilitation activities and timeframes must be approved as part of the EIMP. Rehabilitation performance must be reported in the EIMP annual report. 	<p>Following the completion of construction works, rehabilitation and revegetation of areas that will be returned to their natural condition will be undertaken. Regular inspections of rehabilitated and revegetated areas will be undertaken until disturbed ground has stabilised and revegetation has matured.</p> <p>Before vegetation clearing commences, points will be established where photographs will be taken before construction and monthly during construction and rehabilitation for purposes of monitoring of the success of the rehabilitation programme.</p> <p>A monitoring program for rehabilitation of pipeline easements. This will entail inspections every 3 months for 2 years after completion of primary rehabilitation of an area, and every 6 months for a further 2 years. In addition, in areas susceptible to erosion, inspections will occur after each significant rain event and monthly during winter for 2 years after completion of primary rehabilitation.</p> <p>Establishment of photo points for monthly monitoring of the success of rehabilitation.</p>
26	<p>To manage the risks to listed threatened species associated with roadkill, Gunns Limited must, in accordance with the EIMP:</p> <ol style="list-style-type: none"> Immediately following the date of this approval, establish baseline monitoring of roadkill along the East Tamar highway and other major access routes for construction. 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. 	<p>A consulting firm, Genames, was commissioned to undertake a 3-month baseline survey of roadkill on the East Tamar Highway. A report (Genames (February 2008) <i>Baseline Roadkill Monitoring Programme for Bell Bay Alliance. Report prepared for Gunns Ltd</i>) has been provided to DEWHA and was attached to EIMP Module C as Appendix F.</p> <p>A roadkill minimisation strategy was described and approved in Module C. Pulp mill access roads will be monitored for roadkill and any roadkill carcasses will be removed to minimise risks of roadkill from carcass feeding.</p> <p>The strategy also included a number of measures to reduce worker vehicle movements and speed. Compliance monitoring will be undertaken as follows.</p> <p>Two traffic classifier/counter devices will be installed at suitable locations on the access roads at:</p> <ul style="list-style-type: none"> The access road to the overall site including pulp mill and Gunns' existing operations; and The existing operations, being Gunns Forest Products - Tamar, comprising the Tamar North and South Chip Mills and the associated North East Tasmania forestry business units. Note - the contribution of chip mill operations can be gauged by the difference between the pulp mill road data and the main access road counts. <p>A third traffic counter will be installed on the access road to the solid waste disposal facility and local reservoir.</p> <p>The traffic classifier counters will be configured to report vehicle movements (inward and outward) at both sites according to the AustRoads 1994</p>

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		<p>Vehicle Classification System.</p> <p>Periodic (weekly to fortnightly) interrogation of the recorded data will examine:</p> <ul style="list-style-type: none"> • Speed statistics in 10 km/h bins by vehicle class for both locations for inbound and outbound vehicle movements; and • Daily vehicle counts by hourly time bins. <p>Information obtained by this process will be used for:</p> <ul style="list-style-type: none"> • Monitoring adherence to speed limits; • Management feedback for temporal controls (e.g. diversion of traffic movements from crepuscular periods); • Dissemination of actual performance against targets 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: <ul style="list-style-type: none"> • 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; • Actual verses projected cumulative vehicle movements to the site (with passenger(s) relating to construction); and • Records, photographs and GPS locations of roadkill fauna.
27	<p>To minimise impacts during onshore effluent pipeline and wharf construction on listed threatened and migratory birds, Gunns Limited must, in accordance with the EIMP:</p> <ol style="list-style-type: none"> Carry out a pre-construction survey of the shoreline for breeding shorebirds for a distance of 200 m on either side of the onshore effluent pipeline construction corridor. In the event that nests are located within this area, they will be clearly marked and construction activities managed in accordance with the agreed requirements of the EIMP. Restore the beach profile to its original shape within two months of completion of the onshore effluent pipeline construction; Within two months of completion of the onshore effluent pipeline construction commence rehabilitation of vegetation in the impacted areas of the pipeline construction corridor in accordance with the requirements of the EIMP Report on performance of effectiveness of these mitigation measures in the EIMP annual report. 	<p>During construction work, regular monitoring of the construction corridor for newly arrived nesting shorebirds will be undertaken. If birds begin nesting within the construction corridor after construction commences, this would indicate that they are not distressed by the construction activities. Nevertheless, the nest will be signposted at a distance that does not disturb the birds and it will be avoided by construction vehicles and personnel.</p> <p>Following rehabilitation of the beach profile after construction ends, a confirmation engineering survey of the beach profile will be undertaken and the results made available to DEWHA.</p>
29	<p>To minimise impacts on the Australian Grayling (<i>Prototroctes maraena</i>) Gunns Limited must put in place and implement, as part of the EIMP, measures including:</p> <ol style="list-style-type: none"> Prior to wharf construction, a desktop study must be conducted by a suitably qualified person, agreed to by the Department, to estimate the likely upper limits of the sound impacts at various distances from wharf construction site. The sound fields of the pile-driving activities should be monitored in accordance with the EIMP to re-evaluate the findings of the desktop study. If necessary, bubble curtains or other agreed response strategies must be implemented if trigger levels in the EIMP are exceeded. No night construction or under-water blasting is permitted. 	<p>Underwater noise will be monitored in the vicinity of the wharf at the start of pile driving to validate the predictions of the underwater acoustic expert's report. 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. If measured values deviate significantly from the predictions, further advice will be taken from the study authors.</p> <p>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 to determine 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 re 1 μPa².sec at the 500 m distance.</p>
30	<p>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:</p> <ol style="list-style-type: none"> Prior to wharf or ocean outfall construction, a desktop study must be conducted by a suitably qualified person, agreed to by the Department, to estimate the likely upper limits of the sound impacts at various distances from the relevant construction site. The sound fields of the pile-driving activities should be monitored in accordance with the EIMP to re-evaluate the findings of the desktop study. 	<p>Underwater noise at the wharf will be monitored as described for condition 29.</p> <p>Underwater noise will be monitored during the first stages of construction of the outfall to validate the model predictions of the noise modelling study. The validation monitoring will involve measuring underwater noise using a hydrophone lowered to mid-water depth at a distance of 500 m and 1000 m 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.</p> <p>If noise measured during validation exceeds 190 dB re 1 μPa msp at 500 m (the level at which TTS occurs in pinnipeds) or 180 dB re 1 μPa msp at 1000 m (the level at which TTS occurs in cetaceans) then the safety zones will immediately be extended accordingly so that construction that may</p>

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	<p>c) If necessary, bubble curtains or other agreed response strategies must be implemented if trigger levels in the EIMP are exceeded.</p> <p>d) No night construction or under-water blasting is permitted.</p> <p>e) A suitably qualified person, agreed to by the Department, must visually monitor for marine mammals within the areas defined in the EIMP;</p> <p>f) Radius zones as follows must be implemented:</p> <ul style="list-style-type: none"> i. A 2 km radius alert zone for whales, with a 1 km radius safety zone, within which noise-generating activities will be ceased if a whale approaches; and ii. A 1 km radius alert zone for seals and dolphins with a 0.5 km radius safety zone, within which noise-generating activities will cease if a seal or dolphin approaches. 	<p>cause underwater noise is suspended if a mammal is within a distance where TTS is possible.</p> <p>Vessel skippers and deck officers will keep monitoring watch for marine mammals and take avoidance action when necessary (deviation or stopping), aiming to leave a minimum separation distance of 500 m.</p> <p>Shore based marine mammal observers will also conduct surveillance monitoring and will advise vessels in the vicinity when a marine mammal is within the alert zone of the wharf of ocean outfall construction areas.</p>
31	<p>The volume of wastewater effluent discharged from the operation of the pulp mill to the marine environment must not be more than 64 megalitres per day on an average monthly basis.</p>	<p>The strategy is to monitor effluent flow volumes after effluent emerges from the secondary clarifiers of the treatment plant.</p> <p>The monitoring point is before the input of clean site stormwater to the effluent stream. Stormwater is not part of the effluent produced by the operation of the pulp mill, to which condition 31 relates, and effluent volume will therefore be normalised to exclude streams to which the volume effluent limit applies. Consequently, the daily flows of clean stormwater and other non-permit volume streams (discussed below) into the effluent stream will also be measured.</p> <p>The measured effluent stream will include wash water and stormwater from the chip mill, which will be redirected to the pulp mill's treatment plant. This water also does not form part of the 64 megalitres per day monthly average limit, and it will therefore need to be discounted from the measured exit flow from the secondary clarifiers of treatment plant. To achieve the discounting, input flows from the chip mill will be measured prior to entering the treatment plant. Similar discounting will be done for stormwater if and when there is a stormwater flow.</p> <p>The net average daily flow from the pulp mill alone will be calculated each calendar month and these monthly values will be compared against the approval's 64 ML/day monthly average limit.</p>
32	<p>Gunns Limited must sample the effluent discharge from the operation of the pulp mill for the parameters in the tables below on at least a daily basis. The pulp mill must not operate if the monthly average effluent concentrations from the pulp mill exceed the maximum limits provided in the tables below. These limits may be revised in the final EIMP if agreed by the Independent Expert Group and approved by the Minister as a result of further studies. 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. [Tables of limits not shown here]</p>	<p>The monitoring strategy is to measure effluent quality by 7-day composite samples. Where possible, monitoring for compliance assessment will utilise laboratory based techniques based on traceable standard techniques. Where requirements are not articulated by the Commonwealth Approval Decision guidance on the design of the Plan has been taken from <i>AS 5667.10:1998 Water Quality -Sampling. Part10: Guidance on sampling of wastewaters</i>. Wherever there is a contradiction between the relevant Australian Standard and the Approval Decision, the Approval Decision has taken priority. This is most evident in the requirement stipulated in Condition 41 (g) which states "Effluent monitoring must be undertaken on weekly composites of the daily samples"</p> <p>Analytes are classified into the following groups, based on a combination of chemical species and sample handling requirements. Condition 32 of the Commonwealth approval sets trigger levels and maximum limits for specified parameters and in accordance with condition 33 trigger levels and maximum limits for other analytes have also been developed (in Module L). Analytes shown in bold are condition 32 and 33 trigger level and maximum limit parameters.</p> <ul style="list-style-type: none"> Group A – Instrument measurements – physical, flow,, Group B – General wastewater treatment parameters – chemical oxygen demand (COD), biological oxygen demand (BOD), suspended solids, colour Group C – Chlorate, nitrogen, phosphorus & nitrate. Group D – resin acids Group E – Metals and metalloids (total) - not included in C-BOMP Group F – Metals and metalloids (dissolved) - not included in C-BOMP Group G – Chloroacetic acids Group H – Dioxins, furans and dioxin-like polychlorinated biphenyls (PCBs). <p>The full suite of analytes and their sampling and analysis protocols are described in the C-BOMP (Appendix C).</p> <p>The analytical suite described in the C-BOMP may be supplemented with any additional hydrophobic substances for which monitoring in effluent is determined to be warranted by the reassessment of risk quotients required by condition 37.</p> <p>Group D analytes will be sampled leading up to, during and immediately after pine campaigns. Resin acids are not associated with eucalypt pulp production. The initial planned construction configuration of the mill will not allow for pine production. Therefore Group D monitoring (of resin acids) will be initially suspended. Should a decision be made to alter the configuration of the mill as built, DEWHA will be notified of that decision and the monitoring regime for resin acids will be removed from this initial status of being suspended.</p>

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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.	As for condition 32
34	In accordance with the EIMP, Gunns Limited must obtain (from overseas pulp mills already using technologies similar to that proposed) effluent samples, and conduct chemical analyses and whole effluent toxicity testing to identify the key contaminants and their concentrations and the effluent dilutions needed in the mixing zone for the proposed mill. Gunns Limited must report on the temporal variability in both the contaminant concentrations and toxicity in the effluents from these mills.	<p>Toxicity testing conducted under condition 34 will help establish reference findings against which regular operational toxicity monitoring required under condition 41 can be compared.</p> <p>The effluent sampling at the overseas mill will be undertaken by an appropriately experienced sampling organisation consistent with relevant Australian Standards (particularly AS5667.10-1998). The individual sample(s) will be representative of effluent quality taken over a period of equal to or less than 24 hours. Samples will be transported to an Australian laboratory using handling protocols described in the SAP.</p> <p>Separate effluent samples collected at the same time as the toxicity test samples will be subjected to chemical analysis to describe the chemical make-up of the effluent at the commencement of the toxicity testing.</p> <p>Best endeavours will be made to achieve the minimum practical delivery time – 48 hours is considered to be the shortest achievable period given the significant logistical constraints.</p> <p>The proposed whole effluent toxicity (WET) testing will comprise:</p> <ul style="list-style-type: none"> • Microtox assay using the marine bacterium <i>Vibrio fischeri</i> • 72-h micro-algal growth inhibition test using <i>Nitzschia closterium</i> • 72-h macro-algal germination assay using <i>Hormosira banksii</i> • Sea urchin fertilisation success using <i>Heliocidaris tuberculata</i> • 72-h larval development using the sea urchin <i>Heliocidaris tuberculata</i> • 48-h larval development using the doughboy scallop <i>Mimachlamys asperrima</i> • 96-h survival of the juvenile amphipod <i>Allorchestes compressa</i> • 96-h larval fish imbalance test using the striped trumpeter <i>Latris lineata</i>. <p>Regular toxicity testing of mill effluent will be undertaken after operations commence. Toxicity testing conducted on effluent from an overseas pulp mill under condition 34 will establish reference findings against which regular operational toxicity monitoring required under condition 41 can be compared. In addition to short term ecotoxicological assessments (whole effluent testing), endocrine disrupting ability will be monitored by comparing morphological measurements of fish species. Detailed protocols are based on those developed by the Canadian Pulp and Paper Environmental Effects Monitoring Program for field testing. This program will be included in a revision of the EIMP that will be submitted to the DEWHA for approval prior to commissioning. Further details on strategies to assess endocrine disrupting ability are included in the C-BOMP (Section 3.1).</p>
35	In accordance with the EIMP, to determine the properties affecting the fate of fine particulate organic matter in effluent, Gunns Limited must undertake laboratory studies, agreed to by the Department, to assess the likely settling and flocculation properties of fine particulate organic materials in equivalent effluent.	The laboratory study will be used to inform the hydrodynamic modelling which in turn will inform the monitoring program. The study is described in Module L Precommissioning management.
36	In accordance with the EIMP, to establish the level of background contaminants in sediments and biota, Gunns Limited must: <ul style="list-style-type: none"> a) Undertake a survey of sediment grain size and organic carbon content for the region containing the outfall, including adjacent coastal and offshore regions, and identified depositional zones. b) Determine background concentrations of contaminants of potential concern for sediments along transects from the proposed diffuser site, including both inshore and offshore sites, paying particular attention to depositional zones with fine grain size and high organic content. c) Demonstrate how these findings have both informed, and been informed by, the refined hydrodynamic and sediment transport modelling required by the EIMP. d) Limit samples for this research to the top 2 cm of core samples, so that recent deposition can be determined in later studies. e) Determine background concentrations of contaminants of potential concern needed to be established for sentinel biota from outside of the mixing zone and from sediments collected both inshore and at identified likely deposition zones. Species selection must be agreed to by the 	<p>[The terminology hierarchy used below is <i>Location</i> then <i>Site</i> then <i>Replicate</i>: each Location will have 5 sample Sites within it and each Site may have up to 2 Replicate samples within it.]</p> <p>Sediments Sample Locations will include 4 impact and 10 control Locations that coincide with ecological benthic infauna Locations.</p> <p>The impact Locations are situated at a distance of 25 to 75 m from the edge of the mixing zone defined under the State approval. The mixing zone is set in accordance with the Tasmanian <i>State Policy on Water Quality Management 1994</i>. The edge of the mixing zone identifies the distance from the discharge point where Water Quality Objectives for the ambient environment, prescribed in accordance with the policy, are achieved.</p> <p>The impact Locations are situated where discharge concentrations or deposition of matter are potentially elevated, subsequent to the initial dilution that occurs within the mixing zone.</p> <p>The control Locations are situated approximately 6 km to the west and east of the outfall (5 each), distances where exposure to effluent will be very much less.</p> <p>In addition to the impact and control Locations, 4 transect Locations will be sampled along a transect that will run from the diffuser directly north</p>

Approval condition wording	Summary of monitoring strategy
<p>Department on the basis of:</p> <ul style="list-style-type: none"> i) Benthic surveys; and ii) Expert knowledge of the prey species of listed threatened migratory and marine species and shore birds and the wide-ranging top predators, the Australian Fur Seal (<i>Arctocephalus pusillus</i>) and the Little Penguin (<i>Eudyptula minor</i>). 	<p>into Commonwealth waters. These Locations will indicate any trend of sediment contaminant concentrations towards Commonwealth waters.</p> <p>More (or alternative) Locations may also be determined to be necessary by the hydrodynamic modelling that will be undertaken. This modelling will examine sediment transport and may suggest Locations that are more likely to receive settlement of discharged particulates, and which may therefore be more appropriate sediment sampling locations.</p> <p>All samples for chemical analysis will be restricted to the surface 2 cm, using a spade corer or similar sampling device (eg. box corer).</p> <p>Each sample will be analysed for total nitrogen and total organic carbon content. The ratio of total nitrogen to total carbon will be examined as a covariate in the benthic infauna temporal and spatial variability analyses as the ratio of carbon to nitrogen is affected by terrestrial (wood) versus aquatic plant sources of marine deposition.</p> <p>The 5 Site samples from a given Location will also be used to make a composite sample that will be analysed for particle size distribution, using the Wentworth classification. A separate particle size distribution analysis will also be undertaken on samples retrieved by the benthic infauna sampler (Section 4.1.e).</p> <p>Detailed chemical analysis will be conducted on a subset of Locations, referred to as Intensive Chemistry Locations - one Location from the western controls, one Location from the eastern controls, two from the impact Locations and all four of the transect Locations. The configuration of the Intensive Chemistry Locations will be approximately parallel to the prevailing tidal current along the coast and along a transect, north from the Mixing Zone towards and into Commonwealth waters.</p> <p>All Intensive Chemistry Locations will be sampled and analysed for the WHO₀₅-TEF suite of dioxins and furans at least 6 monthly post operationally for 3 years and thereafter pending a technical review. Other Locations will be sampled and analysed on an annual frequency for the same period and be subject to the same review process at the end of the third year.</p> <p>The chemical analysis will be for dioxins, furans and dioxin-like PCBs (reported as WHO₀₅-TEF congeners and WHO₀₅-TEQ pg/kg) and metalloids (Al, Sb, As, Ba, Cd, Cr-total, CrIII, CrVI, Cu, Pb, Hg, Ni, Zn, Se, Sn, V all mg/kg). The full analytical description and methodology are provided in the C-BOMP (Appendix C).</p> <p>Biota - prey species Listed threatened migratory and marine species and shore birds feed on a range of species too wide to sample practically.</p> <p>Sampling will therefore concentrate on representative species that can reasonably be taken to be indicative of the variety of species that may be preyed upon by threatened migratory marine species and shore birds.</p> <p><u>Blue mussel (<i>Mytilus edulis</i>) and triploid Pacific oyster (<i>Crassostrea gigas</i>).</u> These are filter feeding bivalves that feed on planktonic algae and detritus. The mussels and oysters will be representative of filter feeding bivalves, such as scallops and clams, which form part of the diet of many marine mammals and shore birds. Scallops and clams are less suitable for cage culture and, more particularly, do not have the well established record of use in pollution monitoring that mussels and oysters do.</p> <p>Two sub-programs are planned and both will be trialled for a period of three months before full deployment. One sub-program will focus on tissue accumulation over short periods (3 months, mussels only), while the other program assesses organism health over 24 month deployment (mussels and oysters). Due to the nature of Bass Strait, achievement of this program may be problematic due to a number of natural factors that are unable to be controlled.</p> <p>Deployment over a period prior to mill commissioning will establish baseline contamination levels.</p> <p>Soft tissue will be analysed for discharge contaminants that have the potential to bioaccumulate.</p> <p>In addition to the chemical contamination analysis of the short term exposure program, condition assessments of mussels and oysters will be undertaken for both baseline and operational deployments. Condition indicators will include growth and survival rates, wet to dry weight ratio, wet flesh to total weight ratio and a byssal thread attachment assay.</p> <p><u>Flathead (<i>Neoplatycephalus aurimaculatus</i> and/or <i>Platycephalus basensis</i>)</u></p>

Approval condition wording	Summary of monitoring strategy
	<p>Flathead are bottom dwelling fish and are a mid trophic level opportunistic predator.</p> <p>Flathead share components of the food chain that leads to higher predators of Commonwealth significance and have been reported as minor components of the diet of little penguins and fur seals.</p> <p>Flathead are also a major recreational fishing catch and are therefore of major interest for potential contamination and tainting of human seafood.</p> <p>A pilot catch program for two candidate species - toothy flathead (<i>Neoplatycephalus aurimaculatus</i>) and sand flathead (<i>Platycephalus basensis</i>) - will be undertaken to select the species to be used, based on availability.</p> <p>Fish will be caught in the September/October period each year. Catch locations will be in the vicinity of the diffuser, with reference sites potentially in the Bridport region and in the Musselroe Bay region (see Figure 3). These locations reflect the expected dispersion pattern of the effluent, where Musselroe Bay can be considered a control site.</p> <p>Muscle tissue will be analysed for discharge contaminants that have the potential to bioaccumulate (taste testing will also be conducted). The analytical suite and methodology are described in the C-BOMP (Appendix C).</p> <p>In addition to the chemical contamination analysis, condition assessments of the fish will be undertaken for both baseline and operational deployments. Condition indicators will include histological archiving of gill, kidney, liver and gonads, of a subset of fish for future reference if required and macroscopic assessments including gonadosomatic, hepatosomatic and Fulton's condition indices and inspections for skin lesions and ectoparasites.</p> <p>This scope of this program includes an examination of morphometrics that are commonly associated with endocrine disruption in fish populations. This will provide additional evidence to support the flathead program.</p> <p><u>Leatherjackets (<i>Thamnaconus degeni</i> and/or <i>Scobinichthys granulatus</i>)</u> Degen's leatherjacket (<i>Thamnaconus degeni</i>) is a bottom dwelling species and the rough leatherjacket (<i>Scobinichthys granulatus</i>) is found in seagrass beds and on rocky reefs. Leatherjackets typically have an omnivorous diet that includes algae, epifauna, hydroids, molluscs, crustaceans and polychaetes.</p> <p>Leatherjackets are a common component of the diet of seabirds, such as penguins and crested terns, and also the Australian fur seal.</p> <p>Leatherjackets therefore occupy a mid-level position in the food chain leading to higher predators of Commonwealth significance.</p> <p>Fish will be caught from the vicinity of the diffuser and from the Tenth Island area (see Figure 3), reflecting the foraging area of the Tenth Island seal colony. The precise timing of the sampling events will be confirmed after a series of pilot runs are completed examining the annual maturation cycle of the species, with the intent that the sampling event monitoring condition indices is timed to occur immediately before spawning.</p> <p><u>Seals</u> Baseline monitoring of Australian fur seals in the vicinity of the outfall and at a control Location at Reid Rocks (20 km southeast of King Island) will be undertaken to assess the existing tissue burden of polychlorinated dibenzo-p-dioxin (PCDD or dioxins) and polychlorinated dibenzofuran (PCDF or furans) congeners that have of the WHO₀₅ Toxic Equivalency Factors (TEFs) assigned</p> <p>The monitoring will use samples of seal blubber. Baseline line data will establish the existing dioxin and furans TEQ profile in Australian fur seals.</p> <p>The vast majority of Australian fur seals recorded in the vicinity of the outfall belong to the nearby colony on Tenth Island. The seal monitoring strategy will therefore focus on this colony as the sentinel population. Tenth Island is the closest seal colony to the outfall diffuser, and is located 12 km from it. It is highly likely that seals from this colony will forage in the effluent stream. The closest other Tasmanian breeding colonies are located at Reid Rocks and Moriarty Rocks, 265 km and 149 km distant respectively.</p> <p>In order to minimise sampling impacts on seals, Gunns proposes to use the Reid Rocks control site for a single baseline sampling run and then only sample the site again if an increase in contaminants is observed in seals at the Tenth Island colony. If this circumstance arises, a second site may be introduced through an Investigation of Cause (IoC) process to determine whether that trend is local to the Tenth Island colony or widespread, beyond any potential impact from the pulp mill discharge.</p>

Approval condition wording		Summary of monitoring strategy
		<p>Baseline data will establish the existing POP TEQ profile in seal pup blubber at Tenth Island and Reid Rocks. Consistent with other baseline monitoring and the scientific literature, the baseline data is expected to show a small ratio of low to high chlorinated PCDD/F congeners.</p> <p>Confirmation of the specificity of the signature of the dioxins and furans will be gained from the effluent monitoring (section 4.g.3).</p> <p>Two years of baseline data to determine baseline levels of POPs will be obtained.</p> <p>An initial test sampling run will be undertaken in February/March 2009 at Tenth Island (only). This sampling will test the sampling methodology and provide material for testing the analytical methodology.</p> <p>The variability in POP levels in the test samples will be determined if possible, and the results of this will inform future sample size decisions. The appropriateness and/or need for using composite samples to satisfy laboratory analytical requirements will also be assessed.</p> <p>Penguins Baseline monitoring of little penguins in the vicinity of the outfall will be undertaken to assess the existing tissue burden of polychlorinated dibenzo-p-dioxin (PCDD or dioxins) and polychlorinated dibenzofuran (PCDF or furans) congeners that have of the WHO₀₅ Toxic Equivalency Factors (TEFs) assigned.</p> <p>The monitoring strategy is to use samples of eggs. Baseline line data will establish the existing dioxin and furans TEQ profile in little penguin eggs.</p> <p>In the baseline period, eggs will be collected from the Low Head and King Island little penguin colonies. The Low Head colony is the closest little penguin colony to the outfall diffuser and is approximately 9 km from it. It is highly likely that penguins from this colony will forage in the effluent stream close to the mixing zone.</p> <p>The nominated control site for the little penguins program is the King Island colony on Catarauqui Point.</p> <p>A test sampling run will be undertaken at Low Head (only) in spring 2008 to test the sampling methodology and test the analytical methodology.</p> <p>Two years of baseline data will subsequently be taken at Low Head to determine baseline levels of POPs.</p> <p>In order to minimise impacts on penguin colonies, subsequent sampling of the King Island population beyond the baseline period will only be taken if an increase in contaminants is observed at the Low Head population.</p>
37	<p>Gunns Limited must determine, in accordance with the EIMP, effluent monitoring requirements prior to the commencement of pulp mill commissioning. This must include but not be limited to:</p> <ul style="list-style-type: none"> a) the parameters described in Condition 32; b) a re-assessment of the Risk Quotients (RQs) for hydrophobic substances, in all media, being taken into account; and c) sampling and analysis protocols and accreditation. 	<p>Monitoring for parameters required by condition 32 is described under that condition.</p> <p>The analytical suite described in the C-BOMP (Appendix C) may be supplemented any additional hydrophobic substances for which monitoring in effluent is determined to be warranted by the reassessment of risk quotients required by condition 37.</p>
40	<p>In accordance with the EIMP and conditional of the outcomes of the hydrodynamic and sediment modelling, Gunns Limited must undertake surveys to establish baseline ecological data upon which impacts of effluent can be measured. This must include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> a) A baseline (pre-commissioning) survey of both benthic infauna and epibenthic flora including: <ul style="list-style-type: none"> i) Abundance and diversity at 'impact' locations outside the defined mixing zone; and ii) At control locations to the east and west of the outfall. 	<p>The monitoring strategy includes baseline ecological surveys to establish the existing characteristics of marine communities in the region around the proposed outfall.</p> <p>Pilot sampling surveys commenced in April 2007 and are undertaken in April and October each year. Due to project delays, the April 2008 survey was not conducted. Baseline surveys will recommence in October 2008 to facilitate a program review and recommence as soon as possible after Notice to Proceed is issued by Gunns Limited's Board.</p> <p>The survey design follows a Multiple Before and After at Control and Impact Locations (MBACI) framework.</p> <p>Sample Locations comprise 4 impact Locations and 10 control Locations.</p> <p>The impact Locations are situated at a distance of 25 to 75 m from the edge of the mixing zone defined under the State approval. The mixing zone is set in accordance with the Tasmanian <i>State Policy on Water Quality Management 1994</i>. The edge of the mixing zone identifies the location from the discharge point where Water Quality Objectives for the ambient environment, prescribed in accordance with the policy, are achieved. The impact Locations are situated where discharge concentrations are likely to be high, subsequent to the initial dilution that occurs within the mixing zone.</p> <p>The control Locations are situated progressively approximately 6 km to the west and east of the outfall (5 each), where exposure to effluent will be very much less than the Impact group.</p>

Approval condition wording	Summary of monitoring strategy
	<p>The ecological sampling will comprise benthic infauna grab samples and epibenthic flora and fauna photo samples.</p> <p>Benthic infauna samples will be taken by van Veen grabs over a 1 mm mesh size. At each Location, 5 Sites will be sampled, each with 2 Replicates (a review of the number of replicates and indicators is scheduled for December 08 and may be modified after that review to ensure that the design is optimised). Infauna will be identified to family level, except for molluscs and any introduced species, which will be identified to species level wherever possible. Sediment samples will also be taken for chemical analysis.</p> <p>The photo sampling will involve 50 photo quadrats within each Location, from which percent cover of algae and other epibenthic species will be determined. The fish community diversity and abundance will also be recorded annually using baited video photography. Brown algae, to which the Commonwealth approval refers, will be separately identified as a subset of algae.</p>
<p>41</p> <p>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:</p> <ul style="list-style-type: none"> a) Appropriate early warning of reaching trigger levels in Commonwealth waters. b) Effluent quantity and quality. c) Chemical and ecotoxicological assessments including assessments of endocrine disrupting ability, and ecological assessments. d) Water and sediment quality and bioaccumulation of contaminants in the same sentinel biota as were used to determine baseline concentrations. e) Being of appropriate statistical design, including agreed power and confidence. f) Site selection will be informed by the hydrodynamic and sediment transport models. g) Effluent monitoring must be undertaken on weekly composites of the daily samples. h) Sediment and bioaccumulation monitoring must be taken six monthly. i) Dioxin and furan concentrations in the benthic sediments surrounding the marine outfall progressively towards and including Commonwealth marine waters. j) Impacts of chlorate on the total area of brown algae adjacent to the marine outfall. k) Pollutant levels in sentinel benthic and pelagic species. l) Whole-effluent toxicity testing using species relevant to Commonwealth waters in Bass Strait. m) A mechanism or mechanisms for tracing the actual movement of the effluent plume. 	<p>The monitoring strategy is to measure the dilution and dispersion of the effluent plume beyond the outfall diffuser by a combination of physicochemical, optical and water quality (chemical) parameters. The strategy will be based on a robust statistical design (41(e)). Sampling site location will be informed by the hydrodynamic and sediment transport models (41(f)).</p> <p>The physicochemical and optical monitoring will provide the primary description of the behaviour of the effluent plume in the near-field dispersion zone around the diffuser. The chemical parameters will show how the effluent constituents are diluted.</p> <p>Early warning of reaching trigger levels (41(a))</p> <p>Low, medium and high level early warnings from the monitoring program are contained in Table 3.2.1 of the C-BOMP</p> <p>Effluent quantity (41(b)) Effluent will be monitored as described in condition 31.</p> <p>Effluent quality (41(b) and 41(g)) Effluent will be monitored as described in condition 32 and 33.</p> <p>Physicochemical and optical monitoring (41(m)) Interpretation of plume dispersion monitoring results will be informed by baseline monitoring of existing conditions. For most parameters, monthly monitoring has already commenced.</p> <p>Field measurements of salinity, pH, dissolved oxygen, temperature and oxidation potential will be undertaken at 5 m depth intervals at the diffuser, at sites 250 and 500 m from the diffuser in each of the northeast, northwest, southeast and southwest quadrants and at sites 5 km to the west and east of the diffuser (sites NE250, NE500, NW250, NW500, SE250, SE500, SW250, SW500, WOP AND EOP on Figure 2).</p> <p>Surface water clarity is measured at the diffuser and at sites 5 km to the west and east of the diffuser (sites D, EOP and WOP on Figure 2) using a field instrument. Water colour is measured using an underwater viewer and classified according to the Munsell colour chart.</p> <p>Vertical light penetration will be measured using Photosynthetic Active Radiation sensors. This monitoring including the water clarity referred to above is planned to commence after Notice to Proceed is issued by Gunns Limited's Board. Simultaneous upwelling and downwelling measurement using two sensors will be undertaken to determine the upwelling to downwelling ratio and hence the reflectance coefficient. Vertical light penetration from the sea surface to seabed will also be measured at 1 m intervals.</p> <p>Following mill commissioning, the above monitoring will be undertaken weekly (subject to weather conditions) for the first 6 months and thereafter monthly. For this sampling, the optical monitoring will be extended to cover all the physicochemical monitoring sites and the physicochemical measurements will continue outward from each of the perimeter sampling sites if and as necessary until the values return to background levels.</p> <p>Water quality 41(d) and 41(m)) Interpretation of plume dispersion monitoring results will be informed by baseline monitoring of existing conditions. Continuous monthly monitoring commenced in December 2006 and will continue until a suitable data set is collated (covering 24 months).</p> <p>Paired water samples will be taken from the top 1 m of the water column and approximately 1 m from the seabed at sites 500 m from the diffuser in the north east and southwest quadrants and at sites 5 km to the west and east of the diffuser.</p>

Approval condition wording		Summary of monitoring strategy
		<p>Laboratory analysis of the samples will be undertaken. The analyte groups will be as follows. The full suite of these analytes and their sampling and analysis protocols are described in the C-BOMP (Appendix C).</p> <p>Analytes include both State and Commonwealth approval requirements. Analytes shown in bold are those for which the Commonwealth approval (condition 32) sets effluent trigger levels and/or maximum limits.</p> <p>Physicochemical – physical, suspended solids, bacteria, chlorophyll <i>a</i>, adsorbable organically bound halogens (AOX), nitrogen and phosphorus</p> <p>Toxicants – metals and metalloids, non-metalloids inorganics including chlorate, organic alcohols, halogenated alkanes, chlorinated alkenes, anilines, hydrocarbons, aromatic hydrocarbons (excluding dioxins and furans*), phenols, organic sulphur compounds, surfacants, organic acids including chloroacetic acids, chlorinated natural phenolics and sterols. [*Dioxins and furans will be bound to organic matter and therefore will be monitored in sediment rather than in the water column]</p> <p>Following mill commissioning, the monitoring will be extended to cover sites 500 m from the diffuser in the northeast, northwest, southeast and southwest quadrants and at sites 5 km to the west and east of the diffuser. This monitoring will be undertaken weekly (subject to weather conditions) for the first 6 months and thereafter monthly.</p> <p>Sediment quality monitoring (41(d), 41(h), 41(i)) Following mill commissioning, sediment surveys will be taken quarterly (January, April, July and October) in the first year of operations. Thereafter they will be taken twice annually (April and October) for 3 years unless the findings indicate that quarterly sampling should be continued. The sampling need and sampling frequency will be reviewed after 3 years.</p> <p>The sampling regime and analytes will be as described for the baseline surveys (condition 36).</p> <p>Sampling will be undertaken at the same Locations at which baseline sediment sampling will be conducted.</p> <p>Samples will also be undertaken from an additional 2 sentinel Locations, situated within the mixing zone.</p> <p>Prey species (41(d), 41(h) and 41(k)) Following mill commissioning, the sampling for the baseline surveys will continue up to year 3 year of operations. These samples will allow comparison with the baseline levels to indicate whether effluent contaminants may have entered the food chain of threatened migratory and marine species and shore birds.</p> <p>Seals and penguins (41(d) and 41(h)) Following mill commissioning, the seal and penguin monitoring will be repeated 2 years after the commencement of commissioning and thereafter every third year until it is confirmed that dioxins and furans are not accumulating in the food chain of Australian fur seals or little penguins.</p> <p>Ecological surveys (41(j)) Following mill commissioning, the ecological surveys described in section 4e for the baseline surveys will continue for at least three years. These surveys will allow statistical comparison with the baseline surveys to indicate whether the effluent discharge may have altered benthic and/or epibenthic ecology, including brown algae abundance.</p> <p>Toxicity testing (41(c) and 41(l)) Regular toxicity testing of mill effluent will be undertaken. Toxicity testing conducted under condition 34 will establish reference findings against which regular operational toxicity monitoring required under condition 41 can be compared. In addition to short term ecotoxicological assessments (whole effluent testing), endocrine disrupting ability will be monitored by comparing morphological measurements of fish species. Detailed protocols are based on those developed by the Canadian Pulp and Paper Environmental Effects Monitoring Program for field testing.</p>
42	<p>The maximum limit of concentration of dioxins and furans in the benthic sediments in any location within Commonwealth marine waters is 850pg TEQ/kg. To ensure that concentrations do not reach this level, trends in concentrations of samples collected in State and Commonwealth waters, in accordance with the EIMP, must be analysed and independently reviewed on a six-monthly basis.</p>	<p>Detailed chemical analysis will be conducted on a subset of Locations, referred to as Intensive Chemistry Locations - one Location from the western controls, one Location from the eastern controls, all four of the Impact Locations.</p> <p>The configuration of the Intensive Chemistry Locations will be approximately parallel to the prevailing tidal current along the coast.</p> <p>All Intensive Chemistry Locations will be sampled and analysed in replicate for the WHO₀₅-TEF suite of dioxins and furans at least 6 monthly post operationally for 3 years and thereafter pending a technical review. Other Locations will be sampled and analysed at least on a lower replicate intensity for the same period and be subject to the same review process at the end of the third year.</p> <p>The chemical analysis will include at least the key tracers being dioxins, furans and dioxin-like PCBs (reported as WHO₀₅-TEF congeners and WHO₀₅-</p>

Approval condition wording		Summary of monitoring strategy
		TEQ pg/kg), organic carbon and nitrogen. In accordance with Condition 42, the three nominated determinands above will be intensively examined for any observed spatial and temporal trends. The full analytical description and methodology is provided in the C-BOMP in two areas being Section 3.2.1.2 and 3.2.2. (Appendix C). The topic of sediment monitoring is also described in 4.d.2 above.
43	Requires annual report to include reporting on performance against parameters	A summary of monitoring findings will be included in the annual report.