

## Nammuldi-Silvergrass Expansion Project (Assessment No. 1842)

### Public submissions received and Rio Tinto responses

Item	Submission and/or issue	Rio Tinto response
<b>Submission 1: Department of Indigenous Affairs</b>		
1.	<p>The Department of Indigenous Affairs (DIA) has recently released a set of guidelines to assist developers to assess the level of risk of breaching the <i>Aboriginal Heritage Act, 1972</i> (AHA). The <i>Cultural Heritage Due Diligence Guidelines</i> are available on the DIA website at the address below.</p> <p><a href="http://www.dia.wa.gov.au/Documents/HeritageCulture/Heritage%20management/AHA_Due_Diligence_Guidelines.pdf">http://www.dia.wa.gov.au/Documents/HeritageCulture/Heritage%20management/AHA_Due_Diligence_Guidelines.pdf</a></p> <p>A review of the Register of Aboriginal Sites indicates 432 registered places within ML 4SA (see attached). Please note that the proposed project covers only a portion of the lease area and previous section 18 consent has been granted over portions of land within this lease area.</p> <p>I have reviewed the draft project proposal and in particular the Aboriginal Heritage information in the table on pages xx-xxi, which states that Hamersley Iron Pty Ltd (Hamersley) has consulted with the relevant Aboriginal group and proposes to undertake ethnographic and archaeological survey work. The company is aware that any proposed disturbance to Aboriginal heritage sites will require an application under section 18 of the <i>Aboriginal Heritage Act 1972</i> (AHA). The company proposes to lodge an application under section 18 of the AHA to disturb an unspecified number of Aboriginal heritage sites that cannot be avoided.</p>	Noted.

Item	Submission and/or issue	Rio Tinto response
	<p>The details of this process can be viewed on the DIA website at:  <a href="http://www.dia.wa.gov.au/Section-18-Applications.aspx">http://www.dia.wa.gov.au/Section-18-Applications.aspx</a></p> <p>The company expresses its awareness of its obligations under the AHA and its commitment to comply with the provisions of the AHA.</p> <p>Details of the nature and consequences of disturbances to Aboriginal sites can be viewed on the DIA website at:  <a href="http://www.dia.wa.gov.au/Section-18-Applications/Heritage-management/Site-disturbance.aspx">http://www.dia.wa.gov.au/Section-18-Applications/Heritage-management/Site-disturbance.aspx</a></p>	
<b>Submission 2: Department of State Development</b>		
2.	DSD has reviewed the document and as it correctly refers to the necessary requirements under the relevant State Agreement, DSD has no further comment.	Noted
<b>Submission 3: Ethnoscience (on behalf of Eastern Guruma)</b>		
3.	It is recommended that consultation continue with the Eastern Guruma regarding the proposed Nammuldi-Silvergrass Expansion Project including the associated cultural and environmental impacts;	<p>Ethnoscience conducted all of the ethnographic fieldwork for the Expansion Project, in conjunction with the nominated representatives of Eastern Guruma. Therefore the information provided with the submission has been available to, and considered by, RTIO since the surveys were completed.</p> <p>RTIO recognises the importance of consultation with Traditional Owners and commits to continuing consultation with Eastern Guruma in relation to Nammuldi Silvergrass (see Table ES2 in the PER) .</p>
4.	It is recommended that the proposal, if approved, be implemented in accordance with the ILUA and the requirements of the AHA and that known places of	RTIO is cognisant of its obligations under both the Aboriginal Heritage Act and the Indigenous Land Use Agreement that has been established with Eastern Guruma. As stated in the Table ES2 in the PER, the Expansion Proposal will be implemented in

Item	Submission and/or issue	Rio Tinto response
	significance be managed in accordance with the Aboriginal Heritage Management Plan (Strategen 2012:227-29); and	<p>accordance with these requirements and with EPA Guidance Statement No. 41 (EPA 2004b).</p> <p>Details of mitigation and management measures covered by RTIO's heritage management system are given in Section 13.5 of the PER. Site-specific Cultural Heritage Management Plans are currently being prepared for each of Nammuldi and Silvergrass and will be implemented from the commencement of construction.</p>
5.	It is recommended that a buffer zone of 300m be maintained around the Brockman burials (DIA Site ID 6071 Mt Brockman Station Burial; DIA Site ID 18240 Hsa12 - Brockman Burial 1; and DIA Site ID 18244 Hsa13 – Brockman Burial 2) to ensure their protection.	<p>A 300 m exclusion zone has been established around the grave sites at the request of Eastern Guruma. This exclusion zone has been observed by all designs and has resulted in the repositioning of proposed dewatering infrastructure, haulroads, topsoil stockpiles and the reduction in the size of the closest mine pit.</p> <p>Measures to ensure the continued protection of the burial sites and the associated exclusion area will be specified in the Silvergrass Cultural Heritage Management Plan.</p>
<b>Submission 4: Department of Health</b>		
6.	<p><u>Environmental Review Content</u></p> <p>'Public Health' is recommended to be integrated to the document under the various headings as appropriate. Public Health should include disaster preparedness, health, social and mental wellbeing of the workforce and visitors. Incorporating 'public health' into the design and implementation of the project will ensure a more sustainable development.</p> <p>The project is an expansion proposal of existing operations. Dust management strategies are similar to the original proposal with the addition of the construction of a sealed access road. The proponents should ensure the contingency plan incorporates additional dust controls which involve increased watering, application of dust stabilizers to loads and stockpiles and general moderation of dust generating</p>	<p>Disaster preparedness, social and mental wellbeing of the workforce are aspects that are routinely addressed in the design and implementation of RTIO's expansion projects and during the ongoing operation of its sites. However these are not considered to form part of the scope of a PER and therefore have not specifically been addressed in the document.</p> <p>Section 15.2.3 of the PER describes key mitigation and management measures relating to dust. The Emissions Management Plan (contained within the Environmental Management Plan [EMP], included in Appendix 3 of PER) provides further detail, and sets out the main sources of dust emissions. The Emissions Management Plan identifies environmental objectives, targets and performance indicators, and management, monitoring and contingency actions.</p> <p>Contingency actions have been developed for use in the event that monitoring shows that the emissions objectives and targets are not being achieved. Table 37 in the EMP details contingency actions for emissions:</p> <p>Should dust suppression measures not be effective in reducing dust generated from areas of ground disturbance, the following contingency actions would apply:</p> <ol style="list-style-type: none"> <li>1. Investigate cause.</li> </ol>

Item	Submission and/or issue	Rio Tinto response
	<p>activities. Monitoring of dust should be documented and reviewed periodically.</p>	<p>2. Implement additional dust control measures including, as appropriate:</p> <ul style="list-style-type: none"> <li>• increased application of water.</li> <li>• application of dust stabilisers to vehicle loads and stockpiles.</li> </ul> <p>3. Moderate activities generating dust if actions listed under (2) above are inadequate to reduce dust emissions.</p>
7.	<p><u>Mosquito-borne Disease Control Programs and Services</u></p> <p>The subject land is in a region that regularly experiences considerable problems with nuisance and disease carrying mosquitoes. These mosquitoes can disperse several kilometres from breeding sites and are known carriers of Ross River (RRV) and Barmah Forest (BFV) viruses. Human cases of RRV and BFV diseases occur annually in this general locality.</p> <p>There may be seasonal freshwater mosquito breeding habitat within close proximity to the subject land. Additionally, there is the potential for mosquitoes to breed in onsite infrastructure and constructed water bodies if they are poorly designed or maintained.</p> <p>The proponent should ensure proposed infrastructure and site works do not create additional mosquito breeding habitat as follows:</p> <ul style="list-style-type: none"> <li>• Changes to topography resulting from earthworks (e.g. the installation of pipelines, footpaths, roads etc) must prevent run-off from creating surface ponding as it may become mosquito breeding habitat;</li> <li>• Constructed water bodies (drainage infrastructure, infiltration basins and swales, settling ponds, wetlands, etc) may require</li> </ul>	<p>RTIO is aware of the potential for the creation of breeding grounds for mosquitoes and for the associated risks posed from their potential to carry diseases. Consideration of occupational health risks forms part of RTIO's standard approach to design and operation of its sites.</p>

Item	Submission and/or issue	Rio Tinto response
	<p>regular monitoring and application of herbicides and/or removal of invasive vegetation to prevent the harbourage of mosquito larvae; and</p> <ul style="list-style-type: none"> <li>The <i>Chironomid midge and mosquito risk assessment guide for constructed water bodies</i> (Midge Research Group, 2011) should be referred to during the early stages of planning to ensure that the potential for on-site mosquito breeding is minimised. This document is available at:  <a href="http://www.public.health.wa.gov.au/2/654/2/mosquitoes.pm">www.public.health.wa.gov.au/2/654/2/mosquitoes.pm</a></li> </ul>	
8.	<p><u>Health Impact Assessment</u></p> <p>You should also consider incorporating Health Impact Assessment (HIA) and/or Public Health Assessment (PHA) principles in your decision making process. For your information and guidance, you may access the relevant information at the following sites:</p> <p>HIA -  <a href="http://www.public.health.wa.gov.au/2/1400/2/health_risk_assessment.pm">http://www.public.health.wa.gov.au/2/1400/2/health_risk_assessment.pm</a></p> <p>PHA -  <a href="http://www.public.health.wa.gov.au/2/1399/2/public_health_assessment.pm">http://www.public.health.wa.gov.au/2/1399/2/public_health_assessment.pm</a></p>	Noted as a comment for EPA to consider.
<b>Submission 5: Pilbara Development Commission</b>		
9.	The Commission has reviewed the proposal and recognises that the document reflects the previous work and the plans which are in place which will be able to encompass the expanded project area. The Commission has no concerns at this time and support	Noted.

Item	Submission and/or issue	Rio Tinto response
	the ongoing work being done.	
<b>Submission 6: Department of Mines and Petroleum</b>		
<b>Comments on the PER document</b>		
10.	<p>RTIO have not provided design details for the proposed waste dumps which are proposed to be over 40m in height. Given that the waste dumps will be located on State Agreement Act (SAA) tenure, there will not be an opportunity to assess the detailed design and placement of waste dumps as there would be if they were and subject to the requirement for a Mining Proposal. For this reason it is important that waste management is assessed in detail during the PER assessment. Whilst the geochemical characteristics of expected waste materials have been discussed in some detail (note that kinetic testing of the waste is yet to occur), the physical characteristics of the waste materials have not been addressed except for a statement on page 50 of the Nammuldi Mine Closure Plan that significant quantities of highly erodible materials are likely to be present in the waste materials. RTIO should provide further details on the management of dispersive wastes.</p>	See response to item 14 below.
11.	<p>Design details for the Waste Fines Storage Facility (WFSF) and geochemical characterisation of the waste fines have been deferred to the Mining Proposal stage as the WFSF will be located on <i>Mining Act 1978</i> tenure. DMP is able adequately assess and manage the impacts of this facility through the Mining Proposal and Mine Closure Plan processes. RTIO should note, however, that General Purpose Lease 47/1242 (which is the proposed location of the WFSF) is granted only to a depth of 15m below the natural ground surface (refer to endorsement 3 on the tenement). As such, any</p>	<p>RTIO acknowledges that DMP will be undertaking assessment of the Mining Proposal that includes the Waste Fines Storage Facility (WFSF). RTIO commenced consultation with DMP regarding the Mining Proposal and specifically the WFSF in August 2012.</p> <p>RTIO also acknowledges the limits of the General Purpose Lease tenement and will manage activities accordingly. Geotechnical investigations have been undertaken under a Land Administration Act licence granted for the purpose of those activities.</p>

Item	Submission and/or issue	Rio Tinto response
	monitoring bores, geotechnical drilling or other disturbances would be limited to above 15m in depth.	
12.	As was recommended in DMP's comments on the draft PER, RTIO should further investigate and discuss whether the development of the Irrigation Agricultural Area (IAA) on the Hamersley pastoral lease is allowable under the <i>Iron Ore (Hamersley Range) Agreement Act 1963</i> .	<p>RTIO has discussed the development of the Irrigated Agriculture Area (IAA) with the Department of State Development and other Government Authorities. RTIO will seek the approval of the Minister for State Development to supply water to the pastoral lease, under the <i>Iron Ore (Hamersley Range) Agreement Act 1963</i>. The development of the IAA will be undertaken on the Hamersley Station pastoral lease, and therefore Diversification Permit will be sought from the Pastoral Lands Board</p> <p>Such approvals have previously been granted for the Hamersley Agricultural Project at Marandoo.</p>
13.	With regard to Ministerial Conditions relating to mine closure, DMP recommends that a condition is imposed which requires that updated Mine Closure Plans (MCPs) are submitted every three years in accordance with the DMP-EPA <i>"Guidelines for Preparing Mine Closure Plans"</i> to the requirements of the Environmental Protection Authority on advice from the Department of Mines and Petroleum (and other relevant agencies).	Noted.
<b>Comments on the Nammuldi and Silvergrass Mine Closure Plans:</b>		
14.	The Nammuldi MCP states that a "conservative" design for Nammuldi waste dumps with highly erodible material (and in the absence of capping material) will involve slope gradients of 20 degrees and slope lengths of 50m with maximum lift heights at 20m (see page 85). DMP does not consider this to be a conservative design for a highly erodible waste dump. RTIO should justify this design through further materials characterisation and trials. Details regarding	<p>RTIO agrees that the design parameters provided in the closure plan were based on the standard business parameters at the time, and subsequent investigations have shown them inappropriate for permanent waste dumps with highly erodible material on the external surface.</p> <p>RTIO has undertaken substantial research to improve its final landform designs. This includes the development of systems to ensure that individual dumps are designed and constructed so as to meet expectations with respect to long term stability, based on the specific waste characteristics within each dump:</p>

Item	Submission and/or issue	Rio Tinto response
	<p>mine scheduling are also required to ensure that adverse materials (including Potentially Acid Forming and erosive dispersive wastes) can be effectively encapsulated and that waste dumps will be designed and constructed from the outset with closure in mind.</p>	<p>The Final Landform Design Project was initiated by RTIO in 2010 to ensure that the physical characteristics of waste materials are integral to the design of final landforms. This information is considered on a site by site basis in combination with local climate information to ensure the design and construction of safe and stable final landforms. The results of the project have been incorporated into the Landform Design Guidelines for RTIO sites in the Pilbara and these are currently being implemented across the company's Pilbara iron ore operations.</p> <p>RTIO engaged Landloch Pty Ltd to complete this project which comprised the following stages:</p> <ul style="list-style-type: none"> <li>• Literature Review</li> <li>• Materials Inventory (assessment of all RTIO waste types and classification of wastes into similar geozones to enable sampling of representative wastes)</li> <li>• Collection and analysis of representative waste samples from sites by Landloch to determine their respective physical properties</li> <li>• Material Erodibility Data Collection <ul style="list-style-type: none"> <li>○ application of water as rainfall simulations to each waste type in plots and flumes and measurement of run-off and sediment in runoff</li> <li>○ parameters derived from the laboratory studies were used in the water erosion prediction program (WEPP) to determine predicted erosion rates and ultimately the maximum slope angles, lengths and lift heights to ensure a stable slope</li> <li>○ further modelling then determined minimum berm widths and capacities to ensure safe and stable landforms</li> </ul> </li> <li>• Validation of parameters and modelling techniques through field assessment of natural erosion rates, using rainfall simulators, in the Pilbara to enable comparison of natural land surfaces with modelled erosion</li> <li>• Reporting and development of procedures. Key outputs are: <ul style="list-style-type: none"> <li>○ A design tool that is currently being incorporated into the RTIO(WA) Landform Design Guidelines. These guidelines are used in the design of landforms and specifically when completing designs for final landform</li> </ul> </li> </ul>



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		<p>rehabilitation</p> <ul style="list-style-type: none"> <li>○ Final Landform Design Criteria for use during mine planning</li> </ul> <p>In general terms, the following, more conservative design, parameters have been determined to be appropriate for most final rehabilitated dumps in the Pilbara:</p> <ul style="list-style-type: none"> <li>• 20 degree slope;</li> <li>• 20 metre lift; and</li> <li>• 10 metre back-sloping berm.</li> </ul> <p>Use of these parameters is contingent on competent material being placed on outer slopes.</p> <p>Further work is required to confirm precise final rehabilitated dump designs for the Expansion Project. This requires detailed mine scheduling to be undertaken and will therefore be provided in the next revision of the closure plan in the recommended 3 year period.</p>
15.	<p>Closure options for the IAA have not been discussed adequately in the Nammuldi MCP. Further consultation with Government agencies and other stakeholders will be required prior to finalising a closure strategy for this area however the preliminary MCP should at least present some of the options that are available. Furthermore, in the absence of finalised agreements from Government and future landholders for the continued use and operation of the IAA, the default closure option should be the decommissioning and rehabilitation of this area. The MCP therefore should discuss the decommissioning of water infrastructure and the rehabilitation requirements for the irrigation area.</p>	<p>RTIO agrees that further consultation is required prior to finalising the closure strategies for the Nammuldi IAA project. Such consultation will occur during operations and prior to the development of a final decommissioning plan.</p> <p>RTIO is currently constructing the Hamersley Agriculture Project at Marandoo, and closure strategies developed for that project would be directly applicable to the Nammuldi Silvergrass IAA project.</p>
16.	<p>The Silvergrass MCP identifies in Table 11 that erosion of waste dumps may impact upon the nearby Themeda Grassland TEC but that this issue is mitigated by the proposed closure strategy of backfilling all waste into</p>	<p>The location of the waste dump at Silvergrass has been revised to ensure that the dump is constructed outside of the PEC.</p> <p>The flood protection levee that will be built to direct flood waters from Caves Creek away</p>

Item	Submission and/or issue	Rio Tinto response
	<p>pit voids. The PER and MCP do not address the issue of erosion of the 'temporary' waste dumps impacting upon the TEC during mine life (over 10 years) and Table 18 indicates that erosion monitoring will not begin until the closure phase. DMP have observed at other similar operations that large sediment fans can emanate from active waste dumps if not managed appropriately. RTIO should provide details regarding the management of erosion from these waste dumps prior to backfilling.</p>	<p>from the pits will be designed to also function as a drainage control structure. The structure will direct runoff from the waste dump to sediment traps and thereby avoid sedimentation of the TEC.</p>
17.	<p>DMP have concerns about the long term stability and effectiveness of the proposed Caves Creek re-alignment. From the design details provided (note that engineering designs are still at an early stage) there appears to be potential for bottlenecking and pooling of water at the entry to the realigned section. The PER also states that some overtopping of water is likely during events larger than a 100 year ARI flood event which is likely to reduce the long term stability of the proposed levees. Given that Pit 1 (adjacent to the realignment) will be backfilled to surface at closure, RTIO should investigate further the option of removing the diversion structures at closure and re-instating natural drainage through this area.</p>	<p>RTIO's stated closure outcomes for the Caves Creek re-alignment are that the new section of channel will be stable and revegetated where practicable with riparian species similar to those occurring in the original disturbed section of creek.</p> <p>Engineering and geomorphologic investigations suggest that a stable re-alignment can be established in the calcrete layer, immediately below the alluvial surface material, at the proposed re-aligned channel location. This will result in a similar hydrologic regime compared to the pre-development hydrologic regime due to the similar soil conditions.</p> <p>Re-instating the original creek alignment would likely result in reduced flow to downstream locations due to the potential for increased stream flow losses from flow over backfilled material in Pit 1 that would have no calcrete sub-layer. At closure, it is proposed that the flood protection levee will be removed, with the aim of re-establishing the original Caves Creek 100 year ARI floodplain.</p>
18.	<p>It should also be noted that engineering designs are not sufficiently advanced to confirm that the proposed surface water diversions will not result in significant reduction in flows reaching the <i>Themeda</i> Grassland TEC (see page 86 of the Silvergrass MCP).</p>	<p>RTIO has engaged a consultant engineering firm to provide the detailed engineering design of the Caves Creek realignment. The key requirements of this design are to;</p> <ul style="list-style-type: none"> <li>• ensure the realigned channel functions as a fluvial system in a similar manner to the existing creek in terms of hydrology, channel hydraulics and geomorphology,</li> <li>• ensure flow velocities do not significantly increase during flood events from that of the original alignment,</li> <li>• ensure a smooth transition with the natural creek at the entry and exit of the realignment section to prevent erosion at these points,</li> <li>• minimise impacts on the identified Threatened Ecological Community</li> </ul>

Item	Submission and/or issue	Rio Tinto response
		<p>downstream of the realignment, and</p> <ul style="list-style-type: none"> <li>ensure long-term stability of the structure including closure requirements such as duration the levee will remain in place and rehabilitation of the creek.</li> </ul> <p>Information on the work conducted to characterise the creek system and the TEC/PEC area has been made available to OEPA, DoW and DEC. This work explains the natural conditions of the system and demonstrates the stability of the creek in the vicinity of the cracking clay that forms the TEC/PEC. The design of the creek diversion will be founded on the results of this work and the above stated objectives. As stated in the PER, RTIO will engage in consultation with DEC and DoW during the development of the design to ensure that the approach to design is considered acceptable.</p>
19.	<p>The stakeholder consultation section of the MCPs do not include the comments made by some agencies and do not include RTIO's response or actions taken to address the comments made. It is important that stakeholder comments are considered appropriately and appropriate actions taken to address any concerns raised.</p>	<p>The only project-specific comments received by RTIO on closure were from DEC Pilbara Branch in relation to the closure of the IAA. (Table 15 in the PER).</p> <p>Discussions were held with DMP on the general form and content of closure plans following the publication of the DMP/EPA Guidelines for Preparing Mine Closure Plans.</p> <p>RTIO is not aware of any other comments relating to closure that were made during stakeholder consultation.</p>
20.	<p>A number of the closure objectives in both MCP's appear to be vague and referring more to processes rather than long term, measurable goals (e.g. "Develop and implement strategies for closure which consider the implications on local communities"). Objectives should refer to clear closure goals, not ongoing processes or procedures.</p>	<p>RTIO has developed a closure vision that applies to all of its sites, and this has been adapted to provide a standard set of objectives that apply to all of its sites. It is acknowledged that these objectives are broad, but will be expanded to include site specific objectives where needed to address all the closure issues relevant to a particular site.</p> <p>The closure planning process includes a step to assess the need for and form of any site-specific closure objectives. Such objectives may be required to address critical closure risks or protect key environmental or social values, where these are not sufficiently addressed by the standard objectives.</p> <p>The Proponent will reassess the wording of its objectives in light of DMP's comments</p>
21.	<p>While indicative closure criteria may be acceptable at the preliminary approval stage, these will need to be refined prior to the next revision of the MCPs as many of the criteria provided are not clearly measurable. Specific "measurement tools" should be included</p>	<p>As stated in the DMP closure planning guidelines, indicative criteria are considered to be acceptable at the approvals stage and these should be developed over the life of the operation as a result of further work and stakeholder consultation</p> <p>RTIO considers that the indicative completion criteria specified in the Nammuldi and</p>

Item	Submission and/or issue	Rio Tinto response
	against each criterion as per the examples in the DMP-EPA MCP Guidelines. .	Silvergrass closure plans are consistent with the examples provided in the DMP closure planning guidelines.  Notwithstanding these comments, RTIO will reconsider its processes for developing completion criteria in light of DMP comments.
22.	The "Closure monitoring and maintenance" sections of both MCP's state that post-closure monitoring will be conducted until "parameters being monitored reach a steady state". The end point for post-closure monitoring should be only when agreed closure criteria have been met.	RTIO acknowledges DMP's comments and will reword its closure plans accordingly.
<b>Submission 7: Department of Environment and Conservation (DEC)</b>		
23.	<p><i>Recommendation 1</i></p> <p>That a condition be applied that ensures that a comprehensive on-site and off-site weed monitoring procedure be developed and implemented as a component of the project, to the requirements of the OEPA on advice from DEC, to ensure that weeds (including introduced crops) and to a lesser extent plant pathogens are not allowed to spread or become established outside of the proposal area.</p> <p><i>Discussion</i></p> <p>The potential for weeds (i.e. introduced crops) and to a lesser extent plant pathogens to escape from the project area (i.e. 'Irrigated Agricultural Area' - potential pivot locations) into the surrounding environment, is considered significant. This issue will require monitoring and management provisions developed in consultation with DEC. While recent information (i.e. Non indigenous plant species lists for Western Australia's rangelands Permitted (Green list) and Not Permitted (Red list), WA State Government 2010)</p>	<p>In recognition of the need to balance the discharge of surplus water to creeks against maximising reliable secondary use of surplus water, RTIO has developed the concept of irrigated agriculture on its own pastoral stations to provide an opportunity for re-use of water. Whilst RTIO is cognisant of DEC's concerns over the use of <i>C.gayana</i>, there are few crops available that meet the requirements for high water use, demonstrated tolerance of the high temperatures encountered in the Pilbara during summer and provision of a palatable fodder crop. Additional crop species may be used where they can be proven to be reliable, however the use of <i>C.gayana</i> provides confidence in crop viability and therefore continuity of water demand from the IAA.</p> <p>RTIO has committed to a comprehensive scheme of management and monitoring measures to ensure that crop species and other introduced species associated with cropping do not spread outside the boundaries of the Irrigated Agriculture Area (IAA) and therefore does not consider that a condition is necessary.</p> <p>Statement 883 has authorised the use of <i>Chloris gayana</i> for the Hamersley Agricultural Project (HAP), which is also located on the Hamersley Pastoral Station and operated by RTIO, but closer to Karijini National Park. The weed management measures proposed for the IAA are based directly on those established and agreed for the HAP.</p> <p>An environmental weed risk assessment of <i>C. gayana</i> for the locality was undertaken by Future Farm Industries Cooperative Research Centre in 2009. The risk assessment considered the potential invasiveness, impacts and distribution of <i>C. gayana</i>. The assessment concluded <i>C. gayana</i> is a low risk in the Pilbara based on its inability to</p>

Item	Submission and/or issue	Rio Tinto response
	<p>suggests that Lucerne (<i>Medicago sativa</i>) and forage oats (<i>Avena sativa</i>) have the potential to be a low environmental weed risk, Rhodes Grass (<i>Chloris gayana</i>) has the potential to become a serious weed and will require intensive management during and following the implementation of the project. .</p>	<p>spread by seed and its requirements for highly fertile soil.</p> <p>As described in Section 5.3 of the Agriculture Environmental Management Plan (AEMP), a comprehensive set of management actions has been prescribed to monitor, catalogue and map weed species as they appear in the IAA, and implement suitable control measures immediately. Design, construction and operation of the IAA is to be undertaken in a manner that minimises the likelihood of weed spread, and strict weed hygiene measures will be in place to ensure that weed propagules will not be transported into site via personnel or equipment. In addition pasture seed is to be purchased from registered growers to ensure that it is free from pests, diseases and weeds. These hygiene measures should also act as a prevention measure for any plant pathogens.</p> <p>As described in Section 5.4 of the AEMP, monitoring sites will be established in the following locations:</p> <ul style="list-style-type: none"> <li>• 30 m indirect impact area (buffer of native vegetation surrounding agricultural pivots)</li> <li>• native vegetation surrounding the IAA</li> <li>• substantial drainage lines within and adjacent to the IAA</li> <li>• major roads adjacent to IAA.</li> </ul> <p>All established sites will be monitored quarterly. Additional inspections will be undertaken of the 10 m cleared buffer surrounding pivots, infrastructure and production areas, to determine location and abundance of any weeds or the spread of crop plants, with spot spraying undertaken if necessary.</p> <p>Management of any weeds observed in monitoring sites will be undertaken immediately in order to prevent the spread to internal and external areas.</p> <p>Locations of weeds will be entered into a GIS register and these sites monitored regularly to ensure success of weed control.</p> <p>Monitoring activities will be evaluated at the conclusion of each event. Feedback from results will provide data on the effectiveness of weed management procedures and management actions that are implemented.</p> <p>Trigger levels and contingency actions are described in Table 14 of the AEMP for implementation in the event that performance standards are not met.</p>
24.	<p><i>Recommendation 2</i> That a condition is applied to ensure that the proposed</p>	<p><i>Recommendation 2</i> RTIO does not consider that a condition is necessary as it has committed to</p>

Item	Submission and/or issue	Rio Tinto response
	<p>Silvergrass expansion, specifically Pit 1 and subsequent realignment of Caves Creek will not significantly impact upon;</p> <ul style="list-style-type: none"> <li>• water quality;</li> <li>• flow velocities;</li> <li>• flow regime; and</li> <li>• sediment transportation rates;</li> </ul> <p>of Caves Creek downstream from the proposed creek diversion.</p> <p><i>Recommendation 3</i></p> <p>That a condition is applied to ensure that the proposed Silvergrass expansion will not impact on Palm Springs, the Themeda grasslands on cracking clays (Hamersley Station, Pilbara) Threatened Ecological Community (TEC) and the Brockman Iron cracking clay communities of the Hamersley Range Priority Ecological Community (PEC) as a consequence of altered hydrodynamics associated with Caves Creek.</p> <p><i>Discussion</i></p> <p>There is the potential that the Silvergrass expansion and the associated realignment of Caves Creek may impact upon hydrodynamics and sediment transportation rates of Caves Creek downstream of the groundwater drawdown and creek diversion. Any significant and permanent alteration to the hydrodynamics and sediment transport downstream of the proposal and its associated impacts has the potential to present a residual risk and a management legacy in respect of biodiversity values, including Palm Springs (i.e. permanent pools), the Themeda</p>	<p>management and monitoring actions in the EMP that minimise impact to the hydrology and water quality of Caves Creek.</p> <p>As described in Sections 3.3.12 and 8.4.3, the realignment of Caves Creek will be designed to have a broad flood channel with a low flow channel to maintain the natural hydrologic and hydrogeologic regime, including flow rates, flow velocities and sediment transport rates that are comparable to the natural system. The design will ensure that flood events are safely conveyed through the realigned section without risk to infrastructure or personnel but without significantly increasing the velocity of the flow. The design will include reinforcements, such as rock armouring as required, to ensure the long-term stability of the section and prevent scour and additional sediment load in the channel. The design for the transition section between the realignment and the existing Caves Creek bed will match the natural characteristics of the creek as closely as possible.</p> <p>The Proponent has engaged a consultant engineering firm to provide the detailed engineering design of the Caves Creek realignment. The key requirements of this design are listed in the response to item 18 above.</p> <p>As stated in Section 3.3.12 of the PER further consultation with DoW and DEC will be undertaken as part of the detailed design process to ensure confidence in the basis of design and in the long term stability of the infrastructure.</p> <p>Monitoring actions for Caves Creek are described in Section 4.4.4 of the EMP and include the following:</p> <ul style="list-style-type: none"> <li>• banks and bed of Caves Creek will be monitored quarterly and opportunistically (i.e., after heavy rainfall) for erosion to assess whether erosion additional to baseline conditions is occurring. Caves Creek water quality will also be monitored quarterly for pH, EC, TDS and TSS.</li> <li>• an annual review will be undertaken of Caves Creek stream flow conditions using measured groundwater levels, stream flow data, rainfall, water quality and aquatic fauna monitoring data to identify any changes to flow conditions.</li> </ul> <p>Section 4.4.5 of the EMP outlines contingency actions to be implemented in the event that excessive erosion in the bed or banks or significant alteration in stream flow of Caves Creek occur. These contingency actions require RTIO to investigate the cause of the erosion or alteration, modify the drainage system accordingly (e.g. addition of erosion protection materials), and submit a formal Environmental Incident Report.</p>

Item	Submission and/or issue	Rio Tinto response
	<p>grasslands on cracking clays (Hamersley Station, Pilbara) TEC and the Brockman Iron cracking clay communities of the Hamersley Range PEC.</p>	<p>Monitoring is required to ensure the success of the remedial actions.</p> <p><i>Recommendation 3</i></p> <p>The Proponent does not consider a condition is necessary as it is committing to a design for the realignment of Caves Creek that ensures the following key features of the diverted channel are comparable to the natural channel:</p> <ul style="list-style-type: none"> <li>• flow velocities</li> <li>• flow regime</li> <li>• sediment transport rates.</li> </ul> <p>As described in Section 8.4.3 of the PER, provided that these key features, measured at the end of the diversion, are comparable to those of the natural system, all downstream receptors can be expected to remain unaffected by the diversion.</p> <p>The realignment will be designed to contain a 50 ARI event flow and the structure will be designed to withstand Possible Maximum Flood. A hydrological and geomorphological assessment has been undertaken by consultants as the first stage of the design process. The findings of this work have been provided to DoW, DEC and OEPA and will inform the design process to ensure the long term stability of the infrastructure and to protect the surrounding environment. The results of this assessment and the final engineering design will be provided to DoW, DEC and OEPA.</p> <p>Measures to limit any increase in velocity or sediment-load of the creek, along with erosion control measures, will be considered in the final design if necessary to maintain natural features of the channel. These design features will ensure that flooding events of the downstream <i>Themeda</i> grassland TEC from the creek are not affected.</p> <p>In addition to the comments above, results from specialist consultant investigations confirm that Caves Creek only interacts with the TEC for flow events larger than a 10-year ARI. Based on the analysis of hydrological, hydraulic and sediment transport the realignment is not expected to have a detrimental impact on the TEC or Palm Springs.</p>
25.	<p><i>Recommendation 4</i></p> <p>That the proponent monitors the hydrology, ecology and biomass of the creeks (i.e. Duck and Caves Creek) to be impacted by this proposal specifically within the</p>	<p>RTIO recognises the importance of Palms Springs, Caves Creek and the TEC/PEC areas and has already implemented a comprehensive monitoring program as follows:</p> <p><b>Groundwater monitoring and GDEs</b></p> <p>As stated in Section 2.1.2 of the PER, Palm Springs is a permanent groundwater-fed</p>



Item	Submission and/or issue	Rio Tinto response
	<p>area of influence of the existing and proposed surface water discharge and mine dewatering. This monitoring program should include provision, within the implementation framework of the proposal, for remediating these systems as necessary to ensure that the identified environmental and conservation values associated with these ecosystems and any downstream ecosystems (i.e. Palm Springs, the Themeda grasslands on cracking clays (Hamersley Station, Pilbara) TEC and the Brockman Iron cracking clay communities of the Hamersley Range PEC) are maintained.</p> <p><i>Discussion</i></p> <p>The Palm Springs/Duck Creek wetland system is located within the proposal area and has been identified by DEC as one of four significant wetland systems for biodiversity conservation in the Hamersley IBRA subregion (CALM, 2002). Therefore, it will be important that these systems and potential impacts on them be managed for the effects of groundwater drawdown and surface water discharge.</p> <p>Water management issues associated with this expansion proposal are likely to impact on both the Duck and Caves creek systems including:</p> <ul style="list-style-type: none"> <li>• dewatering at Silvergrass increasing the predicted groundwater drawdown footprint (i.e. 10m drawdown contour) along Caves Creek from the current 4km to 7km, east-west along the creek; and</li> <li>• periodic surplus water discharge down Duck Creek when water exceeds what can be used for mine operations and irrigated agriculture.</li> </ul>	<p>spring located approximately 28 km downstream of the Silvergrass site. Palm Springs is not located within the Proposal Boundary, as shown on Figure 2 of the PER.</p> <p>As stated in Section 8.2.2 of the PER, the Red Book Status Report (EPA 1993) on the conservation values of Palm Springs identified that the site has conservation values due to the presence of Millstream Palms. These palms are restricted to an area within approximately 300m of Palm Springs and are therefore several kilometres from the predicted downstream edge of the cone of depression for the Silvergrass operation.</p> <p>Within the 2 m drawdown contour (used as a threshold for potential adverse environmental effects on groundwater-dependent vegetation along Caves Creek) the dominant riparian tree species recorded is <i>Eucalyptus victrix</i>, which indicates that the riparian vegetation in this section of the creek accesses soil moisture from the vadose zone (unsaturated zone) and is unlikely to be associated with the watertable. This is confirmed by investigations by RTIO that demonstrate the presence of a continuous calcrete layer beneath the alluvium/colluvium of the creek that effectively separates the surface flows in the creek from the deeper orebody aquifer. On this basis, the increase in the extent of drawdown over that predicted for the Original Proposal is unlikely to affect the riparian vegetation along Caves Creek. Palm Springs and the associated Millstream Palms have been shown to not be associated with the Silvergrass east orebody aquifer and are therefore will not be affected by groundwater drawdown at this location.</p> <p>Neither the PEC nor TEC are reliant on groundwater and therefore will not be affected by groundwater drawdown.</p> <p>As stated in Section 7.2.2 of the PER and summarised in Section 3 of this document, RTIO constructed a network of 41 bores in 2011 in a series of six transects across Caves Creek along the 28 km length between Silvergrass and Palm Springs.to investigate the interaction between surface water flows and groundwater levels along the creek. In conjunction with bores at Silvergrass, these creekline bores will be used to monitor the progression of the cone of depression beneath Caves Creek during operation. In combination with the existing biological monitoring programs described below, this data will be used to detect the potential for any impacts on the creek. Post-dewatering they can be used to monitor the recovery of the aquifer.</p> <p>As described in Section 9.4.3 of the PER, groundwater drawdown at Nammuldi is expected to be confined to the Nammuldi valley which does not contain any major creeklines or groundwater-dependent riparian vegetation in proximity to the watertable.</p> <p><b>Surface water monitoring</b></p>



Item	Submission and/or issue	Rio Tinto response
		<p>Prior to the commencement of mining operations at Silvergrass surface water monitoring sites will be established upstream of the proposed development on Caves Creek. Similarly, surface water monitoring sites will also be established in Duck Creek to monitor the hydrologic regime. These sites are in addition to the existing two surface water monitoring sites that were established in Caves Creek, between the TEC and Palm Springs, in 2008.</p> <p><b>Riparian vegetation and creek morphology monitoring</b></p> <p>As stated in the PER, RTIO has already implemented a comprehensive biological monitoring program for both Duck and Caves creeks.</p> <p>Digital Cover Photography (DCP) monitoring of sites has been established along Caves Creek at approximately 4 km intervals. These have been monitored annually since 2008. In 2011, sites were also established along Duck Creek. Monitoring at Caves and Duck creeks will continue throughout the operation of the Expansion Proposal. The ongoing monitoring results will be compared to the baseline data captured over Caves Creek and Duck Creek.</p> <p>Permanent vegetation monitoring transects have similarly been established across Caves and Duck creeks down to the confluence with the Ashburton River. Baseline monitoring has been undertaken to-date by Biota and monitoring will continue at intervals both during and following dewatering and discharge. As part of this baseline the channel cross sections have been surveyed to form a baseline against which any changes in morphology can be compared.</p> <p>Baseline fine resolution (~ 1 m pixel size) Digital Multispectral Imagery (DMSI) was captured over Caves Creek and much of Duck Creek in November 2005, and additional baseline DMSI imagery has been captured for years from 2007 to 2010. DMSI data capture will be re-run at intervals if deemed appropriate, to identify changes in creek and vegetation cover.</p> <p>The EMP specifies management actions for flora and vegetation to prevent decline in the status of Palm Springs and other permanent water features and/or the health of creekline vegetation (beyond natural variability).</p> <p>RTIO proposes to provide funds to offset residual impacts to identified Critical value assets (PEC and riparian vegetation cleared for the realignment of Caves Creek). The details of those funds are currently being discussed with OEPA and will be presented in a detailed Offsets Package.</p>

Item	Submission and/or issue	Rio Tinto response
		<p><b>Aquatic fauna and water quality monitoring</b></p> <p>As stated in the PER RTIO has also already established an aquatic fauna baseline monitoring program for both Duck and Caves creek. Wetland Research and Management has conducted 6 seasons of aquatic fauna and water quality sampling with up to 51 sites being sampled. Monitoring will continue as appropriate once dewatering and discharge commence to allow assessment of any impacts resulting from the expansion.</p>
26.	<p><i>Recommendation 5:</i></p> <p>That a condition is applied to ensure that the proposed Silvergrass expansion will not directly impact on the Themeda grasslands on cracking clays (Hamersley Station, Pilbara) TEC and the Brockman Iron cracking clay communities of the Hamersley Range PEC.</p> <p><i>Recommendation 6:</i></p> <p>In the event that the direct disturbance of 91 ha of the Brockman Iron cracking clay communities of the Hamersley Range PEC, as proposed in the PER, is found to be environmentally acceptable and subsequently approved, conditions be applied to avoid any further disturbance (greater than the identified 91 ha) to this PEC.</p> <p><i>Discussion</i></p> <p>The proponent has committed to having no direct disturbance on the Themeda grasslands on cracking clays (Hamersley Station, Pilbara) TEC. However, the proponent has indicated that the proposal may directly impact 91 ha of the Brockman Iron cracking clay communities of the Hamersley Range PEC. DEC recommends that all impacts to the Brockman Iron cracking clay communities of the Hamersley Range PEC be avoided, where possible.</p>	<p>RTIO considers that such a condition is unnecessary as the PER commits to an exclusion zone being maintained over the DEC's stated TEC area so that no clearing of the <i>Themeda</i> grasslands TEC will occur as part of the expansion. In addition RTIO has applied a 200m buffer to the existing exclusion zone and no disturbance will occur within that buffer.</p> <p>The layout of the Silvergrass site that was proposed in the PER has since been modified and the waste dump that was to encroach onto 91ha of the PEC has now been repositioned to the south of the PEC. Disturbance of the PEC will be limited to that required for development of Pit 5 (revised) with all infrastructure to be located outside of the limits of the PEC. This represents an overall reduction in the quantity of PEC to be disturbed.</p> <p>The development of the Silvergrass pits will result in a reduction in volume of surface runoff from the eastern catchment reaching the <i>Themeda</i> grassland TEC. However the runoff from this area reports to drainage lines within the PEC/TEC rather than to the wider cracking clay area. The <i>Themeda</i> grassland TEC and <i>Astrebla</i> PEC have been shown to have been formed by Caves Creek backing up in this area during flood events and to rely predominately on this and on infiltration of incident rainfall. Therefore a reduction in volume of surface flow on is not expected to affect the long-term values of these vegetation communities.</p>
27.	Recommendation 7:	Trenching for underground pipes will be required for the Expansion Proposal. Routine

Item	Submission and/or issue	Rio Tinto response
	<p>Specific fauna management protocols will need to be implemented by the proponent if trenching activities associated with pipeline installation are to be undertaken. The fauna management protocols for trenching activities and management of vertebrate fauna should be further developed in consultation With DEC.</p> <p><i>Discussion</i></p> <p>It is currently unclear if there will be a requirement for below ground pipeline infrastructure associated with this expansion proposal.</p>	<p>management measures associated with trenching include:</p> <ul style="list-style-type: none"> <li>• all foundation holes, drill holes and trenches shall be covered, fenced, ramped or bunded to prevent stock or fauna entrapment / injury</li> <li>• pipe ends shall be capped</li> <li>• trenches will be inspected twice daily for fauna This will comprise a morning (am) inspection and an afternoon (pm) inspection.</li> <li>• fauna egress ramps shall be no further than 1km apart along open trenches</li> </ul> <p>A Pipeline Installation Management Plan will be developed and implemented prior to the commencement of trenching. This will include management measures associated with fauna becoming trapped in open trenches. The Plan will stipulate that trained snake handlers be on site while trenching works are occurring.</p>
28.	<p><i>Recommendation 8:</i></p> <p>That a condition is applied to ensure that all mine voids are backfilled to a level that will prevent the formation of permanent pit lakes, and to ensure there is a capillary break between the surface and groundwater to maintain groundwater quality.</p> <p><i>Recommendation 9:</i> In the event that permanent water-filled voids, as proposed in the PER, are found to be environmentally acceptable and subsequently approved, conditions be applied to avoid potential long-term impacts on water quality.</p> <p><i>Discussion</i></p> <p>The current proposal, specifically the Nammuldi mine area, will potentially leave permanent water-filled voids at closure. Any permanent water-filled voids left after mining will continue to present a residual risk and a management legacy for land managers and the State. DEC recommends that all mine voids be backfilled to a level that will prevent the formation of permanent pit lakes, to avoid potential long-term impacts on water quality and biodiversity values.</p>	<p>The DMP/EPA Guidelines for Preparing Mine Closure Plans 2011, do not suggest a presumption against pit lakes in the first instance. Rather, the guidelines state that “assessments of pit lakes should be risk-based, talking into account the specific characteristics of the site (including both hydrogeological and environmental considerations) and the potential for negative impacts and beneficial uses.”.</p> <p>As described in Section 14.5.4 of the PER, modelling indicates that after closure it will take at least 50 years before the water levels in the mine voids reach a quasi-steady state and the groundwater level across the entire Nammuldi site stabilises. The salinity in these voids is expected to change from fresh to brackish over a period of approximately 1000 years.</p> <p>Section 14.3.3 of the PER states that modelling has indicated that the outflow component of the water balance from the mine pits will be predominantly from evaporation with flow of water from the pit voids to groundwater likely to be limited to approximately 2% of the outflow from Lens C/D pit void, approximately 11% from Lens A and approximately 21% from Lens E/F.</p> <p>This increase will not significantly affect water quality of the surrounding groundwater as outflow from the pit voids is predicted to be minimal in comparison to the throughflow of groundwater and the affected aquifer is contained within the Nammuldi valley which does not have a strong hydraulic connection to adjacent aquifers</p>

Item	Submission and/or issue	Rio Tinto response
		<p>In addition, there are no nearby groundwater-dependent vegetation, water holes or restricted subterranean fauna communities within the Nammuldi valley that are likely to be affected by a change to groundwater quality.</p> <p>It is therefore considered that retention of mine voids is unlikely to have significant environmental effects.</p> <p>With the application of the management measures identified in the EMP and monitoring methods established in the closure studies RTIO has a high level of confidence that stable, non-polluting landforms can be achieved.</p>
<b>Submission 7 contd.: DEC – Environmental Services Group</b>		
29.	<p>Recommendation:</p> <p>That management measures recommended by the EPA reflect the significance of the quantity of greenhouse gas emissions associated with this proposal.</p> <p>Discussion: The proponent has not identified greenhouse gas emissions as a key environmental factor despite emissions of over 600,000 tonnes/annum CO<sub>2</sub>e from the expanded project; six times the level that the EPA considers to be 'significant' for projects in Western Australia, and 24 times the level set by the Commonwealth as a threshold for the National Greenhouse and Energy Reporting Act 2007 and the Clean Energy Act 2011.</p> <p>It is recommended that the EPA recommend the following conditions to ensure appropriate management of this environmental factor:</p> <p>X Greenhouse Gas Abatement</p> <p>X-1 The proponent shall prepare and submit a Greenhouse Gas Abatement Program. The Program shall:</p>	<p>The predicted greenhouse gas emission rate and intensity was indicated in the draft PER as a minor environmental factor and the PER was authorised by the EPA as being suitable for public review.</p> <p>RTIO is aware of and will comply with the requirements of the National Greenhouse and Energy Reporting Act 2007 and the Clean Energy Act 2011.</p> <p><b>Maximising energy efficiency</b></p> <p>RTIO considers that it is not necessary to apply a Ministerial Condition that effectively duplicates work that is:</p> <ul style="list-style-type: none"> <li>• already underway as part of the engineering design for the expansion, and</li> <li>• required for operating mines under the Energy Efficiency Opportunities Act 2006 (Cmth) (EEO Act).</li> </ul> <p>As part of the Federal Government's Clean Energy Legislative Package the Energy Efficiency Opportunities (EEO) program places requirements on operating sites to improve energy efficiency. The expansion project will be subject to the EEO once productive mining commences in 2014. Further, the EEO will be expanded from the 1st of July 2013 to place similar requirements for energy efficiency improvements on major greenfield and expansion projects. This means that companies will then need to undertake energy efficiency assessments in line with EEO requirements at the design</p>

Item	Submission and/or issue	Rio Tinto response
	<p>1. Include an up-to-date calculation of the Greenhouse Gas emissions associated with the proposal;</p> <p>2. Demonstrate that maximising energy efficiency, and opportunities for future energy recovery and use of renewable energy, have been given due consideration in the design of proposal;</p> <p>3. Ensure that the "greenhouse gas" intensity ("greenhouse gas" per tonne of product produced) is equivalent to, or better than benchmarked best practice through use of best available efficient technologies; and</p> <p>4. Achieve continuous improvement in "greenhouse gas" intensity through an annual review, and if practicable, adoption of advances in technology and process management.</p> <p>X-2 The proponent shall implement the Greenhouse Gas Abatement Program required by condition X-1.</p> <p>X-3 The proponent shall make the Greenhouse Gas Abatement Program required by condition X-1 publicly available.</p> <p>Author: Climate Change Unit</p>	<p>stage of major Greenfield and expansion projects.</p> <p>In recognition of this change to the EEO program, RTIO already considers the impacts on energy efficiency of key project options as early as the Order of Magnitude stage for its expansion projects. Greenhouse Gas and Energy Assessments are subsequently conducted during both Pre-Feasibility Study (PFS) and Feasibility Study (FS) stages for each of its expansion projects. The purpose of these assessments is to ensure compliance with the RTIO Environmental Performance Standard – E4 GHG Emissions. Each assessment includes the following key tasks:</p> <ul style="list-style-type: none"> <li>• Develop, document and maintain knowledge of GHG emissions and energy use. This must include an understanding of current and future GHG emissions and energy use inventories and factors that affect these inventories.</li> <li>• Identify, document and assess GHG emission reduction and energy efficiency improvement opportunities for the business or operation. Opportunities include pre-construction engineering design, on-site operational and engineering controls, emissions trading and offsets.</li> <li>• Enable the review of GHG and energy projections to ensure they adequately reflect the scope of the project and ensure carbon and energy pricing has been reasonably estimated</li> <li>• Identify and document GHG and energy improvement opportunities for expansion projects</li> <li>• Review the methodology and rationale regarding design decisions made to date by the project team that have an impact on energy efficiency.</li> </ul> <p>GHG and Energy Assessments have been completed for Nammuldi and Silvergrass at PFS level. The Nammuldi GHG and Energy assessment is currently underway.</p> <p>Predicted GHG emissions quoted in the PER were based on PFS level assessments and although there could be expected to be some change due to changes to the project since that time, the figures given are considered to indicate the increase in scale and intensity of emissions due to the expansion of the mines.</p> <p><b>Evaluation of renewable energy options</b></p> <p>RTIO is investigating opportunities for building renewable energy into its Pilbara iron ore</p>

Item	Submission and/or issue	Rio Tinto response
		<p>business. Note that the existing generation capacity is based primarily on gas turbines located in proximity to coastal gas supply sources. With respect to electricity supply it is appropriate to evaluate renewable energy options at a regional scale, rather than a site scale, due to the integrated nature of RTIO's power generation, transmission and distribution infrastructure. Particularly given the capital intensive and long-term investment aspects of current renewable energy solutions, any renewable generation capacity should be situated at optimum locations on the network rather than being directly associated with a particular project.</p> <p>A report by Evans &amp; Peck (2011) commissioned by the Commonwealth Government's Australian Centre for renewable Energy (ACRE) identified that although the solar and wind resource in the Pilbara is abundant in regional terms, it has been poorly characterised at local scales relevant for the development of renewable generation capacity. Long term resource characterisation (i.e. over several years) is necessary to support detailed engineering assessments of large scale renewable technologies. RTIO has been conducting solar PV and wind energy resource evaluations since 2008, in order to indentify optimum locations for renewables to augment conventional generation capacity supplying the network. The data generated by these evaluations is being used to support ongoing renewables feasibility assessments.</p> <p><b>Benchmarking</b></p> <p>Energy efficiency benchmarking is inherently difficult for iron ore mining projects, given the variable nature of key factors affecting energy use such as heterogeneity within ore deposits, inconsistent stripping ratios, regular mine plan amendments, mine expansions and upgrades.</p> <p><b>Greenhouse gas emission reporting</b></p> <p>In accordance with the requirements under the National Greenhouse and Energy Reporting Act 2007, RTIO will report annually on:</p> <ul style="list-style-type: none"> <li>• production of energy</li> <li>• consumption of energy</li> <li>• Scope 1 (direct) emissions</li> <li>• Scope 2 (indirect) emissions.</li> </ul> <p>The implementation of greenhouse gas and energy conservation measures will enable</p>

Item	Submission and/or issue	Rio Tinto response
		the company to minimise emissions and provide a mechanism for continuous improvement in greenhouse gas emissions resulting from the Expansion Proposal.
30.	<p>Recommendation: That the proponent clarify the emission intensity figures reported in the PER to ensure the EPA can benchmark the project and ensure best practice outcomes.</p> <p>Discussion: The emission intensity metrics reported by the proponent are confusing and inaccurate. The proponent states that the previous emission intensity is 10t CO<sub>2</sub>e /kt product, based on 200kt CO<sub>2</sub>e /annum and 20MTpa of iron ore extracted. This is based on the emissions from mining and other sources. To facilitate genuine comparison, the emissions based only on mining emissions should be calculated. On this basis, the emissions intensity of the original proposal was 7.5t CO<sub>2</sub>e /kt product (based on emissions (mining only) 150kt CO<sub>2</sub>e/annum and an extraction rate of 20MT/annum.</p> <p>The subsequent data, relating to the expansion, note that emission intensity will increase to 38 CO<sub>2</sub>e /kt product, although no units are identified. Assuming the Proponent means 38t CO<sub>2</sub>e /kt product, this does not tally with the additional extraction amount of 25MTpa and annual emissions (from mining) of 450kt CO<sub>2</sub>e /annum. DEC has calculated that the emissions intensity of the expanded proposal is 18t CO<sub>2</sub>e /kt (based on 450kt CO<sub>2</sub>e /annum and 25MT/annum extraction rate for the expanded project). It is noted that the Greenhouse gas (GHG) intensity for the expansion appears to be very high, more than doubling the intensity of the original proposal. There is no explanation for this significant increase in emissions intensity of the operation. The opposite trend would be expected in line with national projections for declining</p>	<p>The greenhouse emissions estimates and intensity predicted for the Original Project were calculated in 1999 based on the best information available at that time. The emission intensity rate of 10t CO<sub>2</sub>e/kt product used represents RTIO's standard figure that is used in the absence of project specific calculations.</p> <p>As described in Section 3 of the PER. The Expansion Proposal incorporates multiple changes to the Original Project including but not limited to:</p> <ul style="list-style-type: none"> <li>• Increased rate of production from 20Mtpa to 45Mtpa of product</li> <li>• Increased depth of mining</li> <li>• Increased strip ratio</li> <li>• Increase in dewatering rates and overall volumes from 61GL to 643GL over the life of the project</li> <li>• Continuous operation of up to 40 pivots at the Irrigated Agricultural Area</li> <li>• Increase in clearing from 2000ha to 8400ha</li> </ul> <p>An estimate for the peak emission rate for the expansion of 600kt CO<sub>2</sub>e/annum was presented in the PER, representing an increase of 450kt CO<sub>2</sub>e/annum from the projected emission rate for the Original Project. Due to the scale of the changes to clearing, pit depth, material movement and dewatering and due to the introduction of irrigated agriculture, energy intensity would be expected to increase significantly. Therefore there will not be a linear relationship between increase in emissions and an increase in production rate.</p> <p>This estimate was based on a combined production rate of 32Mtpa of product estimated at the end of the Prefeasibility Studies. Since that time the proposed production rate has increased to approximately 45Mtpa. The estimate of emissions will be reviewed during the GHG and Energy Assessments described in the response to item 29 above and the actual emissions will be reported in accordance with the requirements of the NGER Act</p>



Item	Submission and/or issue	Rio Tinto response
	<p>emissions intensity of iron ore mining.</p> <p>Author: Climate Change Unit</p>	<p>2007.</p>
31.	<p>Recommendation:</p> <p>That the proponent benchmark the emission intensity of the project against other comparable iron ore mining projects.</p> <p>Discussion: The proponent has not provided the emission intensity of the project against other comparable projects, noted best practice standards or nominated feasible future emission intensity targets. Annual emissions contained in the PER are based on an apparently static emission intensity level over the life of the project despite the fact that, even without a carbon price, emission intensity (CO<sub>2</sub>-e per \$) for iron ore mining in Australia is expected to drop by around 25% between 2010 and 2050.</p> <p>Reference: <a href="http://www.treasury.gov.au/ligr2010/report/html/06_Chapter_5_Climate_change_and_the_environment.asp">http://www.treasury.gov.au/ligr2010/report/html/06_Chapter_5_Climate_change_and_the_environment.asp</a>.</p> <p>Author: Climate Change Unit</p>	<p>See response to item 29 on benchmarking</p>
32.	<p>Recommendation:</p> <p>That the EPA recommends specific management strategies to minimize greenhouse gas emissions, which are complementary to the carbon pricing mechanism (detailed above).</p> <p>Discussion: The proponent fails to identify any specific management strategies to minimize emissions. The EPA's Guidelines for preparing a Public Environmental Review state that proponents are required to:</p> <ul style="list-style-type: none"> <li>• outline potential impacts on factors of the environment;</li> </ul>	<p>RTIO is committed to minimising emissions of ghg to levels as low as reasonably practicable.</p> <p>Section 15.4.2 of the PER listed some management measures that when implemented will help to minimise ghg emissions.</p> <p>These include measures such as preventing unnecessary clearing of vegetation, increasing the efficiency of the operation through scheduling, pit optimisation and minimisation of rehandling and regularly maintaining and servicing equipment. All of these measures are considered to be appropriate and applicable to the proposed expansion.</p>



Item	Submission and/or issue	Rio Tinto response
	<ul style="list-style-type: none"> <li>• identify proposed management strategies to ensure those environmental factors are appropriately protected; and</li> <li>• demonstrate that proposals should be judged by the EPA to be environmentally acceptable.</li> </ul> <p>In relation to greenhouse gas emissions, the proponent should demonstrate compliance with Guidance No.12 on Minimising Greenhouse Gas Emissions, which notes that proponents should 'clearly indicate in their review documentation':</p> <ul style="list-style-type: none"> <li>• greenhouse gas emissions inventory and benchmarking;</li> <li>• measures to minimize greenhouse gas emissions; and</li> <li>• carbon sequestration to further reduce emissions.</li> </ul> <p>The proponent has outlined general areas of operations which may be the focus of further consideration or analysis (Section 15.4.2). This offers no assurance that energy efficiency opportunities, or use of renewable energy have been appropriately considered, or the extent to which they will be implemented to minimise emissions. Therefore, there is insufficient information to evaluate whether the EPA's objectives for this factor are likely to be met.</p> <p>Author: Climate Change Unit</p>	<p>At the time of writing the PER the detailed project design had not been undertaken and therefore any changes to the engineering design that are specific to reducing ghg emissions from this project had not been identified. This is consistent with the stage of the expansion study program at the approvals stage. In order to take this into account the following management measure was included in the PER: "identifying energy efficiency opportunities during project design". As described in response to item 29 above, specific management opportunities are highlighted and evaluated as part of the RTIO Greenhouse Gas and Energy Assessments that are conducted for projects during study stages.</p> <p>Potential opportunities will be reviewed against financial, feasibility and other business and market factors. This review will determine possibility for integration into the design of the expansion.</p>
33.	<p>Recommendation:</p> <p>That the proponent is made aware that the Greenhouse Challenge Program ceased in July 2009.</p> <p>Discussion: It is stated in Section 18.1 that 'RTIO maintains membership of the Australian Greenhouse Challenge Plus program'. The Greenhouse Challenge</p>	Noted.

Item	Submission and/or issue	Rio Tinto response
	<p>program ceased in July 2009. Author: Climate Change Unit</p>	
34.	<p>Recommendation: That the proponent demonstrates, using the best available climate change science, how projected climate change impacts (including temperature change, rainfall change, extreme weather events etc) will be incorporated into the expansion's infrastructure and site design in order to reduce risks to the natural environment during construction, operational life of the project, and post closure.</p> <p>Discussion: Climate change impacts in the north west are likely to include more intense extreme weather events such as cyclones and storms which will present an increased risk of inundation and flooding in the region. This could lead to infrastructure deterioration/damage and potentially contamination of the environment (for example, as a result of spills, stockpiles being compromised). Higher temperatures, reduced rainfall and increased risk of fires also present risks to the natural environment which have the potential to be exacerbated by impacts from the project. It is therefore recommended that the proponent, using the best available climate change science, demonstrate how projected climate change impacts will be incorporated into the project's design in order to reduce risks to the natural environment during the construction, operational life of the project and post closure.</p> <p>Author: Climate Change Unit</p>	<p>This comment is considered to exceed the reasonable expectations of an environmental impact assessment.</p> <p>As stated in Section 2.1 of the PER the climate is highly seasonal and significantly influenced by the number and intensity of cyclones that cross the Pilbara. The unpredictable nature, duration and specific course that cyclones take when crossing the Pilbara significantly affects seasonal rainfall patterns and results in highly variable rainfall, both geographically and temporally.</p> <p>In recognition of the significant fluctuation and extreme weather that can result from direct contact of a cyclone with the site engineering designs have typically adopted a conservative approach of applying a 100 year ARI standard. Given the projected project life of approximately 17-20 years the project is unlikely to experience a 100 year ARI storm event.</p> <p>It is therefore considered that even if it was possible to reach a consensus on the likely predicted changes in climate in the Pilbara during this time, that the conservative approach of applying a 100 year ARI design standard to handle the unpredictable nature storms events in the Pilbara more than adequately provides sufficient protection to the site.</p>
35.	<p>Recommendation: That the proponent re-assess noise impact from rail noise as prescribed by State Planning Policy (SPP) 5.4, which includes a minimum of one (1) train pass-by per</p>	<p>The source of any noise from rail movements will be RTIO's own rail network which will service Brockman Syncline 4, Brockman 2 and Nammuldi/Silvergrass.</p> <p>SVT conducted the noise assessment using:</p>

Item	Submission and/or issue	Rio Tinto response
	<p>hour during the night-time period and uses the Nordic Kilpe algorithm.</p> <p>Discussion: The currently assessed rail noise is likely to be under predicted given the assumptions used by the acoustic consultant.</p> <p>Author: Noise Regulation Branch</p>	<ul style="list-style-type: none"> <li>• Measured noise levels from actual ore trains</li> <li>• Prediction by RTIO on train size and rail movements from BS4, B2 and N/Sg following the proposed expansion. This amounts to a total of 18 rail movements per day (9 in and 9 out).</li> </ul> <p>Doubling the number of rail movements to 36 per day has been predicted by SVT to result in a relatively small increase of 3dB for all levels.</p> <p>The information used by SVT is therefore considered to accurately reflect the proposed expansion.</p>
36.	<p>Recommendation:</p> <p>That the proponent clarifies which noise-sensitive premises are within the mining proposal/boundary, and therefore clarifies which noise target is to be achieved.</p> <p>Discussion: The assigned levels apply between premises only and it would seem the location of some of the villages, existing or proposed, will be within the RTIO Special Lease and the proposal boundary. Therefore, at these locations, the assigned noise levels may not apply and instead, only the internal noise criterion within the dongas may be applicable.</p> <p>Author: Noise Regulation Branch</p>	<p>The proposed accommodation will be located on Mining Lease or LAA tenure and therefore the assigned noise levels for industrial, commercial or residential premises do not apply.</p> <p>The objective of the SVT noise assessment was to provide guidance to RTIO on where to locate the accommodation facilities for the proposed expansion and therefore the noise targets that were applied were based on RTIO's own internal guidelines. In order to minimise sleep disturbance for its workforce RTIO guidelines adopt a target of residential noise levels for such assessments, which is the most stringent of the three categories listed above. Noise level targets that were used were therefore 35dBA(LA10) measured outside the dongas and 25dBA(LAQ) measured inside the dongas (Australian Standard 2107). These levels are listed in Table 58 of the PER.</p> <p>RTIO considers that the assigned noise levels that were used in its assessment are far more stringent than the noise levels quoted in the Noise Branch's submission and that no further work is required.</p>
37.	<p>Recommendation:</p> <p>That the proponent clarifies which types of premises are to be considered in this assessment and the location of boundaries between the premises.</p> <p>Discussion: The proponent statement on page 248: "The assigned noise level for the mine site, given that no noise-sensitive premises are located in proximity, are 60 dBA (LA 10), 80 dBA (LA 1) and 90 dBA (LA max)." is misleading, as the parameters do not match a specific type of premises. The proposed expansion is surrounded by a pastoral lease, with the exception of some unallocated Crown land to the north. In the case</p>	<p>RTIO considers that the assigned noise levels that were used in its assessment are far more stringent than the noise levels quoted in the Noise Branch's submission and that no further work is required.</p>

Item	Submission and/or issue	Rio Tinto response
	<p>of the boundary between the pastoral lease and the mine site, the assigned noise levels to be met are LAS10 of 60 dB(A), LAS1 of 75 dB(A) and LASmax of 80 dB(A). In the case of the boundary between the mine site and the unallocated Crown land, no assigned levels apply.</p> <p>From the consultant's assessment, the harvesters operating within the pastoral lease were included and are identified as a significant noise source at most receivers. While this is a worthwhile consideration to achieve satisfactory internal noise levels for the dongas, any harvesters operating on rural premises are exempt from regulation 7 under regulation 12 of the Environmental Protection (Noise) Regulations 1997.</p> <p>Author: Noise Regulation Branch</p>	
38.	<p>Recommendation:</p> <p>That Table 58 is amended to include the parameter used for each noise criterion.</p> <p>Discussion: The 'rail operations' is an outdoor LAeq night criterion, the 'dongas' is an internal LAeq,T criterion and the 'mine operations' is the LAS10 from the Environmental Protection (Noise) Regulations 1997.</p> <p>Author: Noise Regulation Branch</p>	
39.	<p>Recommendation:</p> <p>That the proponent clarifies whether or not the dongas' internal noise levels at the 'Existing 82 Operations Camp' comply with the criterion.</p> <p>Discussion: The proposal acknowledges that noise may be an issue at the 'Existing B2 Operations Camp' (page 248). Section 15.1.2 states that received noise levels will exceed the assigned levels for B2 operations camp,</p>	<p>The noise assessment was conducted solely for the proposed expansion which is described in Section 3 of the PER and involves construction and operation of new processing facilities, rail infrastructure and the IAA. All of these facilities will be located to the north of the Nammuldi ridge and in proximity to the existing B2 camp, thereby increasing the potential for noise at that location following expansion rather than during existing operations.</p>

Item	Submission and/or issue	Rio Tinto response
	<p>however it is unclear whether this refers to the proposed or existing B2 operations camp.</p> <p>Author: Noise Regulation Branch</p>	
40.	<p>Recommendation:</p> <p>That the proponent clarifies whether or not any noise control measures are required to ensure the dongas' internal noise levels at the 'Existing 82 Operations Camp' is achieved.</p> <p>Discussion: The acoustic consultant's report identifies that the predicted noise levels inside the dongas may exceed the criterion, however no noise mitigation measures for the dongas at this location are identified.</p> <p>Author: Noise Regulation Branch</p>	<p>Section 15.1.2 of the PER states that</p> <p>“Accommodation facilities will be located at sufficient distance to achieve appropriate noise control and/or may require the inclusion of noise attenuation within the design to ensure that noise levels comply with the assigned levels.”</p> <p>In addition, Section 15.1.3 of the PER states that</p> <p>“Where accommodation camps are within areas modelled as non-compliant (ie Location Option B: new B2 Accommodation), noise attenuation will be incorporated into the design. This will ensure noise levels at the camp are below the assigned levels”</p>
41.	<p>Recommendation:</p> <p>That the proponent provides information indicating that the chemical composition and quality of mine dewatering effluent that may be discharged to creek systems is compatible with sustaining healthy ecosystems within the creeks.</p> <p>Discussion: The discharge of groundwater from mine dewatering operations directly to river systems can have adverse environmental impacts. The amount of water discharge to local creeks has the potential to affect the environmental values of these systems for several tens of kilometres downstream of discharge points.</p> <p>Although the PER acknowledges that the sustained discharge of mine dewatering effluent into waterways could cause environmental impacts on vegetation and other environmental values by changing wetting-drying cycles in these systems, there is only a limited</p>	<p>Section 8.2.2 of the PER describes the water quality of surface water features sampled across the Greater Nammuldi Area during the dry 2009, wet 2012, dry 2012 and wet 2011 periods.</p> <p>Site specific water quality trigger values are being determined by Wetlands Research and Management in accordance with the process prescribed by ANZECC/ARMCANZ (2000) guidelines. The primary objective of the guidelines is to “maintain and enhance the ‘ecological integrity’ of freshwater and marine ecosystems, including biological diversity, relative abundance, and ecological processes.”</p> <p>Section 4.3 of the Adaptive Surface Water Management Plan (contained within the EMP, Appendix 3 of PER) sets out the environmental objectives, targets and performance indicators for surface water management. This includes the protection of environmental values of Caves Creek and Duck Creek. The relevant target is no significant deterioration in water quality in Caves Creek and Duck Creek (beyond natural variation). Related performance indicators are:</p> <ul style="list-style-type: none"> <li>• no significant change in water quality beyond trigger levels</li> <li>• no significant change in biological systems</li> </ul> <p>Section 4.4.1 of the plan describes the management and monitoring actions required to</p>

Item	Submission and/or issue	Rio Tinto response
	<p>discussion of the potential environmental effects of discharging water with a different chemical composition into creeks. A 2011 report by Wetland Research and Management suggested that water quality changes due to dewatering discharge from the Nammuldi-Silvergrass project would be minimal, but this assessment appears to be based on an opinion which has not been substantiated by any studies on similar systems in the Pilbara that have received dewatering discharges. Aquatic macroinvertebrates in particular can be very sensitive to changes in the chemical composition of water and this could have impacts on their populations.</p> <p>As the PER indicates that the discharge of dewatering effluent may directly affect the degree of wetting and drying of riverine systems and water quality in these systems for up to 80 km downstream of dewatering discharge points, it is recommended that ecotoxicological testing is carried on some key organisms to demonstrate that discharge water quality is compatible with maintaining healthy aquatic communities within the affected waterways.</p>	<p>achieve targets. The actions relevant to water quality are:</p> <ul style="list-style-type: none"> <li>• develop site specific trigger levels in accordance with ANZECC &amp; ARMCANZ (2000) guidelines (prior to discharge of water)</li> <li>• continue biological monitoring and water quality of creek lines at existing sampling sites (every second year commencing after dewatering).</li> </ul> <p>Since the PER was finalised additional work has been undertaken or received, as follows:</p> <p><b>Bioaccumulation baseline survey</b></p> <p>An Ecological Risk Assessment conducted by Equinox Environmental, and discussed in the PER, identified a knowledge gap in baseline body tissue concentrations for invertebrates and fish in the potential receiving environment of Duck Creek. In response, WRM conducted baseline analysis of fish tissue (muscle and liver) at control and potential impact sites in July 2012. Due to a lack of invertebrate species being recorded in sufficient biomass, no invertebrates were sampled. Parameters measured in the tissue were selected based on the project area geochemical assessment and groundwater bore data. Additional sampling will be conducted in future once dewatering has commenced.</p> <p><b>Geochemical assessment of discharge to Duck Creek</b></p> <p>Crisalis International Pty Ltd has undertaken an assessment of the potential impacts resulting from discharge of surplus water into Duck Creek (Appendix 2). Crisalis then compared the predicted impacts with those observed from similar discharge at Hope Downs 1 and predicted at Marandoo. The findings indicated that surplus water from both Nammuldi and Silvergrass is generally good with mean TDS of around 650mg/L at Nammuldi and 720mg/L at Silvergrass. Both sites have groundwater of near neutral pH value and appear to have positive redox potentials and moderate concentrations of dissolved oxygen and low concentrations of dissolved iron and manganese. Key findings are that:</p> <ul style="list-style-type: none"> <li>• Groundwater at both sites contains high nitrate levels that have the potential to affect up to 20% of biota (based on default TVs for ANZECC (2000) guidelines). An apparent phosphorous limitation would be likely to limit any significant eutrophication arising from elevated nutrient levels.</li> <li>• There is potential for denitrification to occur in stream sediments under mildly anoxic conditions through reaction between nitrate and mineral sulphides,</li> </ul>

Item	Submission and/or issue	Rio Tinto response
		<p>potentially reducing the nitrate levels in streamwater without intervention.</p> <ul style="list-style-type: none"> <li>• Possible precipitation of carbonate materials (dolomite and calcite) may occur as groundwater is exposed to air with low CO<sub>2</sub> concentration, either increasing the concentration of suspended solids and turbidity of water or possibly forming a hard pan similar to travertine deposits around natural springs if there is rapid equilibrium with air. Monitoring streamwater quality (pH value) within and downstream of the discharge would provide more definitive data on the likely levels of turbidity arising from mineral precipitation.</li> <li>• Comparison of mineral saturation in discharge at Hope Downs 1, Marandoo, Nammuldi and Silvergrass by Crisalis showed the likely greatest impact of carbonate precipitation at Hope Downs 1, followed by Marandoo, Nammuldi and then Silvergrass.</li> <li>• Some minor exceedances of defaults TVs for trace metals aluminium and zinc were observed however Crisalis identified that elevated concentrations of these analytes are potentially due to sampling artefacts.</li> </ul> <p>Details of the site specific trigger value investigations will be discussed with DEC and DoW prior to their finalisation.</p> <p>Monitoring will take place (as described in the response to item 25 above) to ensure that there are no significant adverse long term impacts on aquatic communities (frequency of monitoring may vary depending on discharge volumes, frequencies and results).</p>
42.	<p>Recommendation:</p> <p>That the proponent commits to the ongoing assessment and management of potential water quality changes in mine void lakes.</p> <p>Discussion: The proponent has indicated that mine void lakes may be left after mining, and that water in these features may slowly increase in salinity over a period of several hundred years. Wildlife (particularly birds) may be attracted to the lakes to feed on insect larvae and other organisms that are likely to develop populations in these features. There is a risk that elevated</p>	<p>Refer to response to item 28.</p> <p>In addition, through the ongoing process of closure planning RTIO will refine completion criteria in consultation with stakeholders, and devise a monitoring program to assess compliance with these criteria. This program is likely to include comprehensive monitoring of both pit lake water quality and the quality of surrounding groundwater.</p> <p>With the application of the management measures identified in the EMP and monitoring methods established in the closure studies RTIO has a high level of confidence that stable, non-polluting landforms will be achieved.</p>



Item	Submission and/or issue	Rio Tinto response
	<p>concentrations of metalloids (arsenic and selenium) and some metals could reach concentrations of environmental concern within mine void lakes, and could pose an ongoing risk to wildlife using mine void lakes. This exposure pathway has not been adequately covered in the risk assessment carried out for the PER. If pit lakes are going to be maintained as part of this mining proposal, it is important that the proponent provides commitments for their long-term management.</p> <p>The PER documents indicate that the proponent is undertaking geochemical modelling to predict how water quality will evolve in mine voids after mine closure. It is also understood that the proponent is looking at options for diverting surface water flows to periodically flush the mine void lakes. It is important that these measures are supported by ongoing water quality monitoring and contingencies to manage the mine void lakes in the event that water quality in these features progressively deteriorates over time and poses a threat to wildlife.</p> <p>Author: Contaminated Sites Branch</p>	
43.	<p>Recommendation:</p> <p>Campaign dust monitoring, using the appropriate Australian Standard, may be necessary at sensitive receptors (i.e. permanent village, 82 Camp and 8S4 Camp) inside the site during operational phases to confirm particulate concentrations are below national air quality guideline levels.</p> <p>Discussion: The outline provided for air quality aspects of dust in the environmental management plan is, in general, well-defined. However the dust monitoring was overlooked in the assessment. As stated in the PER, the background dust levels surrounding the Greater</p>	<p>An e-sampler that monitors PM10 concentrations or similar system will be installed at the Nammuldi Silvergrass accommodation and monitored in accordance with the relevant Australian Standard. An automated dust sampler will also be installed adjacent to the TEC/PEC to continuously monitor dust levels at the Silvergrass operation.</p> <p>Dust monitoring data will be used to verify and update the dust modelling completed during the project study phase. Dust concentrations will also be compared against both internal RTIO standards and external standards including NEPM.</p>



Item	Submission and/or issue	Rio Tinto response
	<p>Nammuldi area are naturally high and it can be close to, or higher than, ambient air quality criteria. From an air quality perspective the mining camp should be considered a sensitive receptor and the proponent should consider a campaign monitoring program to confirm that the campsite is not significantly impacted by dust from the mine. The provided particulate concentrations based on Dampier ambient monitoring are not sufficient, given the large distance involved, to indicate that the dust impacts at the Greater Nammuldi area are insignificant.</p> <p>There is a separate dust management plan in an appendix which discusses a number of important dust control issues but should also consider objective measures of dust concentrations rather than focus on visible dust plumes. An adaptive dust management plan which incorporates simple monitoring methods (e.g. particle counters) and the development of trigger levels for management actions can be a very important component of a dust management strategy.</p> <p>The DEC document "A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities" provides guidance on dust management and monitoring.</p> <p>Author: Air Quality Management Branch</p>	
44.	<p>Recommendation: That other emission sources (apart from dust) are identified and addressed in the PER and Environmental Management Plan (EMP).</p> <p>Discussion: DEC agrees that dust would be the main air quality concern for the Greater Nammuldi Area. Other emission sources (apart from dust) associated with the project, including operation and rehabilitation,</p>	<p>The PER addressed the following potential emissions from the expansion project: greenhouse gas, noise and dust. RTIO is not aware of any other potential emissions from an iron ore project that have the potential to result in significant detrimental air quality impacts.</p>

Item	Submission and/or issue	Rio Tinto response
	<p>should be identified and addressed in the EMP and PER. It is the responsibility of the proponent to demonstrate that air quality impacts are low and provide evidence that verifies their claims of emissions being insignificant.</p> <p>Author: Air Quality Management Branch</p>	
45.	<p>Recommendation: Existing modelling results on dust emission impacts and dust deposition should be included in the current EMP and PER. Any previous dust deposition assessment results should be included in the current EMP and PER.</p> <p>Discussion: Section 15.2.2 of the PER states "A subsequent survey was conducted in 2011 (Environmental Alliances 2011) where a preliminary modelling assessment of the impact of dust emissions was undertaken for 2015, 2019 and 2026". This modelling data should have been presented in the EMP and PER. Section 9.4.6 states "Modelling has been undertaken to estimate dust deposition in the vicinity of the Themeda grasslands TEC. The predicted maximum was found to be significantly lower &lt;5%) than the RTIO standard for dust deposition and no adverse impacts on the vegetation would be expected (Environmental Alliances 2010)." These data should be presented in the EMP and PER.</p> <p>Author: Air Quality Management Branch</p>	<p>The Air Quality Management Branch was provided with data from Environmental Alliances' modelling with the PER.</p>
46.	<p>Recommendation: That the proponent demonstrates that hydrocarbons will be stored and transported in accordance with relevant Australian Standards.</p> <p>Discussion: The bulk storage of fuel may require a works approval under Part V of the Environmental</p>	<p>Hydrocarbon storage and handling requirements are detailed in the EMP (included in Appendix 3 of the PER).</p> <p>Section 8.5 of the PER sets out the management measures and performance standards for surface water values and includes the following management measure: Hydrocarbons will be transported and stored in accordance with Australian Standard</p>

Item	Submission and/or issue	Rio Tinto response
	Protection Act 1986. Author: Pilbara Region Industry Regulation	1940:2004.
<b>Submission 8: Department of Water</b>		
47.	<p>Current information shows a potential dewatering rate of 90ML/day (Silvergrass) and 138ML/day (Nammuldi), will be required to reach the ore below water table.</p> <p>The dewatering estimates are preliminary and the numbers provided are not precise at this stage, especially for Silvergrass, where dewatering will result in drawdown impacts on Caves Creek. The DoW believes more work needs to be done to firm up the dewatering rates, in order to allow appropriate assessment of the potential drawdown and discharge impacts. The DoW is not comfortable that dewatering rates for the Silvergrass pit have been adequately defined, and since Silvergrass dewatering is in an area where environmental impacts will be most significant (stygo fauna and vegetation) we would expect that further impact study would be requested for EPA approval.</p>	<p>Section 3.3.10 of the PER states that the hydrogeological models were revised based on an enhanced understanding of the geological and hydrogeological characteristics of both Nammuldi and Silvergrass. The understanding has been developed through the installation of 41 monitoring bores along six transects along Caves Creek, this is summarised in Section 3 of this document.</p> <p>Table 8 in the PER presents the current estimated average daily and total annual dewatering volumes for Nammuldi and Silvergrass.</p> <p>Dewatering rates presented in the PER will be refined following the completion of a comprehensive orebody knowledge hydrogeological field investigation (which includes the drilling of nested monitoring bores in the various hydrostratigraphic units encountered), drilling of test production bores (which will be subject to standard shorter term test pumping) and also a long term test pumping programme to determine boundaries, hydraulic parameters and potential for impacts. This information will be used to update the existing regional groundwater model to improve confidence in the abstraction rates to be included in the water management strategy and also improve definition of potential drawdown impacts on the local and regional groundwater system. This field programme is underway.</p> <p>It is not expected that the results of this field investigation will significantly alter the predicted dewatering rates, cone of depression or abstraction schedule.</p>
48.	<p>Dewatering at Silvergrass has the potential to cause drawdown in the superficial aquifer along Caves Creek, to a much greater extent than identified in the original proposal approximately - 15km. Dewatering is predicted to not have any impact on Palm Springs, and that should be a management objective of the environmental approval.</p> <p>Caves Creek contains several semi-permanent and</p>	<p>Section 7.4.1 of the PER states that the extent of drawdown in the superficial aquifer along Caves Creek will be approximately 15 km, as shown on Figure 34, this extends both upstream and downstream of the Silvergrass site, extending no further than 6 km downstream of Silvergrass. In this area there are no permanent pools.</p> <p>Following the release of the PER, RTIO has completed a report titled <i>Caves Creek Groundwater Investigations – 2012</i> (RTIO 2012), which is summarised in Section 3 of this document and included at Appendix 1.</p> <p>These investigations were undertaken to further the understanding of the Caves Creek hydrogeology, focusing on the interaction between surface and groundwater, which is</p>

Item	Submission and/or issue	Rio Tinto response
	<p>permanent pools which have shown to be hydraulically connected to the local groundwater system associated with the Creek and detrital valley, but not connected to the orebody aquifer. The discharge rates and volumes may impact on Palm Springs, an area of high cultural and environmental significance, if Caves Creek backs up from the large volume of dewatering discharge into Duck Creek.</p> <p>RTIO proposes an adaptive surface water management plan comprising ongoing monitoring and contingency actions to ensure that there are no adverse effects on the water quality at the pools, as well as a groundwater management plan to monitor groundwater quality and water levels.</p> <p>The DoW will work with the proponent and DEC to ensure trigger levels and contingency actions are acceptable, and sufficient to ensure adverse impacts are identified and minimised. At the time of a DoW site visit in July 2012, RTIO was still conducting studies to guide the setting of triggers and responses. The triggers and contingencies will need to be consistent between the approved Environmental Management Plan and the Groundwater Licence.</p>	<p>fundamental in the assessment of downstream impacts of the Expansion Proposal.</p> <p>Hydrological investigations indicate potential surplus water discharge rates into Duck Creek would be significantly smaller than natural flows from the 580 km<sup>2</sup> Duck Creek catchment (measured to the confluence with Caves Creek). Topographical information obtained from LiDAR survey shows that the slope of Caves Creek below Palm Springs is relatively steep with an elevation difference over the 10km between Duck Creek and Palm Springs in excess of 30 m. It is considered unlikely that even a 100-year ARI flood event in Duck Creek would result in water backing up into Caves Creek more than 2 km, well short of the location of Palm Springs. As such, surface water discharge in Duck Creek is considered unlikely to have an impact on Palm Springs.</p> <p>Refer also to response to Item 41 for information on water quality trigger levels.</p>
49.	<p>The realignment of Caves Creek is currently at indicative design stage only. It is proposed that the detail will be further progressed following communication between the proponent, DoW and DEC. The current design is to permanently realign 2.5km of the main creek channel, and will be designed to protect downstream channel, TEC, water quality and Palm Springs.</p> <p>The DoW seeks the EPA's guidance on whether it is</p>	<p>Noted as a comment for EPA to consider.</p>

Item	Submission and/or issue	Rio Tinto response
	<p>acceptable to leave the final design details until after project approval, and in consultation with the DoW and DEC.</p>	
50.	<p>The PER document includes a surplus water management strategy which includes transfer for irrigated agriculture (IAA) and periodic discharge to Duck Creek.</p> <p>DoW notes RTIO has not committed to the options presented for surplus water management - before discharge to Duck Creek. There is a risk that the numbers for discharge to Duck creek may be much higher, should transfer to B4 mine be postponed, or the IAA be unable to cope with large amounts of excess, due to water table rise.</p> <p>There is also the risk that excess discharge to Duck Creek may result in it becoming permanently saturated for a large distance as discharge impacts develop, and may result in groundwater backing up towards Palm Springs.</p> <p>Modelling of the discharge footprint identified that a steady state discharge of 20ML/day is expected to travel over 80km down the creek (pg 117). Should the discharge rate be higher, due to a failure of the alternative options there may be impacts on groundwater dependant ecosystems outside of the project footprint.</p> <p>The DoW would prefer to see a commitment to these alternative options before project approval, or a management condition to limit the extent of discharge impacts from excess disposal.</p> <p>The DoW will expect regular monitoring and reporting of the discharge volumes through commitments in the adaptive surface water management plan, as well as</p>	<p>Section 4.2 states that the development of the surplus water management strategy involved the consideration of a number of different alternatives in accordance with the DoW list of water use options published in the Pilbara Water and Mining Guidelines (DoW 2009). The proposed strategy is presented in Section 3.3.11 of the PER and combines a number of the alternatives that were considered to be both technically and financially feasible, logistically advantageous and wholly under the control of RTIO and these are proposal options under the Expansion Proposal.</p> <p>The strategy is considered to be sufficiently robust to enable effective management of a range of surplus water volumes over the life of the project, promote higher value use of surplus water, and minimise impacts on the riparian environment through reduced discharge (when compared to continuous discharge alone). RTIO acknowledges that a limit may be imposed on the annual volume of water that can be discharged or similarly on the scale of clearing for construction and operation of the agricultural area and considers that the system is flexible enough to accommodate either of those scenarios.</p> <p>Section 3.4.2 of the Groundwater Management Plan contained within the EMP (Appendix 3 of PER) states that the aquifer will be monitored to detect any variations from the predicted outcomes. The data derived from both the borefield operation and monitoring network will be periodically used to validate the Nammuldi-Silvergrass groundwater model. This model will provide the basis for assessing actual versus predicted dewatering performance and as a result provides an advanced tool for predicting future dewatering requirements and impacts of the operation.</p> <p>The operation of the dewatering production bores will be monitored regularly to ensure the discharge rates and pumping water levels are within the required design specifications.</p>

Item	Submission and/or issue	Rio Tinto response
	under operating strategy/licensing commitments.	
51.	<p>The IAA proposes to use surplus discharge from both Nammuldi and Silvergrass pits after water has been used on site, or off-site to other users, according to Rio's surplus water management strategy. Pg 10 of the draft Environmental Management Plan (EMP) states that <i>"by using real-time soil moisture probes to monitor soil moisture and delivering only the amount of water the crop can use, the irrigation system will prevent the area from being over-watered, avoid excessive accumulation of salts in the soil and prevent the water table from rising"</i>.</p> <p>This may imply that the irrigation project will only take the amount of excess water that can be managed through this adaptive process, with contingency to divert the excess to Duck Creek until the elevated water table has declined.</p> <p>The DoW advises that OEPA seek technical advice from DAFWA on whether the management of soil condition is practically achievable by controlling irrigation rates alone.</p>	Noted as a comment for EPA to consider
52.	Table 6 of the EMP states that <i>"if trend becomes evident in changes to water quality and/or depth in monitoring bores adjacent to Palm Springs, beyond natural variation as measured at each location - Notify DEC"</i> . The DoW would like to be notified also should this occur. This should also link to the Palm Springs Management Plan (below).	<p>Noted.</p> <p>A level gauge has been installed in a pool at Palm Springs and a groundwater bore has been installed as close to Palm Springs as RTIO-controlled tenure will allow (500m away from the spring). RTIO will notify DoW and DEC of changes outside normal variation in stage height and water quality measured at these locations.</p>
53.	The proponent proposes to provide funds to support the development and implementation of a Palm Springs Management Plan, as an offset, should a significant residual impact occur on the pools. The DoW considers	<p>The requirement for offsets is considered in Table 60 of the PER. RTIO proposed to provide funds to support the development and implementation of a Palm Springs Management Plan as an offset for:</p> <ul style="list-style-type: none"> <li>clearing of riparian vegetation associated with the creek realignment</li> </ul>

Item	Submission and/or issue	Rio Tinto response
	<p>this management plan should be a condition of approval, to maintain the natural ecosystem, not simply an option for offset.</p>	<ul style="list-style-type: none"> <li>clearing and direct disturbance of vegetation within the mosaic of <i>Astrebla</i> tussock grassland PEC at Silvergrass.</li> </ul> <p>The offset is not being provided in case there is a residual impact on the pools as impact to these pools is not expected.</p> <p>It was expected that the Palm Springs Management Plan proposed in the PER would deliver a framework for increasing scientific knowledge and effective management of threatening processes at Palm Springs. The Plan would be developed in consultation with Traditional Owners, relevant government agencies (i.e. DoW / DEC / EPA) and other key stakeholders.</p> <p>Since the PER was released the requirement for and nature of offsets for the expansion project have been discussed with the OEPA. An Offsets Package will be presented to the OEPA on the basis of those discussions.</p>
54.	<p><b>Stygofauna:</b> Sampling efforts at Silvergrass identified a single species which may be restricted to the Caves Creek alluvial aquifer - stygal taxa <i>Nedsia</i> sp. The OEPA should seek technical advice from the DEC on the potential for impacts to this species, and whether a management condition should be required.</p> <p><b>Vegetation:</b> The proponent has stated that there is no significant groundwater dependent vegetation on Duck Creek, but that the vegetation on Caves Creek has identifiable value. Dewatering at Silvergrass deposit is predicted to impact about 10km of this vegetation, so the DoW will link any monitoring associated with the groundwater licence to the amount of impact allowed by the environmental approval.</p>	<p>It should be noted that <i>Nedsia</i> sp. has been recorded in the Caves Creek valley beyond the limit of the predicted cone of depression for the proposed Silvergrass expansion (Figure 59 in the PER).</p> <p>Noted.</p>
55.	<p>DoW supports RTIO's commitment to backfill the Silvergrass pit to above the predicted stable post water table level, to minimize any long-term impacts to Caves Creek. It is unlikely that the Nammuldi pit will be backfilled due insufficient backfill material, but the lower ecological values associated with Duck Creek make</p>	<p>Noted.</p>



Item	Submission and/or issue	Rio Tinto response
	this acceptable. The DoW is satisfied with this approach, and will review closure plan objectives and commitments in association with DMP.	
56.	The DoW does not feel the project can be managed under the <i>R/W Act</i> 1914 licensing process alone. The DoW recommends further work be undertaken to satisfy the above comments, or the EPA may consider imposing ministerial conditions to address water management aspects of the proposal.	Noted as a comment for EPA.
<b>Submission 9: Office of the Environmental Protection Authority</b>		
57.	Rhodes Grass: The potential invasiveness of Rhodes Grass ( <i>Chloris gayana</i> ) when used for pastoral purposes in the Pilbara is of concern. Less invasive alternatives to Rhodes Grass should be investigated with a view to their use prior to the results of DEC's Rhodes Grass research becoming available.	See response to item 23 for a description of the risk assessment that was undertaken on the use of <i>C.gayana</i> and details of the proposed weed management measures. After the application of the proposed management measures Rhodes Grass is considered unlikely to increase the presence of weeds outside the IAA and, therefore, the use of alternatives is considered unnecessary.
58.	Rehabilitation/offsets: Rehabilitation of the disturbed areas following mining is required as part of the approval to implement the proposal. It is not an offset (PER p 259, Section D).	Section D of the EPA's Offset Reporting Form deals with mitigation measures and does not suggest that rehabilitation is an offset. Proposed offsets are addressed in Section F of the form, which is on page 260 of the PER.
59.	Rehabilitation/offsets: Rehabilitation of the impacts on riparian vegetation is offered "as far as practicable". To what standard would this be? (PER p 259, Section D).	As stated on page 259, Section D of the PER, the rehabilitation will be undertaken "to restore (as far as practicable) riparian vegetation to baseline (pre-impact) condition". It is not currently possible to state the degree to which rehabilitation will be required at cessation of operations; therefore, RTIO has implemented a significant baseline monitoring program which will be continued during operations as necessary. The findings of this monitoring will then inform the riparian rehabilitation strategy (if required). Under the closure planning guidelines RTIO is required to submit updated closure plans every three years. Any requirement and strategy for riparian rehabilitation will be documented in the MCPs.
60.	Monitoring of creeks/offsets: To "monitor creek ecosystems during discharge and compare against	RTIO considers that a monitoring program that measures biological and physical parameters of the receiving environment during operations and compares that data



Item	Submission and/or issue	Rio Tinto response
	baseline data" has no 'rectification' or 'reduction' action associated with it. There appears to be no purpose in this monitoring (PER p 259, Section D).	against baseline allows identification and quantification of any impacts and is therefore an integral part of any strategy to rectify and reduce impacts.