



ERA Energy Resources of Australia Ltd

Chapter 5 Stakeholder Engagement

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Appendix 5.1 ERA Technical Fora Engagement Register

5 Stakeholder Engagement

ERA has a diverse and complex range of stakeholders with varying levels of interest in and influence on the business. Throughout its history, ERA has engaged, communicated and consulted with many stakeholder groups through various engagement activities. ERA's approach to stakeholder engagement is focused on building enduring relationships based on mutual respect, active partnership and long term commitment. Communication, engagement and consultation with ERA stakeholders is undertaken through a range of formal and informal processes, which aim to both provide information and to seek feedback in areas of mutual interest.

Historically, ERA has engaged with many community groups through various forums on aspects of mine closure. Company personnel are in frequent, regular contact with the Gundjeihmi Aboriginal Corporation, Northern Land Council, the Northern Territory Department of Primary Industry and Resources (DPIR), Commonwealth Department of Industry, Innovation and Science, and the Supervising Scientist Branch, both formally and informally and through various stakeholder committees, including the Minesite Technical Committee (MTC). For example, public communication on aspects of mine rehabilitation and closure can be traced back to ERA's first annual report from 1981 (ERA 1981; p 11). There are also documented communications via fora including ARRTC and ARRAC, which date back to 2001 (see Appendix 5.1). This engagement has covered all key aspects of closure, including:

- Engineering and design criteria for technical aspects of closure such as water treatment, landform design, tailings transfers and pit backfills.
- The overall planning process, schedule and associated costs.
- Closure criteria, environmental design criteria and closure objectives.
- Legal requirements and obligations associated with the various agreements for Ranger operations and Jabiru.
- Land tenure, governance and post closure land use.

5.1 Project Stakeholders

Table 5-1 lists ERA's external stakeholders for closure, who either have direct influence on ERA or who have influence on those organisations with formal decision making authority in regard to the Ranger operations. Table 5-2 identifies key internal stakeholders for closure.

Table 5-1: ERA's external stakeholders

Stakeholder group	Description
Traditional owners and local Aboriginal groups	Gundjeihmi Aboriginal Corporation (GAC) Northern Land Council (NLC) Djabulukgu Association Gagudju Association Warnbi Association

Stakeholder group	Description
Australian Government	<p>Australian Safeguards and Non-Proliferation Office (ASNO)</p> <p>Department of Environment/Minister for Environment, which includes the Supervising Scientist Branch (SSB), underpinned by the Office of the Supervising Scientist and ERISS</p> <p>Department of Foreign Affairs and Trade</p> <p>Department of Industry, Innovation and Science (DIIS)</p> <p>Minister for Industry, Innovation and Science</p> <p>Minister for Resources, Energy and Northern Australia</p> <p>Parks Australia</p>
Northern Territory Government	<p>Department of Education</p> <p>Department of Health</p> <p>Department of Primary Industry and Resources (DPIR)</p> <p>Department of Planning and Local Government</p> <p>Northern Territory Treasury</p>
Northern Territory local government	<p>Jabiru Town Development Authority (JTDA)</p> <p>West Arnhem Regional Council</p>
Primary regulatory committee	<p>Minesite Technical Committee (MTC)</p>
Regional scientific overview committee	<p>Alligator Rivers Regional Technical Committee (ARRTC)</p>
Regional overview committee	<p>Alligator Rivers Regional Advisory Committee (ARRAC)</p>
International agencies	<p>International Atomic Energy Agency (IAEA)</p> <p>European Parliament standing committees</p> <p>World Heritage Committee of UNESCO</p>
Others	<p>Australian Conservation Foundation</p> <p>Northern Territory Environment Centre</p> <p>World Wildlife Fund</p>
Business community	<p>Rio Tinto Uranium</p> <p>Rio Tinto</p> <p>Shareholders</p> <p>Suppliers</p>
Local community	<p>Jabiru businesses/organisations</p> <p>Local social and recreational groups</p> <p>Residents</p> <p>Tourists</p>

Table 5-2: Internal stakeholders

Stakeholder group	Description
ERA Board	Comprises independent directors, Rio Tinto appointed directors and Chief Executive
Executive Committee (EXCO)	Chief Executive, Chief Financial Officer, Corporate Counsel, General Manager Operations, General Manager Technical and Major Projects, Chief Advisor Agreements and Land Tenure
Managers	Manager External Relations, Manager Commercial, Manager Finance, Manager Health Safety Environment and Communities, Operations Managers
Legal team	Corporate Counsel, Specialist Legal, Risk and Compliance
Employees	ERA employees, partners and dependents
Contractors	ERA long term contractors

5.2 ERA Engagement Principles

Throughout the life of the Ranger mine, ERA has aimed to build enduring and productive relationships with neighbours and local communities and to be responsive to their needs and concerns. To be meaningful for all parties, engagement must be open, inclusive, culturally appropriate and publicly defensible. Community engagement takes place in accordance with the following guiding principles:

- **Transparent** – in order to develop and maintain a relationship of trust, information which is not commercially sensitive will be shared openly and in a timely manner.
- **Accessible** – staff will be available, approachable and accessible and information will be available in a range of formats. Where appropriate and practical, translation into the local language will be provided.
- **Strategic** – engagement will be provided regularly in a coordinated manner by key ERA staff with reference to key messages and issue management.
- **Two-way** – community stakeholders will be able to participate openly and honestly during engagement with their perspective, feedback and views.

Engagement activities aim to achieve broad community understanding of ERA's operations, its community contributions and its progress in meeting obligations associated with closure and the transition of the Jabiru township. This includes working towards ERA being viewed as a trusted active member of the community.



ERA's consultation with stakeholders is undertaken in accordance with an engagement framework consisting of:

- ERA Communities Policy.
- ERA Communities and Social Performance Plan 2016 – 2021.
- ERA Communication Standard.
- ERA Community Consultation, Engagement and Communication work instruction.
- A number of existing engagement forums and tools.

ERA engages directly with numerous stakeholders on closure aspects for the Ranger mine, including communication in the following formats:

- Quarterly updates on key closure activities.
- Presentations outlining closure strategies, engineering studies, modelling predictions and research and development.
- Participation in development and progress of scientific studies identified in forums such as ARRTC.
- Site visits to the Ranger mine to inform progress on closure activities and associated closure studies such as the trial landform.
- Knowledge sharing and peer review of closure strategies, studies, and activities through workshops, conferences and scientific publications.

Table 5-3 provides an overview of the engagement forums used to engage with stakeholders on closure. As an indication of the extensive engagement already undertaken by ERA on closure, Appendix 5.1 provides a register setting out past engagements on technical closure criteria and rehabilitation planning. Note that Appendix 5.1 is not exhaustive and does not cover social and economic engagements and analyses previously conducted.



Table 5-3: Engagement forums

Engagement forum	Frequency	Comment
Minesite Technical Committee (MTC) meetings	6 per year (approximately every 2 months)	The MTC is the formal forum for key advisory and stakeholder groups, including representatives of the Northern Territory DPIR (Chair), OSS, ERA, GAC and the NLC, to discuss and resolve technical environmental management matters relating to the operation of the Ranger mine. The MTC discusses matters relevant to the regulatory functions of the Northern Territory Government and the supervisory and assessment functions of the Supervising Scientist, as well as operational requirements of ERA and the views of the Mirarr and affected Aboriginal people. In addition the Commonwealth Department of Industry, Innovation and Science is an observer to the MTC.
Alligator Rivers Region Technical Committee (ARRTC) meetings	Bi-annually	The ARRTC was established under the Commonwealth <i>Environment Protection (Alligator Rivers Region) Act 1978</i> and reviews the appropriateness and quality of scientific research conducted by Northern Territory and Commonwealth Government agencies, ERA and others relating to protection of the environment from the potential impacts of uranium mining in the Alligator Rivers Region. Members include an independent Chairperson, the Supervising Scientist, independent scientific members, the NLC, Northern Territory Department of Primary Industry and Resources, ERA, Uranium Equities Limited (current holder of the Nabarlek lease), and Parks Australia.
Alligator Rivers Region Advisory Committee (ARRAC) meetings	Bi-annually	The ARRAC was established under the Commonwealth <i>Environment Protection (Alligator Rivers Region) Act 1978</i> and facilitates communication between government, industry and community stakeholders on environmental issues associated with uranium mining in the Alligator Rivers Region. The Committee includes representatives from several Northern Territory Government departments, Office of the Administrator of the Northern Territory, several Australian government departments, non-government organisations, ERA, and other mining companies that operate in the region. As stated on the SSB website: "ARRAC membership includes an independent chair" (see: http://www.environment.gov.au/science/supervising-scientist/communication/committees/arrac).
Closure Criteria Working Group	As required, several per year	The Closure Criteria Working Group is a sub-committee of the MTC established for the purpose of developing the closure criteria for the RPA. The Closure Criteria Working Group also has a sub-group for each of the criteria elements responsible for the development of the technical criteria for each element being: landform, radiation, water and sediment, flora and fauna, soils, and cultural.



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Engagement forum	Frequency	Comment
Investor Briefings	Bi-annually	Briefings provided by ERA's Chief Executive regarding ERA operations to all company shareholders.
ERA business updates	Bi-annually	Presentation and question and answer session from ERA's General Manager Operations regarding ERA operations and areas of key interest to all local community stakeholders, traditional owner organisations, Federal, Northern Territory and local government stakeholders. These are scheduled twice yearly, however may be undertaken more frequently as required.
Relationship Committee meetings	Quarterly	The Relationship Committee was established under the Ranger Mining Agreement between ERA and the NLC in 2013. The committee was established to ensure effective information sharing and review processes between ERA and the Traditional Owners and their representatives.
Jabiru Town Development Authority meetings	Quarterly	Jabiru serves West Arnhem region as a centre for mining, tourism and community services. Membership includes and Northern Territory Government representative (Chair), two ERA representatives, GAC representative and elected member of the West Arnhem Regional Council.
Ministerial briefings	Regularly as required	Briefings are provided to both Federal and Northern Territory Ministers and senior advisors on ERA operations including aspects of closure.
Kakadu Board of Management Meetings	Meetings held quarterly ERA update provided bi-annually	Kakadu National Park is a jointly managed park between Parks Australia and the traditional owners of Kakadu. A board of management has been established as part of the governance structure for the park and consists of Commonwealth Government representatives, Park Management and traditional owners from each region in the park. ERA provides an operations update, including mine closure status, and consults with the broader indigenous population through this forum.
ERA information centre	Ongoing	The centre displays current information on ERA operations including closure and rehabilitation, with ERA personnel on hand to provide face-to-face interaction.
State of the Nation	Quarterly	Presentation, and question and answer session provided to all ERA personnel and contractors on ERA operations by either the Chief Executive or General Manager Operations including aspects of closure, Jabiru and stakeholder engagement.

5.3 Managing Socio-Economic Impacts

ERA has undertaken extensive engagement with key stakeholders in relation to closure since 2001. This engagement has covered all key aspects of closure, including:

- Engineering and design criteria for technical aspects of closure such as water treatment, landform design, tailings transfers and pit backfills.
- The overall planning process, schedule and associated costs.
- Closure criteria, environmental design criteria and closure objectives.
- Legal requirements and obligations associated with the various agreements for Ranger operations and Jabiru.
- Land tenure, governance and post closure land use.

There has been extensive engagement with the traditional owners (the Mirarr), their representatives (the GAC) and the NLC relating to closure. In particular, the key areas of concern for those stakeholders surround cultural heritage and land management, the incorporation of cultural criteria and requirements into the closure planning process for Ranger, and the economic and infrastructure outlook post mining.

The legislation, agreements and ERA company processes, which make up the existing cultural heritage management system, are also important elements in closure planning, execution and assessment of outcomes. These are described in further detail in Section 5.4.

The potential socio-economic impacts of Ranger closure have already been the subject of significant engagement with key stakeholders and are reasonably well understood. However considerable work remains to be done in planning for the future and agreeing impact mitigation and transition strategies. This will be the particular focus of work in the next phase of stakeholder engagement.

5.4 Cultural Heritage Management on the RPA during Closure

The protection of cultural heritage during closure works is of importance to Mirarr traditional owners and a legislative obligation. ERA has an existing cultural heritage management system which will remain in place during closure. The objectives of the cultural heritage management system are to ensure that:

- ERA remains in compliance with Northern Territory and Commonwealth heritage legislation.
- Cultural heritage incidents are managed in compliance with the ERA Health, Safety and Environment (HSE) Management System and with the Rio Tinto Communities and Social Performance standard.
- A land disturbance permitting process is in place which ensures land disturbance takes place in compliance with the ERA GAC 2006 Interim Protocol Regarding Cultural Heritage on the RPA.
- Cultural heritage sites remain protected prior to land disturbance, during the life of the mine, and mine closure.

- There is site-wide awareness of the ERA cultural heritage management system via web based training, cultural heritage inductions, and the use of the cultural heritage Geographic Information System (GIS).
- Cultural heritage operational procedures and work instructions are in place for managing cultural heritage sites on the RPA.

The cultural heritage system comprises a suite of agreements, legislation, and company policies and procedures. The core components are:

5.4.1 Interim Protocol Regarding Cultural Heritage on the RPA

This agreement prescribes procedures agreed by ERA and GAC relative to conducting cultural heritage surveys prior to disturbing land in the RPA. This agreement is not applicable to specified parts of the RPA such as the mine site, process plant, tailings and water management facilities, and the airport (collectively defined as the “operations area”).

5.4.2 Northern Territory and Commonwealth Heritage Legislation

While parts of the RPA are excluded from compliance with the Interim Protocol Regarding Cultural Heritage on the RPA, the entire RPA including the operations area is subject to both Northern Territory and Commonwealth heritage legislation.

5.4.3 HSE Management System

The operational components of the ERA cultural heritage management system are managed within the HSE management system. Cultural heritage operational procedures and work instructions are stored and accessed via the management system as are incidents, safety, and contractor management. All documentation and records are stored and accessed via ERA document control procedures.

5.4.4 Land Disturbance Permitting (EVP019)

The EVP019 Land Disturbance Permit is owned and processed by ERA's Environment Department. This permitting process provides for implementation of specific environmental and cultural heritage controls to be observed during a work project in a specific area.

5.4.5 Rio Tinto Communities and Social Performance Standard

ERA's cultural heritage management system must meet the Rio Tinto Communities and Social Performance standard. Rio Tinto also provides a cultural heritage guidance note and specialist advisor support for all aspects of cultural heritage management.

5.4.6 ERA Cultural Heritage Standard Operating Procedures

The cultural heritage standard operating procedures prescribe role responsibilities and action to be taken in the event of incidents taking place such as damage to cultural heritage sites, locating human remains, and locating previously unrecorded cultural sites.

5.4.7 Cultural Heritage Work Instructions

The cultural heritage work instructions provide guidance for various aspects of cultural heritage works including planning and conducting cultural heritage surveys, engaging Aboriginal traditional owners, and managing cultural heritage sites.

5.4.8 Cultural Heritage GIS

The cultural heritage GIS is a tool used for recording cultural heritage information necessary for mapping as related to the application of EVP019 Land Disturbance Permit, or for other purposes. The cultural heritage GIS provides a means of visualising and measuring the spatial aspects of all cultural heritage sites in the RPA. The tool is available to all ERA employees. The GIS provides the user with other useful tools including current high resolution images of the mine site, and the facility to measure altitude, distance and area.

5.4.9 Business Conformance Audits and Risk Assessments

These audits identify areas for improvement within the management system. Appropriate actions are then developed to ensure improvements are made and risks are mitigated and managed. The most recent audit was conducted in July 2016 at which time the ERA cultural heritage management system met the Rio Tinto Rio Tinto Communities and Social Performance standard.

5.4.10 Cultural Heritage Site Management Plans

Sites are divided into categories of high and low risk identified by their proximity to operational activity and frequency of mining activity around the site. Management plans are reviewed in line with changed site operational conditions, actions arising from significant incidents, and findings of cultural heritage site audits. Specific site management plans will be in place for sites of high significance such as registered sacred sites and sites which may be within the close vicinity of a major works program.

5.4.11 Cultural Heritage Field Surveys

Cultural heritage surveys are undertaken prior to land disturbance taking place. At June 2016 approximately 75 percent of the RPA has been surveyed. An external specialist nominated by GAC and traditional owners participates in both the planning and execution of these surveys. The process of planning and conducting cultural heritage surveys is detailed in the Interim Protocol Regarding Cultural Heritage on the RPA. The cultural heritage management system is a mature system which has been in place since 2006 and has resulted in no cultural heritage incidents at Ranger since its implementation.

5.5 ERA's Contribution to Addressing the Socio-economic Risks

ERA will continue to engage constructively with traditional owner representatives, the Northern Territory and Commonwealth Governments, relevant governmental agencies and other stakeholders to understand impacts associated with the closure of Ranger and ERA's exit from Jabiru under a range of exit scenarios regarding governance and infrastructure issues.



5.5.1 Ranger Closure

ERA Ranger operations are currently a significant contributor to the socio-economic matrix of Jabiru, the West Arnhem region and more broadly the Northern Territory both through economic inputs and social aspects such as its residential workforce and community involvement.

Whilst ERA's contributions are well understood by the company and its stakeholders, the current socioeconomic baseline was developed during the Jabiru SIA prior to the 2016 census data being released. As part of the Ranger closure feasibility study, ERA will update the socioeconomic baseline with the most recent information so that potential impacts and opportunities associated with closure and ERA's exit from Jabiru can be accurately assessed.

Following the Ranger closure feasibility study, ERA will expand the Jabiru social impact assessment to incorporate specific information on the cessation of Ranger operations. The updated study will identify social and economic risks and opportunities associated with closure, and in consultation with stakeholders, identify potential mitigation options. For the study to be meaningful, key decisions on Jabiru's future and ERA's workforce are required, which is likely to occur in mid-2018.

5.5.2 Jabiru Transition

As part of the planning process, ERA commissioned consultants Jacobs Group (Australia) to complete a social impact assessment by reference to the NT Environment and Protection Authority guidelines for the preparation of an economic and social impact assessment. The purpose of the study was to assess the impacts associated with ERA's rehabilitation obligations under the current Jabiru head lease that potentially extend to the removal of town assets and rehabilitation of the land, and develop potential mitigation options for the identified impacts.

The impact assessment consulted with all key stakeholders associated with Jabiru, providing an opportunity for organisations and community members to directly provide input into the project through a series of briefing sessions, surveys and interviews. The social impact assessment was undertaken in three phases:

Phase 1: Review and update of the social and economic information collected as it pertains to Jabiru

The specific objectives of Phase 1 were to:

- Review data provided by ERA, existing socio-economic reports, latest available economic and population data for Jabiru and nearby communities and identify any gaps in this knowledge base in order to provide a social and economic situational analysis of Jabiru.
- Conduct primary data collection for identified knowledge gaps as required.
- Identify the broader regional usage of Jabiru infrastructure, supplies and services including the Jabiru Airport.



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- Assess the current socio-economic contribution to Jabiru by the groups listed below and the opportunity cost to Jabiru in the event of exit from the town by the company:
 - ERA.
 - Government (including Parks Australia).
 - Tourism.

Phase 2: Community consultation

A series of consultations and surveys were conducted to identify the impacts and social risks associated with each scenario. The consultations included explanation of ERA's rehabilitation obligations, as they currently stand, and the planning process being followed including engagement with other stakeholders about the future of the town. The consultations were mindful not to commit to any activities outside of ERA's current rehabilitation obligations. The consultations:

- Ensured local communities and other stakeholders are engaged and informed in a manner consistent with ERA's approach and prudent project management.
- Appropriately and specifically engaged with and consider the impacts for Aboriginal communities that have a cultural connection to the land on which Jabiru is situated.
- Appropriately and specifically engaged with and consider the impacts for Aboriginal communities who access the goods and services available in Jabiru.
- Provided a detailed analysis of the key impacts, opportunities and suggested mitigation measures in relation to each of the exit scenarios.
- Provided a mechanism for effective internal engagement so that any recommendations proposed are understood and discussed with ERA.

Phase 3: Final report

The final report provided a summary of the scenarios, opportunities, risks, impacts and mitigation strategies for the relinquishment of the current town lease, the potential exit by ERA from Jabiru and the existing rehabilitation legal obligations.

The social impact assessment report identified a range of potential social impacts that could result include:

- Displacement of Jabiru residents.
- Impact on employment opportunities and livelihoods including significant decrease in the number of jobs and economy size.
- Loss of Jabiru as a service hub for residents in the region. This includes health, education and retail facilities which may not be as easily accessible in other locations.
- Loss of critical infrastructure including electricity and water supply.
- Closure of Jabiru Airport which would impact tourism, regional charters and other users.



In light of the current uncertainty, several impacts were identified which have the potential to occur regardless of whether ERA is required to meet its rehabilitation obligations or not with some impacts already occurring. These include anxiety and an inability to plan and make decisions due to the uncertainty about the town's future.

Measures identified in the social impact assessment that could help to mitigate the impacts include:

- Reaching agreement on a plan for the future of Jabiru.
- Early decision-making to reduce the impacts associated with ongoing uncertainty.
- Regular communication and engagement on progress in future planning and opportunities for the community to be involved in the process.

There was an overwhelming view that Jabiru should have a future beyond 2021. ERA acknowledges that good progress has been made by stakeholders involved in the planning process since undertaking the social impact assessment. ERA is already playing a significant role in the future planning process, through representation on the Jabiru key stakeholder group consisting of Commonwealth and Northern Territory government representatives, GAC, NLC and ERA and, has shared the findings of the social impact assessment with the group. ERA will also use the social impact assessment to develop a Jabiru exit strategy.



5.6 References

Energy Resources of Australia Ltd. 1981. *ERA Annual Report 1981* [Online]. Available: <http://www.energyres.com.au/media/1981-annual-report/> [Accessed December 2016].



APPENDIX 5.1 ERA TECHNICAL FORA ENGAGEMENT REGISTER

This Appendix provides an overview of ERA's key closure research activities reported/presented in various technical stakeholder fora/workshops from November 2001 to December 2017. The engagement list is not exhaustive but is indicative of ongoing closure research ERA has undertaken over the past 15 years. The table outlines the emerging issues and subsequent resolution directly or indirectly associated with ERA's research activities, which are drawn from available minuted records. The table also includes discussion topics and emerging issues from key stakeholder workshops relevant to closure planning.

Fora include: Alligator Rivers Research Technical Committee (ARRTC); Alligator Rivers Region Advisory Committee (ARRAC); Ranger Minesite Technical Committee (MTC); Ranger Closure Criteria Working Group (CCWG); Kakadu Board of Management (KBM), etc. Minutes of ARRTC and ARRAC meetings are publicly available on the Commonwealth Department of the Environment and Energy website at: <http://www.environment.gov.au/science/supervising-scientist/communication/committees>, unless otherwise specified. Minutes from the KBM, Ranger MTC and Ranger CCWG and subgroup meetings are not publicly available.

The membership of the various committees are as follows:

Committee	Members
Minesite Technical Committee	NT Department of Primary Industry and Resources (Chair); Northern Land Council; Gundjehmi Aboriginal Corporation ¹ ; Supervising Scientist; ERA.
Alligator Rivers Region Technical Committee	<p>Chairperson with scientific qualifications, appointed by the Minister; one member with scientific or technical qualifications appointed by the Minister on the nomination of the Northern Land Council; an independent scientific member representing environmental non-government organisations; and a range of other independent scientific members, as are from time to time appointed by the Minister.</p> <p>Further information on the ARRTC can be found at: http://www.environment.gov.au/science/supervising-scientist/communication/committees/artc</p>
Alligator Rivers Region Advisory Committee	<ul style="list-style-type: none"> • Independent Chairperson; Supervising Scientist; Director of National Parks; a representative of the Administrator of the NT; Northern Land Council; a representative of an environment organisation nominated by the Minister. • Members representing relevant industry, community and government stakeholder organisations, namely: Afmeco Mining and Exploration Pty Ltd (AREVA Group); Uranium Equities Limited; ERA; Cameco Australia Pty Ltd; Australian Radiation Protection and Nuclear Safety Agency; Commonwealth Department of Industry, Innovation and Science; NT Department of Mines and Energy; NT Environment Protection Authority; NT Department of Health; Gundjehmi Aboriginal Corporation <p>Further information on ARRAC can be found at: http://www.environment.gov.au/science/supervising-scientist/communication/committees/arrac</p>
Closure criteria working group	Members and/or representatives from the Minesite Technical Committee.



Committee	Members
Kakadu Board of Management	The Kakadu Board of Management, which has an Aboriginal majority (10 out of 15 members), representing the Aboriginal traditional owners of land in the park. Members of the KBM are listed in the Kakadu National Park Management Plan 2016-26: http://www.environment.gov.au/resource/kakadu-national-park-management-plan-2016-2026

¹ Until 2012, the GAC was represented by the NLC, at which point the GAC formally joined the NLC on the MTC.

ERA notes that the various committees continue to work on matters related to Ranger closure. There remain areas for further research and where agreement between parties is yet to be reached. The current draft Ranger mine closure plan is based on existing knowledge and agreement or, where gaps remain, it is based on ERA's best estimate at this time of the work to be undertaken, the schedule for that work and the outcomes that would be delivered. This draft mine closure plan remains subject to amendment where new information or agreement with regulators and stakeholders is required.

Date	Description of engagement	Stakeholders	ERA closure research topics	Stakeholder response/emerging issues	Proponent response and/or resolution
Nov 2001	Alligator Rivers Research Technical Committee (ARRTC) meeting 8	ARRTC members	<ul style="list-style-type: none"> ERA presentation "Designing Landforms to Achieve Ecologically Sustainable Outcomes". Objective is to achieve stakeholder agreement on the habitat targets for the final landform. 		Minutes of meeting not publicly available.
25 – 27/02/02	ARRTC meeting 9	ARRTC members	<ul style="list-style-type: none"> Pit 1 closure studies including: Engineering behaviour of unconsolidated material; interaction between pore water and upper layers; interaction between pore water and other aquifers; integrity of sealing following consolidation; and subsidence with consolidation. Final landform construction including: Capped and revegetated pits; reformed tailings dam; and reformed waste stockpiles. Reconstruction of surface catchments. 		Minutes of meeting not publicly available.
09 – 11/09/02	ARRTC meeting 10	ARRTC members	<ul style="list-style-type: none"> ERA focus on generating knowledge required for closure and rehabilitation of the Ranger mine site, including: Process water treatment; tailings densification; and, the deposition of tailings in Pit 1 above RLO. 	Stakeholder responses were directed at understanding broader mine closure aspects such as; the legislative approval process and mine closure criteria closure process and revegetation.	Minuted – offline discussion between EWL Sciences and ARRTC independent science member regarding the development of a successful revegetation strategy to address emerging issues. (See response below to ARRTC Meeting 12.)
16/10/02	Ranger site visit – traditional owner consultation	<ul style="list-style-type: none"> Northern Land Council (NLC) Gundjeihmi Aboriginal Corporation (GAC) 17 traditional owners 	<ul style="list-style-type: none"> Site visit to Georgetown analogue area to discuss the broad vision for landscape reconstruction. 	N/A	Not minuted
17 – 19/02/03	ARRTC meeting 11	ARRTC members	<ul style="list-style-type: none"> ERA advised that closure criteria is emerging issue and solicited members' views as to the processes that might be used to develop criteria. ERA outlined its process of developing a series of criteria for closure, with radiological, geomorphic, geotechnical and target ecosystems all being issues. Key areas of discussion included: the development of credible scientific models; the need to benchmark the surrounding region; the division of ERs into specific criteria with specifications/ numbers for each criterion; stakeholder communication; and developing workable closure criteria for progressing the landform. 	Emerging issue was the process for developing and establishing closure criteria. ARRTC independent science member gave a presentation on the gaps and development of a successful revegetation strategy.	Minuted ARRTC members were solicited for their views on developing closure criteria.
15 – 17/09/03	ARRTC meeting 12	ARRTC members	<ul style="list-style-type: none"> ERA gave a presentation on mine closure criteria and paper, focussing on mine closure goals, the primary ERs, the closure philosophy, closure planning and the draft final landform. 	Divergence in potential long-term revegetation research strategies between ERA and ARRTC member.	Minuted ERA indicated they did not need to agree with all feedback by ARRTC members on revegetation research and success. CSIRO undertook an assessment of ERA revegetation strategy in October 2002, which indicated "in principle" agreement with ERA's proposed revegetation strategy.
15 – 16/03/04	ARRTC meeting 13	ARRTC members	<ul style="list-style-type: none"> Discussion around the timeframe for Ranger rehabilitation – e.g. whether it was realistic or indicative. ERA presentations on the following: Ranger final landform design; and Ranger revegetation strategy. 	Questions raised by ARRTC members covered the following topics: <ul style="list-style-type: none"> landform slope ratios traditional owner input into landform design and floristic species composition current iteration of the landform design – i.e. first cut or pre-design species presence/absence versus species abundance 	Minuted All issues raised were addressed during the presentations. ERA noted that (floral) community structure was based on initial species, and should be regarded as a first pass approach and is not a quantitative ecological examination. ERA also noted at traditional owners were being engaged on all aspects of closure.
13 – 15/09/04	ARRTC meeting 14	ARRTC members	<ul style="list-style-type: none"> Update on ERA project funding and expected timeframes to address priority KKNs. ERA presented a paper <i>Hydrological and mining influences on solute flux in creeks flowing within the Ranger Lease – Phase 1:</i> 	Further update on Magela Creek solutes loads requested.	Minuted ERA to provide an update paper and presentation on the Magela Creek work at the next ARRTC meeting.

Date	Description of engagement	Stakeholders	ERA closure research topics	Stakeholder response/emerging issues	Proponent response and/or resolution
			<p><i>Concentration variation and solute loads in Magela Creek.</i> The study also described issues related to the Corridor Creek system which feeds into the Magela Creek system.</p>		
28/02 – 01/03/05	ARRTC meeting 15	ARRTC members	<ul style="list-style-type: none"> Update on developing a framework for surface water quality closure criteria for the RPA. Assessment of the state of the irrigation areas and fate of contaminants and linkages with radiation does from the final landform. Update on the Ranger final landform design issue, noting the relationship between the land and the plant community on the land. 	<ul style="list-style-type: none"> Main issues regarding surface water quality pertained to potential sulfate loads estimates. Stakeholders noted that the decommissioning of LAAs requires consideration of movement of contaminants through groundwater. General satisfaction with LAA (irrigation area) work. General satisfaction with final landform design project. 	<p>Minuted</p> <p>ERA recommended a mixing model be adopted, incorporating a broader range of factors to assist with determining surface water quality closure criteria.</p>
16/08/05	Alligator Rivers Region Advisory Committee (ARRAC) meeting 23	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Briefing on the Ranger mine closure model, including life-of-mine decommissioning and rehabilitation; first pass assessment of full closure; and status of different assumptions. 	Minutes not available.	
31/08 – 02/09/05	ARRTC meeting 16	ARRTC members	<ul style="list-style-type: none"> Update on ERA closure projects including: Landform design; ecosystem establishment; groundwater dispersion; water treatment; and landform monitoring. 	ARRTC noted the need to consider the higher resolution landscape record in relation to extreme events.	Minuted
04 – 05/10/05	ERA Ranger Weed Workshop	<p>Representatives:</p> <ul style="list-style-type: none"> KNP, ERISS, GAC, NLC, former NRETA Weeds Branch, DME, CDU, former DEH, ERA 	<ul style="list-style-type: none"> Establishment of a shared vision for weed thresholds upon closure of the Ranger mine. Identification of key knowledge gaps and ways in which these knowledge gaps can be closed. 	<p>The group developed a shared vision for the long-term management of weeds on the Ranger Project Area and identified actions needed to meet that vision.</p> <p>A draft list of weed species was prioritised for management, and ways to better manage these species was also discussed.</p>	<p>Minuted.</p> <p>Ongoing stakeholder collaboration.</p>
16/11/05	Meeting with GAC at Mula	<ul style="list-style-type: none"> NLC, Mirarr, former DIPM, ERA, Office of the Supervising Scientist, ERISS 	<ul style="list-style-type: none"> Discussion on final land use objectives, including aspects of final landform scheduling, backfilled pit landforms, land surface rockiness, tailings storage facility rehabilitation and water course reinstatement. 	<ul style="list-style-type: none"> Rock size: The size of the rocks left on the surface outside of the pits –exposed rock should be no larger than golf-balls to allow easy foot access across the site. Erosion: The potential for erosion of the finer materials to expose such rocks outside of the pits – the brown rocks and soils may wash away and expose larger or contaminated material. Land access: The length of time required before access to the land would be available for access. Radiation levels: Material high in radioactivity may remain on the surface. Seepage from pits: May impact upon useable water supplies downstream at Mudginberri. Flow of contaminated water into the reconstructed Djalkmarra Billabong: Considerable concern over the potential for flow of contaminated water into this creek. The future of RP1: Mirarr discussed three options for RP1; retain it, remove it or reshape it into a smaller wetland. Safety of food sources: Concern that geese and fish using RP1 may be contaminated and that this may occur in other areas where water pools on the rehabilitated site. Similar concerns about native fruits and transient animals, as these are important for hunting and gathering by their descendants. Mirarr believe that if revegetation is done properly then animals would return naturally to the site. Open woodlands of woollybutt, stringybark moving to pandanus and melalueca would be acceptable. Speargrass and natural djilli djilli would be acceptable to promote the return of wallaby and goanna species, allowing for resumption of normal hunting patterns. 	<p>Minutes of meeting not publicly available.</p> <ul style="list-style-type: none"> Rock size: ERA indicated that larger rocks are required for stability, but that the top 5 metres in the pits would consist mainly of brown, weathered rocks mixed with some larger rocks. It should be feasible to meet small size requirements for surface rocks, but this would need to be further investigated. Erosion: The weathered rocks are suitable for tree growth and would be utilised wherever possible to ensure a stable, vegetated surface. A low, flat contour would also assist. Use of imported soils could be considered, but this could lead to a significant increase in the presence of weeds. Land access: ERA indicated it will take several years to refill Pits 1 and 3 and the ultimate fate of the tailings dam needs to be carefully considered as it will seep contaminated water for a while after removal. Monitoring is expected to cease around 2030, so it is expected that full access would not be recommended for ten to fifteen years after closure. Radiation: Supervising Scientist indicated burial of the most highly radioactive material along with tailings at the bottom of the pit would significantly reduce the amount of radiation and other associated chemicals that could be transported to the surface. Seepage from pits: ERA indicated that groundwater flows off-lease are not yet well known and that more work tracking them is required. Flow of contaminated water to reconstructed Djalkmarra Billabong: ERA suggested that a sharp rise

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				<ul style="list-style-type: none"> Planting of edible native fruits is expected: Return of an environment containing green plums, red apple, white apple and yams is essential to allow resumption of normal gathering practices in the future. <p>Rain halted discussions.</p>	<p>on this side of reclaimed Pit 3 may be required to direct water flow inwards to wetland Filters and the re-established Coonjimba Creek bed. A wetland filter in this location may be required to manage water coming from the site of the resumed tailings dam and direct it into Coonjimba for final polishing.</p> <ul style="list-style-type: none"> Future of RP1: The main aim is to ensure that the smallest amount of water possible is allowed to pool on the rehabilitated pit area. The preference would be to remove RP1 and place the mud into the Pit. However this may not be possible as RP1 may be the last part to be rehabilitated. Further thought is needed, but Mirarr indicated a preference for removal of RP1. Safety of food sources: ERISS have been testing these species for radiation contamination and that there have not been any indications so far of serious problems. Mussels that live inside the mud of RP1 may be contaminated as they bio-accumulate chemicals easily. ERISS are continuing with testing for contaminants in edible fruits collected from Nabarlek site. Animals tested so far do not indicate any signs of contamination but further tests could be done.
02/12/05	Technical workshop	<ul style="list-style-type: none"> MTC members Charles Darwin University External consultant 	<ul style="list-style-type: none"> Landform workshop, focussing the selection and analysis of analogue landforms which have similar geomorphological and hydrological characteristics to that likely to occur on the rehabilitated landform. 	<ul style="list-style-type: none"> Tailings dam: What's planned for the tailings dam in terms of rehabilitation and final landform construction? How will the dam core be dealt with? A question was raised about the fate of the groundwater mound. The matter of catchments reconstruction was raised – should surface drainage (and seepage) be directed towards Coonjimba or Djalkmarra? What's the timing for removal of the mine access road? If landform stockpile covers are use, what purpose does a cover serve (for example, erosion protection, radiation suppression, ecosystem support)? What designs are needed? The geotechnical stability of the final stockpile landform should be addressed. The impact of extreme events on the stability-behaviour-geomorphic evolution of the final landform is an issue to be addressed. Have off-site hydrogeological assessments been considered? What about flows from seepage into (through) sentinel wetlands? 	<p>Minutes of meeting not publicly available.</p> <p>The concept for the rehabilitated landform is based on:</p> <ul style="list-style-type: none"> design rules radiation protection seepage/hydrology controls <p>ERA plans to have a first draft of this concept to the MTC in December 2005 or early 2006.</p> <p>The design of the final landform should be approved as soon as possible, and well before mining in Pit 3 ceases at Ranger. This will enable the construction of the landform to commence as soon as possible after this event, depending on detailed scheduling of operations. The general concepts for the landform should not be affected significantly by any changes to the life-of-mine-plan; on the basis of current knowledge that there are not likely to be large waste rock volume changes.</p>
06/12/05	ARRAC meeting 24	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Life of mine update including overview of key assumptions outlined in the "first pass" Ranger closure model, completed June 05. 	No responses or emerging issues from stakeholders	N/A
27 – 28/02/06	ARRTC meeting 17	ARRTC members	<ul style="list-style-type: none"> Discussion on grade 2 and 3 ore and implications for backfill during the rehabilitation phase. Status of investigation and modelling for approval to deposit tailings in Pit 3. 	No emerging issues were raised by stakeholders on the topics presented.	Minuted
Mar 2006	Issue of Ranger Draft Closure Model	MTC members	<ul style="list-style-type: none"> Closure model document was circulated to stakeholders, which elicited a detailed response from tradition owners on final landform issues. 	Extensive stakeholder feedback on the closure model.	Stakeholder feedback considered in ongoing iterations of the model/ plan.
04/04/06	ARRAC meeting 25	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Overview of infill planting at Jabiru East and MBL bund on RPA 	No responses or emerging issues from stakeholders.	N/A

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Jul 2006	15 th Australian Weeds Conference	Peer review	<ul style="list-style-type: none"> Paper on developing closure criteria for weeds on Ranger mine (Gardener, M, Addison, J, Ferguson, A, Bayliss, P & Speechley, A 2006). 	N/A	N/A
22/08/06	ARRAC meeting 26	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Feedback from GAC on the "first pass" draft closure model 2005. Traditional owners were pleased with many aspects of the model but had reservations on some aspects, which would be outlined in their response. 	<p>Traditional owner expectations to be progressed at the next consultation – Mula II on 15 November 2006 and include the following topics:</p> <ul style="list-style-type: none"> The GAC has suggested 25 years of monitoring following this date, 5 years not considered long enough. Incorporation of RPA into KNP – ideal outcome. <p>Change vs impact.</p>	
17 – 18/10/06	ARRTC meeting 18	ARRTC members	<ul style="list-style-type: none"> ERA presentation on long term closure planning at Ranger including: Background, outline, objectives and key stages of the closure process. 	No emerging issues were raised by stakeholders on the topics presented.	Minuted
15/11/06	Meeting with traditional owners at Manabadurma (Mula II)	Mirarr, GAC Members, NTDPIM, OSS, ERISS, NLC, ERA	<p>Discussion took place on the following:</p> <ul style="list-style-type: none"> Reoccupation of traditional lands. The closure schedule. Similarity of the final landform to the pre-mining landscape. Remediation of the tailings dam. Clean soil and edible bush tucker. 	<p>Main issues raised at the meeting included:</p> <ul style="list-style-type: none"> Fire Weeds – use of aerial herbicide spraying and ongoing weed management. The size of rocks on the surface of the final landform. Mirarr want to see rock sizes like the natural sizes that exist in undisturbed places. Access to riparian areas of the RPA as early as possible post closure for the purpose of teaching their children traditional values and practices. Concern that extensions to Pit 3 and potential underground mining will delay rehabilitation and closure. Underground access to R3D and possible leakage to the environment. The performance of the Pit 1 barrier. Clean up of riparian zones, and other places on the RPA identified by Mirarr. 	<p>Minutes of meeting not publicly available.</p> <p>Fire & weeds: The plan is to exclude fire from revegetated areas for several years until the new plants had become established. After that, traditional fire management would be introduced progressively on those areas.</p> <p>A fire management plan was being developed for use as a weed management tool instead of relying on aerial herbicide spraying. ERA looking at the best methods of controlling weeds. ERA requested TO advice on their traditional fire management practices, weed management techniques, fruit and tucker species for inclusion in the revegetation mix, and distinction between "weeds" and useful plants, whether native or introduced.</p> <p>Revegetation: ERA noted that seedlings are more expensive than seeds, but can have higher success rates.</p> <p>Surface of final landform: Rock size was acknowledged as requiring attention.</p> <p>Land access: ERA supported Mirarr requirements in respect of land access once it knows what those requirements are.</p> <p>Pit 1 barrier: Currently working as predicted.</p> <p>2026: ERA confirmed its intention to rehabilitate and close the RPA by the statutory date of January 2026.</p>
Nov 2007	Issue of Ranger Closure Model	MTC members	Closure model document (v2007) was circulated to stakeholders, which elicited feedback from SSB.	Feedback on closure model provided by SSB.	Feedback from SSB was incorporated into 2010 iteration.
Mar 07	Kakadu Board of Management (KBM) meeting	KBM members	<p>Discussion on ERA's planning for the eventual closure of the Ranger mine. This included an outline of ERA's 3-stage closure program:</p> <ul style="list-style-type: none"> Development of initial closure strategy, which defines the current knowledge base and identifies gaps to be filled. Development of a detailed closure strategy which includes determining the best options to close the Ranger site. Addressing knowledge gaps and developing detailed project implementation plans. 	No emerging issues were raised by stakeholders on the topics presented.	<p>Minutes of meeting not publicly available.</p> <p>ERA agreed to continue to provide regular updates to board members.</p>
08 – 09/03/07	ARRTC meeting 19	ARRTC members	<ul style="list-style-type: none"> ERA presentations on: Vegetation types and environmental trends in Ranger analogue areas; Ranger landscape design and reconstruction; update on land management projects at Ranger and the drafting of an issues paper on ecosystem closure criteria; site-wide hydrological characterisation of the Ranger mine. 	<ul style="list-style-type: none"> ARRTC requested a copy of the ERA vegetation criteria report. ARRTC expressed interest in commenting on the experimental design document for the trial landform and to visit the site in the future. 	<p>Minuted</p> <p>ERA agreed to provide a copy of the requested report and engage further with ARRTC on the design of the trial landform.</p>

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12/04/07	ARRAC meeting 27	ARRAC members	Closure planning update: <ul style="list-style-type: none"> Decommissioning of the acid plant. 	Clarification sought as to whether the acid plant would be removed as part of decommissioning	Minuted Acid plant was decommissioned as part of the construction of the brine concentrator.
21/08/07	ARRAC meeting 28	ARRAC members	Closure planning update: <ul style="list-style-type: none"> Drafting update to Closure Model for issue in September. Trial landform construction planned before year end. Pit 1 tailings modelling completed, proposed schedule: <ul style="list-style-type: none"> installation of wick drains 2009; pit kept open as potential contingency for process water / tailing storage; backfilling scheduled for 2012 / 2013 Water balance model completed and in use for developing both short and long term water strategies. Next phase to address development of closure criteria and associated studies 	Use of Pit 1 and Pit 3 as tailings repositories was queried.	Minuted Ranger Authorisation specifies tailings must be placed back in pits.
08 – 10/10/07	ARRTC meeting 20	ARRTC members	<ul style="list-style-type: none"> Discussion on the estimated timeframe for closure of Ranger, in particular the closure of Pit 1 and Pit 3. ERA presentations on: Environmental tracers in modelling groundwater recharge/discharge at Ranger; overview of the status of the trial landform and understanding plant-water relationships, erosion rate, and natural diversity accumulation; the status of closure planning and geotechnical investigations around Pit 3; and an outline of the various water management strategies/ scenarios to minimise water inventory, including restoring catchments, use of rock lined channels and evaporation basins. 	<ul style="list-style-type: none"> Trial landform: ARRTC to comment on the initial design of the trial landform to be provided by ERA. Stakeholder engagement: No defined process for stakeholder engagement on closure issues over the preceding 18 months. Pit 1: Potential to delay closing Pit 1 if ERA intended to use the pit for additional tailings storage. 	Minuted <ul style="list-style-type: none"> Stakeholder engagement: ERA stressed the need to adopt a flexible approach which provides for addressing stakeholder input otherwise process may be perceived as being a rubber stamping process. Pit 1: ERA commenced tailings deposition in the pit in August 1996. In May 2005, ERA submitted a second application to the MTC, to increase the tailings deposition level in the pit to an interim 12 mRL, which was approved by the Minister in August 2005.
06 – 07/03/08	ARRTC meeting 21	ARRTC members	<ul style="list-style-type: none"> ERA update on Ranger operations including the preparation for the closure of Pit 1. ERA presentations on the following: Assessment of radiological condition in the land application areas (LAAs) and rehabilitation planning; update on the Ranger surface water – groundwater interaction study; status of planning for the trial landform. Other closure activities covered included: An update on the development of closure criteria – e.g. derivation of water quality closure criteria for Georgetown and Coonjimba Billabongs; analysis of soils from analogue sites; and the status of the ecological risk assessment of the Magela Floodplain. The requirement to define the baseline data/ reference state that existed at the Ranger site prior to development. This will inform the process of the development of closure criteria, which is compatible with the ERs. 	<ul style="list-style-type: none"> LAAs: Traditional owners requested scraping of the top 10 cm of the whole MLAA and are highly concerned about the status of the other LAAs. General ARRTC support for ERAs project on the radiological characterisation of the LAAs. Trial landform: ARRTC stressed the need to maximise opportunities from the trial. <p>ARRTC noted ERA's proposed approach for the landform planning, and was fully supportive of progress so far. ARRTC requested they be formally consulted by ERA in relation to the design and implementation of the trial landform.</p>	Minuted <ul style="list-style-type: none"> LAAs: The definition of radiation exposure pathways in the LAAs and the estimation of radiation doses to the critical group using a Dose Model will determine the level of rehabilitation that ERA will need to undertake. Trial landform: ERA noted the need to also keep the trial simple; that the key is to lock in a species lists as soon as possible and then have further discussion on how to measure turbidity in runoff and other details.
18/03/08	ARRAC meeting 29	ARRAC members	Closure planning update: <ul style="list-style-type: none"> Oct 07 evaluation of closure implications completed for Shell 50 extension. Substantially revised Ranger Closure Model (v3) submitted to stakeholders for comment in Nov 07. Planning for construction of a demonstration (final) landform in 2008 – progressing. Establishment of a MTC CCWG, Terms of Reference (TOR) paper in preparation - planned for Apr 08. 	Use of Shell 50 and its implications for closure was questioned No responses provided for other topics. No emerging issues from stakeholders.	Response to Shell 50 queries provided during meeting.

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07/08/08	ARRAC meeting 30	ARRAC members	Closure planning update: <ul style="list-style-type: none"> • Planning for the trial landform , which will confirm ecosystem re-construction strategies; and behaviour of rehabilitated landforms at Ranger prior to closure • Progressing evaluation of Pit 1 closure strategies – e.g. CSIRO solute transport modelling; and CSIRO geochemical behaviour of tailings. • Establishment of a MTC CCWG – draft TOR with stakeholders for comment; and meetings to initially finalise TOR and working arrangements, and then commence development of final closure criteria set for 19 Aug 08. • Ongoing field investigations of LAAs, ahead of preparation of rehabilitation plans. 	Laterite use in trial landform queried. No responses provided for other topics. No emerging issues from stakeholders.	Response regarding laterite experiments provided during the meeting.
19/08/08	CCWG meeting	CCWG members	<ul style="list-style-type: none"> • ERA to update on TOR as part of 1.a with assumptions. • Ranger Environmental Requirements to be discussed within the context of closure. • Issue paper on traditional ecological knowledge to be distributed to members. 	Groundwater abstraction post closure.	Minutes of meeting not publicly available. CCWG agreed that a constraint on groundwater abstraction from Ranger operational area and some surrounds will be needed to prevent bores being sunk in areas where water will be unsuitable for use.
01/10/08	CCWG meeting	CCWG members	<ul style="list-style-type: none"> • Discuss future land use by traditional owners as a basis for deciding closure criteria themes. • Set themes, priorities and future actions. 	Key assumptions for progressing closure and closure criteria.	Minutes of meeting not publicly available. CCWG agreed the following key assumptions: <ul style="list-style-type: none"> • Scope of closure criteria working group to be focussed on RPA. • Jabiru East airport will remain post closure. • Ongoing
22 – 24/10/08	ARRTC meeting 22	ARRTC members	<ul style="list-style-type: none"> • ERA update on a number of closure studies, including: Evaluation of Pit 1 closure strategies; solute transport modelling; geochemical behaviour of tailings; establishment of the MTC CCWG and draft terms of reference. 	No emerging issues were raised by stakeholders on the topics presented.	Minuted
10/11/08	CCWG meeting	CCWG members	<ul style="list-style-type: none"> • Stakeholders to start documenting a list of key assumptions. • ERA to commence a list of assumptions and send to stakeholders. • Compare themes with Key Knowledge Needs (KKNs). 	Key assumptions for progressing closure and closure criteria.	Minutes of meeting not publicly available. CCWG agreed the following key assumptions: <ul style="list-style-type: none"> • Next land use statement developed to define post-closure land use • Jabiru East airport and associated tourist infrastructure will remain post closure (Jabiru town out of scope). • New power supply for Jabiru established. • Ranger power station removed. • Jabiru East camps removed. • Public access road decommissioned back to a nominal point (i.e. airport turnoff). • Access to site maintained as track. • RPA boundary fencing removed. • Tracks decommissioned except where access required for monitoring. • Minor post closure infrastructure retained at agreed location on lease. • All services currently supplied to Jabiru East will be supplied from Jabiru, i.e. Power, Water.

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					<ul style="list-style-type: none"> ERA's mining operations end at 2020, with lease expiry in 2026.
09/12/08	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Develop a draft statement of next land use attributes. Stakeholders to review and add to the list of key assumptions. Review KKNs and provide feedback. Agree timeline for closure criteria. Incorporate water bodies into closure planning. Ensure safe future use of groundwater and surface water; reduce risk to future users of the land. 	Key assumptions for progressing closure and closure criteria.	<p>Minutes of meeting not publicly available.</p> <p>Additional agreed key assumption:</p> <ul style="list-style-type: none"> All other infrastructure removed from site. (NB: this can be in the form of infrastructure removed from the surface and buried in the pits.)
16/02/09	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Develop a draft statement of next land use attributes. Review and add to list of key assumptions. Incorporate other water bodies into closure criteria. Land zonings as controls for locations that are not suitable for uses above the identified beneficial use. Appropriateness of groundwater trajectory modelling as closure criteria. Distribution of Ranger closure criteria water model to CCWG. 	<ul style="list-style-type: none"> Land use should use existing document sources, such as: Closure model, NLC traditional land use, environmental requirements Water quality criteria will need to be met; Djalkmarra Billabong will need to have a closure criteria quality, this can be determined through water modelling to determine the trajectory and impact of ground water on the environment and other. Traditional owners view is that there should be no new water bodies on site. Agreed that modelling should be used to determine trajectories for impact on the environment. 	<p>Minutes of meeting not publicly available.</p> <p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
18 – 20/03/09	ARRTC meeting 23	ARRTC members	<ul style="list-style-type: none"> Pit 1 hydrogeological conceptualisation and initial calibration solute transport model; reaching of agreement by CCWG on the terms of reference; progress on the trial landform; revision of the closure model; assessment of radiological contamination levels in LAAs; Pit 1 geochemical studies. 	<ul style="list-style-type: none"> ERA to arrange for progress reports on the WRL and CSIRO work on hydrology and tailings modelling to be provided to ARRTC member. Pit 1: ERA commended on its comprehensive forward program for the two Pit 1 closure studies and endorsement of the proposed approach. LAAs: ARRTC member noted the work appears to be covering the key issues and the key issues are not so much the actual values being measured but the difference between pre mining and present. Trial landform: Delays in progressing the construction of the trial landform and management of the proposed irrigation regime. 	<p>Minuted</p> <p>Trial landform: ERA stressed the importance of gaining knowledge and experience regarding irrigation during the dry season, as it may be a vital strategy in order to complete revegetation within the planned timeframe.</p>
07/04/09	ARRAC meeting 31	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Commencement of active process water treatment and disposal options, including bench scale testing in the brine concentrator to make distilled water. Examination of passive process water treatment and disposal options, including evaporation ponds. Trial landform progress, including: Installation of soil moisture probes; planting of tubestock in Mar 09; near completion of 1 of 4 erosion plots; and, partial installation of watering system over 2.67 ha. 	<p>Method for long term isolation of tailings requested.</p> <p>The complexity of accelerated evaporation ponds was highlighted for ERA's consideration.</p>	<p>Ranger Authorisation specifies tailings must be placed back in pits.</p> <p>Complexity of evaporation ponds was noted.</p>
07/05/09	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Draft statement of next land use attributes to developed using existing documents. Key assumptions available for comment. TOR updated. Consider how to incorporate other water bodies into closure criteria - ongoing. 	<p>Djalkmarra Billabong will need to have a closure criteria quality, this can be determined through water modelling to determine the trajectory and impact of ground water on the environment and other</p> <p>Traditional owner view that there should be no new water bodies on site.</p>	<p>Minutes of meeting not publicly available.</p> <p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>

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			<ul style="list-style-type: none"> Land zonings as controls for locations that are not suitable for uses above the identified beneficial use - ongoing. Groundwater trajectory modelling as closure criteria – ongoing. Closure criteria water model forwarded to CCWG for feedback. 		While Djalkmarra Billabong will not be reinstated, ERA has committed to not construct or leave additional water bodies on site post closure, where practicable. It is recognised that some form of sumps or water bodies may be retained to capture sediments eroding from the final landform (refer Ranger Mine Closure Plan, Chapter 10).
27/08/09	ARRAC meeting 32	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Development of the trial landform. 	Method of operation of process water treatment questioned.	Method of operation described by ERA representatives during the meeting.
22/10/09	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Presentation given on developing cultural closure criteria in tropical Australia. Key assumptions available for comment - ongoing. Water modelling to determine trajectory and impacts of ground water on environment. Feedback on the use of sentinel wetlands post closure. Initial flora and fauna criteria. Identify land use and vegetation types. Identify criteria for Gulungul Creek. 	Meeting adjourned to Nov 2009.	Minutes of meeting not publicly available.
04 – 05/11/09	ARRTC meeting 24	ARRTC members	<ul style="list-style-type: none"> Trial landform construction, planting and ongoing management and monitoring. Characterisation of catchments in the Ranger region. Development of complex surface water models to understand fate and behaviour of process water permeate in the system. Ongoing collection of ecophysiology and soil-moisture monitoring data at the Corridor Ck analogue site. Assessing the extent of radiological contamination in the LAAs. Evaluation of catchment issues and hydrological-hydrochemical behaviours in the RP1 catchment. Pit 1 closure studies (incl. surface water – ground-water interactions in the Corridor Ck catchment). 	<p>Pit 1: ERA to present on the current status of Pit 1 closure issues and planning at the next meeting.</p> <p>LAAs: ERA to present the conceptual rehabilitation plan for the LAAs at the strategic level at the next meeting. ERA are to outline what makes that plan robust and check the science is there etc.</p> <p>Trial landform: ERA to provide six-monthly updates on both the trial landform and the eco-hydrology analogue site study.</p>	<p>Minuted</p> <p>Addressed during ARRTC meeting 25.</p>
07 – 08/04/10	ARRTC meeting 25	ARRTC members	<ul style="list-style-type: none"> Conceptual rehabilitation options for the Ranger LAAs, including preliminary dose estimates for LAAs. Groundwater flow and tailings consolidation modelling, Pit 1 closure. Update on trial landform monitoring results. Hydrochemical considerations relating to process water treatment and salt management. 	No emerging issues were raised by stakeholders on the topics presented.	<p>Minuted</p> <ul style="list-style-type: none"> ERA advised that a Pit 1 consolidation model report would be completed in a few months. Updates on the trial landform would continue. Update on LAAs provided.
21/04/10	ARRAC meeting 33	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> ERA presented an overview of the process water management strategy, which is a long term strategic plan, highlighting elements of water management. 	Water management plan requested by the Environment Centre (NT).	ERA advised that the report would be provided at the ERA presentation later in the year.
08/07/10	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Feedback on the use of sentinel wetlands post closure. Defining the meaning of culture. Inclusion of Rio Tinto stewardship principles in closure documentation. Pit 1 closure. Radiation closure criteria. Draft soil sediment closure criteria. 	No emerging issues were raised by stakeholders on the topics presented.	<p>Minutes of meeting not publicly available.</p> <ul style="list-style-type: none"> Closure document updated with Rio Tinto principles of stewardship. Water closure criteria: Criteria amended to read "groundwater release ("seepage") from the final landform will not induce flow to Magela Creek".
25/08/10	ARRAC meeting 34	ARRAC members	<p>Closure planning update:</p>	No responses or emerging issues from stakeholders.	Minuted

Date	Description of engagement	Stakeholders	ERA closure research topics	Stakeholder response/emerging issues	Proponent response and/or resolution
			<ul style="list-style-type: none"> Status on the closure of Pit 1, including future installation of wicks (Q4 2010) to promote consolidation of the tailings for final bulk backfill and pit closure. 		
09/09/10	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Information on the types of acceptable sentinel wetlands post closure. Defining the meaning of culture. Rio Tinto stewardship principles and IAEA sources for consideration. Inclusion of glossary in closure documents. Pit 1 closure. Provision of surface water datasets to CCWG and review of threshold criteria for groundwater release. Agree on appropriate radiation closure criteria Agree on appropriate soil sediment closure criteria. 	No responses or emerging issues from stakeholders.	Minutes of meeting not publicly available.
11/11/10	CCWG meeting	CCWG members	<ul style="list-style-type: none"> Feedback on the use of sentinel wetlands post closure. Defining the meaning of culture. Defining how feedback on closure criteria is updated in relevant documents. Pit 1 closure. Agree on appropriate closure criteria for: Water, radiation; and soil sediment. 	No responses or emerging issues from stakeholders.	Minutes of meeting not publicly available.
28/03/11	ARRAC meeting 35	ARRAC members	Status report on Pit 1 closure activities.	GAC raised concerns regarding the slow rate of progress in planning for closure.	Minuted; no further discussion documented.
07 – 08/04/11	ARRTC meeting 26	ARRTC members	<ul style="list-style-type: none"> Trial landform update. Ecohydrology at analogue sites. 	ERA staff commended on the quality of their presentations and thanked for providing the opportunity for ARRTC to visit Ranger.	Minuted
08/09/11	ARRAC meeting 36	ARRAC members	Update on brine disposal options under consideration, including crystalliser and deep well injection of brine in Pit 1 or Pit 3.	GAC raised concerns regarding the slow rate of progress in planning for closure.	Minuted; no further discussion documented.
29 – 30/11/11	ARRTC meeting 27	ARRTC members	<ul style="list-style-type: none"> Overview of the ERA integrated process water, tailings and closure (ITWC) pre-feasibility study Phase 1, looking at technologies and science. Overview of the Pit 1 closure wicks project. Overview of the Pit 3 tailings deposition strategy. Update on groundwater monitoring and modelling. Gulungul Creek catchment review. Update on the status of the trial landform, including the revegetation strategy, flowering and fruiting species. Update on the LAA rehabilitation studies. 	<ul style="list-style-type: none"> ITWC PFS: ARRTC agreed that the KKNs (and projects under each KKN) should be prioritised based on current mine closure and rehabilitation timeframes. ARRTC requested an update on the current closure schedule components, and the relative priority and status of research addressing these, under each relevant KKN. 	<p>Minuted</p> <ul style="list-style-type: none"> ITWC PFS: ERA advised the process water, tailings and closure strategy has 4 phases and the PFS is focused on phases 3 and 4. The PFS comprises a large number of integrated elements, and as part of the baseline strategy to 2026 decisions need to be made on when to cease milling as this creates process water that needs to be managed. ERA outlined the various concurrent stages of the PFS up until April 2013 and advised further consultation with stakeholders and the MTC would be required.
13/12/11	CCWG meeting 2011_1	CCWG members	<ul style="list-style-type: none"> The purpose of this meeting was to restart the closure criteria process. 	<ul style="list-style-type: none"> Agreement to review all KKNs so that they are more specific to the particular needs of closure and criteria development Definition of 'detrimental impact' questioned. The need to define detrimental impact was added to the agenda for future meetings SSD requested that ERA add "decision points" on the PFS schedule document for the various criteria. This way all are aware of when criteria need to be developed by and will provide us with a priority list. It was agreed that 6 months would be allowed on top of all "decision points" to allow for the approvals process. Agreement to prioritise groundwater criteria to allow Pit 1 closure. 	<p>Minutes of meeting not publicly available.</p> <ul style="list-style-type: none"> ERA to develop a plan for progressing cultural criteria and engaging traditional owners. Definition for detrimental impact remains outstanding. ERA to update the chart with decision points. ERA to consider reinstating the old Jabiru Area Manager position that funded a mining officer position in the Jabiru Regional office.

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				<ul style="list-style-type: none"> Agreement that ERA were the owners of the closure criteria and should be the main drivers. Discussion was held regarding the under-resourcing of NLC. 	
08/03/12	CCWG meeting 2012_1	CCWG members	<ul style="list-style-type: none"> ERA discussed the development of broad ranging closure criteria as a journey for ERA and its stakeholders. 	No responses or emerging issues from stakeholders.	Minutes of meeting not publicly available.
03/04/12	CCWG meeting 2012_2	CCWG members	<ul style="list-style-type: none"> Ongoing discussion and progression of closure criteria for the RPA. 	<ul style="list-style-type: none"> ERISS identified that old ERISS infrastructure was noted for removal during site rehabilitation. ERISS requested that this infrastructure remain. Closure criteria report almost ready for review, draft criteria to be circulated for review and finalisation 	Minutes of meeting not publicly available. Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan provides the most up-to-date view based on current knowledge, studies and stakeholder feedback. The Ranger Mine Closure Plan acknowledges that remediation of ERISS buildings is the responsibility of the Commonwealth (refer Chapter 3, Section 3.2.10).
04/04/12	ARRAC meeting 37	ARRAC members	<p>Update on closure planning:</p> <ul style="list-style-type: none"> Status of the ITWC study: still in definition stage until May 2012, then engineering design will commence focusing on closure issues and progressive rehabilitation. Key focus on salt management; Pit 3 backfill strategy optimisation; tailings dam reclamation and decommissioning; demolition and infrastructure scheduling; risk mitigation work; and, water treatment strategies. Status of wick installation in Pit 1. 	No responses or emerging issues from stakeholders.	Minuted
17 – 18/04/12	ARRTC meeting 28	ARRTC members	<ul style="list-style-type: none"> Current status of Pit 3 and expected completion of mining. Status of tailings dam groundwater monitoring program to improve the understanding of hydrogeology of the mine site in inform rehabilitation planning. Update on Phase I of the ITWC project, including tailings reclamation and dredge transfer to Pit 3; proposed Pit 3 backfill strategy; closure criteria update; Pit 3 tailings and brine disposal options; Pit 1 closure. Status of the CCWG which held its first meeting in December 2011. Presentation on deriving background concentrations of COPC in groundwater and soils to establish background water quality in the three aquifers. Investigation into potential seed provenance for Ranger's revegetation. Update on the status of various groundwater studies at Ranger, including groundwater investigations and modelling. 	<ul style="list-style-type: none"> ITWC PFS: Emerging issues acknowledged by ERA included: how to optimise Pit 3 backfill to maximise consolidation (taking into account seepage control and settlement), identifying the best strategies for: placing material into the Pit, reclaiming the tailings dam, managing the underlying groundwater, closing Pit 1, implementing incremental brine concentrator treatment capacity to reduce the process water inventory to zero, storing the salt from the brine concentrator, achieving site infra-structure synergies (e.g. power and water systems) and demolition/removal of the plant. Decommissioning & rehab: ERA and SSD should undertake further work as part of the proposed risk assessment process to draft a risk based framework for prioritising the KKNs associated with the decommissioning and rehabilitation phases at the Ranger mine. ARRTC members will be involved where possible. 	Minuted <ul style="list-style-type: none"> ITWC PFS: Closure has to be completed by 2026 in accordance with the Section 41 Authority. Any decisions regarding an extension would be subject to outcomes of discussions with stakeholders. However, even if after extensive discussions all stakeholders agreed, the process would take some time due to the legal complexity involved. <p>ERA outlined the integrated elements of the PFS strategy for Pit 3 closure and associated activities, and how these relate to the KKNs.</p> <ul style="list-style-type: none"> Seed provenance: NB: On 12/8/15 GAC Board endorsed the proposed seed collection zone with KNP, based on local provenance study presented at ARRTC. Decommissioning & rehab: Completed.
23/07/12	CCWG meeting 2012_3	CCWG members	<ul style="list-style-type: none"> Ongoing discussion and progression of closure criteria for the RPA. Emphasis on a review of the terms of reference and the closure criteria report. General discussion on the structure of closure criteria. 	<ul style="list-style-type: none"> Discussed inclusion of Parks NT in CCWG meetings and the structure of closure criteria discussed 	Minutes of meeting not publicly available. Parks invited to attend meetings. Attendance began in March 2013.
27/08/12	CCWG meeting 2012_4	CCWG members	<ul style="list-style-type: none"> Discussion on the post closure land use; defining "detrimental impact". 	<ul style="list-style-type: none"> Definition of detrimental impact taken from the ERs was added to the closure criteria report. SSD to review and provide a position paper. Post closure land use document tabled by GAC for review by next meeting. 	Minutes of meeting not publicly available.
06/09/12	ARRAC meeting 38	ARRAC members	Progressive rehabilitation discussed including installation of wicks in Pit 1 and application of trial landform rehabilitation successes across site. ERA presented a conceptualisation of the Pit 3 brine injection and tailings management closure strategy.	The resistance of wick installation at a depth of 20 m was discussed.	In 2012, ERA successfully installed 7,554 prefabricated vertical wick drains into Pit 1, to assist with dewatering the pit, ahead of capping and rehabilitation. The wicks were installed within the top 40 m of the tailings mass in Pit 1. The purpose of

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					the wicks is to dewater the upper level of the tailings and promote tailings consolidation, thus establishing a stable surface upon which to commence backfill activities.
05/10/12	CCWG meeting 2012_5	CCWG members	<ul style="list-style-type: none"> Discussion on the post closure land use; defining "detrimental impact". 	<ul style="list-style-type: none"> Detrimental Impact: SSD provided summary of their interpretation of the definition of 'detrimental impact'. Notes that a scientific view of impact may differ from the traditional owner's perspective. SSD will provide a written interpretation for review by the working group. Technical working groups: General discussion held regarding the development of technical working groups for each closure theme. 	<p>Minutes of meeting not publicly available.</p> <p>Technical working groups were established and have contributed significantly to the closure criteria outlined in the Ranger Mine Closure Plan, Chapter 6.</p> <p>The definition of detrimental impact is currently being addressed by consultants BMT WBM.</p>
05 – 06/12/12	ARRTC meeting 29	ARRTC members	<ul style="list-style-type: none"> Current status of studies on radiation protection of the environment (non-human biota). Recommendations from the independent surface water working group. Status of the trial rehabilitation in the Magela LAAs. Soil erosion and water quality on the trial landform. Radon exhalation from the trial landform. Update on the characterisation of groundwater flows and associated solute source strength and duration, form Pit 3 solutes to Magela Creek. Systems analysis of Ranger closure process. Developing billabong closure criteria for solutes. Potential integration of aquatic ecosystem establishment into the broader rehabilitation/closure process. Overview of progressive rehabilitation pilot projects on the RPA 2012 – 2017. 	<ul style="list-style-type: none"> Pit 1: ERA to provide a presentation on Pit 1 rehabilitation status and proposed final landform to next meeting. Aquatic ecosystems: ARRTC requested that a more detailed project proposal be provided to next ARRTC meeting. Closure criteria: ERA to provide further information on the status of research informing the development of closure criteria for Ranger to next meeting. 	<p>Minuted</p> <p>Completed. Addressed at ARRTC meeting 30.</p>
07/03/13	CCWG meeting 2013_1	CCWG members	<ul style="list-style-type: none"> Discussion on CCWG planning for the year. Discussion on closure ecological risk assessment and development of conceptual models. 	<ul style="list-style-type: none"> Detrimental Impact: definition provided by SSD that there should be no observable biological effect as determined by an appropriately designed monitoring program. This raised further questions surrounding the definition of 'biological effect'. Technical working groups: agreement that these groups need to be formed within the next month. Key tasks include finalising objectives, reviewing the list of environmental studies and doing a gap analysis, commenting on the proposed time lines to determine if they are achievable, documentation of baseline conditions or how they can be calculated and developing the methods for determining closure criteria. Ecological risk assessment and conceptual models: presentation given by ERA summarising recent workshop in conceptual models. Outcomes of risk assessments to be provided to the technical working groups. 	<p>Minutes of meeting not publicly available.</p> <p>Technical working groups were established and have contributed significantly to the closure criteria outlined in the Ranger Mine Closure Plan, Chapter 6.</p> <p>The definition of detrimental impact is currently being addressed by consultants BMT WBM.</p> <p>Ecological risk assessment and conceptual models were developed by SSD in collaboration with stakeholders. Endpoints, pathways, etc, identified in these risk assessments were taken into account in the Ranger Mine Closure Plan, refer Chapter 9.</p>
22/03/13	ARRAC meeting 39	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Backfilling of Pit 3 and the ITWC PFS progressing. Rehabilitation of the Magela LAA and adjoining borrow pit is scheduled to commence this year. Planning for Pit 1 rehabilitation well advanced; over 7,000 wicks installed and preparatory works are expected to be completed by the time Pit 3 backfill is completed. 	No responses or emerging issues from stakeholders.	Minuted
24/04/13	CCWG meeting 2013_2	CCWG members	<ul style="list-style-type: none"> Update on closure project priorities Update on the composition of proposed technical working groups (TWGs) for each closure criteria theme. 	<p>Review of changes suggested for the closure criteria report.</p> <ul style="list-style-type: none"> Groundwater abstraction: agreement by all that ground water abstraction must be prohibited in certain areas across site 	<p>Minutes of meeting not publicly available.</p> <p>Completed by CCWG 2013_3.</p>

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				<ul style="list-style-type: none"> • Cultural aspects of landform: agreement by all to reword Objective 8 to reflect cultural aspects of water bodies, namely the requirement to ensure that the number of water bodies on site after rehabilitation be the same as before mining. • Sentinel wetlands: agreement by all to remove the term 'sentinel wetland' from the plan due to confusion as to its definition. 	<p>NB: Additional permanent water bodies are excluded from the final landform, as per the Ranger Mine Closure Plan, refer Chapter 10.</p>
02/05/13	Technical workshop	<ul style="list-style-type: none"> • MTC members • CSIRO • Geoscience Australia • ATC Williams • Rio Tinto T&I 	<ul style="list-style-type: none"> • Technical workshop on Pit 1 closure and subsequent submission of a notification on 17/05/13 for the Pit 1 preload phase. 	DPIR (former DME and supervising authority) could see no obvious show stoppers with pre-loading.	Minutes of meeting not publicly available. Consensus from the technical workshop attendees that the pre-loading phase for Pit 1 should proceed.
21 – 22/05/13	ARRTC meeting 30	ARRTC members	<ul style="list-style-type: none"> • Update on ITWC study looking at the best options for solving tailings and water disposal and mitigating associated impacts; preparation of Pit 3 for the successful rehabilitation of the tailings dam. • Update on research informing the development of closure criteria for agreed themes: Landform, radiation, water and sediment, flora and fauna and soils. • Update on aquatic ecosystem proposal. • Status of Pit 1 rehabilitation and final landform. • Outcomes of the collaborative Ranger closure ecological risk assessment workshop. 	<ul style="list-style-type: none"> • ITWC PFS: ARRTC commended ERA on the high quality of their scientific work and presentations to this meeting. • Ecological risk assessment: ARRTC requested that a status report (including the results from the screening phase) be provided to next meeting. • Groundwater: ERA asked to provide an update on groundwater modelling activities (including associated boundary conditions) to next meeting. • Revegetation: ERA asked to present on the eco-hydrology research, status (and scientific basis for) the proposed vegetation strategy and closure trajectories. • Landform: ERA and SSD asked to provide an update on the status of erosion modelling for Ranger. 	Minuted Completed. Addressed at ARRTC meeting 31.
16/07/13	CCWG meeting 2013_3	CCWG members	<ul style="list-style-type: none"> • Update on closure criteria objectives, including risk assessment conceptual models. • Update of closure project priorities; outline of the scope of works for the TWGs. • Update on ecosystem trajectories. 	<ul style="list-style-type: none"> • Water and sediment objectives: Drinking and recreational water use values used instead of ecological values as drinking and recreation will also be values applicable to the area. • Fauna objectives: recommendation from SSB to reference stock drinking water values. • Radiation objectives: recommendation from SSB that wording is changed to clarify that radiation exposure is ALARA rather than applying dose limits. • Closure project priorities: general consensus with draft outline. • TWG: technical working groups to be kept small. • Ecosystem trajectories: SSB clarified the two types of ecosystem trajectories as: <ul style="list-style-type: none"> ○ Management trajectory to track progress towards achieving a criteria ○ Trajectory to track progress to a point before achieving the objective as the final objective will not be achieved within a reasonable timeframe • Definition for ecosystem trajectories are to be developed by ERA. 	Minutes of meeting not publicly available. Refer Ranger Mine Closure Plan, Chapters 6 and 7.
05/09/13	ARRAC meeting 40	ARRAC members	<p>Closure planning update (Pit 1):</p> <ul style="list-style-type: none"> • Preload of rock fill has been approved but the final height of consolidation is still to be determined. • Preload will assist with model validation and enable a better understanding of how closely current models are representing reality. • ERA is strongly committed to determining a final consolidation level which is acceptable to stakeholders. • Pit 1 rehabilitation marks the beginning of a broader scale rehabilitation approach across the site. 	No responses or emerging issues from stakeholders.	Minuted

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03/10/13	CCWG meeting 2013_4	CCWG members	<ul style="list-style-type: none"> Final comments and agreement on closure criteria objectives Final comments and issues of TWG scope of works. Update of closure project priorities. 	<ul style="list-style-type: none"> closure criteria Objectives: Phrasing of water and sediment objectives discussed particularly in reference to the risks to fauna when drinking on site water and the impact of creek and billabong sediment loads on ecological function. Cultural objectives require further consultation 	Minutes of meeting not publicly available. Current status of objectives is identified in Chapter 6 of the Ranger Mine Closure Plan 2017.
27 – 28/11/13	ARRTC meeting 31	ARRTC members	<p>Updates on the following ERA and collaborative closure studies:</p> <ul style="list-style-type: none"> Status of ITWC study activities for 2014, including: Pit 3 initial fill, tailings transfer and brine management, Pit 3 preload, seepage studies and associated engineering designs, progressive rehabilitation works on LAAs. Status of Pit 1 preload and validation of consolidation predictions, and wick performance. Status of the Pit 3 underfill for subsequent brine management. Tailings and brine management project- Phase 1. Update on Phase 1 (problem formulation) of the ecological risk assessment. Water quality closure criteria (for natural water bodies) adjacent to Ranger. Revegetation focussing on MLAA's remediation strategies. Groundwater and solute modelling around Pit 1 and Pit 3. Implications for surface water from the Pit 3 groundwater modelling. Key findings of the Pit 1 contaminant transport modelling. Status of planning and scientific knowledge for development of closure criteria and trajectories. 	<ul style="list-style-type: none"> Closure criteria: ERA and SSD to provide an update on the status of the development of closure criteria (including trajectories). 	<p>Minuted</p> <ul style="list-style-type: none"> Addressed during ARRTC meeting 32.
09/04/14	ARRAC meeting 41	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Progress on the backfilling of Pit 3 ahead of schedule. Completion of the ITWC study which outlines the optimal rehabilitation plan for the RPA. 	<p>GAC and NLC comfortable with statues of Pit 1 rehabilitation.</p> <p>Australian Conservation Foundation sought clarification regarding a statement in the ERA 2013 Annual Report that was interpreted as linking approval of R3D as a prerequisite for rehabilitation of the RPA.</p> <p>GAC and Environment Centre NT (ECNT) queried sufficiency of funding for rehabilitation.</p> <p>ECNT tabled report titled 'Reconsidering Ranger – a brief on social, environmental and economic cost of uranium mining in Kakadu'</p>	<p>The wording of the statement interpreted to link R3D approval to successful rehabilitation could not clarified during the meeting. However, the Ranger 3 Deeps project and infrastructure was placed into care and maintenance in June 2015, following the ERA board decision that the project should not proceed to final feasibility study in the current operating environment.</p> <p>Commonwealth Department of Industry and NT Department of Mines and Energy responded to bond queries. The different types of bonds were clarified and assurances provided to GAC, that the departments were satisfied with the value of the bonds.</p>
07 – 08/05/14	ARRTC meeting 32	ARRTC members	<p>Updates on the following ERA and collaborative closure studies:</p> <ul style="list-style-type: none"> ITWC study including: Pit 1 preload and capping; outcomes of the monitoring of the barrier integrity. Prioritisation of key environmental studies to inform closure criteria. Interpreting "detrimental environmental impact". Rehabilitation-closure risk assessment outcomes and initial implications for KKN revisions. Water retention capacity of waste rock substrate to support a functional tropical woodland. Natural colonisation and seasonal responses of emergent aquatic plant in constructed sumps. 	<ul style="list-style-type: none"> Magela Creek: ERA to identify appropriate methodologies to investigate subsurface profile of Magela Creek sand channel and assess potential for solute migration.. Also discuss rationale and recommendations with SSB. Groundwater modelling: ERA to advise if modellers are exploring the sensitivity of the model to geological structures using broad (i.e. hydro stratigraphic unit wide) variations in hydraulic conductivity, or are they looking at preferential flow through linear structures as well? If not, what has been done to systematically assess the presence and characteristics of linear geological structures to act as a potential transport pathway for contaminants to the surface? 	<p>Minuted</p> <ul style="list-style-type: none"> Magela Creek: Addressed during ARRTC meeting 35 – INTERA presentation. Groundwater modelling: Completed and addressed further with presentation by INTERA during ARRTC meeting 33. Pit 3 closure: completed. Water retention of waste rock: Completed. Addressed during ARRTC meeting 34 via ERA presentation. Emergent aquatic plants: completed prior to ARRTC meeting 33. Risk assessment: Ongoing ARRTC meeting 34.

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				<ul style="list-style-type: none"> • Pit 3 closure: ERA to draft and distribute a table of contents for Pit 3 tailings application in addition to making early input data available to members. • Water retention of waste rock: ERA to provide update on the implications of eco-hydrology study for Pit 1, including advice on how to explore lessons for Pit 1's future. • Emergent aquatic plants: ERA/SSB to run a workshop prior to ARRTC 33 to determine the types of water bodies that need to be assessed, what are the risks, what is known, what are the knowledge gaps and the applicability of the sumps to studies. • Risk assessment: ERA to run a qualitative risk assessment process for decommissioning. • ERA to identify appropriate methodologies to investigate subsurface profile of Magela Creek sand channel and assess potential for solute migration. 	
17/06/14	Closure criteria water and sediment TWG meeting 2014-01	CCTWG members	Kick-off meeting for the TWG outlined 6 objectives and 7 specific tasks: <ul style="list-style-type: none"> • Agreement on endpoints, interpretation of ERs, for example on quality of rehabilitation of the site needed for inclusion into KNP, evidence of decisions to support recommendations to the CCWG and MTC. 	<ul style="list-style-type: none"> • Discussion of closure and approvals timelines relevant to water and sediment criteria • Interpretation of environmental requirements including the spatial extent to which the criteria will apply. All members to review the Limits of Acceptable Change paper which includes the spatial context of interpreting the ERs • TWG agreed on the following priority tasks in order to progress the Pit 3 application. These were: <ul style="list-style-type: none"> ○ Determining measurement endpoints ○ Setting parameter values and trajectories 	Minutes of meeting not publicly available. Addressed in Chapter 6 of the Ranger Mine Closure Plan 2017. However, closure criteria will be subject to ongoing refinement as closure activities progress.
14/07/14	Closure criteria water and sediment TWG meeting 2014-02	CCTWG members	<ul style="list-style-type: none"> • Standardisation of ecological nomenclature. • Preparation of recommended interim water quality criteria for Magela Creek and Coonjimba Billabong. • Seeking feedback on acceptable limits of change discussion paper. • Review of risk assessment models an output for Pit 3 closure interim criteria. • Review of constituents of potential concern (COPC) 1985 to present. 	<ul style="list-style-type: none"> • Standardisation of ecological nomenclature referred to CCWG for interpretation. • Water quality limits and contaminants of concern for Magela Creek were presented to group by ERA 	Minutes of meeting not publicly available. Addressed in Chapter 6 of the Ranger Mine Closure Plan 2017. However, closure criteria will be subject to ongoing refinement as closure activities progress.
14/08/14	CCWG meeting 2014_1	CCWG members	Industry comments on closure criteria objectives and agreement on changes to " <i>Detrimental Environmental Impact</i> " paper. <ul style="list-style-type: none"> • Acceptance of report as starting point for progression by the TWG closure criteria report. Update on TWGs; presentations from water and sediment TWG.	<p>Detrimental Environmental Impact: ERA presented a paper proposing the use of the RAMSAR wetland "limits of acceptable change" as a way to incorporate the scientific and cultural/social aspects into a measurable outcome. Paper put forward as a 'starting point' and referred to the water and sediment TWG for progression.</p> <p>Closure Criteria Report: Discussion surrounding the need for groundwater criteria and a groundwater monitoring program.</p> <p>Water and Sediment Group points of discussion:</p> <ul style="list-style-type: none"> • Natural acid events in creeks and billabongs mobilising solutes stored in sediments originating from the rehabilitated landform • The use of load limits or concentrations to enable comparison between modelling output 	Minutes of meeting not publicly available. Addressed in Chapter 6 of the Ranger Mine Closure Plan 2017. Refer Section 11.3.2 of the Ranger Mine Closure Plan 2017, as to the current approach to groundwater.
15/08/14	Closure criteria water and sediment TWG meeting 2014-03	CCTWG members	<ul style="list-style-type: none"> • Defining terms such as parameter, measurement endpoint, criteria. • Report on all candidate ecological processes (from world literature). • Defining "change". 	<p>Defining change: TWG reminded that change definitions are covered in the discussion paper <i>Acceptable Limits of Change/Detrimental Impact</i> that was previously distributed to the TWG. TWG has been asked to use the Limits of Acceptable Change approach when developing criteria.</p> <p>Water quality comparative measures: spatial and temporal differences discussed such as stream vs billabong and wet season vs</p>	Minutes of meeting not publicly available. Addressed in Chapter 6 of the Ranger Mine Closure Plan 2017.

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			<ul style="list-style-type: none"> Considering water quality measures and points – e.g. spatial variations billabong v creek. 	<p>dry season. Measurement methods of concentration vs load were discussed.</p> <p>Water quality values: discussion regarding the information to be compiled in table format to assist in the decision making process on water quality criteria.</p> <p>COPC from tailings and brine: Current solute transport models for the tailings and brine do not include predicted loads and concentrations of metals. ERA to calculate the predicted loads and concentrations from the pit tailings and brines based on current solute models. Compare the predicted concentrations and loads to ecosystem protection data and appropriate health limits.</p>	
09/09/14	ARRAC meeting 42	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Pit 3 initial backfill is nearing completion: 8.3 Mt of waste material moved during the first half of 2014 taking the total to 31.1 Mt at end of June 2014. Tailings management work progressing on schedule and budget. Brine concentrator meeting water quality specifications and throughput has progressively increased. 	No responses or emerging issues from stakeholders.	Minuted
17/10/14	CCWG meeting 2014_2	CCWG members	<ul style="list-style-type: none"> TWG updated on landform. Water and sediment TWG update. 	<p>Landform TWG proposed to separate two distinct phases in landform objectives into two criteria:</p> <ol style="list-style-type: none"> Landform design based criteria and landform monitoring based criteria. 	Minutes of meeting not publicly available. Addressed in Chapter 6 and Chapter 11 of the Ranger Mine Closure Plan 2017.
03/11/14	Closure criteria water and sediment TWG meeting 2014-04	CCTWG members	<p>Technical presentations including:</p> <ul style="list-style-type: none"> Review of operational water quality monitoring parameters, method and trigger values. Parameter review, predicted metal loads from Pit 3. Annual additional load limits (AALL) and dietary intake review for metals. Sediment baseline review. Water quality closure criteria. Toxicity and guideline values for U in billabong sediments. Toxicity of NH₃ in local freshwater biota. 	<ul style="list-style-type: none"> Additional Annual Load Limits (AALL) and dietary intake review for metals: <ol style="list-style-type: none"> All agreed that the 1985 approach for diet assessment and AALL for metals and radionuclides is no longer appropriate Concentration criteria appear to be more restrictive than AALL except for manganese. Supervising Scientist agreed to remove or review the diet based AALL in the Authorisation. Query raised as to whether the background diet for the BRUCE database is not influenced by mining in last 30 years. Evidence required that this is the case. Toxicity and guideline values for uranium in billabong sediments. Discussion paper to be produced describing the data and providing recommendation on approach and value to adopt for interim closure criteria. 	Minutes of meeting not publicly available. Addressed in Chapter 6 of the Ranger Mine Closure Plan 2017.
04 – 06/11/14	ARRTC meeting 33	ARRTC members	<p>Updates on the following ERA and collaborative closure studies:</p> <ul style="list-style-type: none"> Overview of CCWG recent work and outputs. Status of groundwater solute transport modelling indicating negligible flow going through the deep bedrock system, suggesting no need for concern that linear faults with enhance transport of solutes. 5th year of erosion and chemistry studies on the trial landform confirming rapid decline in material leaving the site post construction. Revised direction and work plan for aquatic ecosystem establishment. Outline of the key 14 steps associated with Ranger's revegetation strategy, and the learnings and risks associated with each of the 14 steps. 	No emerging issues were raised by stakeholders on the topics presented.	Minuted

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10/12/14	Closure criteria water and sediment TWG meeting 2014-05	CCTWG members	<ul style="list-style-type: none"> Discussion paper on detrimental impact. Update on diet review Update on cultural values and criteria. Discussion paper on the recommended closure criteria for Objective 3 for water and sediment theme. Drinking water, recreation and wildlife drinking water criteria. 	<p>Detrimental Impact: presentation by SSB on the term 'detrimental impact'. SSB position is that any change detected in the biological program is a detrimental change. To be applied outside of the RPA. All TWG members to review paper.</p> <p>Discussion paper – closure criteria for water and sediment theme: Discussion paper supplemented with a presentation on turbidity criteria. Discussion revolved around monitoring frequency. Frequency will be informed by modelling predictions.</p> <p>Turbidity: criteria to be developed for sediment load and turbidity in the water column in billabongs and creeks.</p> <p>pH and sedimentation in Coonjimba Billabong: ERA and SSB to compile information on Coonjimba Billabong water quality.</p>	<p>Minutes of meeting not publicly available.</p> <p>Addressed in Chapters 6 and 10 of the Ranger Mine Closure Plan.</p> <p>The definition of detrimental impact is currently being addressed by consultants BMT WBM.</p>
21/04/15	ARRAC meeting 43	ARRAC members	<p>Closure planning update:</p> <ul style="list-style-type: none"> Pit 1 closure works, including rock preload and laterite capping, prior to bulk backfill, landform shaping and rehabilitation. Pit 3 closure preparation works, including backfilling and related civil works to enable tailings deposition. 	GAC sought 'stronger' reassurance from ERA regarding the security of future funding for rehabilitation of Ranger.	<p>Minuted</p> <p>Since 2012, ERA as invested over \$425 m in rehabilitation and water management projects, to meet statutory mine closure requirements and stakeholder expectations.</p>
18 – 20/05/15	ARRTC meeting 34	ARRTC members	<ul style="list-style-type: none"> ITCW closure roadmap including information on 8 closure strategies and 4 main options. Update on the installation of the wicks in Pit 1 and preloading. Update on the arrival of the tailings dredge. Pit 3 rehabilitation and the construction of the underfill. Progress of the tailings and brine management project and various strategies. Outcomes based on 113 years of climate data on soil water deficit and plant available water. Closure/rehabilitation related knowledge requirements and outline of the current closure schedule. Outcomes of the environmental risk assessment. 	<ul style="list-style-type: none"> Regional groundwater: Supervising Scientist and ERA to ensure the regional groundwater context is explicitly addressed and considered as part of proposed review of KKNs next meeting Magela Ck subsurface profile: Supervising Scientist and ERA to keep ARRTC informed on identification of appropriate methodologies to investigate subsurface profile of Magela Creek sand channels and assess potential for solute migration. Seismic events: ERA to provide ARRTC with the basis on which seismic events were excluded from the risk assessment process. 	<p>Minuted</p> <ul style="list-style-type: none"> Regional groundwater: Completed. Magela Ck subsurface profile: ERA advised the report is still in draft but the recommendations had been considered as part of recent sediment work. Report to be circulated once finalised. Ongoing. Seismic events: See response under ARRTC 35.
17/07/15	CCWG meeting 2015_1	CCWG members	<ul style="list-style-type: none"> Update on plan to progress closure criteria. 	<p>Tier 2 project: SSB announced it will be setting up a Tier 2 project on Ranger Closure. Tier 2 is a mid-level project that requires regular reporting to the Executive Board. SSD will be getting a resource to establish this project. It will be requiring regular updates from ERA on the progress of closure criteria development.</p> <p>New purpose for TWGs: Agreement that the TWGs would now be used for the review of tabled criteria.</p> <p>Coonjimba billabong: KT noted that SS has some questions about the fate of Coonjimba billabong. It has been historically subjected to sedimentation during construction and is now a lot shallower than pre-mining and there are notable acid events. The question was asked if GAC could provide feedback as to what would be an acceptable state for this billabong on closure.</p>	<p>Minutes of meeting not publicly available.</p> <p>Refer Chapters 6 and 10 of the Ranger Mine Closure Plan.</p>
12/08/15	CCWG meeting 2015_2	CCWG members	<ul style="list-style-type: none"> Discussion on ERA proposed closure criteria. 	No emerging issues were raised by stakeholders on the topics presented.	Minutes of meeting not publicly available.
09/09/15	ARRAC meeting 44	ARRAC members	<p>Overview of \$400 M spent on rehabilitation to date, including:</p> <ul style="list-style-type: none"> Installation and commissioning of the brine concentrator. Outline of the \$30 M rehabilitation spend forecasted for 2015. Transfer line for tailings from the mill to Pit 3. Pumping system for dewatering of Pit 3. 	Minutes not available.	N/A

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			<ul style="list-style-type: none"> Progress on the Pit 1 capping – the majority of the pit has a lateritic cover, remainder of capping within the next two months; bulk backfill and subsequent revegetation will commence in 2017, pending approvals. Completion of civil works in Pit 3 to allow the pit to receive tailings and process water, including the installation of a horizontal bore that will be used to extract seepage and the installation of reinjection bores for storage of process water brines. Impending commissioning of brine injection bores. Launch of tailings dam dredge; now in the commissioning phase. These accomplishments collectively form the last steps towards implementation of the ITWC management processes that will be required for mine closure. The dredge is estimated to move 5-6 Mt of tailings each year to 2020, which will enable final consolidation of material in Pit 3 prior to closure and rehabilitation. 		
23 – 25/11/15	ARRTC meeting 35	ARRTC members	<ul style="list-style-type: none"> INTERA update on groundwater modelling and response to the perceived knowledge gaps in groundwater research. Outline of the current closure schedule. Development of cultural health indices criteria; Ranger post closure land use statement; Coonjimba Billabong ASS risk assessment 2015 sampling; analysis of U concentration in LAAs; collation and description of water quality; and re-vegetation monitoring. Summary of the KKN requirements for the critical and high risks for the ecological risk assessment. 	<p>Intera update: SSB agreed to consider making surface flow and water quality data sets available to Intera subject to a formal request from ERA.</p>	<p>Minuted</p> <ul style="list-style-type: none"> Magela Creek: Addressed by Intera in the site wide model due for completion in early 2016. It was also noted that INTERA have reported that sensitivity studies indicate that the current model is insensitive to changes in the hydraulic conductivity of the Magela sand bed. Ongoing from ARRTC 32. Seismic events: Minutes from FEPS workshop indicated there had been a discussion which had led to agreement that seismic events were not an issue for Ranger rehabilitation. <p>ERA noted that the issue was assessed as "low" in the context of the disposal of tailings in Pit 3. Tailings were being buried in a pit, and an assessment had identified this as best practice and the Ranger Authorisation had been updated to require this. The landform will be built to the required standards; ERA queried the justification for doing additional work to quantify the risk of an earthquake when there are no additional mitigations that can be adopted to protect against such an event.</p> <p>ARRTC suggested work should be done to quantify the risk based on historical records and given the mine is sitting on the edge of a regional fault zone and seismic activities have potential to influence overland and sub surface flows; then note that seismic events are unmitigatable.</p> <p>ERISS advised that the conceptual models for the risk assessment had captured seismic events.</p> <p>ERA advised that a 1997 study had looked at extreme events in the ARR. The relevant section of the report would be provided to ARRTC members. Ongoing.</p>
30/11/15	Flora and fauna TWG closure criteria workshop	Flora and fauna TWG members	<ul style="list-style-type: none"> ERA presentation on the status of current closure planning. ERA presentation on ecosystem re-establishment and species list. Discussion on proposed measurement endpoints. Identification of future actions to obtain agreement on measurement endpoints. 	No emerging issues were raised by stakeholders on the topics presented.	Minutes of meeting not publicly available.
30/11/15	CCWG meeting 2015_3	CCWG members	<ul style="list-style-type: none"> Overview of landform v5. Discussion around CCWG setting the closure criteria objectives. 		<p>Minutes of meeting not publicly available.</p> <p>Final landform v5 is addressed in the following chapters of the Ranger Mine Closure Plan: Chapter 6, 7 and 9.</p>

Date	Description of engagement	Stakeholders	ERA closure research topics	Stakeholder response/emerging issues	Proponent response and/or resolution
11/12/15	Landform TWG meeting	Landform TWG members	<ul style="list-style-type: none"> ERA presentation on current proposed landform and general closure planning ERA overview of proposed landform criteria Discussion on the proposed measurement endpoints (outcomes or targets) Discussion of parameters of relevance to targets Agreement on actions to progress 	<p>General agreement that landform objectives were appropriate.</p> <p>Objective 1: Maintain a stable landform that will not expose tailings through erosion processes for at least 10000 years</p> <p>Outcomes identified to address Objective 1:</p> <ol style="list-style-type: none"> Gully erosion: Landform Evolution Model to be used to identify locations of potential gully erosion and a monitoring program then developed for these areas. Land Slip: Agreement that risk is low due to flat terrain however a risk assessment will be undertaken and a monitoring program developed. Movement of Magela creek impacting toe of landform: this may cause mass movement therefore it was incorporated into the risk assessment for land slip. <p>Objective 2: Erosion characteristics of the rehabilitated landform, as far as can reasonably be achieved do not vary significantly from comparable landforms in surrounding undisturbed areas</p> <p>Outcomes identified to address Objective 2:</p> <ol style="list-style-type: none"> Sediment loads: Post-mining suspended sediment loads will temporally and spatially decrease to match background rates of the surrounding areas Bedload: Sediment or sand does not cause the accelerated infilling of billabongs with sand and silt Denudation: Erosion/denudation rate is comparable to background erosion rates in 10,000 years. 	<p>Minutes of meeting not publicly available.</p> <p>Refer Ranger Mine Closure Plan Chapters 6, 7, 9 and 10 for discussion on the final landform.</p>
23/02/16	Landform TWG workshop	Landform TWG members	<ul style="list-style-type: none"> Setting allowable gully size for the various erosion zones. Setting criteria for other parameters. Review of landform evolution modelling results to identify areas of potential erosion and agreement on the erosion zones for monitoring and criteria setting. 	<p>Agreement could not be reached regarding allowable gully size. Two options were debated:</p> <ol style="list-style-type: none"> Some gully erosion is acceptable. Use modelling to determine gully formation location and size and then this would be the basis for the criteria and monitoring program; or No gully erosion is acceptable. 	<p>Minutes of meeting not publicly available.</p> <p>Refer Ranger Mine Closure Plan Chapters 6, 7, 9 and 10 for discussion on the final landform.</p>
04/03/16	CCWG meeting 2016_1	CCWG members	<ul style="list-style-type: none"> Proposed changes to closure criteria objectives. Update on progress of closure criteria development. 	<p>Cultural criteria: discussion held about the proposed cultural criteria and appropriateness as a measure of final close out. Consensus could not be reached.</p> <p>Flora and Fauna criteria: GAC requested the inclusion of edaphic criteria as an indicator of successful rehabilitation. Flora and fauna group to consider edaphic criteria.</p> <p>SSB noted that the weeds criteria needed simplification</p> <p>Guidance and focus for TWGs: SSB asked for TWGs to focus on the purpose of the technical groups as:</p> <ol style="list-style-type: none"> Set the end state or target for the objective Develop the monitoring program or measurement method Develop the method to reach the end state <p>Expectations on closure criteria: SSB notified the group that they are firming up their position on what it expects for closure criteria.</p>	<p>Minutes of meeting not publicly available.</p> <p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan, Chapter 6, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
06/05/16	Flora and fauna TWG closure criteria workshop	CCTWG members	<ul style="list-style-type: none"> Reporting on revegetation species list Use of dissimilarity matrix to assess revegetation's similarity to analogue sites. Presentation and discussion on draft closure criteria. Reports on trajectory work. Discussion on closure criteria for fauna. 		<p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan, Chapter 6, Section 6.5 provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
24/05/16	Landform TWG meeting	CCTWG members	<ul style="list-style-type: none"> Development of suspended sediment parameters. 		<p>Minutes of meeting not publicly available.</p> <p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan,</p>

Date	Description of engagement	Stakeholders	ERA closure research topics	Stakeholder response/emerging issues	Proponent response and/or resolution
					Chapter 6, Section 6.2 provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.
06/06/16	Closure criteria water and sediment TWG meeting 2016-01	CCTWG members	<ul style="list-style-type: none"> Develop a report for each COPC for which closure criteria are being recommended. Relevance of KKNs to closure criteria. Potential generation of acid sulfate sediments and subsequent environmental consequences Nutrients from tailings/ process water (NH₃) and explosive residues in waste rock (NO₃). Herbicides, hydrocarbons and other metals. 	<p>Magnesium in surface waters: Discussion on use of field and laboratory tests to derive a guideline value for ecosystem protection for magnesium in surface waters. SSB to provide a report of science underpinning Mg closure criterion.</p> <p>Uranium in surface waters: Discussion on appropriate U limit for surface waters taking into account the binding nature of dissolved organic carbon and expectations of traditional owners. SSB to provide report on science underpinning proposed uranium closure criterion.</p> <p>Total Ammonia Nitrogen: Discussion on need for closure criterion for TAN given its high variability in nature. SSD to provide finalised paper to TWG.</p> <p>Turbidity: Discussion on the use of drinking water guidelines to devise a limit for turbidity.</p> <p>Nutrients from tailings: ERA to assess and report on eutrophication risks from mine derived nutrients and suitable criteria/guidelines for preventing eutrophication if required</p> <p>Metals: ERA to calculate and report on predicted metal concentrations transported to surface waters from tailings and process water in closed pits.</p>	<p>Minutes of meeting not publicly available.</p> <p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan, Chapter 6, Section 6.4 provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
26/06/16	Closure criteria water and sediment TWG meeting 2016-02	CCTWG members	<ul style="list-style-type: none"> Magnesium field effects data to set closure criteria Guideline values for drinking water, wildlife, recreation and livestock Science supporting local toxicity guideline values 	<ul style="list-style-type: none"> Magnesium field effects data to set closure criteria: SSB have not yet delivered their SSB Mg field effects paper. Guideline values for drinking water, wildlife, recreation and livestock: All guideline values are compared against all water types. Suggestions put forth to improve the closure plan in regards to water. Science supporting local toxicity guideline values: SSB to supply information on ecotoxicology guideline values and confidence intervals from the species sensitivity distribution curves and assess what information can be supplied on the confidence in field threshold effects GV 	<p>Minutes of meeting not publicly available.</p> <p>Emerging issues continue to be addressed in iterations of the Ranger Mine Closure Plan. The Ranger Mine Closure Plan, Chapter 6, Section 6.4 provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
05/08/16	Flora and fauna TWG	FFTWG members	Discussion on the flora and fauna closure criteria, particularly species composition, canopy architecture, tree distribution, weed composition and abundance, and fauna	<ul style="list-style-type: none"> Species composition: Requires further discussion with run further scenarios given <i>Eucalyptus miniata</i> does not have a high success rate on TLF but <i>Corymbia foecleschia</i> fills the niche. Canopy architecture: Needs to include a canopy cover and ground cover index within the range of the natural analogue sites. Dependent on the water retention in the soils. Weeds: Needs to include introduced species not just declared spp. For example annual pennisetum, red natal are both major issues on the RPA but neither species are declared species. Fauna: Presence/absence is not strong enough. TWG must be able to established measurements. 	<p>Minutes of meeting not publicly available.</p> <p>These emerging issues are addressed in the Ranger Mine Closure Plan, Chapter 6, Section 6.5.</p>
19/08/16	CCWG meeting 2016_2	CCWG members	<ul style="list-style-type: none"> Closure plan review and update Update on progress of criteria development SSB rehabilitation standard 	<ul style="list-style-type: none"> Closure plan: outline of plan presented with a matrix of closure milestones. ERA seeking endorsement of the steps listed in the milestone matrix. General discussion around the feasibility study, scheduled to commence 2017. Findings of the feasibility study to be incorporated into later iterations of the closure plan. Closure Criteria development: Most TWGs are progressing well. SSB rehabilitation standards: Draft of SSB rehabilitation standards are being progressed, due in September 2016. 	<p>Minutes of meeting not publicly available.</p> <p>Closure plan: The closure feasibility study is scheduled to commence September 2017.</p> <p>Closure criteria development: The Ranger Mine Closure Plan, Chapter 6, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p> <p>SSB rehabilitation standards: Draft rehabilitation standards for radiation dose (humans), radiation dose (environment),</p>

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01/09/16	CCWG meeting 2016_3	CCWG members	<ul style="list-style-type: none"> • Closure risk assessment presentation • Closure strategy and schedule • Objectives and outcomes all closure themes • Reporting of closure activities 	<ul style="list-style-type: none"> • Closure Risk Assessment Presentation: high risks (Class 3) highlighted. Some risks required further studies as the controls are ranked as less effective. • Closure strategy and schedule: general discussion regarding the extent that the closure plan covers all closure applications and approvals. Issue to be raised with MTC. • Objectives and outcomes all closure themes: Objectives for each theme were discussed. <ul style="list-style-type: none"> ○ To avoid duplication, tailings outcomes are to be reviewed for incorporation into other outcomes. ○ Flora and fauna outcomes have been changed to align to the ER objective ○ Soils are to follow the general NEPM process ○ Outcomes for the cultural criteria have been taken from the Murray Garde report and cultural health indices. Cultural criteria will be a subjective, not objective measure. • Reporting of closure activities: ERA to provide regular update on closure progress, with parameters, to the MTC. 	<p>magnesium, uranium and manganese surface water were issued to stakeholders for initial feedback on 1 August 2017.</p> <p>Minutes of meeting not publicly available.</p> <p>Findings from the closure feasibility study scheduled to commence in September 2017, will be incorporated into future iterations of the Ranger Mine Closure Plan.</p> <p>The Ranger Mine Closure Plan, provides a table of additional closure applications and approvals appended to Chapter 1. Chapter 6, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
15/09/16	CCWG meeting 2016_4	CCWG members	<ul style="list-style-type: none"> • Closure plan progress update and content review • Best Practicable Technology (BPT) overview • Criteria for each theme • Groundwater abstraction restrictions 	<ul style="list-style-type: none"> • Criteria: general discussion on each criterion <ul style="list-style-type: none"> ○ Radiation - Clarification needed on screening levels vs final value for assessment: SSB to finalise. ○ Landform – what is the acceptable level of error for landform execution, centimetres or metres? ERA to clarify. ○ Water and sediment – discussion around the wording and effects to wildlife from sumps. SSB request that there is no detrimental affect however ERA state that this is not possible. ○ Flora and fauna: further work required on the impact of fire. ○ Soils: noted that soils criteria only apply to contaminated soils. Nutrient cycling and other soil properties pertaining to the development of a sustainable ecosystem are included in flora and fauna criteria ○ Cultural criteria: GAC to review and provide comments. 	<p>Minutes of meeting not publicly available.</p> <p>The Ranger Mine Closure Plan, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>

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30/09/16	CCWG meeting 2016_5	CCWG members	<ul style="list-style-type: none"> • Uncertainty in construction of the landform • Update on water & sediment closure criteria – health, ecosystem protection on and off the RPA, wildlife drinking water. • Update on cultural closure criteria 	<ul style="list-style-type: none"> • Uncertainty in construction of the landform: uncertainty in the landform construction is approximately 1-2 metres. This uncertainty relates to the swell factor that will occur during reclamation and placement of waste rock. Uncertainty may require small changes to topography that will be made in areas that will not impact on the drainage or erosion characteristics. • Update on water & sediment closure criteria: <ul style="list-style-type: none"> ○ Health – accepted as a good framework for progression. Noted that some metals are already higher than tolerable intake levels via natural processes ○ ecosystem protection off the RPA –confusion existed over the interpretation of the outcome. Disagreement between SSB and ERA as to the location where the highest level of protection is applied, the confluence of Magela and Gulungul Creeks or the section of Gulungul Creek between the Gulungul Creek lease boundary and the confluence. ○ Ecosystem protection on the RPA - Disagreement between SSB and ERA reading the application of ALARA to species protection on the RPA ○ wildlife drinking water- discussion regarding the purpose for the criteria on wildlife drinking water. 	<p>Minutes of meeting not publicly available.</p> <p>The Ranger Mine Closure Plan, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback.</p>
13/10/16	CCWG meeting 2016_6	CCWG members	<ul style="list-style-type: none"> • Interpretation of ER 1.1(d) and 1.2d • Update on development of flora and fauna criteria • Update on development of landform criteria 	<ul style="list-style-type: none"> • Interpretation of ER 1.1(d) and 1.2d: Each organisation to send interpretation of ER 1.1(d) and 1.2d to DIIS along with any other ER where there is a material difference of interpretation. • Update on development of flora and fauna criteria: significant discussion on the use of a similarity index as an outcome measure, recruitment and regeneration, weeds and faunal pest • Two new cultural criteria added. These relate to plant/water holding capacity and soil edaphic features. • Update on development of landform criteria: generally accepted by all present 	<p>Minutes of meeting not publicly available.</p> <p>Interpretation of ER 1.1(d) and 1.2 (d) is ongoing regarding the definition of detrimental impact.</p> <p>The Ranger Mine Closure Plan, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback. For landform; flora and fauna; and, cultural criteria, refer Chapter 6 Sections 6.2, 6.6 and 6.7, respectively.</p>
28/10/16	CCWG meeting 2016_7	CCWG members	<ul style="list-style-type: none"> • Update on development of closure criteria all themes 	<ul style="list-style-type: none"> • Cultural criteria: All the cultural health index criteria have been updated to match that proposed by GAC, the visual connection criteria has been added and a criterion on plant available water has been included in the flora and fauna table. • Water criteria: have been modified to include decision trees. The criteria for 'on the Ranger Project Area' have also changed to that requested by SSB in the Sept 30 meeting to be an 'As Low as Reasonably Achievable' (ALARA) assessment. Finally wildlife drinking water criteria have been removed following a risk assessment process that has been presented in the closure plan. 	<p>Minutes of meeting not publicly available.</p> <p>The Ranger Mine Closure Plan, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback. For water and sediment; and, cultural criteria, refer Chapter 6 Sections 6.4 and 6.7, respectively.</p>
29 – 30/11/16	ARRTC meeting 37	ARRTC members	<ul style="list-style-type: none"> • ERA report and closure update, including: Groundwater drilling program; Surface water model: Closure milestones; Jabiluka revegetation; Trial landform vegetation; Final landform version 5 • Closure criteria as presented in the Closure Plan 	<p>ARRTC noted a lot of the concerns it has raised over the years around groundwater were being addressed; and noted the release of the Ranger Conceptual Model and Ranger Groundwater Workshop as major advances forward in this regard. ARRTC noted there may still not be 100 per cent agreement around certain groundwater issues, but believed there is now a clear and manageable way forward to resolving these. ARRTC commended the work of Intera on the Ranger Conceptual Model (groundwater).</p> <p>ARRTC sought clarification on the relationship between the SSB's Rehabilitation Standards and ERA's closure criteria. SSB explained</p>	<p>Minutes of meeting publicly available.</p> <ul style="list-style-type: none"> • ERA committed to provide ARRTC with a copy of the draft Closure Plan, which includes closure criteria (Chapter 6), once all feedback was addressed, and invite comments from members. <p>Future work committed to by ERA:</p> <ul style="list-style-type: none"> • Additional work to update groundwater models. • Surface water modelling to be undertaken by external experts.

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				that the Rehabilitation Standards represent the Supervising Scientist's view of what is required to achieve the environmental objectives detailed in the Ranger Environmental Requirements. They represent advice, and are not mandatory. In contrast, it is ERA's responsibility to propose closure criteria for the rehabilitation, which, once approved by the relevant Minister, become mandatory. ERA may or may not elect to align its closure criteria with the SSB's Rehabilitation Standards. The relevant Minister will make a decision on whether the closure criteria are approved and, as part of this, will consider the advice of the Supervising Scientist	
11/11/17	CCWG meeting 2016_8	CCWG members	<ul style="list-style-type: none"> All closure criteria 	<ul style="list-style-type: none"> Landform: SSB requested validation process for modelling, suspended sediment criteria will only be possible to monitor following the completion of active management as ERA will be actively trapping sediments (therefore turbidity is not a true reflection of erosion). ERA disagreed. Water and sediment: Discussion over the use of decision trees to demonstrate that objectives are met. Fauna and flora: weed criteria wording to be modified. Further work required regarding fauna criteria. SSB is not satisfied with the current wording of ground cover criteria. 	Minutes of meeting not publicly available. The Ranger Mine Closure Plan, provides the most up-to-date view based on current knowledge, studies and stakeholder feedback. For landform; water and sediment; flora and fauna; and cultural criteria, refer Chapter 6 Sections 6.2, 6.4, 6.5 and 6.7, respectively.
03/05/17	Ranger rehabilitation and closure workshop	Representatives from: DIIS, DPIR, NLC, GAC, ERA, SSB, Geoscience Australia	<ul style="list-style-type: none"> The DIIS presented a draft preliminary framework for the assessment and approval of rehabilitation implementation at Ranger. GAC raise additional matters including: the time-limited nature of the existing regulatory framework and the issue of survivability; critical pathway analysis to track works and contingency; assessment timeframe(s) and facilitation of stakeholder participation. ERA presented on its needs and schedule for decommissioning and rehabilitation, closure strategy for each domain of the RPA and closure objectives. DPIR presented on the parts of the Mining Management Act relevant to rehabilitation and closure. SSB presented on its role in the rehabilitation and closure process. It is aware of time limitations but must ensure that the ERs are not compromised 	Emerging issues were broad ranging, including but not limited to: <ul style="list-style-type: none"> DIIS plans for close-out to be a separate process to rehabilitation approvals. Acknowledgement that the NLC and GAC are consulted throughout the regulatory process via the Minesite Technical Committee. The NLC questioned the robustness of the consultation process if its views could be disregarded under ER 9.4. The resolution of ambiguities in the interpretation and application of ER 9.2 was marked as a critical issue for follow-up. Amendments to the draft rehabilitation applications table to include Ranger 3 Deeps, and approvals timeframes. The level of required technical detail in the separate applications to ensure key elements are adequately addressed. Establishing synergies between the Mining Management Plan and the Mine Closure Plan, as annual updates to both documents is unsustainable. Decision-making process flowchart needs to include a "stop the clock" mechanism. DPIR would be primary approver of any request during assessments. Intergovernmental processes within the framework need to include a set timeframe. 	Minutes of meeting not publicly available. Issues emerging from this workshop particularly relating to the proposed decision-making process, are subject to ongoing stakeholder discussions. The next workshop is scheduled for 13 September 2017. However some issues, have been addressed and integrated into the Ranger Mine Closure Plan.
09-10/05/17	ERA consultants (BMT WBM) and Closure criteria water and sediment TWG	SSB NTDPIR GAC	<ul style="list-style-type: none"> Initial consultation on developing a framework for assessing detrimental impact of guideline value exceedances in terms of Environmental Requirements 	Outcomes of these informal discussions were not minuted.	
25/07/17	ERA consultants (BMT WBM) and Closure criteria water and sediment TWG	CCTWG members	<ul style="list-style-type: none"> Preliminary findings/data of Mg guideline exceedance review and framework for assessing detrimental impact of such exceedances in terms of Environmental Requirements. This work is undertaken by Consultants BMT WBM. 	Discussion centred around: <ul style="list-style-type: none"> The number of water types to be considered the definition of 'different' in the context of biological attributes the use of taxa richness as a measure of environmental impact the definition of detrimental impact level of modelling accuracy 	Minutes of meeting not publicly available. ERA provided a copy of the draft consultant's report to stakeholders for review on 16 August 2017.
10 – 11/08/17	ARRTC meeting 36	ARRTC members	<ul style="list-style-type: none"> ERA report and closure update (including tailings transfer from TSF, Pit 1 active rehabilitation) Ranger conceptual model 	Issues discussed with inputs and sensitivities of conceptual model and geochemical source term.	Minutes of meeting not publicly available. SSB convening a groundwater workshop to review Conceptual Model and models of solute transport from the pits.

Date	Description of engagement	Stakeholders	ERA closure research topics	Stakeholder response/emerging issues	Proponent response and/or resolution
03 – 05/09/17	(SSB led) groundwater workshop	SSB (and various consultants to SSB: SA Dept of Environment, Water & Natural Resources, Office of Water Science, Geoscience Australia; David Jones) GAC, NLC, DPIR, DIIS, ERA & Intera	<ul style="list-style-type: none"> Response to stakeholder questions & discussion on the Ranger Conceptual Model and Solute Transport (from Pits 1 & 3) models. 	Fractures, faults and subsurface pathways, sensitivity of model; geochemical source term, temporal resolution. A summary of the workshop was provided to ARRTC 37 (see below).	Minutes of meeting not publicly available Intera provided 2.5 days of presentations addressing questions provided in advance and during the meeting. Conceptual Model report updated with response to major concerns raised. Additional work scoped to update solute egress modelling to address outstanding concerns. Scope of works provided to stakeholders for input.
16 – 17/05/17	ARRTC meeting 38	ARRTC members & observers from MTC organisations	<ul style="list-style-type: none"> ERA report and closure update (including tailings deposition methods) CCLAA to Gulungul Creek Upper Tributary groundwater plume delineation; GCT2 interception system update; Landform flood modelling to inform sediment/erosion management Revegetation research update & Vegetation understorey trial 	Concerns presented by GAC about lack of (i) specific KKNs for cover design parameters to ensure successful revegetation, (ii) detail on same in Ranger Closure Plan, and (iii) recent research and monitoring programs to support design criteria. Support from members and stakeholders for proposed sediment and erosion controls and planned understorey trial.	Minutes of meeting publicly available. Next ARRTC meeting is to focus on these issues.