

So, you think you're ready? An overview of Rio Tinto's Closure Readiness approach

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Abstract

Although mining is an ancient industry there is limited knowledge, experience, and processes to support the transition of large-scale mining assets from the operational to closure execution phases. This gap presented a significant challenge for Rio Tinto with several assets scheduled to cease operations and transition into closure execution within the space of 12 months. In preparation for the emerging pipeline of asset closures Rio Tinto formed a dedicated global business unit for asset closure across the Rio Tinto portfolio, within which was established a Closure Readiness function. This paper outlines the Closure Readiness approach that Rio Tinto has developed to transition an asset safely and efficiently to the closure execution phase, while establishing the plan of action to realise the closure objectives. Application of the process has led to consistency, cohesion, transparency, and development of leading practice across Rio Tinto assets which continues to facilitate the optimisation of closure execution.

Keywords: mine closure, closure readiness, closure preparedness, closure execution, transition

1 Introduction

Mining is an ancient industry that is inextricably linked to the evolution of human civilisation; there has been significant advancement in mining practices and standards through time. Mineral resources are finite and therefore exhaustion and mine closure are not new, however successful closure execution in the modern era of increased Environmental, Social and Governance (ESG) expectations is an area of limited experience across the industry (Boggs et al. 2022). Across the globe the number of mine closures are forecast to increase markedly in the coming years, in 2018 the International Council on Mining and Metals (ICMM) surveyed its members and found that of the assets that responded more than 40 per cent are expected to close over the next 25 years (Brock & Stevens 2021). Extensive knowledge has been built on mine closure planning processes, technical aspects such as environmental studies and cost estimation, learnings are emerging on the social facets of closure, however there is limited guidance available on the operationalisation of large-scale mine closure execution. In addition, detailed mine closure studies and closure readiness are emerging fields where there is the opportunity to build capability and capacity.

Rio Tinto operates across six continents, in 35 countries and has more than 54,000 employees. To produce aluminium, copper, diamonds, gold, industrial minerals and iron ore, Rio Tinto owns and operates open pit and underground mines, mills, refineries, smelters, power stations, research and service facilities, and to deliver materials to its customers, Rio Tinto uses its own railways, ports and ships. Rio Tinto's business structure is comprised of four Product Groups (Aluminium, Copper, Minerals and Iron Ore) which are complemented by Development and Technology, and Commercial groups, as well as service and support functions. Due to Rio Tinto's large-scale, communication, processes, and standardisation are key to efficient operation and unlocking value. At the end of 2022, closure provisions on Rio Tinto's balance sheet totalled USD 15.8 billion.

In 2018 Rio Tinto foresaw that an increasing number of assets within their portfolio were scheduled to cease operations and move into closure execution over the next ten years. While detailed closure planning was

underway, Rio Tinto recognised it had limited large-scale closure execution experience, and the need to better prepare the business for the transition. To address the emerging pipeline of asset closures, Rio Tinto formed a dedicated global business unit to manage asset closure across the Rio Tinto portfolio. The Rio Tinto Closure (RTC) business safely transforms Rio Tinto's end of life mining, processing, and infrastructure assets. Through the Rio Tinto Closure Framework and supporting company standards, governance and assurance processes, the team collaborates with all parts of Rio Tinto across the asset life cycle to embed closure into the life of the asset; optimise closure execution; enhance Rio Tinto's reputation and growth; and minimise long term risks and realise value. Core to this is focusing on social outcomes at the end of the asset's life and its transition to next use. As described in Kalisch and Dunow (2022) this programmatic approach is enabling the realisation of many opportunities such as improved governance, performance, standardisation, and continuous improvement.

Rio Tinto's central model for closure execution relies on collaborative partnering between Rio Tinto Closure, the operational Product Group (PG) and Rio Tinto Projects (RT Projects) and is designed with the closing asset transferring from the Product Group to Rio Tinto Closure upon the cessation of operations (Figure 1). This model ensures closure execution is overseen by a team with the necessary capability, experience and focus and allows the Product Groups to concentrate on safe production. However, each asset is unique and, in some instances, due to factors such as advanced local closure execution experience or the integrated nature of the asset, it may make sense for the Product Group to retain the asset; there is flexibility within the closure framework to facilitate this alternate model. In 2018 the assets scheduled to transition into closure execution were at various levels of closure planning maturity, few assets had transitioned into closure execution to date and therefore there was limited detailed closure readiness corporate knowledge and experience, and significant change management was required to support asset transfer. To manage these challenges the Closure Readiness approach was created.

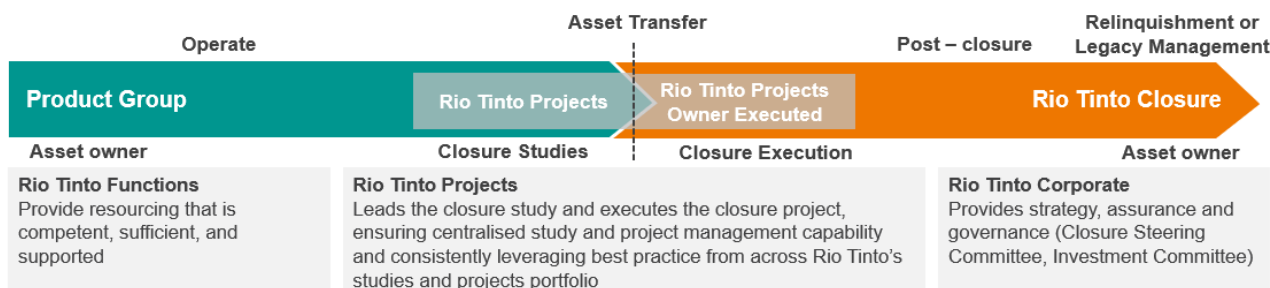


Figure 1 Rio Tinto asset closure accountability central model

Rio Tinto defines closure readiness as all preparatory activities required to safely and efficiently transition an asset to the closure execution phase while establishing the plan of action to realise the closure objectives. Closure Readiness bridges the operations and closure execution phases, de-risks and optimises closure execution and cost, based on learnings and best practice. The closure readiness approach presented in this paper has been developed from Rio Tinto's experience to date and is a "typical" framework, as each asset is unique and different factors influence the timing and context of closure. The approach was designed for large-scale, whole site closures, but has been successfully adapted for smaller, partial site closures (e.g. pit or specific infrastructure). The approach design also allows for adaptation for other asset phase transitions, such as to monitoring and maintenance, and post-relinquishment.

Since 2018 closure readiness planning and implementation has been undertaken for several Rio Tinto assets including:

- the Gove Aluminium Refinery and Residue Disposal Areas, part of Rio Tinto's bauxite mining operations located in East Arnhem Land in the Northern Territory of Australia, which permanently

ceased operations in 2017. The balance of the Gove mining operation and appurtenant facilities remain under operation.

- the Argyle Diamond Mine located in the Kimberley region of Western Australia which ceased operations in November 2020.
- several operating mining and processing assets across Canada, Australia and New Zealand that are preparing for the cessation of operations.

The work completed to date has enabled the development of a closure readiness approach to facilitate internal consistency, cohesion, transparency, and development of leading practice across Rio Tinto. The approach will continue to mature as it is refined based on learnings from its application. The Rio Tinto Closure Readiness approach is aligned with the principles of the Anglo American Mine Closure Toolbox (Grant & Botha 2019) and the International Council on Mining and Metals (ICMM) Closure Maturity Framework that was released in 2020 (ICMM 2020). Rio Tinto's Closure Readiness approach and examples of its application are the subject of this paper.

2 Methodology

Development of the Rio Tinto Closure Readiness approach commenced by leveraging existing business processes and experience in operational readiness, mergers and acquisitions, and divestments. A skeleton approach was developed and applied at assets, and then built out as tools were developed and learnings fed back. Dedicated closure readiness resources at each asset led development and implementation of the approach but relied heavily on a multi-disciplinary integrated team to develop and guide the tools and content. Document reviews, interviews and workshops were completed to distil lessons learnt to date from assets that had transitioned into closure execution and this information was used to produce the refined process presented in this paper. As each site's closure context is different and closure readiness is relatively nascent, the approach taken was to develop guidance with a framework and real examples for application, rather than a detailed mandatory process.

3 Closure readiness

Rio Tinto defines Closure Readiness as all preparatory activities required to safely and efficiently transition an asset to the closure execution phase while establishing the plan of action to realise the closure objectives. Each asset is unique and factors such as time remaining until closure, technical and environmental risk, socio-economic and community impact, ownership structure, complexity and scale must be considered to tailor the closure readiness approach and develop the appropriate site-specific methods, scope and timelines. Rio Tinto's Closure Readiness approach is composed of five components (Figure 2):

1. **Governance and Strategy:** Provide governance and oversight across closure strategy, closure readiness activities and integration with broader business decisions. Ensure progression of the asset closure strategy including agreement on closure end state, outcomes and criteria as well as improvement of the closure knowledge base.
2. **Operating Philosophy:** With closure approaching, the asset operating philosophy should adopt the closure values and vision whilst maintaining operational performance. Closure to be embedded in operational decision making to optimise long-term savings and facilitate closure outcomes, including establishing closure metrics, key performance indicators (KPIs) and priorities aligned with closure objectives.

3. **Transition to Closure:** A framework to support successful change from the operations to closure execution phases, including the execution of essential pre-closure activities with long lead time that facilitate and de-risk the transition.
4. **Closure Studies:** Complete detailed closure planning that identifies, scopes (engineering, resources, timeline) and optimises closure outcomes and post-closure land use in relation to environmental, social, financial, and reputational drivers.
5. **Asset Transfer:** The handover of organisational accountability of the asset from the Product Group to Rio Tinto Closure (only applicable to those assets transferring to Rio Tinto Closure for closure execution).

The components are described in further detail in Sections 3.1 to 3.5 below.



Figure 2 The five components of Rio Tinto's Closure Readiness approach

Based on Rio Tinto's experience and in line with the move from conceptual closure planning into detailed closure studies, closure readiness activities are designed to commence around twelve years from the scheduled cessation of operations, then ramp up around six years out with convergence into one central case closure strategy. There is an increase in activity intensity from three years out, with the detailed transition and transfer planning and implementation needed to facilitate the asset transitioning into closure execution, and which ends approximately one year after the transition, once the asset has been embedded in the closure execution phase (Figure 3).

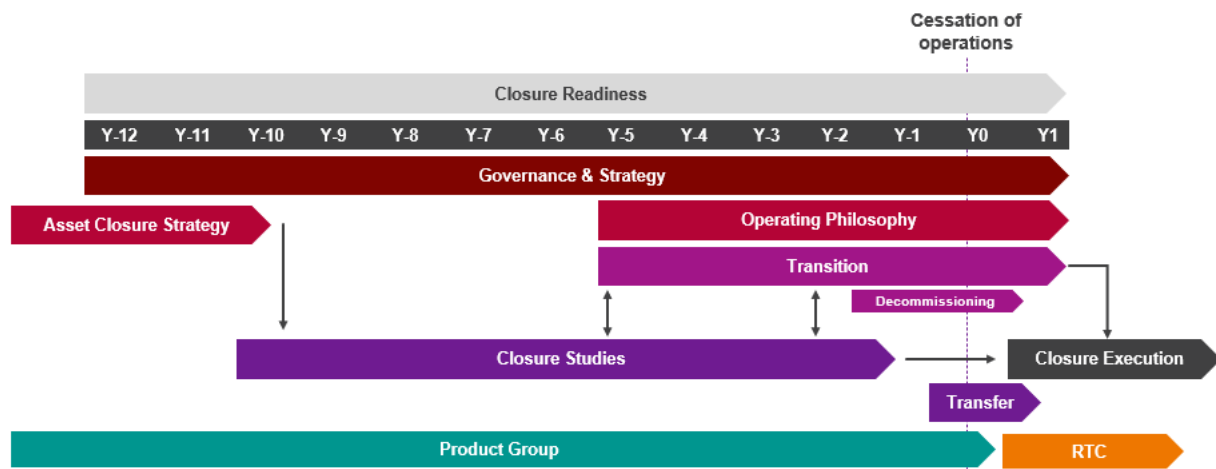


Figure 3 Indicative timeline of Rio Tinto's Closure Readiness approach

Rio Tinto's Closure Readiness approach has been captured in a framework, supported by guidance documents, tools and worked asset examples, and can be accessed by all employees. The key closure readiness deliverables are a fully resourced and budgeted Closure Readiness and Transition Execution Plan and transition criteria that have been agreed between the current operations and closure asset manager. The approach can also be used to prepare for the transition from closure execution to the monitoring and maintenance phase, and the transition to relinquishment, where relevant.

Rio Tinto's current approach involves a centralised closure readiness subject matter expert resource to continually improve the process, drive collaboration through a community of practice, provide closure readiness support to Product Groups and help build internal closure readiness capability and expertise. Once closure readiness activities ramp up at each asset, dedicated closure readiness resources are allocated to undertake the detailed planning and implementation.

From Rio Tinto's experience to date, common themes have emerged which reinforce the importance of being ready for closure, they include: the need to understand and address technical and stakeholder complexities specific to the asset; and complexity associated with developing an accurate estimate of workload and time required to prepare assets for the transition into closure execution. Since the development of the closure readiness approach, assets approaching closure are more prepared for the transition and the foundations have been laid for the achievement of closure execution objectives, however, there remain opportunities to improve and therefore we are partnering with our stakeholders and striving to refine our closure readiness approach.

3.1 Governance and strategy

To be successful, closure must have a clear strategy supported by strong governance. The closure strategy remains the central pillar that encompasses and consolidates all key information and thinking regarding the asset closure. Progressing the closure strategy is the Product Group's responsibility and fundamentally includes completing the following in accordance with the Rio Tinto Closure Standard:

- Closure outcomes: Determine and regularly challenge the asset closure vision and associated outcomes to manage the social, environmental and financial risks associated with permanently ceasing operations. This includes a good understanding of the closure end state as well as detailed closure acceptance criteria.
- Closure plan: Perform a periodic review of the closure plan to ensure it reflects current strategy and includes all the latest insights, assumptions, options, costs, knowledge base and required actions pertaining to all aspects of closure and post-closure. The plan must include a clear description of the closure execution model and associated high level areas of accountabilities.
- Closure provision: Ensure the closure cost estimate is an accurate estimate of closure costs reflecting the latest closure plan and is linked to the asset's financial planning.
- Strong external partnerships: Maintain strong partnerships with communities, regulators and local governments through transparent and genuine engagement, including agreement on closure end state, criteria and outcomes.

Although the asset maintains closure governance throughout the operational phase with the aim of progressing and integrating the asset closure strategy, this work becomes even more detailed and will require more support as the asset approaches closure. Closure governance should be integrated with broader business decision making to ensure impacts on closure are considered and to enable the optimisation of business value (ICMM 2019). A governance board should be formed and supported by a clear charter, that outlines decision making processes, and a memorandum of understanding is recommended where co-

commitments for resources have been made between internal divisions. The company structure must be considered in the design of the governance model e.g. ownership structure, review and consideration should be given to change management, assurance, risk, ethics and compliance. Figure 4 shows a generic example of a closure readiness governance model.



Figure 4 Generic closure readiness governance model example

3.2 Operating philosophy

With the approaching asset closure, it is important that the asset culture and decision making reflect the upcoming challenges and risks associated with cessation of operations, closure execution and post-closure monitoring and maintenance. The asset must not only ensure it maintains operational performance during this period, but it must also introduce a modified operating philosophy in these last years to ensure closure is set up for success. This can be achieved by providing a clear vision for the asset workforce beyond operations, working towards a common purpose, promoting innovation and entrepreneurial mindset, and ensuring leaders embrace closure as a continuation of the asset lifecycle.

Closure can be embedded into decision making to facilitate closure outcomes and optimise savings by:

- Ensuring the Product Group and Rio Tinto Closure have a shared understanding of the closure execution scope, schedule and model.
- Ensuring decision makers have a thorough understanding of the potential implications of decisions on closure.
- Integrating closure considerations into the management of change process.
- Integrating closure objectives and actions with operating plans.
- Establishing a strong partnership between the Product Group and Rio Tinto Closure.
- Establishing KPIs that balance operational and closure requirements.
- Ensuring employees understand their closure responsibilities.

Preparing for the cessation of operations and the transition into closure execution required a change to the existing organisational mind set at Argyle, this was achieved via the 'Honouring Argyle's Story, Closing With Pride' program. Leadership, characterised by a clear vision, with honest and transparent communication and a caring approach was key to the success of the program and in changing the workforce culture to support the specific context of closure. Implementation of the program resulted in improved operational performance, safe execution of the 'make safe' phase and a smoother transfer to Rio Tinto Closure.

3.3 Transition to closure

The asset transition process is a step-by-step change management approach designed to facilitate the transition of an asset from the operational to the closure execution phase. The process includes six steps and provides a structure to effectively and efficiently manage the transition (Figure 5). The objectives of the transition include: preparing the asset for closure execution; streamlining the asset to be lean, fit-for-purpose and efficient for closure execution; and safely ceasing operations and completing decommissioning. For the asset transition process to be successful, all internal stakeholders, including the Product Group, Rio Tinto Closure, Rio Tinto Projects and functional teams work together to achieve the closure vision and objectives. It is also important that where possible the asset transition process aligns and takes advantage of potential synergies and opportunities with the closure feasibility study.

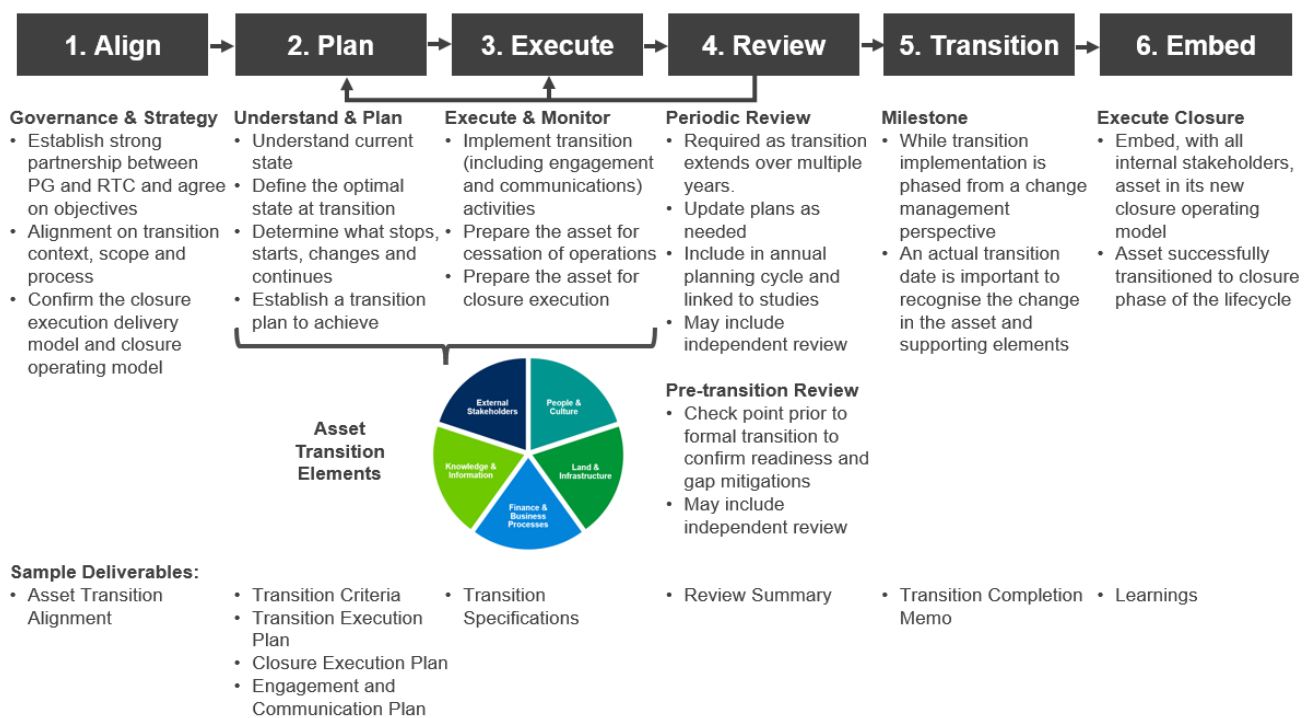


Figure 5 Rio Tinto six step Transition to Closure planning process

To facilitate the process and provide a standardised approach for steps two and three shown above, closure transition has been structured as five elements, the elements are described in more detail in the next sections of this paper (Figure 6).

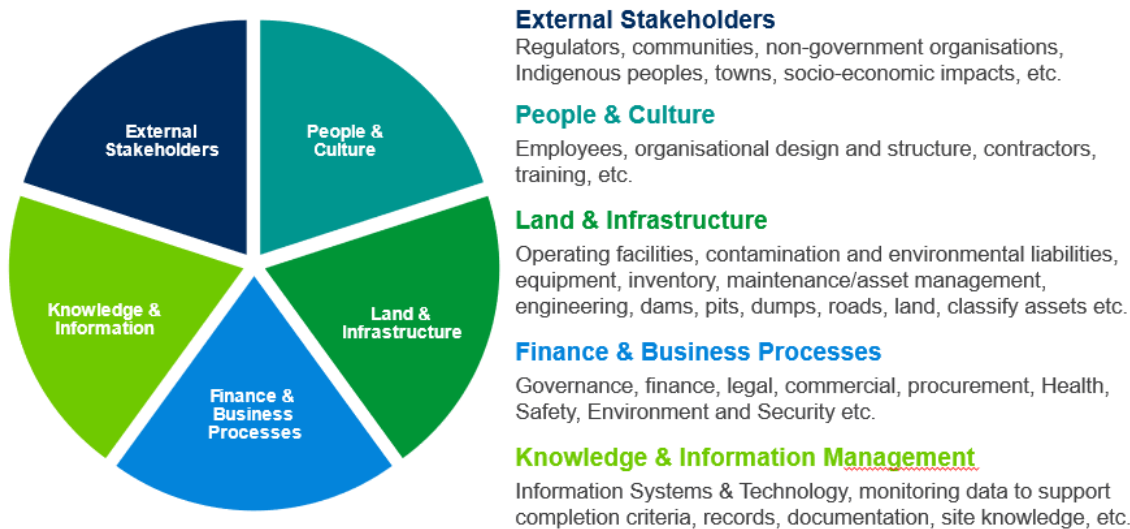


Figure 6 The five Rio Tinto Transition to Closure planning elements

A detailed Work Breakdown Structure (WBS) has been developed to align with each element and is used as a “checklist” to determine which elements are relevant for the asset given its context. The WBS checklist enables transition assessments to be conducted for each business area to determine:

1. As is – current approach.
2. To be – future planned requirements in next closure phase.
3. What stops, starts, changes and continues.

The information collected is used to develop the asset Closure Readiness and Transition Execution Plan and identifies opportunities for simplification and efficiencies in closure execution.

High level transition planning should commence approximately five years from the planned cessation of operations and the work, effort and resources required over this time horizon depend on the asset context including knowledge base, long lead enablers, closure outcome and closure execution model. Although some long lead enablers such as regional economic development planning, local business capability and capacity building, and environmental studies could require decades, detailed transition planning and implementation will typically ramp up three years prior to the planned cessation of operations parallel with the closure feasibility study. The process should end approximately one year after the cessation of operations, once closure execution is progressing steadily and all transition risks are being adequately managed.

3.3.1 External stakeholders

As with all other phases of an asset’s life cycle, external stakeholders play a critical role in closure. The management of relationships, knowledge and agreements with all external parties must be front of mind throughout closure readiness and transition activities. The Rio Tinto Communities and Social Performance Standard and supporting procedures and guidance are applied through this transition. Where possible the transition of individuals and teams who hold the relationships and execute the work in this area during the operational phase should remain and transition into closure execution. Existing engagement plans, agreements, approvals, permits, and knowledge base are critical inputs into the transition. Integration with the closure study is a key consideration and typically the outcomes of the transition decision process would be captured in the Stakeholder Engagement Plan which is refined throughout the asset lifecycle. Table 1 shows the work breakdown structure checklist which should be reviewed and considered during External Stakeholder transition planning.

Table 1 External stakeholders work breakdown structure checklist

Level 2	Example Considerations
Stakeholder engagement strategy and communication plan	Relationship ownership, tracking and record keeping, stakeholder engagement capability and capacity
Landowner, community agreements and commitments	Land access protocols, agreement on post-closure land use and key closure outcomes
Gifts and donations strategy	Identified approach for distribution of goods from closure
Regional economies and infrastructure	Local business capability mapping, local contracting strategy
Socio-economic impact management	Regional transition plan, towns, accommodation, civic infrastructure and services
Social investments, sponsorships	Social investment plan and understanding of community dependencies
Cultural Heritage	Management plan for cultural heritage during closure execution
Regulatory requirements	Legal and other requirements register, Mine Closure Plan updates, regulatory reporting
Lease and tenure management strategy	Relinquishment strategy

Stakeholder engagement in readiness for closure at Gove is a great example of how we need to start talking about closure as early as possible with community and government representatives, and ensure we understand the expectations of our stakeholders. Engagement with the Traditional Owners is important in the case of Gove, as once Rio Tinto relinquishes its leases the land will be returned to them. Bauxite production at Gove is expected to cease later this decade. The Gove Peninsula Futures Reference Group was formed in 2019 to support the region's positive future and includes members from Traditional Owner organisations Rirratjingu Aboriginal Corporation and Gumatj Corporation Ltd, together with the Northern Land Council, the Northern Territory Government, the Australian Government and Rio Tinto. The closure readiness components, with a particular focus on regional economic transition planning, continue to be implemented at Gove, in partnership with the Gove Peninsula Futures Reference Group to facilitate realisation of the closure outcomes.

3.3.2 People and culture

Change, and particularly major change as experienced in closure, impacts each person and each will have differing responses that will be expressed and experienced in varying ways. The key objectives for the people and culture workstream are to enable the development of an integrated (i.e. aligned between operations and closure execution) strategy that manages the impact of the transition to closure on our people and ensures that the right skills are engaged and available for closure execution. Critical to successful transition related to people and culture is early alignment on the delivery execution model, an employee communications and engagement plan, a workforce plan including resource requirements and an employee support program. Work on this element ideally commences between three to five years from the date of cessation of operations, to provide sufficient lead time to develop and implement people strategies and effective mitigations.

Integration with the closure study is a key consideration and typically the outcomes of the transition decision process would be captured in the Employee Relations Management Plan which would be a study deliverable

to be implemented during transition and closure execution. Table 2 shows the work breakdown structure checklist which should be reviewed and considered during People and Culture transition planning.

Table 2 People and culture work breakdown structure checklist

Level 2	Example Considerations
Culture and ways of working	Adjusted vision and purpose
Employee communications and engagement plan	
Employee support program	
Accountability model and governance	Define governance structures
Organisational Design	Rosters, functional and technical support, core services
Employee Relations, Remuneration, Reward and Benefits	
Capability development	
Workforce and retention planning	Headcount planning, retention and redeployment strategies, succession planning
Recruitment and Attraction	
Contractor management	Partnerships, capacity and capability development
Human resources information systems	

Argyle is an iconic Australian mine and for some employees it represented a near lifetime of their career. Argyle began operating in 1983, moving to underground mining from 2013, with a known likely end date of 2021, and therefore the Argyle team were aware over several years that the end of the mine was imminent. To support the approaching cessation of operations, Rio Tinto developed a closure employment strategy known as 'Life After Argyle' that provided each individual employee with career coaching to allow them to decide what they wanted to do when their time at the mine came to an end. This enabled people to make informed decisions from the available options of: reassignment at the asset for closure execution; redeployment to another Rio Tinto site; retirement; alternative employment; or entrepreneurial ventures. Respecting people's preferences, and the fact that these were often fluid, and providing equal support frameworks across all the option streams was key to the success of the program. The program proved very effective in the last years of operations and contributed to marked improvements in employee satisfaction and retention, and safety and production performance. The program has been refined to incorporate learnings from Argyle and renamed My Future Plan and can be tailored to support closure transition planning at other Rio Tinto assets.

3.3.3 Land and infrastructure

The land and infrastructure element considers all the plant, equipment, services and physical features related to the asset and ensures each asset has a robust strategy to achieve its closure outcome. Typically, this is the element with the most mature thinking as it is often the focus of progressive closure and closure studies. Progressive rehabilitation and early closure activities are key to this element and should consider the management of: contaminated sites; waste; water; tailings; progressive rehabilitation; redundant facilities; buffer land and carbon credits. Completing these activities during operations has many benefits such as tax concessions, managing cash flow, reducing uncertainty by trialling methods, increasing the accuracy of

closure costs estimates, building trust with external stakeholders and ultimately optimising overall business value (ICMM 2019).

A current land and infrastructure inventory for the asset closure scope area is critical and must be complimented by an asset health assessment. This information is used to determine the agreed closure outcome for each specific infrastructure asset and should be aligned with the asset's post-closure land use, pathway options include: retain for closure execution and/or monitoring and maintenance phases; retain for transfer to external third party; demolition; or disposal. Asset management strategies during the operations phase that consider closure execution and monitoring and maintenance timeframes are important to optimise closure costs.

To provide transparency and limit rework, one live infrastructure asset retention register in the form of a decision-making register outlining the assets to be retained for closure should track key decisions, changes, and discussions. Handover criteria documents agreed between the Product Group and Rio Tinto Closure are critical to record which assets are being retained and the decommissioning and handover condition.

When an asset is intended to be transferred to an external third party there must be clear agreement on the condition of the asset at handover and Rio Tinto needs to determine the true cost associated with satisfying these requirements. Donations and gifting processes to an external third party must consider the sustainability and management of the asset after it has been gifted, for example does the third party fully understand the cost of, and do they have the resources to support, the ongoing asset maintenance.

To support infrastructure asset demolition a clear agreed plan for asset decommissioning and de-energisation is necessary no less than two years prior to the cessation of operations. De-energisation refers to the removal of an energy source, or potential energy source, from an asset or piece of equipment and includes various energy types including electrical, mechanical, potential, nuclear, magnetic and chemical. It is recommended that a power strategy and de-energisation plan form part of the execution and transition planning for safety purposes, even if the operating asset is not completing the de-energisation activities. This plan should clearly state accountabilities, including statutory roles, instructions on how the assets are to be de-energised, piping and instrumentation diagrams, site maps and asset locations, relevant electrical drawings and air gap locations. This will form part of the handover documentation to the demolition contractor.

Disposals of items such as mobile equipment, warehouse inventory and fixed assets represents an income stream and supports ESG elements by enabling reuse of existing items, it must be supported by a robust process to integrate with demolition and optimise the opportunities.

The Care, Custody and Control process is a defined process tailored to the asset's legal context, closure execution model and accountability strategies that enables the transfer of an area to another party, such as transfer to a demolition contractor to start works, or transfer to a third party. The process considers factors such as physical battery limits, ownership, government approvals, regulatory requirements, operating and maintenance documentation and health, safety and environmental management.

Table 3 shows the work breakdown structure checklist which should be reviewed and considered during Land and Infrastructure transition planning.

Table 3 Land and infrastructure work breakdown structure checklist

Level 2	Example Considerations
Asset assessment and agreement on outcome	Classify assets (demolish, retain for closure execution or handover)
Asset disposals and gifting	Sale, disposal, gifting strategies
Assets for demolition	Decommissioning, de-energisation, decontamination
Assets to be retained	Operating strategies (process, skills, equipment), condition assessments, asset management, warehouse and inventory management (parts), IS&T hardware, comms infrastructure, landfill facilities
New assets to be constructed	Operating strategies (process, skills, equipment), asset management
Assets to be transferred to Third Parties	Asset condition handover criteria, legal assessment and contract, operating strategies (process, skills, equipment), asset management
Progressive rehabilitation and early closure activities	Rehabilitation trials, progressive pit backfill, waste disposal, contaminated site remediation, redundant infrastructure demolition
Care, custody and control process	To enable safe transfer of an area
Site Access during execution	Haul and access road network

An example of the application of the land and infrastructure element is the safe decommissioning process termed 'Make Safe', implemented at Argyle for process plant assets that were to be handed over from the Product Group to Rio Tinto Closure as they were scheduled for demolition. The process was developed with the operations team and involved: confirmation of the specific assets to be demolished, asset condition assessment and specification, a make safe resourcing plan (e.g. specialist contractors), identification of new or unusual tasks to be risk assessed and managed, a plant run down and clean out plan and a de-energisation plan. The key learning from the Argyle experience is that the make safe period is critical and best completed by operations personnel who are most familiar with the infrastructure assets, with involvement from the parties who will be responsible for the future of the asset e.g. demolition contractor.

3.3.4 Finance and business processes

Finance and business processes required to support the running of the asset must be considered when planning the transition from the operations to the closure execution, and monitoring and maintenance, phases. Project controls and administration are typically not in place during operations but are critical for closure execution due to the project nature of the work. The establishment of resources, processes and tools is essential and the approach to be implemented should be aligned to the closure execution model. Table 4 shows the work breakdown structure checklist which should be reviewed and considered during Finance and Business Processes transition planning.

Table 4 Finance and business processes work breakdown structure checklist

Level 2	Example Considerations
Governance and Strategy	Business and asset closure strategies, assurance, risk, ethics and compliance
Legal	Legal entities, company structure, tenure, leases, permits and approvals, Indigenous peoples agreements, litigation, statutory roles
Finance	Statutory management and corporate reporting, taxation, provision management, valuation and closure modelling, budgeting, insurance
Procurement and contracts management	Procurement and contracts, inventory and warehousing
Projects Controls and Administration	Scope, cost and schedule management, document management and control
HSES	Strategy, culture and leadership, HSEQ management system
Sales and marketing	Remnant product
Business IT systems	SAP

During Argyle closure transition planning it was identified that an inventory of diamonds remained unsold and following engagement between the Product Group, Rio Tinto Closure and the Rio Tinto Diamonds Sales and Marketing function it was agreed that the latter team would manage the Argyle Pink Diamond trademark and sales during the closure execution phase. Leveraging the existing commercial team and infrastructure, a successful marketing campaign turned the mine closure to its advantage and branded the 2021 Argyle Pink Diamonds Tender titled 'The Journey Beyond' as the last opportunity to own the rarest diamonds. From 2000 to 2020, the prices of pinks sold at the annual tender had increased by 600 per cent, and the 2021 tender saw this trend continue, achieving record-breaking figures. This is an example of how the closure readiness approach is driving the inclusion of broad business considerations in asset closure preparations.

3.3.5 Knowledge and information management

As with all other phases of an asset's life cycle, the management of information and the supporting systems and infrastructure are critical, particularly with the large loss of company knowledge experienced as most of the operational workforce depart on the cessation of operations. The transition into closure execution enables: those data elements and systems no longer required to be archived with a focus on enabling access to historical information; refinement of data collection and management required to enable closure execution and meeting of completion criteria; and the identification of the systems and infrastructure required to support closure execution and the monitoring and maintenance phases. A document and record management process needs to be maintained until asset relinquishment and must satisfy legal and corporate requirements. Table 5 shows the work breakdown structure checklist which should be reviewed and considered during Knowledge and Information Management transition planning.

Table 5 Knowledge and Information Management work breakdown structure checklist

Level 2	Example Considerations
Knowledge and information acquisition and retention (physical and digital)	Record retention, destruction and retrieval requirements (physical and digital), completion criteria data management, spatial data management, long term storage/access approach
Artwork disposal process	Artefacts, paintings, memorabilia, photographs
IT infrastructure planning	Business and technical systems, networks, applications, access
IS&T monitoring and maintenance strategy	Support and maintenance of IS&T applications and infrastructure, licence management
Functional support and recharges	Shared services

As make safe and decommissioning activities took place at the Argyle mine site, numerous pieces of artwork were collected from various site and corporate offices. The definition of 'artworks' in this instance was broad and covered a wide range of items, including artefacts, paintings, various plaques and memorabilia, framed photographs and canvas prints. A detailed inventory of the artworks with photographs and descriptions was developed and enabled an archaeologist and communities specialist to categorise each item. An artworks disposal process was created that required a tailored approach for certain items, mainly artefacts and paintings, that required consultation with Traditional Owners to ensure the items were returned to the right people under a transparent process. The balance of the items was disposed of using a fair and equitable process whereby expressions of interest were sought from Argyle employees and contractors through an online platform to afford interested individuals opportunity to view and obtain the items. The Argyle experience has enabled Rio Tinto to develop an artwork disposal procedure that can be tailored to support closure transition planning at other Rio Tinto assets.

3.4 Closure studies

Study delivery is the progressive evaluation of an asset closure project through the stage-gated study phases as detailed in the Rio Tinto Major Projects Development Guidance Note and Closure Study Definition Guidance Note. The study phases progressively increase the confidence in the technical, economic and ESG development parameters of a proposed project and are fundamental for Rio Tinto to determine whether a project meets Rio Tinto Group investment criteria.

A study aims to evaluate the risks and develop a robust business case as it progresses through the appropriate reviews and approvals of each phase. The study delivery process applies to all major projects and focuses attention on the optimal management of study phases, successfully preparing for the project execution phase and handover to the business. The study delivery process is conducted over three phases in the major project development life cycle for closure studies including Order of Magnitude (OoM), Prefeasibility (PFS) and Feasibility (FS). Within Rio Tinto closure studies are the vehicle for the progression of detailed closure planning, they culminate in the production of the closure execution plan and closure cost estimate, and ultimately facilitate investment approval.

3.5 Asset transfer

Rio Tinto's central model for asset closure execution involves assets transferring from the Product Group to Rio Tinto Closure upon cessation of operations. The asset transfer process has been created to assist this transfer and is defined as the handover of organisational accountability for an asset from the Product Group to Rio Tinto Closure. The process is intended to be a flexible guide to prompt what decisions may be required to fulfil a transfer and not a detailed plan to be followed. It is important to ensure asset transfer occurs promptly to avoid unnecessary business risks, typically once the business is aligned the asset transfer can

occur in approximately 90 days. The five transition to closure elements described above also apply to asset transfer planning.

The asset transfer process has three phases as shown in Figure 7:

1. **Align:** involves investigating and agreeing on the transfer scope, timing, resourcing requirements and asset risk profile, with the development of a memorandum of understanding between the Product Group and Rio Tinto Closure.
2. **Deliver:** involves developing and executing a detailed transfer action plan that identifies activities, accountabilities and timeframes and an internal and external engagement and communication plan. The asset transfer plan should consider the implications of the following elements: Governance, External Stakeholders, People and Culture, Land and Infrastructure, Finance and Business Processes and Knowledge and Information Management. A change management plan is a key deliverable of this phase.
3. **Transfer:** asset accountability is handed over from the Product Group to Rio Tinto Closure with the execution of the change management plan and issue of the asset transfer memo. The change is embedded with the commencement of steady state operation of the transferred asset. Lessons learnt during the transfer phase are captured and used to refine the process.

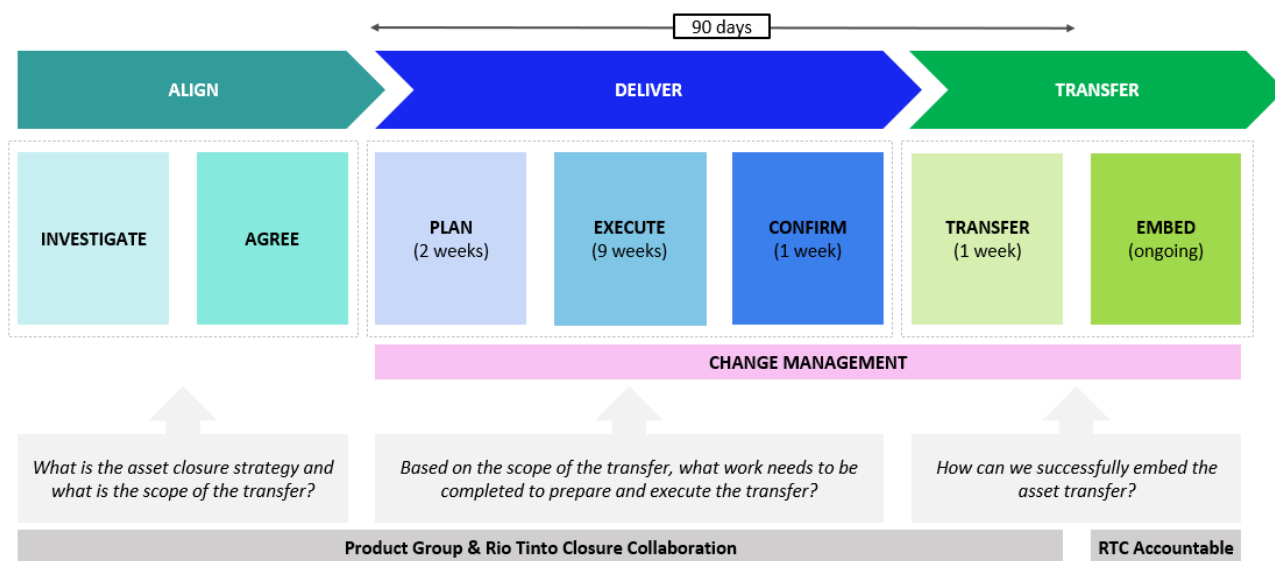


Figure 7 The Rio Tinto Closure Readiness Asset Transfer Process

The Gove closure program is one of Rio Tinto's largest and most complex projects, the refinery demolition alone is currently the largest demolition project in the Southern Hemisphere and is expected to take approximately 10 years to complete. In 2021 the Aluminium Refinery and Residue Disposal Areas transferred from the Product Group to Rio Tinto Closure, the transfer was supported by an extensive asset transfer planning and implementation process, made even more complex as the Product Group will continue to operate the adjacent bauxite mine. The transfer process described above was implemented, it included key instruments such as a Responsible, Accountable, Consulted and Informed (RACI) matrix between the internal Rio Tinto groups, and enabled a safe, efficient and effective handover of organisational accountability.

4 Conclusion

Since 2018, Rio Tinto has undertaken closure readiness planning and implementation on several assets, had assets safely and efficiently transition from the operating to closure execution phase and currently has assets well progressed into closure execution. Over this time a closure readiness approach was established, supporting tools developed, and capacity and capability has been built throughout the business. The work completed to date has enabled the development of the closure readiness approach described above to facilitate consistency, cohesion, transparency, and development of leading practice across Rio Tinto. Each asset is unique and factors such as time remaining until closure, technical and environmental risk, socio-economic and community impact, ownership structure, complexity and scale must be considered to tailor the closure readiness approach and develop the appropriate site-specific methods, scope, and timelines. The approach is still developing and subject to continuous improvement as we learn from its ongoing application. The implementation of the closure readiness approach at Rio Tinto is helping to bridge the operations and closure execution phases, de-risk and optimise closure execution and facilitate realisation of closure outcomes. It is hoped other industry members can use the approach presented in this paper to assess how ready their assets are to transition into closure execution, and act as required to facilitate realisation of their closure objectives.

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