25 Mine Closure

25.1 Introduction

This chapter of the Simandou Mine SEIA addresses the closure of the Simandou Mine, including the cessation of operations, decommissioning of plant and equipment, rehabilitation of land, and post-closure management and use of the mine site. As explained in Chapter 2: Project Description, the mine is envisaged to have an operating life of at least 45 years. Closure will commence at Pic de Fon after approximately 25 years and at Ouéléba after approximately 45 to 50 years, and will therefore take place progressively during the latter part of the mine operations.

The impacts of decommissioning and closure of the mine on the physical, natural, cultural and socio-economic environment have been assessed in preceding chapters of the report. This chapter provides a high level summary of those impacts and how they will be mitigated as part of the closure strategy for the mine.

The remainder of the chapter is structured as follows.

- Section 25.2 provides an overview of the area of influence and reviews legal and other requirements relevant to closure (1).
- Section 25.3 provides a summary of closure impacts identified by the SEIA and identifies specific mitigation measures that have been identified to date for inclusion in the Mine Closure Plan.
- Section 25.4 presents the planned Closure Strategy and proposals for the Mine Closure Plan, including more detailed sub-plans that will incorporate the specific mitigation measures identified in Section 25.3.
- Section 25.5 provides a summary of findings.

It must be emphasised that as closure will not commence for many years, the identification of mitigation measures is only indicative at this stage. The need for specific measures will be regularly reviewed as the Project proceeds and a Closure Strategy and detailed Mine Closure Plan will be developed and kept up to date as the Project progresses through the various stages of development and completion of each phase of operations.

25.2 Approach

25.2.1 Study Area

The Closure Strategy and Closure Plan will apply progressively to the whole area within which mining activities are undertaken including both Pic de Fon and Ouéléba mine pits, their waste emplacements, conveyors, haul and access roads, the mine process plant area, the workshop area and offices, the stockyard and the mine camps. They will also include any other facilities and services in nearby villages and towns built to support the development and operation of the mine, and owned and managed by the mine. These last will be included in the strategy and plan but it is envisaged that they will have been transferred to private or state ownership at an earlier stage and will remain in place after the end of mining. Rio Tinto’s Closure Standard (see Section 25.2.2) requires that where the ownership of assets or the responsibility for services is transferred to other parties, this is done in a managed way and that adequate capacity and resources are in place for their continuation.

The Simandou Railway and Port are excluded from the Mine Closure Strategy and Mine Closure Plan as ownership and operation of these assets will have been transferred to the Republic of Guinea prior to closure of the mine. However, their handover will be undertaken in a manner that is consistent with the requirement

(1) The approach to prediction and evaluation of closure impacts is described in the preceding chapters dealing with each type of impact.
of Rio Tinto’s Closure Standard, noted above, that this be done in a managed way and with adequate capacity and resources.

25.2.2 Legislation and Standards

The following national, international and corporate legislation and standards apply to closure planning.

25.2.2.1 Guinean Legal Requirements

The framework for regulation of the Simandou Mine is provided by the Mining Code (1).

The Code requires that as far as is practicable, the site must be restored to a stable land form that is close to the original condition of the land. The rehabilitation must be acceptable to the Government departments responsible for mining and the environment in terms of safety, agricultural productivity and visual impacts. All facilities, including plant facilities, must be removed at the cessation of mining activities. Land that was previously useful for agricultural purposes must be restored to the same state and forest land must be reforested.

Article 2.2(c) of the Decree governing application for permits for mineral exploitation (Décret A98/MRNE/SGG fixant les conditions de dépôt et d’enregistrement des demandes de permis d’exploitation minière) requires that a plan for rehabilitation of sites be provided together with an Environmental Impact Study for the proposed project. This chapter of the SEIA Report provides the initial details of that plan and it will be further developed prior to start of production.

25.2.2.2 International Standards

The International Finance Corporation (IFC) Environmental, Health and Safety Guidelines for Mining (December 2007) require that closure and post-closure activities should be considered as early in the planning and design stages of a mine as possible and that a Mine Closure Plan should be prepared in draft form prior to the start of production, clearly identifying allocated and sustainable funding sources to implement the Plan. This should continue to be developed over the lifetime of the mine and should be designed to incorporate both physical rehabilitation and socio-economic considerations so that:

- future public health and safety are not compromised;
- the after-use of the site is beneficial and sustainable to the affected communities in the long term; and
- adverse socio-economic impacts are minimised and socioeconomic benefits are maximised.

Key aspects of the IFC guidance on Mine Closure Planning are summarised below.

<table>
<thead>
<tr>
<th>IFC EHS Guidelines on Mine Closure Planning</th>
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<tbody>
<tr>
<td>Closure Plans should:</td>
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<tr>
<td>- address beneficial future land use determined using a multi-stakeholder process that includes consultation and dialogue with regulatory and other government agencies, local communities, traditional land users, adjacent leaseholders, civil society and other affected parties, and must be approved prior to implementation by the relevant national authorities;</td>
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<tr>
<td>- be regularly updated to reflect changes in mine development, operational planning, and environmental and social conditions;</td>
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<tr>
<td>- records the mine works as they develop;</td>
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<tr>
<td>- include post-closure, aftercare and continued risk-based monitoring of the site, pollutant emissions and impacts typically extending to a minimum of five years after closure;</td>
</tr>
<tr>
<td>- include progressive restoration during operations; and</td>
</tr>
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</table>
• include contingencies for temporary suspension of activities and permanent early closure.

Closure Plans should meet the following objectives for financial feasibility and physical, chemical and ecological integrity.

• Financial Feasibility: The costs associated with mine closure and post-closure care, should be considered during planning and design and should address the availability of necessary funds to cover the cost of closure at any stage in the mine life, including early or temporary closure. Funding should be by either a cash accrual system or a financial guarantee (1). Closure requirements should be reviewed annually and funding arrangements adjusted to reflect any changes.

• Physical Integrity: All structures should remain stable such that they do not impose a hazard to public health and safety. They should be decommissioned so that surface water accumulation is minimised, and water can flow away via drains or spillways designed to accommodate the maximum probable flood event and maintained as required after closure. Structures should not erode or move from their intended location under routine or extreme events. Consideration should be given to backfilling of mine workings. Physical hazards such as unguarded roads and other openings should be effectively and permanently blocked from all access to the public until such time that the site can be converted into a new beneficial land use.

• Chemical Integrity: Surface water and groundwater should be protected against adverse environmental impacts resulting from mining and processing activities. Leaching of chemicals into the environment should be prevented, so as to avoid endangering public health or safety or exceeding water quality objectives in downstream surface water and groundwater systems.

• Ecological Habitat Integrity: Ecological habitat integrity must be considered in establishing physical and chemical integrity, but must also consider provision of habitat that is beneficial for future ecological use. Plans should contain comprehensive measures for reclamation during the operating life of the mine according to a plan approved with the environmental and mineral authorities and with the engagement of local government and communities.

25.2.2.3 Corporate Standards

Closure of the Simandou Mine will be undertaken in accordance with the following Rio Tinto standards:

• Rio Tinto Closure Standard, 2010 (Document No: STCLO_D4);
• Rio Tinto Standard E3 - Acid Rock Drainage Prediction and Control, 2008 (Document No: STE03); and
• Rio Tinto Standard E9 – Land Use Stewardship, 2008 (Document No: STE09).

The key aspects of the closure standard are summarised below.

Rio Tinto’s Closure Standard

The Rio Tinto Closure Standard provides a framework for closure that is consistent with national and international regulatory requirements. Closure must be addressed from the earliest stages of project development to minimise financial, social and environmental threats whilst maximising opportunities. The standard requires that a Closure Strategy be established that defines:

• the outcomes and impacts of closure and post-closure;
• the options considered;
• the criteria used to select the preferred option;
• the preferred option; and
• further research that will be done on closure.

(1) The two acceptable cash accrual systems are fully funded escrow accounts (including government managed arrangements) or sinking funds. An acceptable form of financial guarantee must be provided by a reputable financial institution.
The Closure Strategy must be developed by a senior multi-disciplinary team, there must be clear allocation of responsibility for its management, a comprehensive internal and external consultation process must be carried out, and the strategy must be communicated to all stakeholders.

The preferred option identified in the Closure Strategy must then be worked up into a detailed Mine Closure Plan which describes the vision for closure, the preferred option and the costs. The Plan must contain objectives, targets, a schedule and detailed work programme for:

- progressive rehabilitation in a manner compatible with local and regional land management plans;
- on and off site biodiversity conservation;
- environmental mitigation;
- socio-economic mitigation;
- employee relations;
- internal and external communications;
- management arrangements; and
- monitoring.

Specific technical solutions must be defined for inter alia pit lakes and groundwater rebound, low grade ore stockpiles, and engineered waste deposits.

The programme for mitigation of socio-economic impacts must address:

- land owner considerations and community dependencies throughout the life of the operation;
- transitional arrangements for company housing including a handover strategy;
- a handover plan for all infrastructure and social services developed by the company, including management and operational systems, adequate resources for the projects to continue delivering, and sufficient lead-time for phase out;
- post closure institutional arrangements that clearly outline the governance, financing, staffing and monitoring of these institutions; and
- development of programmes to manage the issues associated with community activities which have potential to adversely impact mine closure solutions.

The knowledge base used in the preparation of the Closure Strategy and Closure Plan must be developed during the life of the mine and must include an understanding of stakeholder expectations for closure and post-closure land use. The Mine Closure Plan must be updated at least every seven years and must identify the adequacy, performance, threats and opportunities (taking into account input from key stakeholders), future trends, possible changes in standards or expectations, and closure costs.

A full Decommissioning Plan must be developed five years prior to the estimated date for cessation of production containing specific details of how closure will be achieved and how monitoring will be carried out to demonstrate the success of closure and allow relinquishment.

25.2.3 Assessment Methodology

As noted in Section 25.1, the assessment of impacts reported in this chapter is not a separate assessment but summarises the findings relating to impacts of closure from the preceding chapters of the report. The baseline and assessment methods are therefore as reported in those chapters.

25.3 Summary of Impacts and Mitigation Measures during Mine Closure

This section provides a high level overview of the impacts of mine closure and the identified mitigation measures, summarised from the preceding chapters of the SEIA Report. Impacts have been grouped together as follows:

(1) The Closure Standard refers to a Closure Management Plan but the terminology Mine Closure Plan is used here for consistency with IFC guidance.
short term impacts of decommissioning work on soils, water quality, noise and air quality (see Chapters 5: Geology, Soils and Mineral Waste, 6: Water Environment, 7: Noise and Vibration and 8: Air Quality);
long term impacts on soil and water quality (see Chapters 5: Geology, Soils and Waste and 6: Water Environment);
long term impacts on water resources and supply (see Chapter 6: Water Environment);
long term biodiversity and landscape impacts (see Chapters 12: Biodiversity and 14: Landscape and Visual);
employment and economic development, national economy, social structures and community life, labour and working conditions and human rights (see Chapters 17: Employment and Economic Development, 19: Land Use and Land-Based Livelihoods, 22: Labour and Working Conditions and 24: Human Rights);
land use and livelihoods (see Chapter 19: Land Use and Land-Based Livelihoods); and
risks to public safety (see Chapter 21: Community Health, Safety and Security).

No significant impacts from closure were identified in other chapters in the report.

The mitigation measures identified in this section will all be developed and implemented through the Closure Strategy and Mine Closure Plan which will be developed progressively over the lifetime of the mine as detailed in Section 25.4.

25.3.1 Short Term Impacts of Decommissioning Work on Soils, Water Quality, Noise and Air Quality

Decommissioning of the mine will involve activities very similar to those carried out during construction, as structures are demolished, haul roads, conveyors and supporting infrastructure are removed, and sites are re-graded for rehabilitation and potential future use. Impacts will also be similar to those during construction and could include:

- damage to soils from movement of heavy equipment and during stripping, storage and re-spreading;
- erosion and release of sediments into surface water;
- discharge of other effluents from decommissioning operations;
- pollution from disposal of waste generated during decommissioning;
- noise, dust and exhaust emissions from earthworks, decommissioning equipment and traffic; and
- risks of accidental spills causing adverse impacts on soils and water quality.

In the absence of mitigation measures the short term impacts on soil resources, water quality, and noise and air quality at nearby sensitive receptors are identified as moderate. Measures to mitigate these impacts will be the same as during construction and will include:

- protection of soils resources by minimising compaction and selective stripping, stockpiling and re-use;
- actions to minimise erosion and control run-off across disturbed areas;
- rehabilitation of disturbed areas as soon as possible after completion of works;
- good site practice to control noise, dust and other emissions;
- removal and re-use or recycling of all decommissioned equipment (motors, crushers, screens, pumps etc);
- removal of all waste materials (demolition waste, concrete, scrap metal etc) and either re-use, recycling or disposal in an appropriately designed and approved facility, including separate treatment and disposal of any hazardous waste; and
- operation of an emergency prevention, preparedness and response plan to minimise the risk and manage the impacts of accidental releases to the environment.
These measures will all be set out in the detailed Decommissioning Plan as part of the Mine Closure Plan. With these mitigation measures the short term impacts of closure on the environment are all assessed as minor.

25.3.2 Long Term Impacts on Soil and Water Quality

After closure erosion from exposed pit walls, waste emplacements and other exposed slopes (road embankments, bunds etc) could continue to cause moderate impacts on soils and water quality in the long term. These will be mitigated by:

- retention of erosion and sediment control structures on external waste emplacements and in-pit waste disposal areas until revegetation is sufficiently well-established to control further erosion;
- any potentially contaminated ground will be identified, monitored, and appropriately treated, including any post closure pit lakes, runoff and / or groundwater that could become contaminated as a result of acid rock drainage;
- stabilising disturbed areas such as the faces of embankments using banks, drains and drop structures where necessary;
- rehabilitating all land previously occupied by works with the aim of creating safe and stable landforms, habitats of value for biodiversity or areas of agreed community beneficial use; and
- continuing the revegetation trials that are already in progress to assist in identifying practical means of propagating priority species and achieving revegetation of difficult surfaces such as pit slopes.

There will be some benefit at the time from restoration of soil resources in areas where mine facilities are removed and land rehabilitated after mine closure but the area will be relatively small and the overall residual impact on soils is considered to be not significant.

During operations potentially acid-generating waste materials will have been identified and disposed of within the waste emplacements and some could remain exposed within the mine pits. After closure there is the potential for this material to continue to generate acid leachate. This will decline over time but could nevertheless cause moderate impacts on downstream soils and water quality. Acid rock drainage planning will be completed and all necessary controls will be put in place during operations including, if required, segregation of acid-generating waste in separate cells, managing infiltration of water, and collection and treatment of leachate to meet discharge and receiving water quality standards. The Mine Closure Plan will include any controls needed to provide adequate continued management of acid rock drainage after closure and these controls should continue to provide adequate protection. Adverse impacts would only occur if the system fails.

With these mitigation measures in place acid rock drainage is considered to present a minor impact over the long term after closure.

25.3.3 Long Term Impacts on Water Resources and Supply

Following closure of the mine, stream baseflows at Ouéléba and Pic de Fon are predicted to recover to approximately pre-mining levels in most catchments. Exceptions are in the Kinyeko / Mala and Miya catchments to the northwest and northeast of Ouéléba, where there will be a shift in groundwater discharge away from these catchments towards the Woron catchment flowing to the southwest caused by a large body of low permeability backfill, and in the Western Spur catchment where a 10% reduction in flow is predicted. These changes are predicted to have a critical impact in Miya which is a catchment of importance for community water supply, a major impact in Kinyeko which is important for biodiversity and community water supply, and a major impact in the Western Spur catchment which is of importance for biodiversity. A moderate impact is predicted in three further catchments of importance for biodiversity (Dianiworo, Miya South and Whisky South) and one for community supply (Dianiworo).
An active mine water management system will have operated during operation of the mine to maintain flows in affected catchments to agreed levels. After closure the aim will be to transition this to a passive system with recovery of groundwater levels to a point where streamflows meet environmental and community requirements. Further groundwater modelling and a more site specific assessment of impacts will be carried out during detailed design and operation to determine the need for, and if necessary inform the development of, post-closure mitigation measures. Monitoring of surface and groundwater flows in resources of importance to communities will continue for a period of five years after closure. If necessary the Project will work with the authorities and affected villages to identify and develop an alternative strategy for sustainable long term water supply for communities and ecosystems and all required measures will be included within the Mine Closure Plan.

With these measures the residual impacts after mine closure should be no more than minor.

25.3.4 Long Term Biodiversity and Landscape Impacts

In the absence of measures to mitigate impacts, closure and abandonment of the mine will cause continuing major impacts on biodiversity and the landscape, as a result of continued presence of the exposed pit walls and pit lakes, and presence of abandoned mine plant and other works. These would prevent establishment of natural habitats, present significant risks to wildlife from pollution and accidents, and leave permanent visual scars.

To mitigate these impacts the Mine Closure Plan will include detailed plans for rehabilitation of all land affected by the mine to enable either the development of habitats of benefit for biodiversity, or the establishment of beneficial land uses, or at minimum establishment of a secure and non-polluting final landform.

The proposed approach to rehabilitation with respect to biodiversity and landscape is outlined below (impacts in relation to land use and safety are discussed further in Sections 25.3.6 and 25.3.7):

- the rehabilitation of previous natural habitats with the aim of achieving, where feasible, the pre-disturbance conditions;
- achievement of the Project’s offset objectives will be monitored during the lifetime of mine operations and the plan will address the long term management and sustainability of offset sites after closure;
- unless it is agreed with the local authorities and communities that facilities will be retained for future use, all mine plant, roads, conveyors, pipelines, power plant, offices, accommodation and other infrastructure will be dismantled and removed, including foundations down to 1 m below ground level;
- restoration and rehabilitation plans during closure will take into account a landscape-level perspective and consideration of how best to maintain and re-establish connectivity of habitats;
- dams and other water management structures not required for long term water and sediment control will be removed and drainage lines will be reinstated;
- the ground surface will be prepared as necessary by re-grading, ripping, tilling and soil improvement to facilitate restoration or creation of appropriate natural habitats;
- rehabilitation of pit areas will commence as soon as possible after mining of an area is complete and will proceed progressively alongside operations; where feasible land will either be revegetated or allowed to revegetate naturally;
- in accordance with the requirements of the Mining Code any land that was forested prior to mining will be replanted where possible or replaced with an equivalent area of reforestation unless otherwise agreed with the local authorities and the community;
• the materials to be used in rehabilitation will be selected to suit the proposed habitat and surrounding undisturbed vegetation. Locally available natural materials and vegetation, including seeds and plants propagated in local nurseries will be used as preference. Where use of non-natives cannot be avoided they will be subject to careful evaluation of risks to local biodiversity interests prior to use;

• short term cover plants may be used whilst longer term vegetation becomes established to reduce the risk of erosion during the establishment phase;

• where possible, the rehabilitation works will be scheduled as soon as areas become available to minimise the potential for soil erosion, weed invasion, surface crusting and sealing, and enhance the likelihood of successful seed germination and vegetation establishment;

• rehabilitated areas will be monitored during the period of establishment to confirm that the objectives are met and monitoring will continue as needed until a sustainable situation is achieved;

• as part of closure planning the Project will, where appropriate, continue to foster partnership and coordination with local government and communities, and consider further support and contribution to capacity building measures and development of alternative livelihoods developed to manage impacts arising from induced access and the in-migrant population into the closure phase; and

• all measures to mitigate disease transmission will be incorporated into closure / decommissioning planning.

With these measures the long term impact of the mine after closure on biodiversity and landscape is predicted to decline over time to a minor impact.

25.3.5 Employment and Economic Development, National Economy, Social Structures and Community Life, Labour and Working Conditions and Human Rights

Closure of the mine will lead to a loss of approximately 2 100 jobs directly at the mine, plus knock-on effects in the local economy that could impact on indirect employment for about 11 000 people. A workforce of some 400 is envisaged to be employed during decommissioning. A sudden reduction in local employment would have a major impact on the local area. The mine will also cease procuring goods and services from local enterprises with a further moderate impact on the local economy and on local economic vulnerability. If not managed properly the impact on the expectations of the local community for employment could cause major impact on local communities through creating tension and potential conflict. This would extend to in-migrants who have established themselves in the local area over the lifetime of the mine.

A range of measures to mitigate these impacts will be implemented through continued development and implementation of the Project’s Social Management Framework, in consultation with relevant authorities and local communities, and in particular through work on Employment and Livelihoods. A Retrenchment Plan will be developed as part of the Mine Closure Plan and will include provisions for:

• consultation with personnel and their representatives, and with the relevant authorities;
• staged and orderly reduction in the workforce;
• termination of workers including severance payments and fulfilment of other conditions for termination as set out in contracts of employment and any collective bargaining agreements;
• grievance and appeal procedures; and
• ensuring non-discrimination in retrenchment.

The Plan will identify the changing mix of skills likely to be required as the operation moves from full production through decommissioning, rehabilitation, and eventually post-closure management and monitoring. It will also identify plans for training of Project personnel to assist them in transitioning to new employment and training of Human Resources staff to ensure they know how to handle the retrenchment process.
The Closure Plan will also include a programme of support for local suppliers to ease transition to closure, and plans for managing the impacts of potential migrant outflows on local land use and economic activity, including the possible abandonment of settlements.

At a national level, the cessation of payments of mining taxes and royalties to government has the potential to have an adverse impact on the national economy. The Project will liaise with government during the life of the mine and as it approaches closure, to assist the government in minimising the impact of closure through economic diversification.

These measures will be worked out in detail during the progressive development of the Mine Closure Plan. With implementation of the plan, closure of the mine is predicted to have moderate negative impacts on local employment and the local economy, minor positive impacts in terms of equipping people for new jobs and business opportunities, and moderate negative impacts in terms of local tension and conflict. A potentially moderate to major negative impact in terms of increased economic vulnerability could remain. The impact on the national economy cannot be predicted at this stage but the Project will do what is feasible within its sphere of influence, to minimise any adverse effects.

The establishment of a thorough Retrenchment Plan in accordance with IFC Performance Standard PS2: Labour and Working Conditions, should result in no significant impact on workers’ rights associated with breach of international standards for labour and working conditions.

25.3.6 Land Use and Land-Based Livelihoods

In the absence of specific measures, cessation of mining will provide minor positive impacts for land use and livelihoods through release of land for alternative uses. To enhance these benefits, the Project’s Land Use Management Plan will be revised for mine closure, with the aim of facilitating beneficial uses of land wherever these can be established practicably and safely, and taking into account the need to avoid adverse impacts on biodiversity.

The land released will be rehabilitated as discussed in Section 25.3.4 in a manner appropriate to the planned future use. This will include reinstatement of original uses or creation of new uses as agreed with the relevant authorities and the community. All rehabilitated areas will be monitored during the establishment of planting to confirm that the objectives are met; maintenance and replanting will be undertaken if needed. Monitoring will continue as needed until a sustainable end use is achieved.

With these measures mine closure should lead to moderate positive impacts on land use and livelihoods.

25.3.7 Risks to Public, Livestock and Wildlife Safety

If no measures are taken to make the works safe following closure of the mine, there will be a major risk to public safety from failure of pit walls, waste emplacements, cuttings, embankments, bunds etc and from the presence of pit lakes. Livestock and wildlife entering the site will also be at risk. Measures that will be taken to mitigate these risks include design of all engineered structures taking into account geotechnical safety factors, re-shaping of steep slopes, risk-based monitoring of structures at risk of failure, design to minimise the risks associated with pit lakes, measures to control access to high risk areas as far as possible (eg barriers), and education activities to make local people aware of the risks.

The stability of pit walls will be a key requirement during the operational phase and the experience gained over the life of mine will lead to final pit wall designs that will be stable in the medium to long term although normal forces of erosion will modify the walls over time. The in-pit placement of mineral waste will substantially reduce risks associated with stability of pit walls and the formation of lakes.

Managing access by the public and animals will also be important. Preventing access will be impossible given the location and layout of the site, but physical barriers such as bunds that are in place during operation will be left after closure and additional barriers will be installed at likely access points to make it difficult for people to enter the mine pits without being very aware of the risks. Livestock and wildlife will
venture into the pit areas particularly if water is present during the dry season and ramps will be provided so that animals can exit the pit area safely.

These measures will reduce the likelihood and severity of incidents but given that a risk of severe injury or fatality from members of the public will persist, a moderate risk to public safety will remain after closure.

25.4 The Closure Strategy and Mine Closure Planning

25.4.1 Closure Strategy

In accordance with the Rio Tinto Closure Standard a Closure Strategy will be developed prior to start of operations and will be kept under review and updated as necessary, including in the run-up to completion of works in Pic de Fon pit halfway through the mine life, and then Ouéléba pit at the end of the mine life. Responsibility for the Strategy will rest with the operating company and it will be prepared and kept up to date by a multi-disciplinary team with the requisite seniority and experience.

The overarching goal of the Closure Strategy will be developed in consultation with stakeholders but will essentially be to leave a rehabilitated mine site behind that is stable, non-contaminating and with generally improved biodiversity conditions, and to leave local communities who have been empowered during the period of mining to be self-reliant in creating livelihoods and providing and maintaining community services, and, if not already self-sustaining at mine closure, being on well-established trajectories towards this. Within this the specific objectives for closure, again developed in consultation with stakeholders, will include the following:

- to rehabilitate the site and establish and manage its associated offset sites to have an overall net positive impact on biodiversity;
- to identify post-closure uses of the site that are beneficial and sustainable for the affected communities in the long term;
- to relinquish a safe, stable and uncontaminated site, where the majority of the site is suitable for an agreed future land use (aligned with the Pic de Fon Classified Forest Management Plan) and where the closed mine will not pose an unacceptable risk to public health and safety;
- to create a final landform that fits with the surrounding landscape as far as possible;
- to minimise adverse environmental effects once the mine ceases operation and construct post-mining landforms that are non-polluting;
- to establish sustainable vegetation units consistent with surrounding undisturbed vegetation and suitable for the future planned land use;
- to ensure water quality is suitable for planned future use and minimise adverse effects on the local water regime and water supply for communities and ecosystems;
- to equip employees to transition to new opportunities offering sustainable future livelihoods; and
- to provide local communities with long-term, sustainable opportunities following closure and empower them to continue a trajectory of self-reliance established during the period of mining.

The Closure Strategy will present the proposed approach to closure and post closure based on an assessment of options and evaluation of their environmental, social and economic costs and benefits. It will be based on extensive consultation with all relevant stakeholders including government authorities, local communities and the workforce, and it will detail continuing research studies and stakeholder engagement that will be undertaken to keep the Strategy up to date.
A Knowledge Base will be established and kept up to date that includes information on the socio-economic, cultural, biotic and physical (abiotic) environment, all regulatory and other requirements relevant to closure and all agreements reached with stakeholders.

25.4.2 Mine Closure Plan

At the next level the Closure Strategy will be developed into a more detailed Mine Closure Plan. A first conceptual version of this will be developed during finalisation of the detailed design and will be available prior to start of operations. It will then be kept under review and progressively developed and updated at least every five years over the life of the mine and in particular prior to closure of, first the Pic de Fon pit, and later the Ouéléba pit. There will be extensive consultation with the workforce, the local community and government during all stages of planning.

The Mine Closure Plan will set out:

1. The Vision for Closure;
2. Outline of Legal and Regulatory Requirements;
3. Results of Stakeholder Engagement and Government, Landowner and Community Expectations;
4. Objectives, Targets and Indicators;
5. Assessment of Social and Environmental Impacts and Risks;
6. Final Land Use and Zoning Plan: Planned Final Land Form, Land Use and Habitat Creation;
7. Biodiversity:
   a) Habitat Restoration and Creation;
   b) Habitat Management; and
   c) Management of Offset Sites.
8. Site Safety and Security:
   a) Risk Assessment;
   b) Safe Design and Safety Precautions;
   c) Public Information and Education; and
   d) Emergency Response.
9. Decommissioning:
   a) Decommissioning, Demolition and Site Clearance;
   b) Site Investigation and Decontamination;
   c) Site Re-Profiling and Re-Grading; and
   d) Management of Decommissioning Waste.
10. Land Rehabilitation
    a) Ground Preparation (Ripping, Tilling, Soil Improvement etc);
    b) Passive and Managed Revegetation;
    c) Installation of Site Safety and Security Measures; and
    d) Site Handover.
11. Workforce Retrenchment
    a) Consultations;
    b) Planned Workforce Reduction;
    c) Severance Terms;
    d) Non-Discrimination;
    e) Grievance and Appeal Procedures; and
    f) Out-Placement Support and Training.
12. Social Management:
    a) Managing Cessation of Local Procurement;
    b) Handover of Housing, Infrastructure and Services;
    c) Transition for Project Community Programmes
    d) Managing Impacts of Potential Migrant Outflows; and
    e) Managing Impacts of Cessation of Government Revenues (Taxes and Royalties).
13. Long Term Environmental Management:
    a) Management of Pit Lakes and Groundwater Rebound;
    b) Management Of Waste Emplacements and Low-Grade Stockpiles;
    c) Acid Rock Drainage Management;
d) Erosion and Sediment Controls; and

e) Water Management and Maintenance of Streamflows.

14. Site Maintenance and Monitoring;

15. On-Going Management and Institutional Arrangements:
   a) Criteria for Relinquishment;
   b) Plan For Site Relinquishment;
   c) Future Land Ownership;
   d) On-Going Institutional Arrangements;
   e) Institutional Resources and Capacity; and
   f) Liabilities.

16. Schedule Of Actions (timetable);

17. Roles and Responsibilities;

18. Cost Estimate, Funding Arrangements and Accounting Provision;


The Mine Closure Plan will include all the measures identified in Section 25.3 and will incorporate specific sub-plans relating to the following:

- Retrenchment;
- Decommissioning;
- Biodiversity;
- Land Use;
- Rehabilitation;
- ARD Management;
- Water Management;
- Environmental Management during Decommissioning;
- Social Management; and
- Stakeholder Engagement.

These will be developed at least five years ahead of the start of each phase of closure activities.

25.4.3 Costs and Funding

The current total projected cost of closure is estimated to be approximately US$96 million. This figure will be kept under review and updated with progressive development of the Mine Closure Plan. This cost will be funded in accordance with the requirements of Rio Tinto’s Closure Standard and international standards as detailed in Section 25.2.2.

25.4.4 Relinquishment

Once all the criteria for relinquishment specified in the Mine Closure Plan have been met, the Mining Concession will be relinquished.

25.5 Summary of Findings

Closure of the Simandou Mine will entail the progressive winding down and eventual cessation of mining activities, retrenchment of the workforce, decommissioning, demolition and removal of all plant, equipment, buildings and infrastructure, preparation for and rehabilitation of as much as possible of the land occupied by the mine for either habitat restoration or beneficial use, making safe the remaining areas, and ensuring appropriate arrangements are made for long term management and monitoring of the site.

In the absence of measures to mitigate impacts mine closure has the potential for a range of adverse environmental and social impacts including:

- short term environmental impacts during decommissioning activities including soils degradation, water pollution, noise and air emissions, waste disposal and risks of accidental spills;
- long term impacts on soils and water quality from erosion of exposed surfaces, sediment contamination of surface waters, and acid rock drainage affecting quality of soils, surface water and groundwater;

- long term impacts on water resources and supply to communities and ecosystems as a result of diversion of natural flows;

- long term impacts on biodiversity and the landscape from the continued presence of the mine pits, mine plant and infrastructure;

- impacts on the local and national economy, the workforce and community life through the loss of jobs and reduction in economic activity and national revenues associated with mine closure; and

- risks to public, livestock and wildlife safety from the presence of abandoned plant, steep slopes, potentially unstable engineered structures and pit lakes.

There will be minor benefits from release of land for alternative use.

In order to mitigate these adverse impacts and maximise the benefits of mine closure the Project will develop a Closure Strategy and a detailed Mine Closure Plan in consultation with relevant authorities, the workforce and local communities. The aim will be to leave a rehabilitated mine site behind that is stable, non-contaminating, and with generally improved biodiversity conditions, and to leave local communities that have been empowered during the period of mining to be self-reliant in creating livelihoods and providing and maintaining community services and, if not already self-sustaining at mine closure, being on well-established trajectories towards this.

As part of the Mine Closure Plan specific sub-plans will be developed to address:

- Retrenchment;
- Decommissioning;
- Biodiversity;
- Land Use;
- Rehabilitation;
- ARD Management;
- Water Management;
- Environmental Management during Decommissioning;
- Social Management; and
- Future Stakeholder Engagement.

A conceptual Strategy and Plan will be developed prior to start of operations and these will be reviewed and updated at least every five years during operations. The detailed Mine Closure Plan and sub-plans will be completed at least five years prior to cessation of operations in each area of the mine and their implementation and success will be monitored until the site achieves a sustainable long term future.