



Tropicana Gold Project
Conceptual Closure and
Rehabilitation Strategy

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INTEGRATED MANAGEMENT SYSTEM

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1 OVERVIEW

The Conceptual Closure and Rehabilitation Strategy (Conceptual Strategy) contained within this document provides the framework for managing closure and rehabilitation requirements over the life of the Tropicana Gold Project (the Project). The Conceptual Strategy forms part of the Project Integrated Management System that ensures the effective management of all health, safety, environment, community and operational issues associated with the Project.

The Integrated Management System (including the Conceptual Strategy) establishes the framework and standards that must be achieved for all activities associated with the Project. It includes the development and management of policies, management strategy, procedures and reporting requirements.

This document has been compiled with the assistance of 360 Environmental.

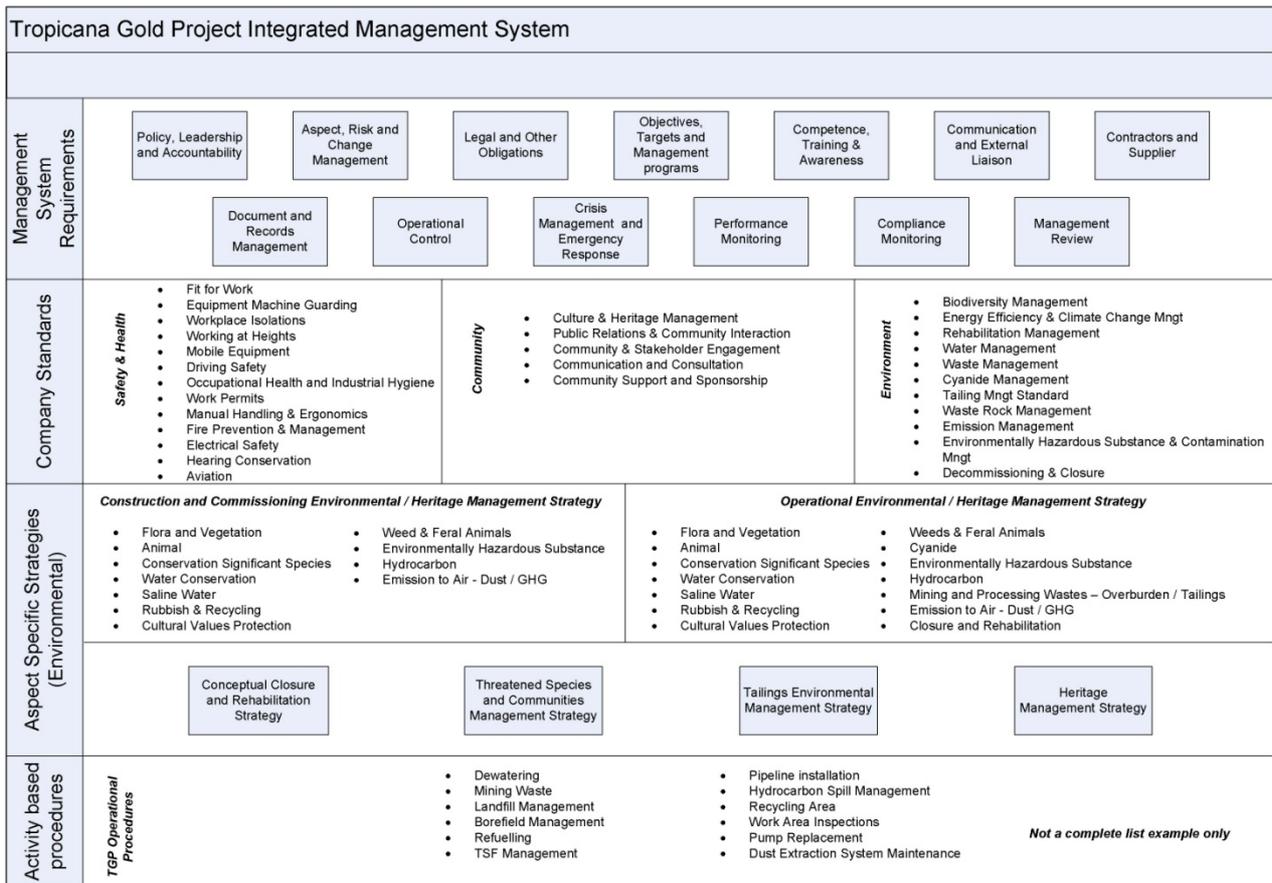


Figure 1 Tropicana Gold Project Integrated Management System

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2 PURPOSE OF THE STRATEGY

This document aims to demonstrate that the Tropicana Joint Venture (the Joint Venture) recognises the significance of mine closure and rehabilitation as a precondition to the Project’s feasibility and as such has adopted a life of mine closure and rehabilitation strategy. The development of a conceptual closure plan during a project’s planning phase is recommended in the *Strategic Framework for Mine Closure* produced by the Minerals Council of Australia for the Commonwealth Government (ANZMEC MCA 2000).

Figure 2 illustrates the position of conceptual closure planning in a mine life cycle. The diagram shows that the closure planning detail increases as a project progresses and highlights key points of stakeholder input.

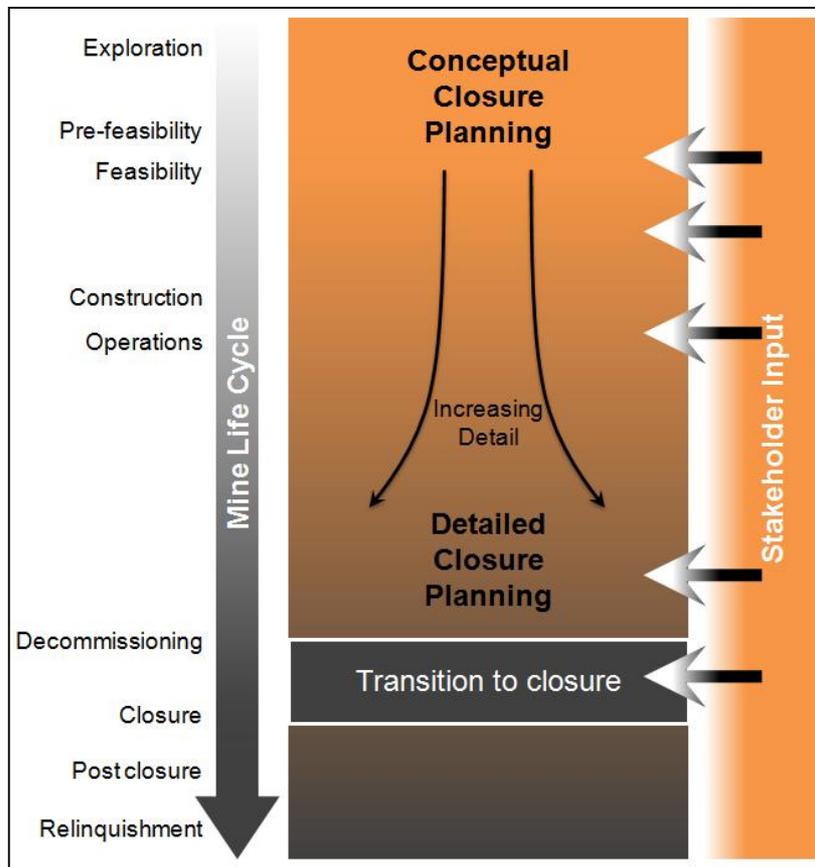


Figure 2 Closure Planning Process

(Adapted from International Council of Mining and Metal 2008)

This Conceptual Strategy identifies the key objectives for mine closure, including rehabilitation, to guide Project development and design. Because the Project is at a formative stage, this conceptual plan does not preclude changes in land use aims over the life of the Project to reflect changes in both knowledge and technology.

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This plan aligns with the following standards contained in the AngloGold Ashanti Australia Integrated Management System:

- Biodiversity Standard;
- Rehabilitation Standard; and,
- Closure and Decommissioning Standard.

3 SCOPE

This Conceptual Strategy is applicable for all closure and rehabilitation activities associated with the Project. It does not cover regional exploration requirements, which are managed via the AngloGold Ashanti Australia Exploration Integrated Management System.

4 CLOSURE AND REHABILITATION AIMS AND OBJECTIVES

The post-mining aim for the Project is:

To establish a sustainable native ecosystem that is as similar to the pre-existing ecosystem as can be achieved within the limits of recognised good practice rehabilitation methods and the post-mining environment.

(adopted from the International Council of Mining and Minerals, 2005)

Setting closure objectives at this early stage provides the basis to progress the various facets of closure and rehabilitation planning and execution over the life of the Project. The objectives may change over the life of the Project and if they do, a record of the change and its reasoning should be included in future Closure Plans.

This Conceptual Strategy outlines a framework for achieving the following objectives:

1. **Closure planning and implementation** – To ensure that the process of closure can occur in an orderly, cost-effective and timely manner with clear accountabilities defined.
2. **Risk appreciation** – To identify and manage risks to closure according to their likelihood and consequence.
3. **Financial provision** – To adequately represent and plan for the cost of closure in company accounts so that the community is not left with a liability.
4. **Stakeholder involvement** – To consider stakeholder interests during the mine closure process.
5. **Completion criteria** – To establish a set of indicators and criteria that will demonstrate successful completion of the closure process.
6. **Waste materials management** – To minimise waste generation over the mine life and to ensure that remaining waste cannot adversely affect the surrounding environment.
7. **Decommissioning** – To ensure that the decommissioning process can occur in an orderly, cost-effective and timely manner with clear accountabilities defined.

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- 8. **Rehabilitation planning and implementation** - To ensure that the Rehabilitation process can occur in an orderly, cost-effective and timely manner with clear accountabilities defined.
- 9. **Relinquishment** – To arrive at a point where the Tropicana Gold Project has met, or is confidently tracking towards, agreed completion criteria to the satisfaction of the Western Australian Government.

5 CLOSURE PLANNING AND IMPLEMENTATION

Objective: To ensure that the process of closure can occur in an orderly, cost-effective and timely manner with clear accountabilities defined.

5.1 DOCUMENT DEVELOPMENT

The intended progression of closure and rehabilitation planning for the Project will be:

1. Conceptual Mine Closure and Rehabilitation Strategy (this document, as submitted with the Public Environmental Review documentation) – This strategy document's the concepts behind the closure and rehabilitation outcomes and principles that will be incorporated into the closure and rehabilitation strategies.
2. Proposed Mine Closure and Rehabilitation Strategy – The proposed strategy will be prepared within five years of the Project's commencement. The plan will be reviewed every two to three years or following a significant change to the Project.
3. Approved Mine Closure and Rehabilitation Plan – The document will be submitted to the relevant stakeholders for approval three to five years prior to the closure of the Project.

The development of the above documents will be supported by a Closure and Rehabilitation Research and Development Strategy which aims to combine existing broad-scale rehabilitation knowledge with a research program tailored to improve the Joint Venture's understanding of the rehabilitation requirements for the Project (Figure 3). This strategy will be a live document that will be modified to meet the requirements of the Project's Closure and Rehabilitation objectives.

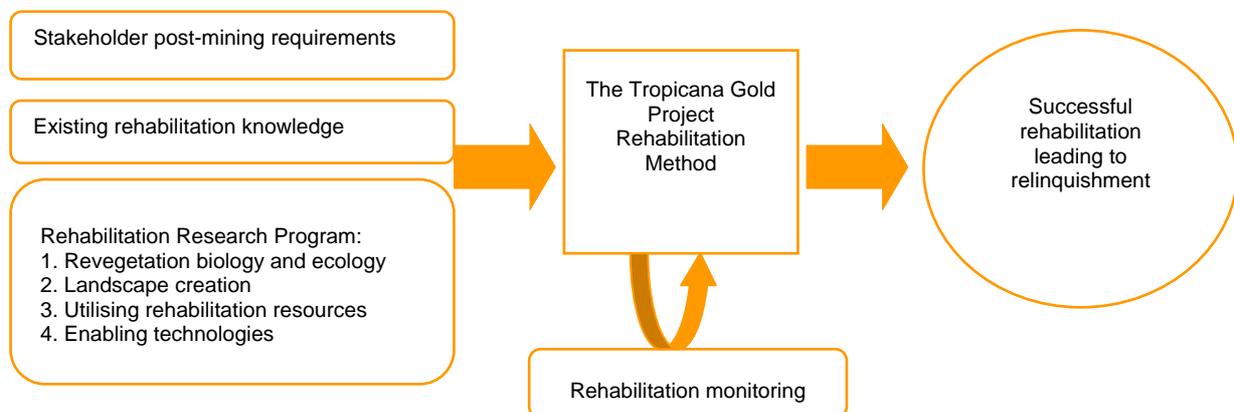


Figure 3 Rehabilitation Research Strategy to Achieve Rehabilitation Completion Criteria

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5.2 CONTINGENCY PLANNING

The various iterations of the Project's Mine Closure and Rehabilitation Strategies will contain plans / strategies for the unexpectedly early closure of the Project. These contingency strategies will be documented in the Care and Maintenance component of each iteration of the Project's Closure and Rehabilitation Strategies. At a minimum, the contingency strategies will require the following in the event of sudden closure or if the Project was unexpectedly placed in care and maintenance:

- an environmental audit of the entire site will be undertaken to fully appreciate any environmental risks that will exist during the closure / care and maintenance period;
- the Care and Maintenance Plan will be reviewed immediately; and,
- the reviewed Care and Maintenance Plan will be submitted to the Department of Mines and Petroleum for their information.

The Care and Maintenance Plan will include:

- an Emergency Response Procedure;
- a mine access and security review;
- a geo-technical monitoring program to ensure the ongoing stability of tailings storage and waste landforms;
- a program to address outstanding rehabilitation and remediation works; and,
- a program of environmental monitoring and inspection. This will include chemical and hydrocarbon storage, treatment plant condition, pit water monitoring, erosion monitoring, rehabilitation monitoring.

5.3 KNOWLEDGE MANAGEMENT

The retention of knowledge is a critical factor for orderly and effective closure and rehabilitation. The Closure and Rehabilitation Strategy will confirm the location of important documents at each review and will allocate responsibility for the filing and cataloguing of operational documents, environmental documents and stakeholder consultation documents that are pertinent to closure and rehabilitation.

5.4 PLANNING DOCUMENTS TO FACILITATE CLOSURE

Table 3 Planning Documents to be Prepared and Reviewed for Successful Closure

Document	Action/ Timing
Conceptual Closure and Rehabilitation Strategy	This document. Prepared for submission with Public Environmental Review documentation in 2009.
Closure Strategy	Develop a Closure Strategy within five years of construction commencing. Review every subsequent five years and every year for the last five years of operation. In the event of sudden closure, or if the Project was placed in care maintenance, review immediately.
Rehabilitation Strategy	Develop a Rehabilitation Strategy including Rehabilitation Research Program prior to construction commencing and, if required, review every five years until relinquishment.
Closure Knowledge Base	Develop and maintain a Closure Knowledge Document Control procedure prior to construction commencing.

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5.5 OPERATIONAL ACTIVITIES TO FACILITATE CLOSURE

Effective closure integrates closure and rehabilitation activities into mine operations, where appropriate. This includes planned reiterations of the site Closure Strategy. The following schedule of tasks highlights key operational actions required to enable successful closure.

Table 4: Operational Activities to be Managed for Successful Closure

Activity	Action	Accountable	Phase
Ground disturbance	Develop ground disturbance procedures to regulate ground disturbance.	Environment Manager	Pre-construction
Weed hygiene	Develop weed hygiene and auditing procedures to maintain the Tropicana Gold Project's low weed status.	Environment Manager	Pre-construction
Manage overburden waste	Finalise waste containment strategy based on co-mingling Potentially Acid Forming (PAF) waste with, Non Acid Forming (NAF) waste and waste with an Acid Neutralising Capacity (ANC).	Mine Manager / Environment Manager	Construction
	Develop and maintain a procedure to characterise waste and co-dump according to specification. This procedure will allocate enough NAF waste to cover each waste landform with a 10 m thick layer.	Mine Manager / Environment Manager	Construction and Operations
Manage tailings	Monitor tailings disposal ensuring that cyanide levels are within agreed limits.	Processing Manager	Operations
Non-process waste management	Establish a procurement policy that minimises waste inputs to site and maximises recycling opportunities through back loading and resource recovery.	Procurement Manager	Construction
	Establish a designated landfill facility with an appropriate management procedure and auditing schedule.	Mine Manager	Construction
Hydrocarbon contamination management	Establish a hydrocarbon bio-remediation facility to manage contaminated soils resulting from oil and fuel spills.	Mine Manager	Operations
Growing medium for rehabilitation	Prepare a growing medium balance to ensure that all areas requiring one metre of growing medium will receive it. If this is not possible a new rehabilitation strategy must be devised.	Environment Manager	Construction
	Develop and maintain a procedure to characterise growing media to ensure surface covers are not acidic, saline, dispersive or hard setting.	Environment Manager	Construction and Operations
Rehabilitation	Execute the Rehabilitation Strategy.	Environment Manager	Operations and Closure
Fire management	Develop and implement a rehabilitation fire protection plan.	Environment Manager	Operations
Rehabilitation Research Program	Develop a Rehabilitation Research Program. To be reviewed and adapted as needed.	Environment Manager	Pre-construction, Construction and Operations
Closure	Review and update financial provision for mine closure.	Mine Manager / Environment Manager	Operations
	Establish a Closure Consultative Committee.	Mine Manager	Operations

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Activity	Action	Accountable	Phase
Completion Criteria	Determine final land-uses and get regulator sign off.	Environment Manager	Operations
	Determine indicators for completion and obtain regulator sign off.	Environment Manager	Operations
	Determine actual completion criteria (often expressed as a number or range) through environmental investigation and applied research.	Environment Manager	Operations
Knowledge Management	Develop and maintain an information system that records and maps waste stockpiling and final deposition.	Mine Manager	Construction and Operations
	Develop and maintain an information system that records and maps growing media stockpiling and final deposition.	Mine Manager	Construction and Operations
	Implement the Closure Knowledge Document Control Procedure	Environment Manager	Pre-construction, Construction, Operations, Closure and Post-relinquishment

6 RISK APPRECIATION

Objective: To identify and manage risks to closure and rehabilitation according to their likelihood and consequence.

Identifying potential risks to closure and successful rehabilitation in the Project's planning stage allows for pro-active risk management strategies to be developed. The International Council on Mining and Minerals recommends the AS/NZS 4360:2004 Risk Management Standard (ICCM 2005). Informed by AS/NZS 4360:2004, risk for the Project is determined based on the following risk management process:

1. Collation of Project activities.
2. Identification threatening actions or events from the collated project activities that may affect closure and rehabilitation and their possible impacts.
3. Assess the reasonable likelihood of those threatening actions occurring.
4. Assess the reasonable consequence of the impact.
5. Use a risk matrix to assign a risk rating to each threatening action.

There are four possible risk ratings in the risk matrix employed by the Joint Venture - Low, Medium, High and Extreme. Management of the risks will be commensurate with the severity of the risk rating. Controls to reduce the risk and its consequences to an acceptable level will be applied from the following hierarchy:

1. Avoid – avoid impacts where possible, particularly on 'critical assets'.
2. Minimise – if impacts cannot be avoided, minimise and manage appropriately.
3. Rectify – repair, rehabilitate and restore affected areas as soon as possible after disturbance.

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4. Reduce – reduce affected area by preservation and maintenance throughout life of mine.
5. Offset – where negative impacts still occur, develop an offset package to achieve a net environmental benefit.

All closure and rehabilitation related risks have been extracted from the overall Project risk register and those risks are addressed according to the process described above.

7 FINANCIAL PROVISION

Estimating closure costs at the planning stage helps the Joint Venture to understand the level of liability it is committing to and allows for the provision of appropriate funds for closure and rehabilitation. This informs the Project’s overall economic feasibility. Australian companies are required to comply with *Australian Accounting Standards Board 137: Provisions, Contingent Liabilities and Contingent Assets* and the costs of closure and rehabilitation are recorded as a liability on the company’s balance sheet (Commonwealth of Australia, 2006).

Estimating closure costs at this early stage can only be indicative. Closure costs will be reviewed annually as part of the business planning process to adjust for evolving closure requirements, improved technical understanding and for inflation.

Cost estimates assume that all progressive rehabilitation planned to occur prior to closure will have been undertaken. Closure works will include final reclamation and rehabilitation works to complete closure of the tailings storage facility, closure of the waste landform and final removal / closure of all Project infrastructure that must necessarily remain in service until operations conclude.

An approach that breaks closure and rehabilitation issues into to manageable segments, or closure management units, assists understanding for both the operators and regulators. Each unit can then be given its own status and can be managed as an individual entity. Proposed management units for the Tropicana Gold Project include:

- ore processing plant / crusher;
- workshops and hydrocarbon storage areas;
- waste landform;
- tailing storage facility;
- run of mine / stockpiles;
- pit voids;
- water supply borefield;
- infrastructure corridors (e.g. pipelines and roads);
- village;
- aerodrome; and,
- power station.

The first site Closure Plan and all subsequent reiterations will include a balance sheet costing the decommissioning, remediation (if required) and rehabilitation of each closure management unit.

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8 STAKEHOLDER INVOLVEMENT

Objective: To consider stakeholder interests during the mine closure process.

Stakeholder engagement is a common theme in mine closure and rehabilitation guidance documents (Environmental Protection Authority 2006, Commonwealth Government 2006, ICMM 2006, ICMM 2008). Successful stakeholder engagement throughout the Project's lifespan increases the likelihood of successful closure and rehabilitation outcomes.

During the Project's planning stage closure and rehabilitation thinking is premised on a mutually held goal to, as much as possible, return the Project area to its original state. This goal may alter over the lifespan of the Project and effective stakeholder involvement will give the Joint Venture certainty of purpose as it plans and implements closure and rehabilitation at the Project.

8.1 CONSULTATIVE CLOSURE COMMITTEE

The establishment of a Consultative Closure Committee, as part of an overall stakeholder engagement strategy, can be a useful forum in which long term objectives can be discussed (Commonwealth of Australia 2006).

A Consultative Closure Committee for the Project will be an effective means of engaging stakeholders and demonstrating to regulators that there is community support and input into the overall Closure and Rehabilitation Plan. The Consultative Closure Committee can also have a formal role in the relinquishment sign-off process.

The Joint Venture has brought together a Peer Review Panel for the duration of the approval process and the approval process has included wide ranging stakeholder identification and consultation. The formation of a Consultation Closure Committee will be required as the Project becomes operational.

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Table 6 Potential Closure and Rehabilitation Stakeholders Identified for Consultation

Stakeholder type	Stakeholder
State Government Agencies	Department of Mines and Petroleum
	Department of Environment and Conservation
	Environmental Protection Agency
	Department of Indigenous Affairs
	Department of Planning and Infrastructure
	Department of Water
	Department of Health
Commonwealth Government Agencies	Department of the Environment, Water, Heritage and the Arts
Local Government	Shire of Menzies
	Shire of Laverton
	City of Kalgoorlie-Boulder
Indigenous Groups	Central Desert Native Title Services
	Goldfields Land and Sea Council
	Representatives from all applicable Native Title Claimants
	Tjuntjuntarra Aboriginal Community
Environmental Groups	Conservation Council of Western Australia
	Goldfields Naturalist Group
	Kalgoorlie-Boulder Urban Landcare Group
	Malleefowl Preservation Group
	Wilderness Society
	Wildflower Society of Western Australia

9 COMPLETION CRITERIA

Objective: To establish a set of indicators and criteria that will demonstrate successful completion of the closure process.

The nationally accepted definition of completion criteria is “an agreed standard or level of performance, which demonstrates successful closure of a site” (Commonwealth of Australia 2006). Determining what the “agreed standard” and the definition of “success” plays a vital role in the progression towards relinquishment. Further, completion criteria are highly site specific and should reflect the unique set of environmental, social and economic characteristics of each operation (ANZMEC 2000) and as such must be tailored to suit each operation.

Completion criteria bridge the gap between the expectations of regulatory bodies, the mining operator and relevant stakeholders and give a set of site specific, formalised objectives on which all parties agree and to which the mining operator can aim toward in order for rehabilitated land to be relinquished.

Developing completion criteria for rehabilitated mine sites has proven to be very difficult for mining operations and their stakeholders. This is in spite of the fact that completion criteria provide the mine operator with a degree of certainty about required outcomes and direction to enable the outcomes to be realised.

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Defining preliminary completion criteria for the Project at this early stage will establish clear aims and pathways to achieving closure. The following table identifies completion goals, objectives and indicators. Deriving specific completion criteria will require further research and consultation as the Project progresses. It is intended that this table will be broken down into individual tables for each closure management unit as the Project progresses.

Table 7 Conceptual Completion Criteria for Tropicana Gold Project

Goal	Objective	Indicator	Completion Criteria
Agreed land use	Stakeholders agree on the final land use for each management unit	Majority Agreement	Documented consultation and agreement on the final use for each management unit
Safe	The site is safe for humans and animals, now and in the foreseeable future	Presence of hazards	Safety hazards removed or controlled including: <ul style="list-style-type: none"> • mining infrastructure removed; • no unstable areas; • no hazardous materials; and, • void protected by bunding
Non-polluting	Groundwater remains uncontaminated	Groundwater monitoring	Certification that monitoring data meet specified criteria for potential contaminants
Stable landform	Landform erosion comparable to undisturbed areas	Slope angle and length	Slope angles meet agreed design specifications
End ecosystem	Ecosystem definition: One of the analogous local vegetation communities <i>to be determined for each management unit.</i>		
	Self sustaining vegetation community	Presence of framework species	Appropriate framework species densities <i>to be determined.</i>
		Species richness	Appropriate specie richness target 70% of original
		Priority species returned	Appropriate percentage return <i>to be determined</i>
		Presence of weeds	Absence of any weeds not recorded in pre-mining surveys.
Fauna return	Animals	Appropriate measure of faunal utilisation <i>to be determined</i>	

10 WASTE MATERIAL MANAGEMENT

Objective: To minimise waste generation over the mine life and to ensure that remaining waste cannot adversely affect the surrounding environment.

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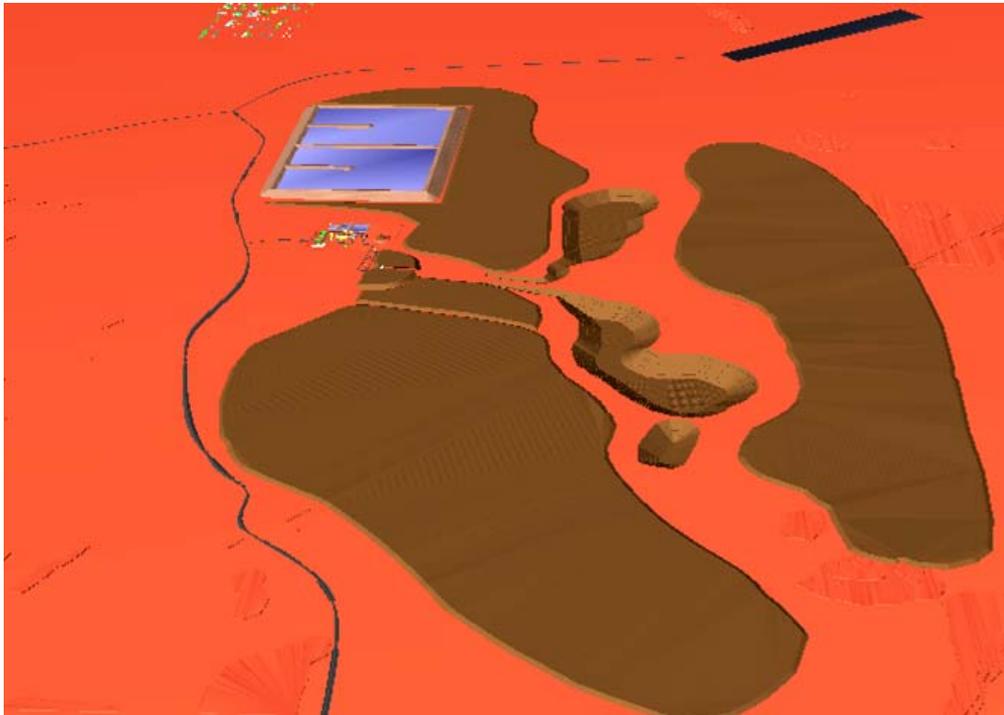


Figure 3 Layout for Waste Landforms, Tailings Storage Facility and Mine Voids

10.1 MINE WASTE DISPOSAL

Mine waste consists of overburden and non-gold bearing material. The overburden and non-gold bearing material has not been altered by the mining process but exposure to the atmosphere can potentially activate chemical processes that could be harmful to a receiving environment. The two potential pollution types are acid generating waste and leachable heavy metals. To contain mine wastes the mine waste landform design will adhere to the following principles and parameters:

- create a permanent landform that is stable, non-eroding and sustains native vegetation so that the landform will blend into the surrounding environment visually and ecologically;
- the identified preferred waste management procedure will entail co-dumping Potentially Acid Forming (PAF) waste with Non-Acid Forming (NAF) waste and waste with an Acid Neutralising Capacity (ANC). The dilution and potential neutralisation of PAF waste by co-mingling with NAF and waste with ANC will avoid the creation of a concentrated cell of PAF waste that could be potentially harmful if exposed to air. Initial overburden characterisation indicates relatively small volumes of PAF;
- a layer of NAF waste will cover the co-mingled NAF, PAF and ANC waste;
- the final waste landform will be a low elevated landform that surrounds the mine pit voids. Waste landforms will be lower than surrounding high points so that the final structures will not be visible from beyond the valley where the Project's Operational Area is situated;

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- the maximum landform slope angle will be 15° (6:1 ratio) which is comparable to local dune slope angles;
- the waste landforms will be ringed by a toe bund. This will direct any surface runoff resulting from heavy rain into a pit void; and,
- ongoing work over the life of the Project will be required to verify the results obtained during the initial static and kinetic testing to ensure the proposed strategies remain appropriate.

A layer of selected growing medium will cover the surface of the landforms with a wind erosion rock armouring on landform crests (if required). This landform surface will then be revegetated.

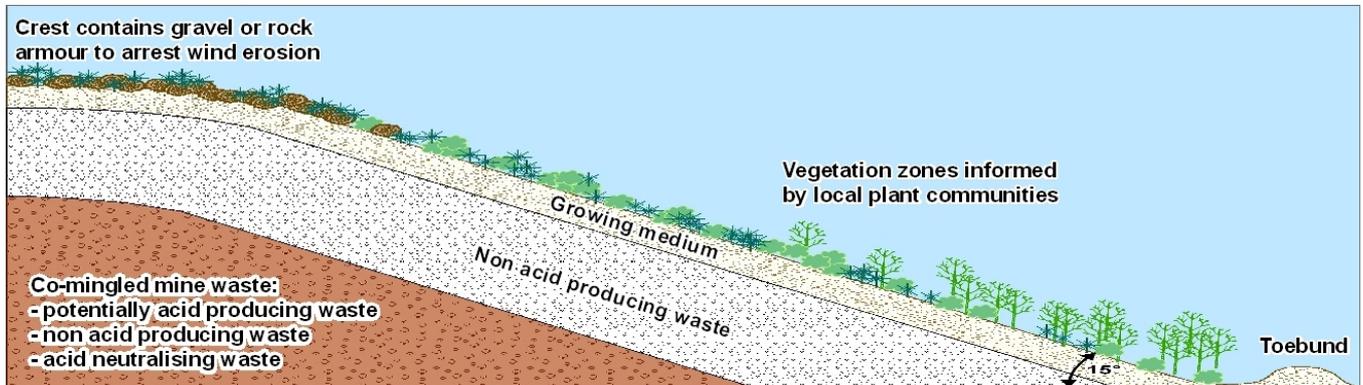


Figure 4 Cross Section of the Conceptual Waste Landform

(for illustrative purposes only)

10.2 TAILINGS STORAGE FACILITY

Knight Piesold Consulting evaluated the tailings storage requirements and recommended a facility that will be located to the north of the plant site adjacent to the waste landform (See figure 3). Tailings will be stored in a two-cell paddock storage facility to be progressively raised over the life of the Project as required by the mining and processing rates.

The tailings storage facility will be incorporated into the surrounding mine waste landform and the outer wall will be progressively rehabilitated as practicable. The facility will be covered with inert mine waste, followed by growing medium and revegetated.

10.3 NON-PROCESSING WASTES

Wastes will be segregated to facilitate recycling where practical. Putrescible and inert wastes will be disposed of at the Project landfill, to be located in a construction quarry pit. At closure the landfill will be capped with inert material and then spread with growing medium before being revegetated. The landfill will be recorded on a contaminated sites register, as required by the State *Contaminated Sites Act 2003*.

10.4 TYRES

Tyres form a substantial waste stream in mining operations. If tyre reuse or recycling is not feasible for the Project, used tyres will be appropriately buried within the waste material landforms.

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10.5 HYDROCARBON CONTAMINATION

Hydrocarbons will be managed by ensuring they are stored in designated areas. Despite best practice management, it is inevitable that an amount of hydrocarbon contaminated soil will be created over the Project life from spills associated with mobile and fixed plant. Hydrocarbon contaminated material will be decontaminated using a designated hydrocarbon remediation facility. The remediation facility will be decommissioned after monitoring confirms contamination levels have diminished and the site will be capped with growing medium and revegetated.

11 DECOMMISSIONING

Objective: To ensure that the decommissioning process can occur in an orderly, cost-effective and timely manner with clear accountabilities defined.

Decommissioning in this document means removing an installation from service and undertaking all works required to allow for rehabilitation to occur.

11.1 WATER SUPPLY AREA AND PIPELINE CORRIDOR

Investigation of the proposed production water bore field at Minigwal aquifer concludes that the aquifer will recover naturally 10 years following the cessation of abstraction of up to 14 ML/day (Pennington Scott, March 2009).

For closure:

- individual bores will be capped and locked;
- all borefield infrastructure of value will be transported off site;
- all remaining inert waste will be removed to the landfill or broken up and buried in situ; and,
- all ground disturbance will be rehabilitated using the techniques to be developed in the Project's rehabilitation program.

The aquifer will be monitored for 10 years or until it recovers more than 80 % of its initial level.

11.2 MINE VOIDS

It is intended that the mine pit voids will remain at closure although there is potential to backfill small satellite voids provided reopening of a pit due to future changes in resource economics is not considered viable.

The core objectives of final void management are informed by the *Mine Void Water Resource Issues in Western Australia* report (Johnson and Wright, 2003) prepared by the then Water and Rivers Commission (Department of Water). They are:

- render the site acceptable and safe over the long term;
- minimise environmental and health risks;
- maximise to the practicable extent potential future usage of the site; and,
- develop a 'walk away' solution.

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The mine voids will intersect with saline groundwater aquifers between 20 m and 50 m below the present surface (URS, October 2007) and will slowly form permanent pit lakes at the cessation of operations. The pit lakes have the potential to become increasingly saline over time. The possible impact of the permanent pit lakes on the surrounding groundwater will be resolved over the life of mine closure process.

11.3 OTHER INFRASTRUCTURE

This plan is premised on the removal, remediation and rehabilitation of all mine infrastructure including roads, airstrip, buildings and other structures. Prior to mine closure a decision will be made in consultation with stakeholders as to whether any infrastructure will be retained. All structures that are dismantled will be removed from site, relocated for burial in a designated onsite landfill or broken up and buried in situ.

The mine village is planned to be constructed using environmentally sustainable principles and sited in an aesthetically pleasing setting. There is potential for the village to be utilised for post-mining purposes if required.

12 REHABILITATION

Objective: To ensure that the rehabilitation process can occur in an orderly, cost-effective and timely manner with clear accountabilities defined.

As a principle, rehabilitation will be progressively undertaken as an area ceases to be operational. Progressive rehabilitation will reduce environmental risk, reduce financial liability at closure and enable site specific rehabilitation techniques to be proven. The majority of disturbed areas, however, will remain operational until the closure and de-commissioning phases of the Project, thus the majority of rehabilitation will occur during the closure phase (Table 8).

Up to approximately 3,940 (including the pit void) hectares of land will be disturbed and require rehabilitation over the life of the project.

Table 8 Rehabilitation Areas and Timing for the Project

Activity	Area (ha)	Timing
Operational Area (excluding the Power Supply and final pit voids)	2,170 ¹	Progressive
Water Supply Area	200	Closure
Infrastructure Corridors ²	670	Closure
Disturbance Estimate – Total	3,040 ha	

1: Excludes the pit voids which will remain as permanent pit lakes post-closure.

2: Includes a separate communication corridor (which may not be necessary if communication infrastructure is laid within the access road corridor).

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12.1 REHABILITATION EARTHWORKS

All disturbed areas (excluding the open pit voids) will be prepared for revegetation. Following the removal of infrastructure a case by case decision will be made as to the most appropriate surface preparation for areas to facilitate revegetation. Options include leaving an area as is, preparing a seeding and/or planting surface by ripping and scarifying, or application of a growing medium.

Areas requiring revegetation may include:

- the mine access road and utilities corridors;
- borrow pits;
- the mine village;
- the aerodrome;
- the borefield and pipeline corridor;
- vehicle tracks;
- mine traffic areas;
- mine infrastructure; and,
- the run of mine area (with or without stockpiled material).

12.2 RE-ESTABLISHING ECOSYSTEMS

Re-establishing functioning ecosystems that fit into the surrounding area is crucial to the success of the Project. There is a well developed body of knowledge on revegetation techniques throughout Australia including waste dump revegetation in the Goldfields and other arid and semi-arid areas; however, there is no revegetation project that is directly comparable to the Tropicana Gold Project and therefore the overall revegetation process will be unique to the site. The Joint Venture anticipates that the successful revegetation of the Project's disturbed areas will present technical challenges that will require targeted research and trials to address over the mine's life. The Joint Venture is committed to undertaking appropriate research and trials to ensure successful rehabilitation for the Project.

There are two distinct types of rehabilitation proposed for the Project:

1. Constructed landform rehabilitation – This will require the selection of vegetation types that are appropriate to the new landforms and the creation of appropriate conditions to permanently support a self-sustaining ecosystem.
2. Re-instatement of disturbed areas – This will aim to blend rehabilitated areas into the surrounding landscape by, and as much as is practicable, returning original vegetation. This will include areas outside of the active operational area such as access roads, water extraction areas, the village and the airstrip.

Growth Medium

The waste landforms will be covered with one metre of sand as a growing media. Research will determine whether an impervious layer below the growth medium is needed to support dune vegetation. The waste material landform crests will be particularly vulnerable to wind erosion and will be armoured with a gravel/rock cover. The cover material will be carefully selected to be able to support vegetation.

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To this end it must not be dispersive or hard setting, acidic, saline or contain heavy metals in concentrations injurious to plant growth

Another set of rehabilitation protocols will be developed to prepare areas for revegetation outside the operational area (such as access roads, water extraction infrastructure and the village).

Sandy growing medium for rehabilitation is identified as a crucial resource at the Project. Procedures will be developed to characterise, strip, stockpile, re-spread and account for growing medium to ensure its wise use. If trials prove it possible, biological attributes such as seed and soil biota will be recovered from the clearing and stripping process and transported to waste landform covers

Vegetation Composition

Selection of the preferred vegetation assemblage for each distinct area of rehabilitation will be informed by developing a comprehensive understanding of the various vegetation communities that occur in the local area and matching that with a comprehensive understanding of what type of vegetation communities are possible in the reconstructed landscape.

Revegetation Approach

The establishment of the nominated vegetation communities will be tackled by applying the following hierarchy of priority:

1. Focus on framework species: Vegetation surveys have identified a number of species that make up the majority of plant cover in the various plant communities that are expected to be routinely rehabilitated for the Project. Those species are:
 - *Eucalyptus gongylocarpa* (Marble Gum) and a variety of other tree- and mallee-form Eucalypts;
 - *Acacia aneura* (Mulga); and,
 - *Casuarina cristata* (Black Oak).
2. Dominant understorey species:
 - *Triodia basedowii* (Hard Spinifex) and other ubiquitous grass species.
3. Priority species affected by mining operations.
4. Other species that were present before clearing: Ideally all species that were present prior to clearing for the Project will be returned during rehabilitation. However, the applied research program may demonstrate that the return of some species cannot reasonably be accomplished. The Joint Venture assumes a species return target of at least 70% of the original botanical diversity of the area formerly occupied by the disturbance area in question.

Proven successful rehabilitation at other locations invariably relies on a combination of techniques to reintroduce biodiversity. The majority of the Project's disturbance areas are located in a region with no rehabilitation analogue for direct comparison. The most appropriate combination of rehabilitation methodologies will be determined by applied research. Methods at the disposal of the Project team could potentially include:

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- re-introduce plant species and soil biota by careful handling and application of growing medium;
- direct seeding;
- growing seedlings for planting out;
- growing cuttings for planting out;
- direct transplantation;
- employing micro-propagation methods to multiply plants; and,
- creating habitat and micro-habitat for fauna re-colonisation by employing methods such as increasing surface roughness or replacing sheltering logs and rocks within the rehabilitation.

Seed Management

Seed collecting for direct seeding or seedling propagation are the tools most consistently included in a typical mining project's rehabilitation program. Effective seed management is therefore likely to be key to the success of the Project's rehabilitation program. Seed management will include the following elements:

- establish seed collection provenance zones that ensure the genetic integrity of the new vegetation communities;
- determine the abundance of the seed resource within the allocated seed provenance zones to ensure that the ecology of the seed collection areas are not compromised by over collecting;
- establish seed storage protocols that maximise viability, shelf life and revegetation success;
- establish seeding techniques that maximise germination and establishment; and,
- undertake a cost-benefit analysis that weighs up the effort of collecting seed with the effectiveness of the revegetation method. For example, if the seed of a particular species is relatively abundant then direct seeding with a relatively low establishment may be appropriate, however, if the seed of a species is difficult to collect then methods such as seedling raising (to increase recruitment) may be more appropriate.

12.3 REHABILITATION MONITORING AND MAINTENANCE

Recognise Uncertainty

The Project, once approved, will exist in a semi-arid environment with highly variable weather from year to year. In spite of the best efforts by the rehabilitation team, new rehabilitation will be vulnerable to drought and other weather extremes. To address this uncertainty, the Project team will:

- monitor and analyse revegetation establishment;
- make provision for poor establishment; and,
- include rehabilitation maintenance and remediation as part of its standard practice.

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Monitoring

The rehabilitation monitoring program will be designed to measure the indicators that will be used to assess completion criteria. In addition to the completion criteria a set of interim monitoring criteria will be defined to measure against. The interim criteria will act as a series of sequential milestones that a section of rehabilitation must pass through in order to meet the next interim criteria or completion criteria. If a section of rehabilitation is unable to reach an interim criterion the monitoring will trigger a remediation response.

Fire Management

Fire is a ubiquitous factor in the semi-arid landscape. Management of fire within rehabilitation areas may include:

- excluding fire from some areas for at least seven years to protect young rehabilitation as it develops to a state that is fire tolerant; and,
- potentially using fire in specific areas as a tool to manipulate rehabilitation development e.g. to encourage re-sprouting species and grasses or to create space for enrichment seeding or planting.

Weed Management

Weed management will focus on ensuring existing species remain at a low presence and new weed species are excluded by inspection and monitoring procedures. Weed management measures will include:

- a weed hygiene procedure for light vehicles and mobile heavy equipment will be developed to prevent weeds from entering the Project areas or the surrounding area;
- regular weed surveys will be undertaken across the Project areas to identify, control and eradicate (if feasible) weed species; and,
- purchasing certified weeds free seed.

Remediation

Monitoring serves two purposes - it confirms that rehabilitation is tracking towards the completion criteria, and if it is not a, triggers a remediation response. The Joint Venture recognises that remediation is a critical element of successful rehabilitation and is building remediation planning into standard operating practice. Rehabilitation remediation may require a different suite of methods to rehabilitation establishment. The Joint Venture together with the Project team will address gaps in remediation knowledge in the Rehabilitation Research Program.

12.4 REHABILITATION RESEARCH PROGRAM

The Joint Venture, in partnership with appropriate research institutes such as the Botanic Gardens and Parks Authority, aim to further explore the ecology of the area surrounding the main disturbance zones of the Project and to advance leading practice in semi-arid and arid zone mine rehabilitation. There are numerous areas of potential investigation and future directions for research will be dictated as areas of greatest challenge arise.

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There are four interrelated research themes so far identified to be explored for the Project, they are:

1. Revegetation biology and ecology – investigating species that would be included in the rehabilitation program and what they would require to persist. Subjects under this theme include:
 - key plant biology and key community ecology (otherwise known as eco-physiology);
 - plant regeneration strategies and fire responses;
 - plant establishment ecology; and,
 - seed production.
2. Creating a landscape suitable for revegetation – design and construction of landforms that can sustain vegetation. Subjects under this theme include:
 - creating a stable, non-eroding landform to sustain vegetation;
 - soil properties required for vegetation;
 - soil properties that are hostile to vegetation; and,
 - how to ensure that waste contained in constructed landforms does not impact on the surface vegetation.
3. Utilising rehabilitation resources – understanding and valuing the resources that rehabilitation will utilise. Subjects under this theme include:
 - soil seed bank;
 - available growth medium;
 - cleared vegetation and rocks; and,
 - the exploitable seed resource in the surrounding area.
4. Enabling technologies – enabling rehabilitation practitioners to use the scientific knowledge on the ecology and rehabilitation to create on ground rehabilitation outcomes. Subjects under this theme include:
 - handling growing media;
 - seed collecting, storage and utilisation;
 - rehabilitation monitoring methods; and,
 - rehabilitation monitoring.

13 RELINQUISHMENT

Upon successful rehabilitation of the Project area, the Joint Venture will seek to relinquish the mining lease to the Western Australian Government via the lead regulatory agency (currently the Department of Mines and Petroleum). The establishment of a closure process early in the Project’s life (outlined in this document and including agreed and achievable completion criteria) will bring about a clear understanding of expectations and direction for all stakeholders and the Joint Venture.

It is proposed that relinquishment of the Project will involve the following steps:

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1. Establishment of formal closure, sign off and relinquishment mechanisms – The Joint Venture seeks to achieve this through the establishment of agreed completion criteria, an up to date closure plan and a Consultative Closure Committee.
2. Peer review of formal mechanisms prior to stakeholder assessment and approval – The Joint Venture is working with the Botanical Gardens and Parks Authority to establish the technical parameters for the rehabilitation of the Project. Their participation will incorporate other areas of technical speciality as the Project progresses.
3. Sites that have successfully met the criteria are presented for relinquishment in a formal sign off – The Project team will prepare a checklist of completion criteria and record the status of each area against the criteria to be inspected and signed off by representatives of the Joint Venture and lead regulatory agency.
4. Establish a process to deal with any sites that do not meet the completion criteria – a corrective action plan would be prepared by the Project team to address any concerns of the lead regulatory agency.

13.1 RECORDS RETENTION

This Conceptual Closure and Rehabilitation Strategy has identified that records retention can play an important role in achieving consistent rehabilitation outcomes. The AngloGold Ashanti Integrated Management System provides the mechanism for records retention following the closure and relinquishment of the Project. Records to be retained following relinquishment should include the following:

- geological records, including core logs;
- plans and surveys of developments and facilities;
- locations, quantities and qualities of stored waste;
- design and specifications of final landform construction and rehabilitation; and,
- rehabilitation research and monitoring.

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14 REFERENCES

This document has been produced with reference to the following documents:

- ANZMEC MCA, August 2000, Strategic Framework for Mine Closure Commonwealth of Australia
- Department of Industry and Resources WA, December 2006, Mining Environmental Management Guidelines – Review of Environmental Performance Bonds in Western Australia, Environment Division
- Department of Industry and Resources WA, December 2006, Environmental Notes on Mining – Care and Maintenance, Environment Division
- Department of Industry Tourism and Resources, 2006, Mine Closure and Completion, Australian Government
- Department of Industry Tourism and Resources (2006), Mine Rehabilitation, Australian Government
- Environmental Protection Authority, June 2006, Guidance for the Assessment of Environment Factors (in accordance with the Environmental Protection Act 1986) No.6
- International Council on Mining and Metals, 2005, Good Practice Guidance for Mining and Biodiversity ICMM London UK.
- International Council on Mining and Metals, 2008, Planning for Integrated Mine Closure: Toolkit ICMM London UK.
- Johnson, S. L. and Wright, A.H. 2003 Mine Void Water Resource Issues in Western Australia Report No. HG9 WA Water and Rivers Commission – Resource Science Division
- Pennington Scott, November 2008, Process Water Supply Investigation, report for Anglo Gold Ashanti Australia
- SRK Consulting, October 2008, Geochemical Characterisation of Tropicana Waste Samples: Phase 1, report for Anglo Gold Ashanti Australia
- Department of Mines and Energy-Environment Division, January 2009, DMP Bonds Policy Effective July 2008-includes moratorium imposed January 1 2009. Western Australian Government
- Outback Ecology, October 2008, TGP - Characterisation of soils and regolith material from RC drilling report for Anglo Gold Ashanti Australia
- URS, August 2008, Tropicana Hydrological Investigation.

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