21.1 Introduction

This chapter describes the approach by Matilda for the rehabilitation and closure of their mineral sands mining operations on the Tiwi Islands.

Matilda will manage rehabilitation requirements through the development and implementation of:

- Rehabilitation objectives;
- Rehabilitation methodologies and procedures;
- Reviewing and undertaking rehabilitation research; and
- Monitoring, reporting and contingency planning.

Mine closure is defined in specific closure criteria that takes into account:

- Legal and other requirements;
- Stakeholders interest;
- Post operation closure requirements; and
- Relinquishment signoff.

These rehabilitation and closure criteria will be based upon documented agreements between Matilda, the TLC and the traditional owners of the areas to be mined. Wherever possible the local community will be engaged in rehabilitation activities and environmental programs. Specific identified areas where the local community may be contracted to provide services to Matilda include seed collection, propagation of seedlings and management of a nursery on the Islands, revegetation works, rehabilitation monitoring, weed management and fire management.

In particular, the TLC has plans to establish an Environment Centre and a land-based Ranger program. Matilda would like to utilise the skills that would be offered by these organizations, and support the establishment and maintenance of these programs both via financial sponsorship and employment opportunities.

Rehabilitation and Closure requirements and agreements will be documented into a Rehabilitation and Mine Closure Plan (RCMP). This plan will form the basis of security calculations. The RCMP will be reviewed on an annual basis and submitted to the Department of Primary Industry, Fisheries and Mines (DPIFM) as part of the Annual Mine Management Plan (MMP). The RCMP will also form the basis for accounting for rehabilitation and mine closure budget provisions.

It is noted, however, that consultation with local landowners as to final land uses is will be continuing as part of and beyond the EIS process.

21.2 Rehabilitation

21.2.1 Rehabilitation objectives

Matilda's rehabilitation activities will focus on four key objectives:

- To minimise the area of land disturbed and to minimize the area of land that is cleared at any point in time, and to progressively rehabilitate mined areas as soon as practicably possible;
- To ensure that the post-mining landform is consistent with the pre-mining landform and the surrounding undisturbed area wherever possible;
- To stabilise disturbed areas as soon as practically possible to prevent wind and water erosion; and
- To revegetate the stabilised post-mining landform to provide for the long-term stability of the system, and for the return of native flora and fauna communities that are similar to pre-mining conditions and surrounding undisturbed areas.

These objectives have been used in the development of the rehabilitation methodology. The sub-sections below describe the proposed approach to rehabilitation under the following headings:

- Rehabilitation methodology;
- Rehabilitation constraints;
- Review of rehabilitation research;
- Rehabilitation monitoring and reporting; and
- Contingency planning.

21.2.2 Rehabilitation methodology

Exploration

Matilda's approach to the rehabilitation of areas disturbed by exploration is set out in the Matilda Minerals Tiwi Islands Exploration Environmental Management Plan, 2004 (Exploration EMP). This plan recognises the need to cause minimum disturbance to the environment during exploration, and documents procedures to minimise the risk of bushfires, prevent the spread of noxious weeds and fauna, and facilitate rehabilitation of areas disturbed by exploration.

The Exploration EMP lists the following specific requirements in relation to minimisation of disturbance and rehabilitation of areas subject to exploration activities. These requirements are the responsibility of a designated representative of Matilda, and are audited to ensure that controls are met.

- Drill holes or access tracks will not be located near to known species of high conservation significance.
- Each drill site will be photographed prior to drilling and following completion of program.
- All drill holes will be cleared of litter, and survey pegs and flagging tape will be removed.
- All lines leaving current tracks should have a dog-leg at the intersection with the track to minimise later access by unauthorized personnel.
- All vehicles should be mechanically sound such that there is no likelihood of their leaking fuel, oil or other pollutants.
- Vehicles should always engage four-wheel drive to minimise their impact on the soils.
- All vehicles should remain on defined tracks and survey lines, and avoid disturbance of trackside vegetation.
- Access tracks will be rehabilitated and monitored following exploration access. Matilda will be responsible for any rehabilitation or follow-up work that may be required.
- Drill cuttings should be returned to the drill-hole where possible and all overburden should be raked out to minimize impact on surrounds. The holes should be plugged using an 'Octo-plug' or similar immediately upon drilling.
- Drill holes and drill pads will be rehabilitated in accordance with the DPIFM Advisory Note PA6 – 015, Capping and Plugging of Exploration Drill Holes.
- No domestic animals, traps or firearms will be taken onto the site.
- Exploration will not take place during times of extreme fire danger. All vehicles must have fire extinguishers.

(Matilda Minerals 2004c)

All exploration programs will be under the control and responsibility of a designated qualified representative of Matilda and audited to ensure that requirements are met. (Matilda Minerals 2004c)

Minesite and Infrastructure Areas

The approach to mine rehabilitation would be finalised as part of the DPIFM mining approval process, in the preparation of a Mining Management Plan (MMP). The MMP would set out the agreed mine rehabilitation measures arising from the EIS process, including for monitoring and reporting.

The proposed mine site rehabilitation procedures are illustrated in Figure 2.2. Rehabilitation will be undertaken continuously as an integral part of the mining operation, with the mining being undertaken as a progressive operation, with a continuous rehabilitation program following close behind the mining face.

Personnel will be made aware that operations must minimise disturbance and rehabilitation requirements.

The key rehabilitation measures are set out below:

- Prior to clearing, detailed surveys of the mining area will be undertaken to ascertain species diversity and numbers to assist in defining revegetation requirements and also to provide input into the rehabilitation monitoring program.
- The mining area will be cleared periodically ahead of the mining face, and vegetation and topsoil to a depth of 50 mm, will be pushed separately to one side and stockpiled for later spreading and used as a brush cover and seed bank in the site rehabilitation.
- When active mining of an area is complete, all tailings will be placed back into the mined areas and the landform will be reconstructed to the original profile (unless the original profile is too steep for successful rehabilitation, in which case alternative landforms suitable for long-term stability would be employed).
- It is anticipated that the resultant profile, over the original mineral sand bearing zone, will be approximately 150 mm lower than the existing profile due to the HM content of the sands.
- The stockpiled topsoil and cleared vegetation (brush cover) will be respread and reseeded.
- Reinstatement of soil will ideally occur within one season to facilitate germination of seed stored in the topsoil (Metcalfe 2005a).
- Care will be taken to ensure that surface contours are retained and long-term visual amenity is maintained. Drainage will be re-established to maintain pre-existing conditions where appropriate.
- Reseeding or revegetation with seedling stock of areas disturbed by mining will be undertaken using species identified during initial surveys. Seed would be collected from the mining area to ensure that the flora provenance is preserved.
- Where possible, and where it does not result in additional disturbance, old logs salvaged from cleared areas will be returned to rehabilitated areas to facilitate recolonisation of areas by local flora and fauna (including birds) (Brady and Firth 2005). These will also provide additional protection from wind and water erosion if placed correctly.
- Edible seed bearing plants, native perennial grasses and sedges will also be included in revegetation species lists to further encourage recolonisation by native fauna (Brady and Firth 2005) as appropriate.

- Rehabilitation of areas associated with the camp and plant site will be carried out at the completion of mining. Discussions by Matilda with landowners to date have indicated that the landowners would like to retain certain camp facilities and the access roads for the development of tourism enterprises. The camp will be transported from Andranangoo to Lethbridge after completion of mining at Andranangoo. If mining is approved in subsequent areas on the Islands the camp will be used at these other sites. The camp will be left at the last site where mining is undertaken, subject to the landowners and TLC's approval.

- Agreements will be put into place with the TLC and the traditional owners in regards to ongoing maintenance of facilities left for community use.

- All access roads, tracks, building pads and other infrastructure not required for future use will be removed, and the area ripped and levelled to the original profile. Areas susceptible to erosion will be covered with brush and seeded. Suitable arrangements will be made to dispose of materials used for hardstands, foundations and road surfacing.

- Upon vacating the site all areas will be made safe and litter will be removed.

- Water supply bores will be decommissioned, or left subject to the landowners and TLC's approval.

Overall the rehabilitation program will focus on returning native vegetation endemic to the area wherever possible. Key flora species will be identified and targeted for recolonisation where appropriate. Completion criteria will be established for percentage plant cover based on baseline data.

Weed species will be monitored and a Pest, Weeds and Environmental Management Plan will be developed to prevent and control the spread of weeds should they colonise areas along the haul road and around the minesite and the camp.

21.2.3 Rehabilitation constraints

Matilda recognises that there are a number of constraints that may potentially affect the success or otherwise of rehabilitation in coastal areas. The identified potential constraints include:

- Natural slopes may not be sufficiently stable for rehabilitation once the plant cover has been removed. It is noted that Matilda intends to return disturbed areas to the pre-mining landform wherever possible. However if the original profile is too steep for successful rehabilitation, alternative landforms that are compatible with the surrounding landscape will be used.

- Suitable planting times may be limited to early in the wet season, as this would take advantage of the wet season rains to optimise growth.

- Sandy soils characteristically have low moisture content. Additionally exposure of soils can lead to desiccation due to a loss of moisture through evaporation. It is proposed that a brush cover

sourced from the original vegetation cover (Figure 2-2) will provide some protection from desiccation. Progressive rehabilitation will be timed so as to minimise the amount of time that soils are exposed.

- In addition to solar radiation, reflected and radiated heat levels are high in exposed coastal dune sands. It is proposed that the brush cover will provide protection from reflected heat and some shading for seedlings until they become established. Progressive rehabilitation will minimise the area subjected to reflected or radiated heat.
- Wind may cause sand-blasting of foliage and erosion around the root zone, or may result in burial of small plants. The brush cover will provide some protection from wind erosion.
- There are high levels of airborne salt in the minesite areas, due to the proximity to the sea. Matilda proposes to plant species that are endemic to the area and adapted to living in a coastal environment, and to ensure that the flora provenance is preserved.
- Soils are sandy and have a low nutrient status and this may be exacerbated by leaching and denitrification during the period that the topsoil is stockpiled. Matilda may consider the use of fertiliser to replace lost nutrients, and to assist in establishing ground cover, if low nutrient status is found to be a constraint to rehabilitation.
- As noted above, weed species will be monitored and a Pest, Weed and Disease Environmental Management Plan will be developed to prevent and control the spread of weeds should they colonise areas along the haul road and around the minesite and the camp.

21.2.4 Review of rehabilitation research

Matilda has drawn on techniques employed by other sand mining operations to develop rehabilitation strategies.

Matilda will trial and monitor the effectiveness of these methods over time against pre-defined completion criteria. Should these methods not prove adequate, corrective measures would be developed based on reviews of available rehabilitation research and, where necessary, rehabilitation trials may be undertaken.

Alternative strategies that may be considered based on an initial review of available research, include:

- Management of cleared vegetation;
- Refining seeding mixture;
- Use of cover crops;
- Seed treatment;

- Fertiliser application;
- Construction of windbreaks;
- Soil moisture testing;
- Herbivore-proof fencing;
- Dominant species control; and
- Additional seeding or planting of seedlings.

These are described briefly below.

Management of cleared vegetation

Current research suggests that respreading of brush cover over topsoil will decrease windspeed, provide a source of seed, assist in maintaining soil moisture, provide physical protection for seedlings from wind and solar radiation, and provide habitat for fauna. However, site trials may determine that rehabilitation will improve if the vegetation is treated differently. Examples used at other sites include mulching vegetation and placing vegetation in windrows (URS 2005).

Refining seeding mixture

It will be possible to refine seeding prescriptions by comparing flora in rehabilitated areas with adjacent undisturbed areas. Species that regenerate well from re-spread topsoil and vegetation material can be deleted from the seeding list, and efforts can be directed at species that prove more difficult to establish (URS 2005).

Cover crops

If local species and brush cover do not provide adequate cover it may be necessary to sow a cover crop to protect the soil. This would be an infertile annual species that will die off after one year rather than reproduce and spread to surrounding areas. This will provide initial assistance for endemic species by increasing protection against wind and soil erosion. This procedure has been employed at North Stradbroke Island Minerals Sand Mine (URS 2005).

Seed treatment

Some seed germination rates are dramatically improved if the seeds are treated prior to planting. A range of treatments are available and would be investigated as necessary to maximise revegetation success and cost effectiveness (URS 2005).

Application of fertiliser

The use of fertilizer increases levels of soil nutrients, and thus may increase germination rates of vegetation during the early years of revegetation (URS 2005).

Construction of windbreaks

Results at the Namakwa Sand Mine suggest that windbreaks provide wind protection to seedlings as well as catch dew to provide the seedlings with additional sources of moisture (URS 2005).

Soil moisture testing

If soil moisture retention poses a significant constraint, research and development could be undertaken to compare soil moisture retention abilities of rehabilitated areas with adjacent undisturbed areas, and to implement alternative soil reconstruction methods if improvements can be demonstrated (URS 2005).

Herbivore-proof fencing

Young nutrient rich growth may entice herbivores to rehabilitated areas. The increased grazing pressure may decrease the rate of rehabilitation. Herbivore-proof fencing may be required around the rehabilitation zones in the early stages to protect seedlings from grazers if grazing pressure is found to significantly affect growth (URS 2005).

Dominant species control

Remedial works may also include management of over-representation of particular native species (URS, 2005).

Additional seeding or planting of seedlings

Additional seeding or planting of seedlings may be required during the rehabilitation process to increase site density and floristics (URS 2005).

21.2.5 Rehabilitation monitoring and reporting

Matilda has developed draft flora and fauna monitoring procedures that would be used to assess the effectiveness of rehabilitation programs. These procedures outline the use of flora and fauna survey sites in rehabilitated areas and in control areas.

Flora monitoring procedures include assessment of stability, infiltration and nutrient cycling, as well as species abundance, height and vegetative cover. These procedures are based on the Landscape Functional

Analysis theory and were primarily developed for applicability to minesites in the rangelands (Tongway and Hindley 2004). However, these procedures have also been modified and implemented by sand mining operations in Western Australia and Qld (Tongway pers. comm.. 2005)

Fauna monitoring procedures include pit trapping, Elliot-box trapping, spotlighting, mist-netting, bird monitoring, ant monitoring and microhabitat searches and cage trappings (feral animals).

Additionally, Matilda will develop weed monitoring procedures, as part of the Weed, Pest and Disease Environmental Management Plan,.

Results of flora and fauna and weeds monitoring programs would be documented in an Assessment of Reshaped Area Stability Report and a Fauna Report. This data will also be reported in the Annual Mine Management Plan.

If acid sulphate soils are identified as a potential issue, an acid sulphate soils monitoring and management plan will be developed. Investigations to assess the presence of acid sulphate soils have been undertaken at Andranangoo. Investigations into the presence of ASS at Lethbridge will be undertaken as part of more detailed site work prior to mining being undertaken. However, it is expected that the results for Lethbridge will be similar to those obtained for Andranangoo. The analytical results in all samples indicated that they were not likely to be acid forming (Section 5.1.1).

21.2.6 Contingency planning

As a part of the rehabilitation monitoring program, the rehabilitation success would be determined. If the monitoring program indicates that rehabilitation progress is poor, or if re-profiled areas become unstable, action would be taken to ensure rehabilitation success as measured by the monitoring program.

The measures used to ensure rehabilitation success would depend on the issue. For areas where site stability is an issue, these would be repaired or regraded with appropriate scale equipment, and stabilised with additional surface stabilisation materials. These may include use of biodegradable organic matting in problem areas.

Wherever possible maintenance works will be undertaken within the same planting season. Once reasons for poor site stability success have been determined, and rectified, for example reinstatement or realignment of drainage control, repaired areas will be seeded. (Hadden 1993)

Areas may also be revegetated either by reseeding or by planting nursery seedlings, or treated to manage weeds, if monitoring programs indicate that revegetation progress is poor. The need to undertake additional rehabilitation works will be assessed based on guidelines documented in the 'Soil Conservation Handbook for Parks and Reserves in the NT' (Hadden 1993). This reference offers the following guidelines for assessing the need for further revegetation work;

- If the area has less than 60% damage or failed germination, seeding or planting of seedlings should be repeated using half the rates originally used.

- If the area has more than 60% failed germination, the revegetation process should be repeated from scratch, including ground preparation if required.

21.3 Mine closure

Closure requirements would be incorporated into the MMP, as part of the DPIFM mining approval process. The adopted mining methodology (Figure 2.2) is designed to provide for progressive rehabilitation, to facilitate mine closure. Discussions about mine closure and future land uses with local stakeholders commenced very early in the mine planning process.

Matilda considered a number of operational scenarios as part of its mine planning process. These alternatives included consideration of the full range of potential environmental impacts and the ability to manage and rehabilitate the impacts. These alternatives are described briefly in Section 1.7.3.

The adopted mining methodology is considered to provide the best outcome in terms of progressive rehabilitation, and in the facilitation of mine closure.

21.3.1 Mine closure objectives

Matilda's RMCP will be consistent with the DPIFM Close Out Criteria – Life of Mine Planning Objectives (DPIFM formerly DBIRD 2001), and also the (ANZMEC / MCA Framework for Mine Closure Commonwealth of Australia 2000). These criteria will be combined with the more specific criteria to be documented in the MMP as a result of the consultation process and will form the basis of Matilda's RMCP for operations proposed to be undertaken on the Tiwi Islands.

The broad objective for mine closure in the Northern Territory is that the mine site should be rehabilitated to a standard which minimises or negates restrictions on subsequent land use, both on site and in adjacent areas, and which complies with the laws of the Northern Territory (DPIFM formerly DBIRD 2001).

21.3.2 Mine closure completion criteria

Within the above broad objective, the DPIFM has defined the following closure criteria in relation to the following key issues:

- Compatibility with agreed post-mining land use;
- Physical safety;
- Low risk to biota;
- Stability;
- Rubbish clean-up;

- Revegetation or other improvements;
- Visual amenity; and
- Management of heritage and archaeological sites.

These criteria form the basis by which the NT Government is expected to assess Matilda's rehabilitation success over time, and to assess environmental liability.

A description of the above criteria and the strategies Matilda plan to adopt to achieve these criteria are presented in Table 21.1.

Table 21.1: Department of Primary Industry and Mines Closure Criteria and Strategies to Address Criteria

Completion Criteria	Description	Strategies to Address Criteria
Compatibility with agreed post-mining land use	Specific agreed post mining land uses are defined and achieved for each site.	• Matilda has undertaken extensive consultation with Traditional Owners and the local community to determine their wishes in relation to post-mining use. The strategies reflect these discussions. • Processing facilities and associated infrastructure will be dismantled and removed, and infrastructure, processing and mining areas will be rehabilitated and returned to native vegetation. • Cleared areas and haul roads will be retained for use by the local community. • In agreement with the local Traditional Owners and the TLC, camp facilities will be made available to the community at the last site to be mined, and a maintenance agreement will be put in place to manage the area post relinquishment. • Revegetation objectives will be based on baseline data collected as part of the EIS process, and specific area surveys prior to vegetation clearance.
	Monitoring trends should indicate ability to support and sustain the agreed post-mining land use.	• Monitoring programs will be established to evaluate progress towards sustainability of revegetated systems in line with agreed post-mining land uses. • Rehabilitation monitoring programs will include assessments of landform stability, vegetation cover, structure and diversity, fauna colonization and the presences of pests and weeds.
Physical Safety	Excavations and subsidence to be rendered safe.	• Tailings and topsoil will be replaced in mined areas in correct sequence and to original profile, unless the original profile was such that rehabilitation success would be inhibited. If alternative landforms need to be considered these will be compatible with the surrounding land uses.

Completion Criteria	Description	Strategies to Address Criteria
	All drill holes, shafts, open cuts and other openings to be securely capped, filled or otherwise made safe.	• Procedures have been developed to rehabilitate exploration sites. The implementation of these procedures is the responsibility of the Exploration Manager. Exploration areas will be audited as part of Matilda's Environmental Management System (EMS).
	Access of people and livestock to be restricted as appropriate to site conditions.	• Camp and access roads will be retained post-closure for the use of the local community. • If required, rehabilitation areas will be fenced and signposted to prevent unauthorized access, until rehabilitation is deemed to have been successful.
Low risk to Biota	The quality of water leaving the site should be such as to cause no significant deterioration of water quality to the downstream beneficial use(s) or water quality objectives of the receiving waters declared under Section 73 of the *Water Act 1992*.	• Surface water runoff will be monitored as required until relinquishment. It is noted that the sandy nature of the soils in the mining areas means that these areas will drain very quickly, particularly during the dry. Surface water sampling programs will necessarily focus upon opportunistic surface sampling after periods of heavy rainfall. • Where required, sediment traps will be utilised to reduce the potential for sediments to be transported off-site and for increasing sediment loads in surrounding surface water systems.
	Production of polluted water (e.g., acidic or caustic run-off from pits, stockpiles, waste rock or tailings) should be minimized and trends should indicate improvement.	• Chemicals are not used in the mining or separation processes. • Appropriate management plans will be developed to prevent pollution of surface water and ground water. If Acid Sulphate Soils are a potential issue, an Acid Sulphate Soils Monitoring and Management will be developed.
	Continuing active intervention should not be required for site water management.	• On-going water management will not be required post closure.

Completion Criteria	Description	Strategies to Address Criteria
	Residual toxic material, such as process chemicals, should be removed or contained; mobilisation of toxicants in general should be prevented and, in the case of acid rock drainage, minimized and controlled.	• Chemicals are not used in the mining or separation processes. • Contaminated materials will either be removed for disposal or suitably contained and covered so as to prevent mobilization of toxicants.
	All sources of radioactivity should be decontaminated, removed or encapsulated such that levels of radioactivity on site conform to contemporary criteria.	• Baseline radiation assessment indicates that radiation levels will not be an issue. The background levels of the mineral sands deposit areas are quite low compared to average world background levels. • A Draft Radiation Management Plan is included in this Draft EIS and a radiation monitoring program will be established in the first year of operations to provide a comparison of pre and post assessment of radiation levels in the mined areas, and to confirm or otherwise the predictions. • In the unlikely event that radiation levels rise to such a level that they pose a potential issue, a Radiation Management and Monitoring Plan will be revised accordingly.
Stability	All disturbed areas should be stabilised, including the construction of stable landforms.	• Tailings, overburden and topsoil will be replaced in mined areas in correct sequence and to original profile, unless the original profile was such that rehabilitation success would be inhibited. • Rehabilitation monitoring programs will include assessment of erosion, stability and vegetative cover. • Contingency plans will be developed if required (refer Section 21.2.6).
	Drainage should be consistent with post-mining land use and natural drainage patterns should be re-established where appropriate.	• Existing drainage will be re-established wherever possible through the re-instatement of existing contours.

Completion Criteria	Description	Strategies to Address Criteria
	Erosion by wind and water should be at least comparable with background levels for the area.	• Rehabilitation procedures will include consideration of methods required to reduce wind and water erosion. • Rehabilitation monitoring procedures will include an assessment of wind and water erosion.
	Storages left in situ should be stable, providing adequate margin of safety which is dependent on material stored, against floods, erosion and subsidence.	• Hydrocarbon storage facilities will be removed from site; inert materials will be taken to subsequent sites to be mined, or disposed to landfill subject to NT Government, TLC and local Traditional Owners approval.
Rubbish Clean-up	Facilities and equipment should be removed unless they are to remain for an agreed future use.	• Cleared camp areas and access tracks will be left for community use as required. The camp may be retained for community use at the last site to be mined, under agreement with the TLC and local Traditional Owners. All other facilities, roads, tracks, building pads and equipment not required for future use will be cleared, ripped and rehabilitated. • Water supply bores will be decommissioned unless they are required by the landowners.
	No rubbish should remain at the surface, or at risk of being exposed through erosion.	• Hydrocarbon and chemical waste will be removed from site and disposed of in appropriate landfill facilities on the mainland. • Domestic waste will be collected in 205 L drums, periodically burnt and disposed in a small sanitary landfill trench adjacent to the infrastructure area.

Completion Criteria	Description	Strategies to Address Criteria
Revegetated or otherwise improved	All surfaces should be revegetated to a self-sustaining condition similar to revegetation in comparable local areas to a standard that is consistent with data obtained from pre-mining baseline environmental studies where these have been done.	• Rehabilitation programs will focus on returning native vegetation endemic to the area wherever possible. Surveys of the areas to be disturbed will be undertaken prior to clearing to identify key species and percentage plant cover, to provide a reference for success of the rehabilitation monitoring programs. • Topsoil will be cleared and stockpiled for use in rehabilitation in order to promote germination of local seeds. Topsoil will be replaced without excessive compaction. • Cleared vegetation will also be stockpiled and replaced as brush cover to provide a source of seed and for protection from wind erosion. As required areas will be seeded and planted with seedlings. • Any seedlings planted would be grown from seed collected from the area, to ensure best rehabilitation success, and that the flora provenance is preserved.
	Vegetation communities should be developed that will attract and support recolonisation by native flora and fauna species found in the region.	• Revegetation programs will include consideration of the possibility of reconstructing fauna habitats. Old salvage logs from cleared areas will be replaced after mining, where possible, to provide habitat for fauna. • Key fauna species will be identified and targeted for recolonisation where appropriate. Edible seed bearing plants, perennial grasses and sedges may be seeded or planted to encourage recolonisation by native fauna.
	Vegetation should be able to survive the local fire regime.	• Firebreaks and fire management will be established around the camp site. • Matilda will actively prevent the potential for fire entering rehabilitation areas in the early stages of revegetation.

Completion Criteria	Description	Strategies to Address Criteria
	Introduction and spread of weeds and pests particularly those of disease significance should be prevented and an active program in place to minimise their presence.	• Matilda will develop a Pest, Weed and Disease Management Plan and quarantine procedures to prevent the spread of weeds and pests to the Tiwi Islands as a result of its activities. • Flora surveys conducted to date included an assessment of the presence of weeds along the proposed haul roads. The results revealed that weeds were limited to the areas around Pickertaramoor and existing roads in this area. Matilda will instruct personnel to avoid access to these roads leading in and out of Pickertaramoor wherever possible to prevent further spread of weeds from this area.
	Site specific criteria may apply, as agreed during project planning and documentation in mine / environment plans.	• Matilda will use knowledge gathered from environmental monitoring programs and from rehabilitation experience gathered over time, to revise and refine rehabilitation procedures and completion criteria overtime. • Consultations with local communities and key stakeholders will continue throughout the life of the operations. Completion criteria will be revised to reflect community expectations as appropriate. Initial agreements will be documented in the MMP prior to commencement of operations.
Visual Amenity	Long-term visual impact should be minimized by creating acceptable landforms, preferably compatible with the adjacent landscape.	• Visual amenity will be maintained by establishing a 200 m natural vegetative buffer between operations and the high water mark. This will ensure that operations cannot be seen by tourist or other groups using the coastal areas adjacent to the mining leases. • A vegetation buffer will also be maintained between the camp and the processing areas to minimise noise and maintain visual amenity for Matilda's workforce.
Heritage and Archaeological sites	Condition of heritage and archaeological sites should meet requirements of relevant authorities.	• Surveys have indicated that there are no archaeological or heritage sites located in the areas proposed to be disturbed.

21.3.3 Legal and other requirements

Legislation and other obligations and guidelines relevant to rehabilitation of Matilda's proposed operations on Melville Island are presented in Table 21.2

Table 21.2: Relevant Legislation and Other Requirements

Jurisdiction	Legislation
Northern Territory legislation	*Environmental Assessment Act 1992*
	Waste Management and Pollution Control Act 1998
	Mine Management Act 2001
	Parks and Wildlife Conservation Act 2000
	Weeds Management Act 2001
	Water Act 2001
	Soil Conservation and Land Utilisation Act 1985
	Radiation (Safety Control) Act 1999
	Aboriginal Land Rights (NT) Act 1976
	Heritage Conservation Act 1999
	Local Government Act 1999
	Tiwi Islands Natural Resource Management Strategy 2004
	Department of Primary Industry and Mines Mine Closeout Criteria – Life of Mine Planning Objectives 2001
	Office of Environment and Heritage Environmental Guidelines for Reclamation in Coastal Areas 1999
Commonwealth legislation	*Environment Protection and Biodiversity Conservation Act 1999*
	Native Title Act 1993
	Aboriginal and Torres Strait Islander Heritage Protection Act 1984

Jurisdiction	Legislation
	Australian Radiation Protection and Nuclear Safety Act 1998
Codes of practice, guidelines, etc	Department of Primary Industry and Mine Closeout Criteria – Life of Mine Planning Objectives 2001
	Office of Environment and Heritage Environmental Guidelines for Reclamation in Coastal Areas 1999
	Australian Minerals Industry Code for Environmental Management 2003
	ANZMEC MCA Strategic Framework for Mine Closure 2000
	The Commonwealth Environmental Protection Agency Series 'Best Practice Environmental Management in Mining' 1995
	Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores 1987
Company Policy	Matilda Minerals Company Policies
	Matilda Minerals Environmental Management Plan
	Matilda Minerals Mining Management Plan
	Matilda Minerals Procedures

21.3.4 Stakeholder Consultation

The ANZMEC Strategic Framework for Mine Closure (2000) defines stakeholders as 'those parties with the potential to be affected by the mine closure process.' Although it is understood that interested parties and groups may change over the life of the project, a preliminary list of key stakeholders consulted to date has been prepared and is presented in Table 21.3.

In particular extensive consultation was undertaken with the local community and the TLC in the early planning stages, prior to submitting applications to explore the proposed mining areas.

Matilda will continue to consult with these key stakeholder groups in relation to rehabilitation and mine closure, as well as other aspects of proposed operations, as appropriate over the life of the mining operations, to ensure that closure objectives and criteria reflect community expectations.

Table 21.3: Key Stakeholders Affected by the Mine Closure Process

Stakeholder Group	Organisation
Local Community	Traditional Owners
	Local Elders
	Residents of Milikapiti
Commonwealth Government	Department of Environment and Heritage
Northern Territory Government	Office of Environment and Heritage
	Department of Primary Industry, Fisheries and Mines
	Conservation and Natural Resources
	NT Parks and Wildlife
	Department of Health and Community Services
	Office of Indigenous Policy Coordination
Local Government	Tiwi Land Council
	Tiwi Island Local Government
Non-Government Organisations	NT Minerals Council
	Environment Centre
	Amateur Fishing Association of the Northern Territory
	Local fishing tour operators

21.3.5 Post operational closure

The Environmental Coordinator will ensure that closure requirements are progressed and achieved, as required after mining operations have ceased at Andranangoo and Lethbridge Bay West. In the event that Matilda does not continue sand mining on the Tiwi Islands, a Caretaker would be appointed until the rehabilitation and closure criteria are met.

A monitoring program will be established to evaluate performance against closure criteria and objectives. Once closure criteria and objectives are achieved Matilda will work with the NT Government and local stakeholders to relinquish the site.

21.3.6 Site relinquishment

Final site relinquishment will require sign-off from the Traditional Owners, NT Government and the Tiwi Islands Land Council.

Matilda will work with these organisations over the life of the proposed operations to ensure that rehabilitation and closure criteria meet the requirements of these groups to facilitate site relinquishment in an equitable manner.

21.4 Rehabilitation and mine closure planning

A RMCP will be developed in consultation with the Landowners, TLC and DBIRD, prior to commencement of mining activities, with due consideration to post mining land uses and community expectations.

The plan will incorporate rehabilitation objectives and completion criteria and reference specific rehabilitation, closure and relinquishment procedures, as appropriate. The RMCP will also include provisions and procedures for on-going monitoring and maintenance, as well as contingency requirements in the event of rehabilitation failure.

The RMCP will be a working document, which will be reviewed on an annual basis in order to ensure that closure costs and provisions for rehabilitation are adequate. The RMCP will also allow for the incorporation of new rehabilitation methodologies and techniques as they evolve, and incorporate findings of environmental research that may be conducted by Matilda over the life of the mining operations.

21.5 Rehabilitation and mine closure provisions

Matilda will make an annual budget allocation to its balance sheet as part of Matilda's operating expenditure for site rehabilitation and mine closure purposes, These will accumulate in the balance sheet over time.

Matilda’s Accountant will be responsible for ensuring that the funds are sufficient to restore the minesite to the agreed closure and rehabilitation criteria. Rehabilitation and closure costs will be calculated based on the requirements of the RMCP.

Provisions will include allocations for expenses associated with decommissioning, dismantling, and removing any plant and infrastructure, as well as rehabilitation, maintenance and on-going monitoring requirements.

Expenditure from this rehabilitation and closure account will be authorised only by the responsible officer and must utilised in accordance with long-term rehabilitation goals.

21.6 Security

In order to commence mining operations in the Northern Territory, companies must demonstrate to the NT Government that they have adequate Securities to provide for rehabilitation and decommissioning in the event of project failure.

Under the requirements of the *Mining Management Act 200*1, Matilda will review securities on an annual basis as part of the process of reviewing the annual MMP, or when significant changes occur to operations to ensure that they reflect current mining activities.

21.6.1 Current Securities

Currently Matilda has lodged securities with DPIFM in the form of a Bank Guarantee for exploration activities being undertaken to date on the Tiwi Islands.

21.6.2 Security calculations

Existing securities will be adjusted to take into account proposed mineral sands mining activities. The calculations of additional securities will involve:

- Determining the physical area proposed to be disturbed.
- Defining close out criteria as described above. These criteria will be confirmed with stakeholders prior to calculation of the securities and commencement of mining. This will include formalisation of agreements regarding the camp and access roads, which will be documented in the MMP.
- Determining what rehabilitation activities are required, for example, landform reconstruction, ripping, revegetation, and monitoring. Rehabilitation requirements will be based on the commitments made in this document.
- Calculating the costs associated with these activities on an area basis in accordance with the Mines Division Advisory Notes PA6-009 (Self Assessment Procedure) and PA6 – 008 (Security Calculation Procedure) (Matilda MMP 2004c) (DPIFM formerly DBIRD, 2001 and 2001).

Costs will be based on personnel-hours and equipment costs, and will include any mobilisation and demobilisation costs. If possible and appropriate, local contractors that have experience in undertaking rehabilitation works will be approached to tender for these works.

The factors that need to be considered are not static, and will be reviewed over time to ensure that they reflect changes in legislation, Government policy, community expectations and technological advancements. As noted above, securities will be reviewed on an annual basis as part of the process of reviewing the annual MMP, or when significant changes occur to operations to ensure that they reflect current mining activities.

As stated earlier, over time the calculations of securities will be based on the detailed plans that will be specified in the RMCP and documented in the annual MMP.

21.7 Commitments

Matilda commits to consultations with the TLC and the local community to establish agreed end land use of areas and infrastructure requirements (Section 21.3.4).

Matilda commits to developing a RMCP which documents requirements and agreements in relation to rehabilitation and mine closure. This document will be consistent with the DPIFM rehabilitation and closure requirements, will be reviewed on an annual basis and will include security calculation (Section 21.3, 21.4 and 21.6).

Matilda commits to minimising the area of land disturbed and to minimise the area of land that is cleared at any point in time, and to progressively rehabilitate mined areas as soon as practicably possible (Section 21.2.1).

Matilda commits, where possible to restoring disturbed areas back to the original landform contours. Where this is not possible reshaped contours will be compatible with the surrounding landform (Section 21.2 and 21.3).

Matilda commits to stabilising disturbed areas as soon as practically possible to prevent wind and water erosion (Section 21.2 and 21.3).

Matilda commits to revegetating the disturbed land to provide for the long-term stability of the system, and for the return of native flora and fauna communities that are similar to pre-mining conditions and surrounding undisturbed areas (Section 21.2 and 21.3).

Matilda commits to a developing a rehabilitation monitoring program that includes assessments of landform stability, flora and fauna in the rehabilitated areas (Section 21.2.5).

Matilda commits to ensuring that closure requirements are progressed and achieved, as required after mining operations have ceased and to implement contingency plans if required (Section 21.2.6).

Matilda commits to allocating money to a nominated account every six months, as to budget for operating expenditure for site rehabilitation and mine closure purposes (Section 21.5).