1 PURPOSE

To provide details for the rehabilitation of the McArthur River and Barney Creek rechannelling areas as required by the approval process for the Open Cut Mine. Revegetation of the proposed diversion channels is considered by MRM to be a high priority necessary for the early establishment of aquatic and riparian ecosystem function.

2 SCOPE

This rehabilitation plan is applicable to the areas disturbed by the River Rechannelling Works conducted prior to the 2006/07 wet season.

3 AUTHORITY

Changes to this document require the authorisation of the McArthur River Mine (MRM) HSEC Manager.

4 DEFINITIONS

N/A

5 OBJECTIVES

The main objectives are to:

- Plan the placement of materials in a strategic manner to facilitate progressive rehabilitation and to minimise material handling costs;
- Conduct studies that will enable effective techniques to be implemented when carrying out rehabilitation;

- Carry out rehabilitation works that at the completion of the mining project will result in a stable, vegetated landscape having minimal impact on the surrounding environment; and
- Carry out construction and rehabilitation works that at the completion of the mining project will result in stable stream channels having minimal impact on the surrounding environment.

6 METHODOLOGY AND REHABILITATION SITES

The MRM Rehabilitation Monitoring Programme is designed to meet three key objectives:

- **Scientific assessment**. To provide data on specific indicators from rehabilitated sites throughout the MRM lease assessment area and a comparison against undisturbed reference sites;
- **Continuous improvement**. To provide results which allow refinement of rehabilitation techniques / practices and assessment of specific management options; and
- **Evaluation of ecosystem development**. To quantify the condition of sites to enable assessment of status or position of different aged rehabilitation sites on a trajectory of rehabilitation states directed toward completion criteria.

These objectives are designed to progress the rehabilitation programme towards the overall aim of restoring mined land to self-sustaining riparian and aquatic ecosystems, similar to those which existed prior to the rechannelling works.

The MRM Rehabilitation Programme 2012 is illustrated in Figure 6-1.

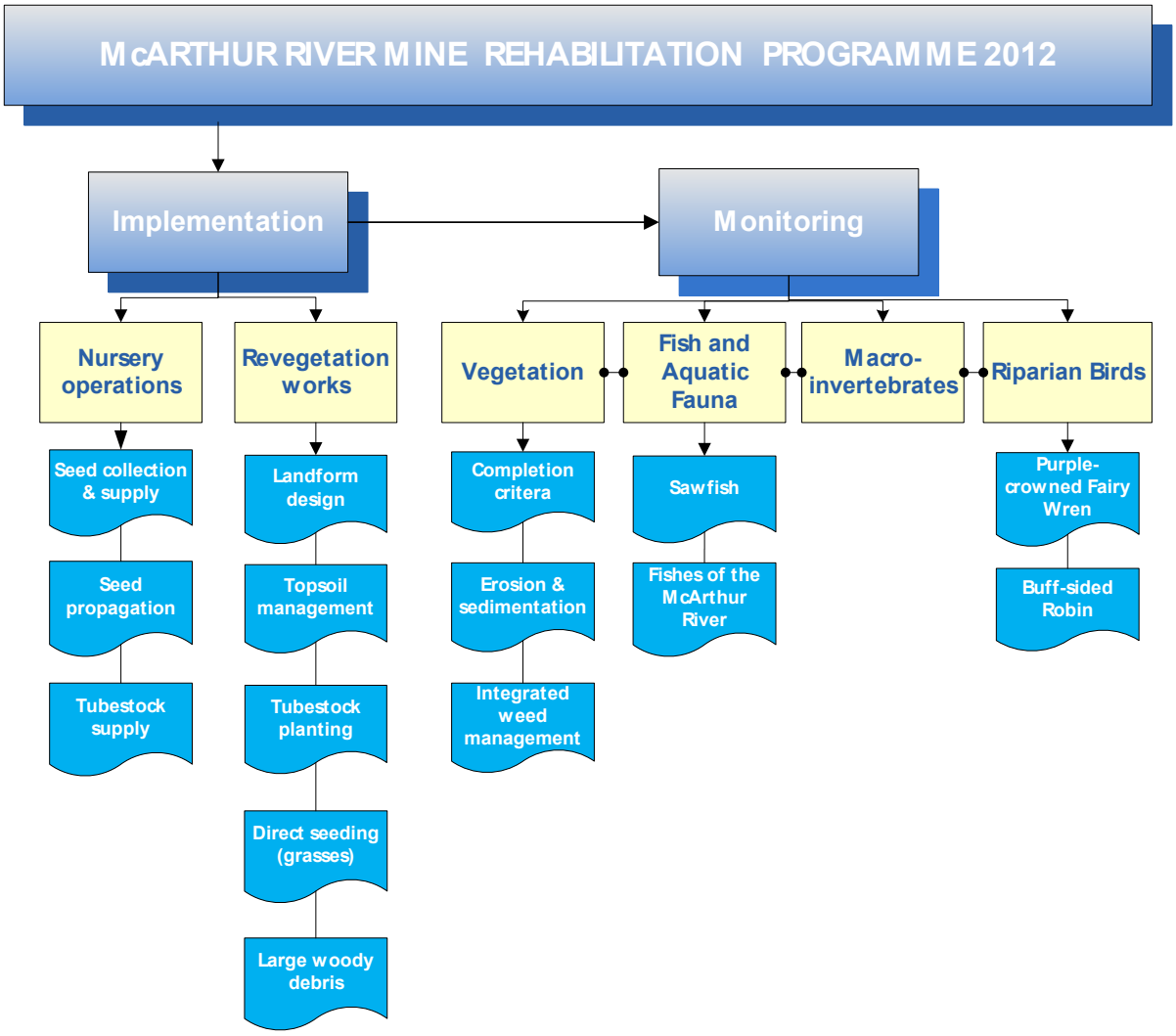

Figure 6-1: Schematic diagram of the MRM Rehabilitation Programme 2012

6.1 Implementation of the MRM Rehabilitation Programme

6.1.1 Nursery Operations

6.1.1.1 Seed collection and seedling supply

Native provenance species are preferred but due to the remoteness of the mine this cannot always be achieved. Local seed collection will be carried out by the rehabilitation technician in 2012 and entered into the MRM seed register developed to identify species location and phenology for future collection.

External seed supply is currently sourced through Top End Seeds and Greening Australia. The quantity of seed collected each season will ultimately determine the final species mix and will be dependent on the season.

Seedling tenders are sent to wholesale nurseries in Darwin to determine the appropriate supplier. Several seedling species will also be grown within the MRM onsite greenhouse by MRM staff using sexual and asexual propagation techniques.

6.1.1.2 Species selection

The species selected for revegetation works aims to develop a plant community that will:

- Return disturbed areas to an agreed post mine land use;
- Maintain the biodiversity of the area;
- Provide long-term and sustainable revegetation, consistent with existing vegetation communities in the area;
- Stabilise stream bank erosion;
- Provide micro-habitat for aquatic fauna; and
- Re-establish fragmented habitat utilised by riparian habitat specialist birds as identified in the EIS. For example Cane Grass (*Chionachne cyathopoda)* which is a favoured habitat for the Purple-crowned Fairy-wren and Freshwater Mangrove (*Barringtonia acutangula)* for the White Browed Robin.

In November 2007, Charles Darwin University were commissioned to conduct surveys at representative non disturbed sites (analogue) to identify the species composition and stand structure of vegetation communities located along Barney Creek. Subsequent to the initial survey additional surveys have been conducted to record the mortality rate of planted species and will be used as contingency for actual planting rates (Table 6-1).

Table 6-1: Key and primary plant species identified at Barney Creek and McArthur River survey sites

Channel area description	Key and primary plant species	Stratum / life form	Analogue survey site (trees>1m/ha) (CDU 2008)	Mortality %	Adjusted planting rate / ha

Bank	*Excocaria parvifolia*	M small tree / shrub	19	35%	20
Bank	*Ficus aculeata*	M small tree	4	35%	4
Bank	*Ficus coronulata*	M small tree / shrub	93	35%	93
Bank upper deep sandy alluvial	*Corymbia bella*	U Tree	11	35%	11
Bank low	*Barringtonia acutangula*	M Tree	1137	35%	1137
Bank low	*Nauclea orientalis*	U Tree	23	35%	23
Bank low	*Pandanus aquaticus*	M	11	35%	11
Bank mid low	*Lophostemon grandiflorus*	U Tree	33	48%	33
Bank mid- low	*Casuarina cunnninghamiana*	U Tree	208	58%	209
Bank mid- low	*Melaleuca leucadendra*	U Tree	478	27%	478
Bank upper alluvial	*Eucalyptus camaldulensis*	U Tree	30	6%	30
Upper bank	*Atalaya hemiglauca*	M small tree	4	35%	4
Upper bank	*E. microtheca*	U Tree	19	35%	19
	Eucalptus other	U Tree	11	35%	11
Backplane	*Antidesma ghesaembilla*	M Tree / Shrub	56	35%	56
Backplane	*Atalaya hemiglauca*	M small tree	222	35%	222
Backplane	*Barringtonia acutangula*	M Tree	104	35%	104
Backplane	*Bauhinia cunninghamii*	M	30	35%	30
Backplane	*Casuarina cunnninghamiana*	U Tree	185	35%	185
Backplane	*Corymbia bella*	U Tree	4	35%	4
Backplane	*Corymbia terminalis*	U Tree	19	35%	19
Backplane	*E. microtheca*	U Tree	103	35%	103
Backplane	*E.camaldulanesis*	U Tree	311	35%	311
Backplane	*Excocaria parvifolia*	M small tree / shrub	37	35%	37
Backplane	*Ficus aculeata*	M small tree	4	35%	4
Backplane	*Ficus coronulata*	M small tree /	215	35%	215
Backplane	*Hakea arborescens*	M small tree	48	35%	48
Backplane	*Lophostemon grandiflorus*	U Tree	33	48%	33
Backplane	*Melaleuca leucadendra*	U Tree	11	27%	11

Backplane	*Petalostigma pubescens*	M small tree/ shrub	11	35%	11
Backplane	*Terminalia carpentariae*	M small tree	4	35%	4

6.1.2 Revegetation works

6.1.2.1 Site selection

Revegetation works will be carried out in the following areas:

- Rechannel batters; and
- Disturbed areas adjacent to the crest of the channel;

6.1.2.2 Landform design

The batter slopes of the new channels vary depending on the material type they have been constructed of. Sections of the channel which have been developed through alluvial material have been rock lined to ensure stability. These areas have been covered with a 1:4 topsoil to rock ratio in preparation for rehabilitation.

The rock/topsoil material was prepared by stockpiling rock and topsoil adjacent to the batters and using an excavator to place the materials on the batter.

Rock was included in the initial to enhance stability and sediment trap whilst the topsoil has aims to provide a suitable substrate for seed germination and plant growth. Topsoil is to be obtained from areas adjacent to the channel.

Sections of the McArthur River Channel have been excavated through bed-rock material such as sandstone. In these areas planting will only be possible at the base of the channel, the crest of the batter and the associated floodplain. A minimum of 20 m wide strip each side of the crest of the channels was created to allow vehicle access during construction. These areas have been reshaped to allow drainage back into the channel through drainage chutes. The topsoil from these areas was stripped and used in the construction of the batters.

The design of the channels has included several chutes to allow water to flow into the channel without causing scouring. These areas consist of rock lined material and

disturbed ground. Areas of instability have been lined with synthetic/biodegradable geofabric.

Micro-depressions on the eastern McArthur River Diversion (close to the high-flow line) have been created via the use of an excavator. These depressions are a kidney-shape and occur approximately every 50 m along the channel. The primary purpose of these is to establish small clusters of cane grass which can strategically expand over time to produce extensive alternative habitat for the Purple-crowned Fairy-wren.

Since the construction of the channels, erosion works has taken place on batters .Rehabilitation of erosion will continue where required after each wet season in order to establish stable ground.

6.1.2.3 Topsoil management

Topsoil was stripped from all areas of disturbance in the initial construction of the channels and was placed back with rock material along the batters and the flatters areas above Barney Creek and the McArthur Channel. Areas where there was high weed infestation in the first layer of topsoil were scraped away and placed in the "unsuitable" material stockpile. Continual weed management of these areas has occurred since and will continue to do so throughout the future of the mine. Some remaining topsoil from Barney Creek was stockpiled adjacent to the cleared areas and was seeded with native grass in the 2006/07 wet season

6.1.2.4 Direct seeding and tubestock planting

In 2007 MRM direct seeded the McArthur River and Barney Creek rechannelling corridors prior to the first rains of the wet season. The programme's success was limited by:

- Heavy rainfall events and subsequent wet season flooding dislodged the seed bank; and
- Newly germinated seedlings had insufficient root development for anchorage to withstand the flow rate of flooding

Since 2008 seedlings propagated in 50ml tubes (tubestock) has provided the most successful method of plant establishment and survival, however native grasses are established by direct seeding and separation from motherstock.

During 2009 it was evident that major plantings should to be conducted during the dry season. This will accommodate access to potential planting sites and allow adequate time for the seedlings to potentially develop sufficient root structure to withstand the subsequent wet-season water velocities. Revegetation works in the base section of the channel should to be carried out after wet season sedimentation. Deposited sediment provides a more favourable planting medium.

Plantings must be irrigated during the dry season to maximise survival and plant growth. Since 2007 approximately 27,000 tubestock have been planted at Barney Creek and a further 50,000 tubestock have been planted along the McArthur River channel.

6.1.2.4.1 Irrigation

MRM trialled the use of a water cart for irrigation purposes however this was unsuccessful. As a result of this MRM designed a sled which was implemented in 2010.

The sled mounted tank with a sprinkler system ensures the survival over consecutive dry seasons until they become established enough. The current sled system is approximately 2.5 km in length with an additional sled planned to be installed by MRM staff during the 2012 dry season.

The irrigation system will facilitate planting to occur towards the end of the wet season which reduces the risk of flood damage through plant removal.

6.1.2.5 Large woody debris

As per recommendations from the EIS and PER several design features have been implemented for both Barney Creek and McArthur River to provide habitat for aquatic and riverine species. These include the construction of riffles or drop structures, the use of rock boulders for fish habitat, the use of Large Woody Debris (LWD) for fish habitat and the establishment of Cane grass areas.

It was identified that the placement of Large Woody Debris (LWD) in the channel of the McArthur River is an important and effective strategy in establishing suitable fish habitat and other aquatic fauna. LWD was placed along the batters and on top of the slope assisting in trapping sediment and restricting access by grazing animals. During periods of high flow in consecutive wet seasons however some of the large woody debris has been dislodged.

LWD was secured to boulders in the base of the channels by drilling a hole in the rock and securing the material to the boulder with chains. The LWD was stockpiled from initial operational areas being cleared. As a result of some of this LWD being dislodged since the construction of the channels during 2010, 35 more locations were created within the McArthur channel from clearing operations around the pit. These LWD locations will be monitored over time in order to establish whether or not it is required on an annual basis until a stable riverbed has been formed.

An additional amount of LWD will be placed in the channel in late 2011.

7 REHABILIATION MONITORING

7.1 Vegetation Monitoring

7.1.1 Previous vegetation monitoring study

MRM commissioned Charles Darwin University (CDU) in 2007- 2011 to conduct the annual revegetation monitoring programme. The scope of the monitoring programme includes:

- Measure woody plant density at three sites each along Barney Creek and the McArthur River channels;
- Establish these plots as permanent monitoring plots for potential comparison with analogue vegetation monitoring sites; and
- obtain survival information to assist in determining the main factors causing mortality

The monitoring programme was designed to provide the following information:

- baseline information on the post mining landscape;
- assessment of various rehabilitation techniques; and
- Provide a framework for future monitoring.

7.1.1.1 Monitoring sites

The CDU vegetation monitoring sites are located upstream and downstream sites along the McArthur River as per Figure 7-1.

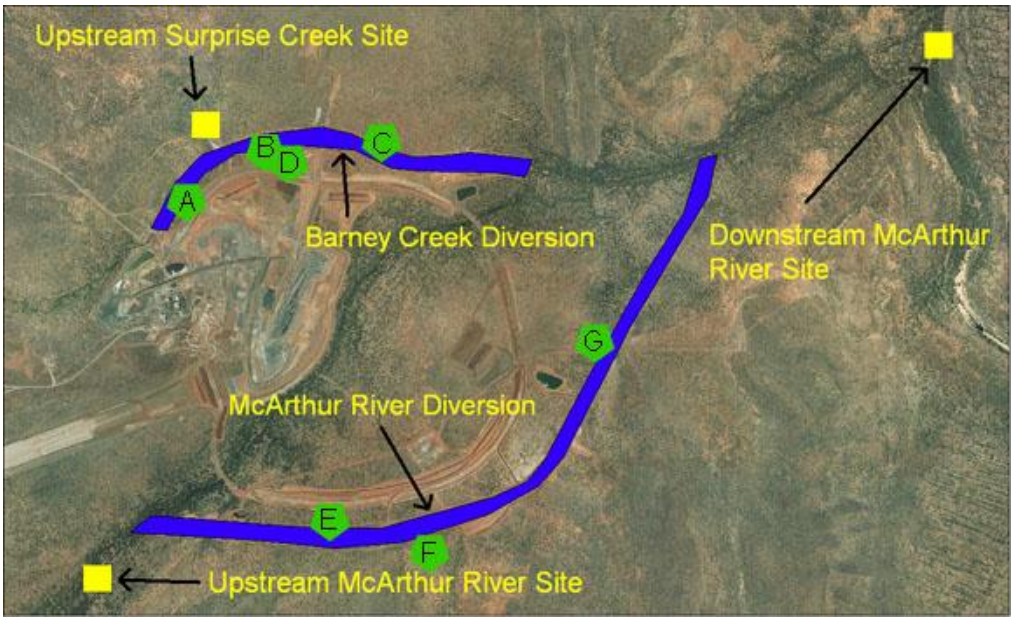

Figure 7-1: Location of analogue sites (yellow squares) and rehabilitation monitoring sites (green polygons)

At each site, three 30 m x 30 m plots were placed along the river bank. These were placed along a 400 m width (but this may be restricted for the upstream site in order to survey steeply sloping and rocky area). The total length was divided into thirds and each plot randomly located in each third. The floodplain plots were located 30 m away from the upper slope edge of the river bank.

7.1.1.2 Vegetation measurements and tree densities

Each tubestock seedling within a plot had its species and location within the plot recorded and subsequently its survival and health were recorded. This allowed the plant density, species composition and survival to be determined for all tubestock in the whole plot. Tree growth was assessed by measuring the height from the base of the stem to the apical bud of the tallest shoot. For trees that were taller than 120 cm the DBH (stem diameter at breast height – 120 cm) was recorded. For the two grasses tubestock species the height to the tallest green leaf or stem was measured. Health was recorded using the following scale: 0 – dead, 1 – minimal green or flexible tissue, 2 – substantial death or damage to leaves, 3 – plant vigorous and healthy

At 10 m intervals along transects per plot, ground cover characteristics is recorded as proportion of litter, bare ground, foliage cover, rock.

7.1.1.3 Appraisal of riparian condition

The TRARC Tropical Rapid Appraisal of Riparian Condition in the baseline study conducted in 2007. Information will be used to assess the general condition of the river channels will be used to indicate changes in river condition over time.

It involves assessment of canopy cover, canopy health, tree size classes, tree regeneration, midstorey cover, midstorey weeds, grass cover, grass weeds, ground cover, ground storey weeds, organic litter, weed litter, exposed soil, bank stability, logs, high impact weeds presence, canopy continuity, exposure of tree roots, erosion (slumping, gullying), fire damage and animal impact.

7.1.2 Vegetation Rehabilitation Monitoring Programme Design 2012

7.1.2.1 Selection of indicators

Indicators condense information about complex environments for management, monitoring and reporting purposes (Dale and Beyer, 2001). The information gathered from data collection and analysis is condensed into a set of indicators that form the completion criteria, and ultimately determine assessment for rehabilitation success.

For completion criteria to be successful, the indicators being used need to be simple and convenient to assess. They need to be consistent over time and between operators, inexpensive to implement, teachable to new operators, sensitive and unambiguous, informative, representing measurable variables and to be able to act as the communication link between science and stakeholders (Tongway, 2001).

The indicators used in the MRM Vegetation Rehabilitation Monitoring Programme are illustrated in Figure 7-2.

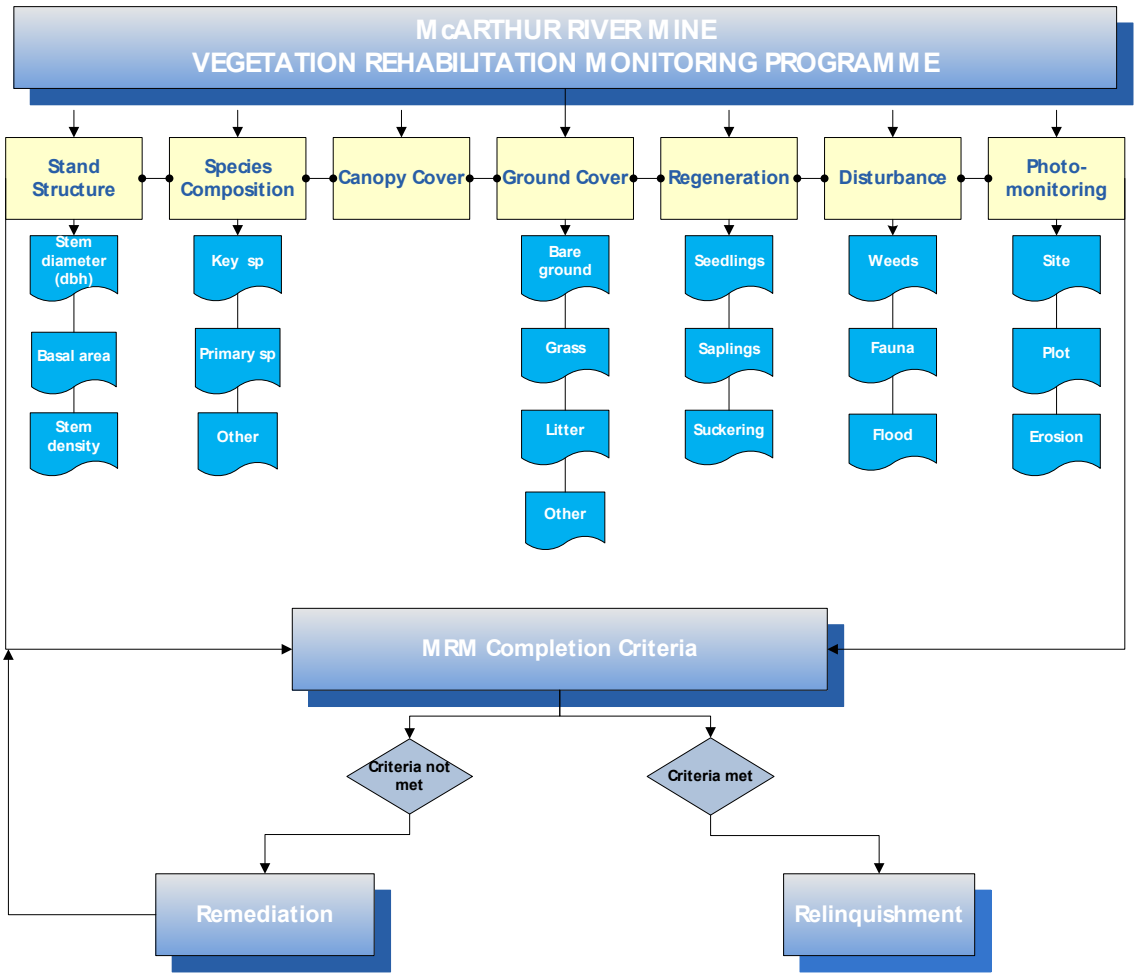

Figure 7-2: Selected indicators for monitoring vegetation at MRM

7.1.2.2 Sampling

The design of this study is based on the MBACI strategy i.e., multiple control sites (M); incorporating measurements before (B) and after (A) disturbance at control (C) and impact sites (I). This experimental design is generally accepted by scientists as the best possible design strategy for biological monitoring projects (Underwood, 1991).

The model for this study is to establish revegetation sites at MRM that represents the native plant communities of the surrounding unmined lands.

This model does not intend to explain ecosystem processes but rather the pattern of plant communities in established rehabilitated sites compared to the undisturbed natural

communities. Comparisons will be made in the first instance and continue over time until the completion criteria is achieved.

7.1.2.3 Experimental test

The MRM survey techniques and data collection methods are considered to be relatively conventional from an industry viewpoint. The experimental tests are designed for repeated use over time and any changes in data can be quickly assessed to determine if a particular area is still on its succession pathway, or requires additional management input.

If a site is on the right trajectory and completion criteria values signify an area is within the range of rehabilitation success, when compared against the control site data, then the site is considered highly functional and representative of desired end point rehabilitation i.e., it is assessed to be the same as the natural undisturbed communities.

The following important statistical principles are incorporated into the design of the study:

- Adequate replication of control sites (3 sites per channel);
- Adequate replication of study plots (3 x 100m^2 plots at both rehabilitation and control sites);
- Random placement of study plots within sites. Coordinates are selected from random number tables;
- Adequate replication of sub plots (5 randomly placed 1 m x 1 m quadrats per plot).
- Consistency in the application of field procedures. Field pro-forma is used for recording data. Field work is conducted by the same person who supervises and trains field assistants as a long term staffing consideration. All measuring equipment must be in good working condition and used between sites and over time;
- The use of objective, quantitative measures e.g., densiometer, DBH tape, and sub-plot sampling quadrat; and
- Ensuring the accuracy and precision of data collected facilitates valid results from a range of statistical analyses.

7.1.2.4 Data analysis

Multivariate data will be used to test whether the species composition is converging towards the pre-mined condition. Variables include:

- Stand Total Basal Area (STBA);
- Species composition. Key (K) and Primary (P) species STBA live stems;
- STBA species richness (K & P species);
- Canopy cover;
- Seedling richness (K & P species); and
- Sapling richness (K & P species).

The computer software package PRIMER version 6 (Plymouth Routines in Multivariate Ecological Research) will be used to conduct non-metric multidimensional scaling (MDS).

7.1.2.5 Completion criteria

MRM is committed to environmental management and minimisation of environmental impacts arising from its operations. As such, it recognises that management of the rehabilitation process requires assessment of progress against quantifiable completion criteria and monitoring of ecosystem function.

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). To comply with this definition it is critical to determine what the 'agreed' definition of success is, and what tools should be utilised to measure success in a rehabilitation monitoring Programme.

Rehabilitation success is difficult to assess. It has often been judged by a superficial resemblance to a local vegetation type, whether that be pasture, forest, native woodland or wetland. In setting completion criteria, regulatory authorities tend to set vegetation composition, richness density and cover values. However, in Australia there is an increasing desire to create sustainable native vegetation communities after mining (Bellairs, 1998).

The MRM Completion Criteria is site specific and aims to reflect the unique set of environmental, social and economic characteristics of the operation. These criteria will be continually developed through research and monitoring programmes (Table 7-1).

Table 7-1: MRM Completion Criteria proforma

Year of survey	**MRM VEGETATION MONITORING**	**SITE CODE:**
Year planted	**COMPLETION CRITERIA**	**SITE LOCATION**

Success Criteria	Lower Range	Upper Range			Comments
Ground cover	%	%	Mean (%)		
Litter					
Grass					
Bare					
Regeneration Key (K) & Primary (P) species			Species Richness	Relative abundance %	
Seedlings					
Key species					
Primary species					
Saplings					
Key species					
Primary species					
Species composition Key (K) & Primary (P) **living** species Stems ≥ 2m & ≥2cm dbh			Species Richness	Standing total basal area (%)	Structural classification (Specht 1991)
Key species					
Primary species					
Total Basal Area	m^2/ha^{-1}		m^2/ha^{-1}		
living + dead species					
Canopy Cover	%	%	%		
Weeds	%	%	%		
	0	<15			
GIS Classification					
	1	6			

Code	Class	Description
1	**Under Review - for remediation**	Does not currently meet Completion Criteria or trajectory for age and requires remediation or intense replanting
2	**Under Review Juvenile**	Under 3 years of age, in line with trajectory and contains adequate Completion Criteria species. Lacks resilience
3	**Under Review Pre-maturity**	3 - 5 years of age, in line with trajectory and contains adequate Completion Criteria species. Lacks resilience
4	**Established Rehabilitation Incomplete Criteria**	Older than 5 years. Rehabilitation or remediation resilient to natural disturbance, 60% on track for Completion

		Criteria. May require additional work e.g. planting key and/or primary species; disturbance control
5	**Established Rehabilitation Approaching Success**	Older than 5 years. Rehabilitation or remediation resilient to natural disturbance, 75% on track for Completion Criteria. May only require additional time or protection from fire or weeds
6	**Successful Rehabilitation**	Meets 80 - 100% of Completion criteria.

7.2 Fishes of the McArthur River and Other Aquatic Fauna Monitoring Programme

MRM established an aquatic fauna monitoring programme as part of the approvals for the McArthur River diversion works. The aim of the programme is to assess the abundance and distribution of fish populations in the McArthur River and to assess the potential impacts of the river diversion on fish populations.

Monitoring of fishes of the McArthur River commenced in May 2006 with samples being collected during the early and late dry seasons of each year after that.

MRM commissions Indo-Pacific Environmental Pty Ltd to perform annual fish surveys in and around the vicinity of the McArthur River to assess the potential impacts the mine might be having on the aquatic ecosystem and life within it. Two sampling events were conducted during 2011, one in the early dry season (May), and one in the late dry season (October). The report(s) supplied to MRM in 2011 is a collation and analysis of these sampling events and a discussion on the health and impacts on the river resulting from mining operations.

The sampling and report set out to:

- Monitor fish populations in permanent and semi-permanent pools;
- Monitor populations of the Freshwater Sawfish, *Pristis microdon*;
- Monitor fish diversity in temporary or semi-permanent pools and riffles;
- Assess heavy metal content in aquatic life;
- Monitor fish passage success through the diversion channel;

- Compare fish abundance and diversity between the old McArthur River next to the mine and the new river diversion;
- Compare size distribution of fish both inside and outside of the new river diversion;
- Collate and compare water temperature data;
- Collate data on the Freshwater Sawfish, *Pristis microdon*; and
- Discuss migration of fishes in the McArthur River and diversion channel.

7.3 Macro-invertebrate Monitoring Programme

MRM established an aquatic fauna assessment programme as part of the approvals for the McArthur River rechannelling works and commissioned a programme of biological monitoring of receiving waters and channels which included the use of aquatic macro-invertebrates as indicators.

Monitoring of aquatic macro-invertebrates of the McArthur River channel commenced in April-May 2007. Following consultation with Northern Territory Government representatives the programme was expanded and based on the Northern Territory AUSRIVAS protocol (Lamche 2007).

At each site a range of standard surface water, fluvial sediment, spatial and habitat variables are measured during sampling.

A summary of monitoring results include but not limited to be:

- Analysis of the 2008 edge data indicate that a number of surface water variable, habitat variables (% vegetation cover 100m reach, % pebbles in edge habitat) and spatial variables has a significant relationship with the macro-invertebrate species. Percentage vegetation cover (100m reach) alone accounted for 22% of the variability in the data and was the most important variable;
- Riffle habitats at exposed sites including the Barney Creek channel showed a greater level of impairment ; and
- The correlation between edge habitat taxa numbers and riparian vegetation parameters (% vegetation cover 100m reach and % vegetation cover edge) were positive, with sites with higher percentages of vegetation cover recording higher numbers of macro-invertebrate taxa. These habitat

correlations indicate that riparian vegetation condition is an important factor in relation to the condition of instream macro-invertebrate populations in edge habitats.

7.4 Riparian Bird Monitoring Programme

MRM is committed to conducting a riparian bird monitoring programme to assess the impacts of the McArthur River diversion on riparian fauna and to measure the rehabilitation success of the Barney Creek and McArthur River re-channeling works. The monitoring programme focuses on riparian bird fauna and in particular on two indicator bird species, the buff-sided robin (*Poecilodryas cerviniventris*) and the purple-crowned fairy-wren (*Malurus coronatus macgillivrayi*) (EMS 2006a; EMS 2006b).

The riparian bird monitoring programme provides data on the bird species occurring in riparian habitats associated with the McArthur River, the diversion areas and associated tributaries along a 17 km stretch of the McArthur River. The monitoring programme includes (EMS 2010a):

- Seasonal monitoring of riparian bird communities at established sample sites;
- Assessment of seasonal changes in the abundance and distribution of riparian bird assemblage and riparian habitat specialist species (purple-crowned fairy-wren and buff-sided robin);
- Assessment of movements of colour banded birds; and

Monitoring of vegetation condition parameters within riparian bird monitoring plots using the Tropical Rapid Appraisal of Riparian Condition method or TRARC

8 ONGOING MANAGEMENT

8.1.1 Remediation

The monitoring completed will highlight any issues with species composition and distribution, habitat development etc. This will assist in providing information on the ongoing management of the channel rehabilitation. It may identify issues such as:

- Vegetation cover;
- Survival rates of plants;
- Species composition; and

- Weed management.

Additional infill planting may be required depending on the results of the survey.

8.1.2 Integrated weed management

A trial was conducted to determine the weed species in the topsoil being used for rehabilitation, however additional weed seed sources will result from flooding events. The weeds of major concern include:

- Noogoora Burr (*Xanthium occidentale*);
- Parkinsonia (*Parkinsonia aculeate*);
- Devils Claw (*Martynia annua*); and
- Flannel Weed (*Sida cordifolia*).

The management of these weeds will be included in the MRM Weed Management Plan (GEN-HSE-PLN-6040-0006). Advice on the management of weeds is also to be obtained from the District Weeds Officer.

8.1.3 Vertebrate animal control

Animals of concern in the rehabilitation areas include:

- Cattle;
- Donkeys; and
- Feral pigs.

The perimeter fencing was re-constructed in 2011 following floodwater damage in 2009-2010.The fence aims to prevent access to the area by cattle and donkeys that have a negative impact on the success of the rehabilitation. Prior to the completion of the fencing, mustering was carried to remove all stock from inside the fence. During the wet season fences across the river or tributaries will need to be taken down and replaced when flow has reduced. Additional mustering will be required following the wet season to ensure the rehabilitation areas are protected during the dry season.

Regular inspections of the fence will be required during the dry season (and as access permits) to ensure its integrity.

9 RESPONSIBILITY

9.1 Health, Safety, Environment and Community Manager

- Ensure rehabilitation is conducted as per commitments in the PER and MMP.

9.2 Environment Superintendent

- Identify areas which require rehabilitation and develop a progressive rehabilitation plan; and
- Implement revised rehabilitation monitoring programme

9.3 Environmental Rehabilitation Technician

- Plan rehabilitation projects a required;
- Assist with the implementation of the rehabilitation plan;
- Propagate and maintain nursery stock and infrastructure; and
- Weed management.

10 REFERENCE

GEN-SD-STD-6040-0012 SD STD 10 Environment Biodiversity and Ecological Function
Xstrata SD Standard 10 Environment Biodiversity and Landscape Functions
McArthur River Mining Environmental Impact Statement (URS 2005)
GEN-HSE-PLN-6040-0003 MRM Sustainable Development Mining Management Plan 2011-2012
GEN-HSE-PLN-6040-0004 MRM Sustainable Development Water Management Plan 2011-2012
GEN-ENV-PLN-6040-0006 MRM Weed Management Plan

11 REVISION HISTORY

Issue No	Revision No	Section	Brief Description	Initials
1	0	All	Development of plan	JLY
2	0	All	Minor changes to reflect SD Standard	GT
3	0	All	Changes to reflect review of programme success and future management	JC

Issue No	Revision No	Section	Brief Description	Initials
4	0	All	Amend monitoring programme	JC