A member of the Rio Tinto Group

Mesa K Remnant Mining Project

Environmental Management Plan

DRAFT

Prepared for
Robe River Mining Company Pty Ltd
by Strategen

February 2008

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Environmental Management Plan

DRAFT

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Client: Robe River Mining Company Pty Ltd

Report	Version	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
Preliminary Draft Report	V1	BS	WM/JN	Electronic	31/08/07
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Draft Report	V4	BS	JN	Electronic	14/01/08
Draft Report for EPASU	V5	JN	-	8 x hard copy	27/02/08

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1. INTRODUCTION

1.1 BACKGROUND

The Robe River Mining Company Pty Ltd (Robe), as Manager for Robe River Iron Associates, proposes to recommence mining at Mesa K in 2008 in order to meet the predicted shortfall of dry ore from its existing Mesa J operation. The proposal will be operated as a satellite project to the current Mesa J operation and will be managed on behalf of Robe by Pilbara Iron Company (Services) Pty Ltd (Pilbara Iron), which is a member of the Rio Tinto Group.

The Mesa K deposit is located in the Robe Valley area of the Pilbara region, Western Australia (Figure 1), approximately 4 km north of Mesa J and 11 km south-west of the town of Pannawonica (Figure 2). The deposit was mined from February 1988 to May 1995, producing approximately 48.2 million tonnes (Mt) of pisolite ore. After this time, the mine site was partially rehabilitated, although access to the Mesa K open cut pits and remnant ore was retained.

The proposed Mesa K Remnant Mining Project will supplement production at Mesa J to maintain current total production from the Mesa J train loadout. The proposal will not increase total production from Mesa J or change throughput at the Cape Lambert port.

1.2 PURPOSE AND SCOPE OF DOCUMENT

As part of its proposal to recommence mining at Mesa K, Robe has committed to the development and implementation of an Environmental Management Plan (EMP). The purpose of this EMP is to document environmental management objectives and strategies in relation to the proposed remnant mining at Mesa K, including:

- measures to prevent, minimise and mitigate any potential environmental impacts of the proposal
- details of the timing and persons responsible for implementation of these measures
- monitoring and reporting procedures.

1.3 ENVIRONMENTAL SETTING

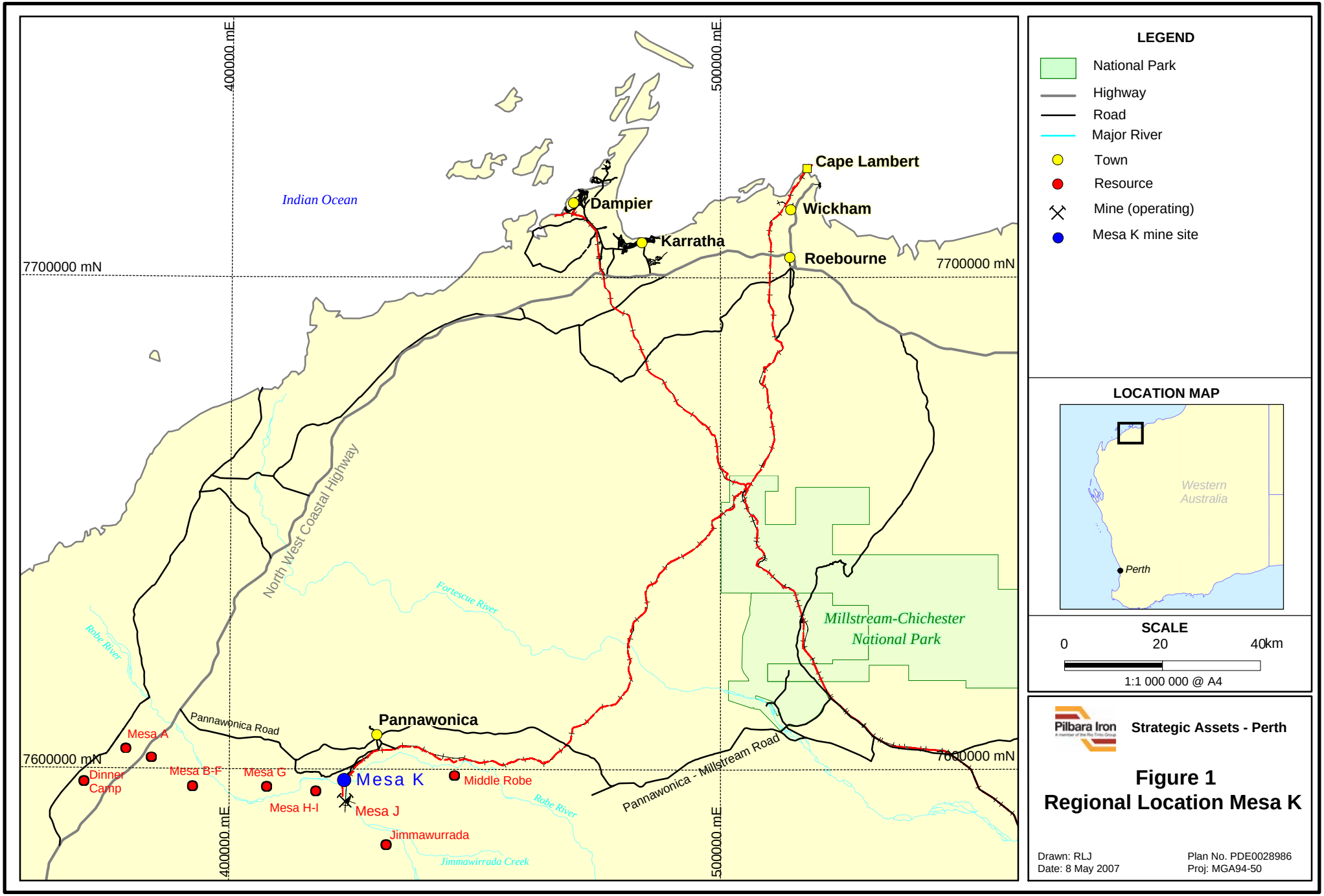
The existing physical, biological and social environment in the vicinity of the project area is detailed in Section 2 of the Environmental Protection Statement (EPS).

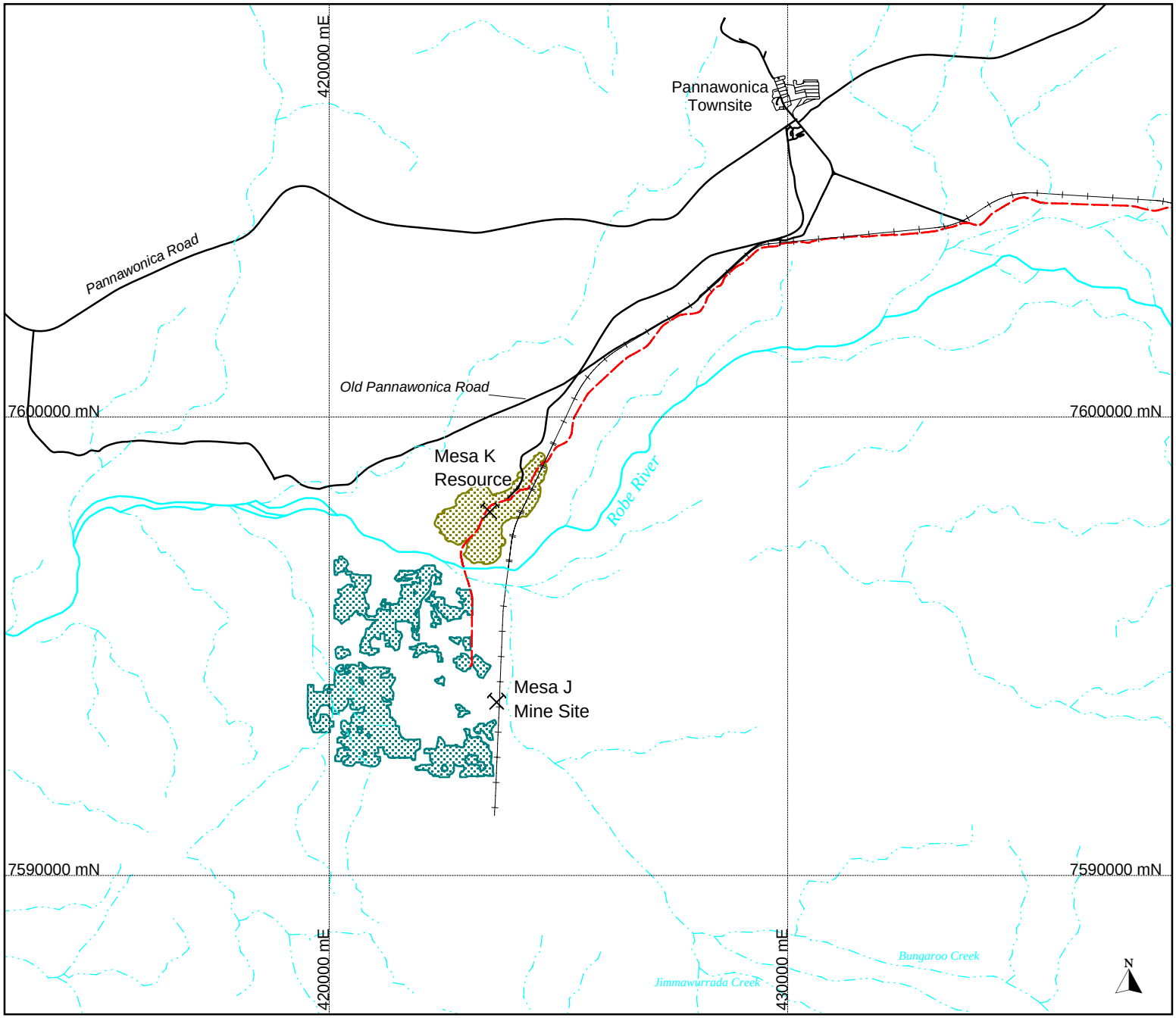
1.4 DESCRIPTION OF MINING OPERATION

A detailed description of the proposed remnant mining operation is included in Section 3 of the EPS.

The proposal will involve:

- mining of remnant ore in five (5) existing open cut pits: Gravel Yard pit, Central pit, West-South pit, West-North pit and Gully pit
- mining by conventional drill and blast, load and haul mainly through the dry months of May to December, utilising equipment fleet, personnel and other resources from Mesa J
- haulage of Run of Mine (ROM) ore by truck from Mesa K to Mesa J using the existing mine access road
- minor realignment and widening of the existing mine access road from Mesa K to Mesa J
- establishment of transportable office, portable crib room, toilets, septic tank, water tank and generators at Mesa K
- sourcing of water and fuel from existing Mesa J facilities.

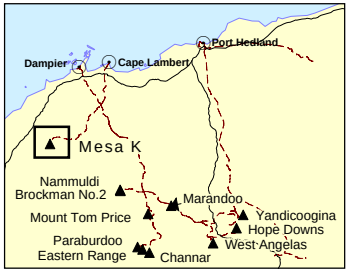

400000 mE
500000 mE
7700000 mN
7600000 mN
Indian Ocean
Cape Lambert
Dampier
Wickham
Karratha
Roebourne
North West Coastal Highway
Fortescue River
Robe River
Millstream-Chichester National Park
Pannawonica Road
Pannawonica
Pannawonica - Millstream Road
Mesa A
Dinner Camp
Mesa B-F
Mesa G
Mesa H-I
Mesa K
Mesa J
Middle Robe
Jimmawurrada
Jimmawirrada Creek
LEGEND
National Park
Highway
Road
Major River
Town
Resource
Mine (operating)
Mesa K mine site
LOCATION MAP
Western Australia
Perth
SCALE
0
20
40km
1:1 000 000 @ A4
Pilbara Iron
Strategic Assets - Perth
Figure 1
Regional Location Mesa K
Drawn: RLJ
Date: 8 May 2007
Plan No. PDE0028986
Proj: MGA94-50



LEGEND

- Private Road
- Railway
- Road
- Minor rivers/creeks
- Mine (operating)
- Mesa K resource
- Mesa J resource

LOCATION MAP



SCALE

0 2 4 6 km

1:125 000 @ A4

Pilbara Iron

Strategic Assets - Perth

Figure 2
General Location Plan of Mesa K

Drawn: R Jenaway
Date: 9 May 2007

Plan No. PDE0028914
Proj: GDA94-50

2. LEGISLATIVE AND REGULATORY FRAMEWORK

Management of the key environmental aspects of the proposal is governed by a range of Commonwealth and State legislation (Table 1).

Table 1 Commonwealth and state legislation relevant to environmental management at Mesa K

Legislation	Relevance	Regulatory authority
Commonwealth legislation		
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Preservation and protection of significant Aboriginal areas and objects.	Commonwealth Government
Environment Protection and Biodiversity Conservation Act 1999	Protection of environmental matters of national significance.	Department of the Environment and Water Resources
Native Title Act 1993	Recognition and protection of native title.	National Native Title Tribunal
State legislation		
Aboriginal Heritage Act 1972	Protection of sites of Aboriginal heritage significance, both known and as yet unknown.	Department of Indigenous Affairs
Agriculture and Related Resources Protection Act 1976	Obligations for control, destruction and notification of gazetted noxious plants and animals.	Department of Agriculture and Food Western Australia
Bush Fires Act 1954	Minimising dangers resulting from bush fires, and the prevention, control and extinguishment of bush fires.	Fire and Emergency Services Authority of Western Australia
Conservation and Land Management Act 1984	Preservation and conservation of flora and fauna.	Department of Environment and Conservation
Contaminated Sites Act 2003	Regulation of matters relating to the identification, assessment, recording, management and clean-up of contaminated land.	Department of Environment and Conservation
Dangerous Goods and Safety Act 2004	Safe storage, handling and transport of dangerous goods.	Department of Industry and Resources
Dangerous Goods (Transport) Act 1998	Safe transport of dangerous goods by vehicles.	Department of Industry and Resources
Environmental Protection Act 1986	Prevention, control and abatement of pollution. Conservation, protection and enhancement of environment.	Department of Environment and Conservation
Explosives and Dangerous Goods Act 1961	Safe and correct use, classification, marking, storage and carriage of explosives and dangerous goods.	Department of Industry and Resources
Native Title (State Provisions) Act 1999	Recognition and protection of native title.	Department of Indigenous Affairs
Soil and Land Conservation Act 1988 (WA) and Clearing Control Regulations 1991	Conservation of soil and land resources and mitigation of the effects of erosion.	Department of Agriculture and Food Western Australia
Waterways Conservation Act 1976	Conservation and management of waterways and their associated environment.	Department of Environment and Conservation
Wildlife Conservation Act 1950 (WA)	Conservation and protection of wildlife (flora and fauna). Special provisions and schedules apply to the protection and management of gazetted rare flora and fauna.	Department of Environment and Conservation

3. FLORA AND VEGETATION

3.1 DESCRIPTION

Much of the Mesa K site has been disturbed as a result of previous mining activities. Disturbed areas are considered to be in Poor condition[1] and are either entirely cleared or comprise regenerating vegetation. The relatively intact vegetation in undisturbed areas is considered to be in Excellent to Very Good condition (Biota 2007a).

Vegetation associated with the Robe River is considered to be of high conservation significance, as it supports Priority flora and other restricted taxa, and comprises the major drainage feature for the locality. The remaining vegetation types in undisturbed areas are considered to have moderate conservation significance as they comprise areas of native vegetation in relatively good condition.

No Declared Rare Flora (DRF) or Threatened Ecological Communities (TECs) have been recorded within the vicinity of Mesa K. Three Priority 3 flora species have been recorded at Mesa K and are either expected to be widespread in the project area (*Abutilon trudgenii* ms. and *Sida* sp. Wittenoom) or are scattered mainly through the Robe River (*Rhynchosia bungarensis*).

Weeds recorded at Mesa K include *Argemone ochroleuca* subsp. *ochroleuca* (Mexican Poppy), which is a Declared Plant for the Pilbara under the *Agriculture and Related Resources Protection Act 1976*, as well as *Aerva javanica* (Kapok Bush), *Acetosa vesicaria* (Ruby Dock), *Cenchrus ciliaris* (Buffel Grass) and *Cenchrus setiger* (Birdwood Grass), which are all considered to be serious environmental weeds by the Department of Environment and Conservation (DEC). Weed occurrences are mainly associated with the Robe River and adjacent floodplain.

A detailed description of the flora and vegetation of Mesa K is included in Section 7 of the EPS.

[1] This classification has been assigned to all areas that have been previously disturbed and is not applied as a measure of rehabilitation success, but rather as an indication of the degree of disturbance in comparison to intact vegetation.

3.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure protection of flora and vegetation values:

- **vegetation clearing** for the mine pit area and associated infrastructure, including roads, will lead to the direct disturbance to vegetation
- **vehicle and earth movements** could potentially introduce and/or spread weed species
- **dust generation** could potentially smother vegetation, thereby retarding growth
- **increased human and vehicle activity** in the area may increase the risk of fire.

The management of dust is addressed in Section 7 and fire control is addressed in Section 11.

3.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on flora and vegetation management objectives at Mesa K (Table 2).

Table 2 Objectives, targets and performance indicators for flora and vegetation management at Mesa K

Management objective	Target	Performance indicators
Ensure that clearing is as approved and is kept within the mining area.	No clearing or disturbance outside of pre-defined boundaries (as indicated in Schedule 1 of the Ministerial Statement for the proposal) throughout the duration of the proposal.	Ground disturbance authorisations and Inspection Reports.
Minimise the clearing of previously undisturbed vegetation within approved boundaries.	Opportunities to reduce the area of vegetation cleared within approved boundaries are investigated and documented prior to ground disturbance.	Opportunities to reduce the area of vegetation cleared within approved boundaries documented in the Mine Clearing Plan.
Minimise the introduction and spread of weeds.	No increase in the prevalence of weeds in the project area throughout the duration of the proposal.	Presence and location of any weeds over the project area.

3.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving flora and vegetation management objectives (Table 3). The monitoring program for flora and vegetation at Mesa K (Table 3) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets.

Table 3 Management and monitoring actions required to achieve targets for flora and vegetation management at Mesa K

Parameter	Action	Timing	Responsibility
Clearing controls	1. The approved clearing envelope shall be available to all persons involved in mine planning at Mesa K and relevant personnel involved in initial ground disturbance authorisation.	Prior to ground disturbance.	Ground Disturbance Officer.
	2. Opportunities to further reduce the clearing of previously undisturbed and rehabilitated vegetation within approved boundaries shall be investigated and documented in the Mine Clearing Plan. This shall include: • preferentially locating infrastructure in cleared areas, or, if not possible, in rehabilitated areas, rather than in undisturbed areas • using established access tracks and roads as far as practicable. Where new tracks are required, they shall be preferentially located within previously disturbed areas.	Prior to ground disturbance.	Ground Disturbance Officer.
	3. Internal Ground Disturbance Authorisation shall be obtained in accordance with the Pilbara Iron Ground Disturbance Authorisation Procedure for each area to be disturbed.	Prior to ground disturbance.	Mine Planning Superintendent.
	4. Clearing boundaries shall be defined with ground markings (e.g. flagging) or as GPS coordinates in the earthmoving equipment prior to commencement of ground-disturbing activities to ensure that personnel are aware of clearing limits.	Prior to ground disturbance.	Mine Planning Superintendent.
	5. Areas of intact vegetation within the project area that are to be retained (including the southern escarpment and singleton troglofauna buffers) shall be demarcated to avoid accidental disturbance.	Prior to ground disturbance.	Mine Planning Superintendent.
Weed management	6. The distribution within the project area of target weed species (Mexican Poppy, Kapok Bush, Ruby Dock, Buffel Grass and Birdwood Grass) shall be internally reported, recorded, mapped and monitored.	Ongoing.	Environment Superintendent.
	7. Weed control shall be undertaken in areas to be disturbed, where required.	Prior to initial ground disturbance.	Environmental Advisor.
	8. Weed hygiene measures for mobilisation and demobilisation of mining equipment entering and leaving the project area shall be implemented as required in accordance with the Pilbara Iron Weed Management Plan and procedures, including: • inspecting the equipment • cleaning the equipment (including dust bowls and filters) at the nearest washdown facility, as required.	At all times.	Mine Planning Superintendent. Mine Production Superintendent.
	9. Weed control shall be undertaken in and around the project area as part of the annual weed control program and as otherwise required.	Annually and as required.	Environmental Advisor.
Induction	10. The induction program shall include information on: • existing remnant vegetation and significant flora locations and their importance • the requirement to stay within approved clearing boundaries • identification and reporting of weeds • procedures to minimise the introduction and spread of weeds.	Prior to personnel commencing work on site.	Environmental Advisor.
Monitoring	11. Clearing lines, temporary fences and markings shall be monitored to ensure they are in accordance with Ground Disturbance Authorisations and the Mine Clearing Plan.	Monthly throughout ground disturbance.	Ground Disturbance Officer. Environmental Advisor.
	12. The project area shall be monitored for new weed infestations.	Monthly.	Environmental Advisor.

3.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for flora and vegetation management at Mesa K are not being achieved (Table 4).

Table 4 Contingency actions for flora and vegetation management at Mesa K

Trigger	Action
1. Marked clearing boundary is not as shown in the Mine Clearing Plan and/or Ground Disturbance Authorisation.	1. Stop work in area immediately adjacent to clearing boundary. 2. Complete incident report and investigations. 3. Implement corrective actions, which may include amending clearing boundaries in accordance with the Mine Clearing Plan and/or Ground Disturbance Authorisation.
2. Breaching clearing boundary.	1. Report as Environmental Incident and initiate Incident Response Procedure, including: a) stopping work in the vicinity of the clearing boundary b) investigating cause of breach c) implementing corrective actions, including rehabilitating the disturbed area.
3. Population(s) of threatened flora species not previously recorded, are found within the operational area.	1. Investigate opportunities to prevent or minimise the impact to the newly recorded flora. 2. Indicate individuals to be protected in the Geographic Information System. 3. If Declared Rare Flora (DRF) are found, submit an application to the DEC to take DRF, for approval by the Minister for the Environment in accordance with the *Wildlife Conservation Act 1950*.
4. Introduction of new weed species and/or spread of existing weed species.	1. Undertake weed control. 2. Review relevant procedures (e.g. vehicle hygiene procedures) and modify as required. 3. Incorporate locations into Geographic Information System.

4. TERRESTRIAL FAUNA

4.1 DESCRIPTION

The two primary fauna habitat types at Mesa K are 'stony hills' and 'major creeklines and their associated floodplains'. The escarpments of the mesas and deeply-incised gullies form specific niches within the stony hills habitat types and are of some importance. The escarpments contain caves and overhangs, which can often be important habitats for bats.

Of the range of vertebrate and invertebrate species occurring at Mesa K, the following are of key interest for management purposes:

- *Rhinonicteris aurantius* (Orange Leaf-nosed Bat); considered 'rare and likely to become extinct' under Schedule 1 of the *Wildlife Conservation Act 1950* and listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A single itinerant Orange Leaf-nosed Bat was recorded from one cave on the southern escarpment. The cave is not thought to constitute a significant roost sites for this species due to its relative shallowness (Biota 2007b)
- *Macroderma gigas* (Ghost Bat); listed as 'Priority 4' in the DEC Priority Fauna Listing and 'Vulnerable A2c' by the International Union for Conservation of Nature and Natural Resources (1996). This species was not recorded at Mesa K, but may possibly be an occasional visitor to caves on the southern escarpment of the mesa
- *Dasyurus hallucatus* (Northern Quoll); considered 'rare and likely to become extinct' under Schedule 1 of the *Wildlife Conservation Act 1950* and 'Endangered' under the EPBC Act. This species was not recorded in the project area during the recent survey, but is considered to potentially occur on the southern escarpment of the mesa
- Araneae (specifically trapdoor spiders); a single species of mygalomorph (trapdoor) spider was recorded on the southern escarpment of Mesa K
- Pseudoscorpionida (pseudoscorpions); a single species of pseudoscorpion was recorded on the southern escarpment of Mesa K.

A detailed description of the terrestrial fauna of Mesa K is included in Section 8 of the EPS.

4.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure protection of terrestrial fauna values:

- **vegetation clearing** will directly disturb terrestrial fauna habitat and may result in the loss of individual terrestrial fauna
- **vehicle movements** in mining areas and on mine access roads could potentially result in the loss of individual terrestrial fauna, especially less-mobile species
- **increased human activity** could affect fauna behaviour and distribution, and could improve conditions for feral animals.

The management of the clearing of potential fauna habitat is addressed in Section 3.

4.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on terrestrial fauna management objectives at Mesa K (Table 5). Objectives relating to clearing of potential fauna habitat are outlined in Section 3.3.

Table 5 Objectives, targets and performance indicators for terrestrial fauna management at Mesa K

Management objective	Target	Performance indicators
Protect significant habitats not approved to be cleared.	No disturbance to the southern escarpment of Mesa K, except where approved, throughout the duration of the proposal.	Occurrences of impacts to the southern escarpment, except where approved, recorded as an Environmental Incident.
	No encroachment into the buffer between the mesa escarpment and operational mine areas throughout the duration of the proposal.	Any disturbance within the buffer recorded as an Environmental Incident.
	Maintain habitat condition on the southern escarpment throughout the duration of the proposal.	Photographic monitoring and Landform Function Analysis as required.
Minimise the effect of feral animals on native terrestrial fauna.	No significant increase in feral animal abundance in the vicinity of the project area throughout the duration of the proposal.	Number of feral animals recorded during trapping exercises at the commencement of mining compared to the number recorded at the completion of mining at Mesa K.

4.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving terrestrial fauna management objectives (Table 6). The monitoring program for terrestrial fauna at Mesa K (Table 6) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets. Management actions relating to potential impacts to fauna as a result of habitat loss are addressed in Section 3.4.

Table 6 Management and monitoring actions required to achieve targets for terrestrial fauna management at Mesa K

Parameter	Action	Timing	Responsibility
Protect significant habitats	1. A substantial and geotechnically stable buffer shall be demarcated between the southern edge of the mesa and adjacent mining areas. The study determining the buffer shall be documented and the boundary of the buffer shall be indicated in the Mine Clearing Plan.	Prior to ground disturbance.	Mine Planning Superintendent.
Native fauna protection	2. Firearms and pets shall be prohibited on the mine site.	At all times.	Mine Operations Manager.
	3. Personnel shall be instructed to remain on defined access tracks and roads except in cases of emergency.	At all times.	Mine Operations Manager.
	4. Appropriate speed limits for both mining equipment and light vehicles shall be implemented, sign-posted and enforced on the Mesa K to Mesa J access road, including the Robe River crossing.	Prior to ground disturbance.	Mine Operations Manager.
	5. Metallic reflectors shall be installed on any barbed wire used onsite.	Ongoing.	Mine Operations Manager
	6. Lighting controls, such as minimising light broadcast and installation of sodium lights, shall be implemented.	Ongoing.	Mine Operations Manager
Native fauna encounter	7. Native animals encountered on-site shall be given the opportunity to move on if there is no threat to personnel safety in doing so.	At all times.	All personnel.
	8. If sick or injured animals are encountered, the nominated carer or Wildlife Hotline shall be called to assess possible rescue and rehabilitation of the animal.	At all times.	All personnel.
Feral animal control	9. Feral animal control measures shall be implemented, including: • prohibiting the feeding of feral animals • trapping and eradication programs • effective management of rubbish (refer to Section 9.4).	Ongoing.	All personnel. Environmental Advisor.
Induction	10. The induction shall include information on: • important fauna habitat, particularly the southern escarpment • potential for mine activities to affect fauna and fauna habitat • fauna encounter procedures • feral animal controls.	Prior to personnel commencing work on site.	Environmental Advisor.
Monitoring	11. The southern escarpment buffer shall be monitored to ensure it has not been disturbed by the proposal, except where approved.	Monthly.	Mine Planning Superintendent.

4.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for terrestrial fauna management at Mesa K are not being achieved (Table 7).

Table 7 Contingency actions for terrestrial fauna management at Mesa K

Trigger	Action
1. Disturbance to areas of the southern escarpment (except where approved).	1. Report as Environmental Incident and initiate Incident Response Procedure, including: a) investigating cause b) implementing corrective actions, including rehabilitating disturbed area.
2. Decline in habitat condition on the southern escarpment.	1. Investigate cause. 2. If necessary, consult with relevant authorities to determine actions required to restore the habitat.
3. Increased feral animal abundance.	3. Report as Environmental Incident and initiate Incident Response Procedure, including: a) investigating cause b) implementing corrective actions, including undertaking additional trapping as required.

5. SUBTERRANEAN FAUNA

5.1 DESCRIPTION

Troglofauna sampling was undertaken at Mesa K from 2004 to 2007 and is ongoing. Sampling to date has utilised 56 bore holes spread across the mesa and has recorded a total of 178 troglobitic or potentially troglobitic individuals, representing seven orders. These specimens were recorded from 33 of the 56 bore holes sampled. The troglofauna recorded at Mesa K were identified as 10 individual taxa. All of the 10 taxa recorded are treated as being endemic to Mesa K, as it cannot currently be demonstrated that any occur in the other mesas sampled during earlier work (Biota 2007c).

Five of the collected taxa were singletons (taxa represented by only one individual) at the completion of four phases of sampling. Further sampling has collected another specimen of one of these taxa (Scolopendrida), reducing the number of singletons to four. All singleton occurrences of troglofauna have been excluded from the mine plan and will be protected with an appropriate buffer.

The proposed remnant mining of Mesa K does not involve mining below the water table and will not adversely affect stygofauna.

A detailed description of the subterranean fauna of Mesa K is included in Section 9 of the EPS.

5.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure protection of subterranean fauna values:

- **direct habitat removal** through mining will result in habitat loss and the loss of some individual subterranean fauna
- **changes to surface hydrology**, particularly in regards to sealing of recharge areas and increased surface water runoff, may lead to a reduction in habitat suitability (refer to Section 6)
- **changes to the subterranean microclimate**, particularly a reduction in humidity levels, could lead to changes in the use of retained habitat by troglofauna
- **surface and ground water contamination** through spills of hydrocarbons or wastewater has the potential to degrade the subterranean environment (refer to Section 10)
- **reduction in organic inputs** through clearing of vegetation beyond the mine footprint may lead to a reduction in the availability of inputs to the foundation trophic levels (refer to Section 3).
- **vibration** from blasting activities has the potential to cause collapses of strata and mesocaverns within the remnant mesa formation (refer to Section 8).

5.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on subterranean fauna management objectives at Mesa K (Table 8). Troglofauna protection and management at Mesa K primarily involves effective management of related environmental aspects that have a direct bearing on troglofauna and their habitat. These aspects include: vegetation clearing; habitat disturbance and retention; surface water and hydrocarbon management; and rehabilitation. Troglofauna management has been a key consideration in the development of management measures for each of these aspects (refer to the Section 9 of the EPS for detailed discussion). Objectives relating to clearing and habitat retention are outlined in Section 3.3 and 4.3. Objectives relating to surface water and hydrocarbon management are outlined in Sections 6 and 10 respectively. Objectives relating to blasting are outlined in Section 8. Objectives and management measures relating to rehabilitation (and habitat protection) are detailed in the Mesa K Preliminary Rehabilitation Plan.

Key measures developed to protect troglofauna and habitat include:

- exclusion of singleton troglofauna occurrences (including an appropriate buffer) from the mine plan
- minimising new disturbance wherever possible
- retention of the majority of the pisolite resource as a contiguous system
- backfilling of the Central pit and the southern section of Gravel Yard pit to protect retained habitat and biophysical processes
- progressive rehabilitation.

Table 8 Objectives, targets and performance indicators for subterranean fauna management at Mesa K

Management objective	Target	Performance indicators
Protect troglofauna habitat not approved to be disturbed.	No mining in areas not approved for disturbance (as indicated in Schedule 1 of the Ministerial Statement for the proposal) and no encroachment of mining activities within singleton troglofauna buffers throughout the duration of the proposal.	Disturbance outside approved areas or within buffers recorded as an Environmental Incident.

5.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND SAMPLING

Specific actions have been identified to assist in achieving subterranean fauna management objectives (Table 9). Troglofauna will be sampled annually from a representative spread of bores across the mesa throughout the life of the mine. The objectives for this sampling are to:

- accumulate additional troglobitic species
- allow additional genetic and morphological identifications to be completed
- provide indicator data on the continued presence of troglofauna in sampling locations at Mesa K.

Management actions relating to singleton troglofauna buffers are addressed in Section 3.4.

Table 9 Management actions required to achieve targets for subterranean fauna management at Mesa K

Parameter	Action	Timing	Responsibility
Protect troglofauna habitat	1. A 50 m radius buffer shall be demarcated around each singleton troglofauna occurrence. The buffer shall be indicated in the Mine Clearing Plan.	Prior to ground disturbance.	Mine Planning Superintendent.
	2. The Central pit void and the southern leg of the Gravel Yard pit void shall be backfilled.	Prior to rehabilitation.	Mine Planning Superintendent.
	3. Trim blasts as appropriate when approaching proposed pit extents based on available results from vibration test work at Mesa J and/or Mesa A.	During mining	Mine Planning Superintendent.
Induction	4. The induction shall include information on: • the general ecology of troglofauna • potential for mine activities to affect troglofauna and their habitat • locations of singleton occurrences of troglofauna.	Prior to personnel commencing work on site.	Environmental Advisor.
Sampling	5. A representative spread of bores across the mesa shall be sampled for troglofauna throughout the life of the mine.	Annually.	Environmental Advisor.
Monitoring	6. Undertake the following actions to investigate habitat conditions in previously disturbed areas versus undisturbed areas:		
	• monitor downhole humidity and temperature in drillholes in previously disturbed areas, undisturbed areas and rehabilitated areas to assess differences in physical conditions	Continuous logging commencing prior to productive mining (subject to appropriate loggers being sourced through Mesa A test work)	Environmental Advisor
	• measure carbon dioxide concentrations in drillholes in previously disturbed areas, undisturbed areas and rehabilitated areas to assess differences in conditions	Quarterly commencing prior to productive mining	Environmental Advisor
	• estimate percentage vegetation cover overlying the drillholes being monitored in previously disturbed areas, undisturbed areas and rehabilitated areas to examine any relationships between vegetation cover and physical habitat conditions	6-monthly commencing prior to productive mining	Environmental Advisor
	• undertake groundwater sampling to determine nutrient (N, P) concentrations in previously disturbed areas, undisturbed areas and rehabilitated areas to investigate possible differences in nutrient concentrations in groundwater.	Quarterly commencing prior to productive mining	Environmental Advisor

Parameter	Action	Timing	Responsibility
	7. Undertake the following actions to investigate the influence of the pit face on habitat conditions:		
	• record the aspect (e.g. North facing) of the pit face closest to the monitored drillholes to determine the influence (if any) of pit face aspect upon the monitored physical habitat conditions	Upon commencement of productive mining	Environmental Advisor
	• monitor downhole humidity and temperature in drillholes located at various distances from the exposed pit faces and examine the data for changes over time as the pit faces progress	Continuous logging commencing prior to productive mining (subject to appropriate loggers being sourced through Mesa A test work)	Environmental Advisor
	• measure carbon dioxide concentrations in drillholes located at various distances from the exposed pit faces and examine the data for changes over time as the pit faces progress.	Quarterly commencing prior to productive mining	Environmental Advisor
	8. Undertake the following actions to allow possible impacts of rainfall and unplanned events on habitat conditions to be examined:		
	• record occurrence of significant rainfall events	During mining	Environmental Advisor
	• record occurrence and location of hydrocarbon spills within the pit and the remedial actions undertaken	During mining	Environmental Advisor
	• assess whether there are any relationships between rainfall events or spills and changes in physical habitat conditions.	During mining	Environmental Advisor
	9. Undertake the following action to examine the impact of vibration on troglofauna habitat:		
	• examine fractures and voids in drillholes located at various distances from the exposed pit faces and examine the data for changes over time as the pit faces progress.	Annually commencing prior to productive mining	Environmental Advisor

5.5 CONTINGENCIES

Contingency actions have been developed to be enacted if sampling indicates that the environmental objectives and targets for subterranean fauna management at Mesa K are not being achieved (Table 10).

Table 10 Contingency actions for subterranean fauna management at Mesa K

Trigger	Action
1. Mining within areas not approved for disturbance or disturbance within buffers surrounding singleton occurrences of troglofauna.	1. Report as Environmental Incident and initiate Incident Response Procedure, including: a) investigating cause b) implementing corrective actions, including rehabilitating disturbed area.
2. Monitoring indicates risks to troglofauna populations are increasing as a result of the proposal.	2. Develop and implement mitigation measures to reduce the risk to troglofauna populations to the requirements of the Chief Executive Officer of the DEC.

6. SURFACE WATER

6.1 DESCRIPTION

The Robe River is the dominant surface hydrological feature in the project area, with the channel passing alongside the southern escarpment of Mesa K. There are no significant tributaries that originate in, or cross, the mining area.

Mesa K is situated at the top of local, internally-draining subcatchments created through previous mining activities. Uncontrolled surface water runoff generated from the mining areas during high rainfall events is unlikely to reach the Robe River. The subcatchments created by previous mining activity at Mesa K presently contain all surface water runoff from rainfall events of less than a 20 year annual recurrence interval (ARI), and all but one subcatchment are also capable of containing surface water runoff from rainfall events greater than a 50 year ARI. The capacity for internal storage of surface water runoff will increase with mine development, as the mining pits increase in depth and spatial extent.

A detailed description of environmental aspects related to surface water at Mesa K is included in Section 10 of the EPS.

6.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure protection of surface water values:

- **drainage management** associated with construction of mine pits and infrastructure will alter surface water flow paths
- **discharge of stormwater** has the potential to affect water quality through contamination by sediments and hydrocarbons.

6.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on surface water management objectives at Mesa K (Table 11).

Table 11 Objectives, targets and performance indicators for surface water management at Mesa K

Management objective	Target	Performance indicators
Protect the environmental values of the Robe River.	All surface water runoff is directed to settling ponds or sediment traps/basins, as appropriate, prior to discharge from the project area throughout the duration of the proposal.	Settling ponds or sediment traps/basins installed and functional.
	Any surface water runoff returned to the Robe River is discharged at designated locations via rock-lined spillways throughout the duration of the proposal.	Discharge to the Robe River occurring at unauthorised locations recorded as an Environmental Incident.

6.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving surface water management objectives (Table 12). The monitoring program for surface water at Mesa K (Table 12) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets.

Table 12 Management and monitoring actions required to achieve targets for surface water management at Mesa K

Parameter	Action	Timing	Responsibility
Drainage management	1. All surface water drainage shall conform to the Pilbara Iron Sediment and Drainage Control Design Criteria, including: • stabilising diversion structures and drains to reduce erosion and associated water quality impacts • installing sediment traps/basins where appropriate to reduce sediment loads in runoff from the mine area.	At all times.	Mine Planning Superintendent.
	2. Waste dumps shall be designed to incorporate water management features to minimise the potential for sediment-laden surface water runoff.	At all times.	Mine Planning Superintendent.
	3. Mining shall be undertaken such that open pit voids retain a minimum of a 20 year ARI rainfall event.	At all times.	Mine Planning Superintendent.
Stormwater management	4. Settling ponds shall be installed to reduce sediment loads in stormwater prior to re-use/discharge.	Ongoing.	Mine Planning Superintendent.
	5. Captured surface water runoff shall be returned to the Robe River as required at designated discharge locations using rock-lined spillways to reduce erosion.	As required.	Mine Planning Superintendent.
Induction	6. The induction shall include information on: • potential for drainage and stormwater management to affect vegetation, fauna and surface water values • drainage and stormwater management procedures.	Prior to personnel commencing work on site.	Environmental Advisor.
Monitoring	7. Settling ponds, sediment traps and basins shall be monitored for debris and sediment accumulation to determine when maintenance is required.	Quarterly or opportunistically after heavy rainfall events.	Mine Planning Superintendent.

6.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for surface water management at Mesa K are not being achieved (Table 13).

Table 13 Contingency actions for surface water management at Mesa K

Trigger	Action
1. Flooding or ponding occurring on-site.	1. Investigate cause. 2. Modify drainage system as required.

Trigger	Action
2. Excessive debris and sediment accumulation within drainage system.	1. Undertake maintenance to remove accumulated material and ensure drainage system remains effective.
3. Integrity of drainage system compromised.	1. Investigate cause. 2. Modify drainage system as required.

7. DUST

7.1 DESCRIPTION

Dust emissions from physical disturbance to the land surface represent one of the main sources of dust in mining operations. Dust will be generated at Mesa K during mining and ore handling activities, and along the short haul route to Mesa J. Due to the remoteness of the operations, dust generated at Mesa K is not expected to affect any public or private premises.

The most effective way to control fugitive dust is to prevent dust generation through appropriate prevention measures. During mining operations at Mesa K, appropriate dust management strategies will be implemented to minimise the generation of dust from disturbed areas across the site (including along the haul route) and at ore handling facilities at Mesa J. This will include application of water to haul roads, working surfaces and stockpiles as required.

The potential for dust generation will also be limited by:

- the small amount of additional clearing required
- the coarse nature of the mined material
- backfilling of waste into voids, reducing exposure to wind
- stockpiling of low grade ore within voids, reducing exposure to wind
- progressive rehabilitation of disturbed areas.

A detailed description of environmental aspects related to dust at Mesa K is included in Section 6.3.1 of the EPS.

7.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure dust emissions are minimised:

- **physical disturbance to the land surface** during construction of infrastructure and mining (removal of vegetation, blasting and excavations)
- **haulage and light traffic** on unsealed roads.

7.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on dust management objectives at Mesa K (Table 14).

Table 14 Objectives, targets and performance indicators for dust management at Mesa K

Management objective	Target	Performance indicators
Minimise the effect of dust generated by mining activities on the surrounding environment.	No visible dust build-up on vegetation outside the project area throughout the duration of the proposal.	Vegetation health monitoring and Inspection Reports.

7.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving dust management objectives (Table 15). The monitoring program for dust at Mesa K (Table 15) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets. Management actions to control ground disturbance are outlined in Table 3.

Table 15 Management and monitoring actions required to achieve targets for dust management at Mesa K

Parameter	Action	Timing	Responsibility
Minimise soil exposure and ground disturbance	1. Vegetated areas shall be retained until required to be cleared for mine development (in order to minimise the area of soil exposed at any one time).	Ongoing.	Mine Planning Superintendent.
Dust suppression	2. Water tankers shall be used to wet down areas across the mine site, including: • haul roads and access tracks • mineral waste and topsoil stockpiles • cleared areas and working surfaces.	As required.	Mine Production Superintendent.
Vehicle movements	3. All personnel shall be instructed to adhere to on-site vehicle speed limits to reduce dust lift-off from unsealed roads.	Ongoing.	Mine Operations Manager.
Induction	4. The induction shall include information on: • the potential for mine activities to increase dust generation • potential effects of dust on health and the environment • dust suppression procedures.	Prior to personnel commencing work on site.	Environmental Advisor.
Monitoring	5. Visual observations of areas of ground disturbance shall be undertaken to determine whether dust suppression is required.	Daily.	Mine Production Superintendent.
	6. Visual observations of areas of ground disturbance shall be undertaken to determine the effectiveness of dust suppression.	Daily.	Mine Production Superintendent.

7.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for dust management at Mesa K are not being achieved (Table 16).

Table 16 Contingency actions for dust management at Mesa K

Trigger	Action
1. Visual observations indicate dust suppression is not effective in reducing dust generated from areas of ground disturbance.	1. Investigate cause. 2. Implement additional dust control measures including, as appropriate: a) increased application of water b) application of dust stabilisers to vehicle loads and stockpiles. 3. Moderate activities generating dust if actions listed under (2) above are inadequate to reduce dust emissions to acceptable levels.
2. Excessive dust accumulated on vegetation not approved to be disturbed.	1. Investigate cause. 2. Implement additional dust control measures.

8. NOISE AND VIBRATION

8.1 DESCRIPTION

Noise and vibration will be generated at Mesa K during mining and ore transport and handling operations. Due to the remoteness of the operations, noise and vibration are not expected to affect any noise-sensitive premises. Noise emissions from the proposed operations may cause localised disruption to fauna behaviour in areas adjacent to mining operations and transport corridors; however, it is unlikely that fauna would be disrupted by noise emissions in the long-term. Vibration from blasting activities has the potential to cause changes to strata and mesocaverns within the remnant mesa formation, and may decrease (or increase) the habitat available to troglofauna.

A detailed description of environmental aspects related to noise and vibration at Mesa K is included in Section 6.3.2 of the EPS.

8.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure generation of noise and/or vibration is minimised:

- **blasting** activities
- **handling and transport** of ore, including loading haul trucks and general vehicle noise.

8.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on noise and vibration management objectives at Mesa K (Table 17).

Table 17 Objectives, targets and performance indicators for noise and vibration management at Mesa K

Management objective	Target	Performance indicators
Noise control equipment is maintained so it is effective in reducing noise to acceptable levels.	Compliance with the Department of Industry and Resources (DoIR) noise requirements for mine safety and health at all times throughout the duration of the proposal.	Vehicle Maintenance Register.

8.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving noise and vibration management objectives (Table 18). The monitoring program for noise and vibration at Mesa K (Table 18) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets.

Table 18 Management and monitoring actions required to achieve targets for noise and vibration management at Mesa K

Parameter	Action	Timing	Responsibility
Blasting	1. Blasting activities shall only be conducted during daylight hours.	At all times.	Mine Production Superintendent.
	• 2. Blasting near final pit face limits shall be managed to control blast vibration effects, including tailored final face blast pattern and shot sequence designs incorporating limitations on Maximum Instantaneous Charge (MIC), and modified explosive factors, as required.	At all times.	Mine Production Superintendent.
Vehicle and equipment noise control	3. Noise control measures for vehicles and other equipment shall be implemented, including fitting mobile and stationary equipment with effective exhaust mufflers.	At all times.	Mine Production Superintendent.
	4. All noise control equipment shall be maintained so it is effective in reducing noise levels to accepted standards.	As required.	Maintenance Superintendent.
Monitoring	6. The integrity of noise control equipment shall be monitored to ensure it is in good working order.	Monthly.	Maintenance Superintendent.

8.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for noise and vibration management at Mesa K are not being achieved (Table 19).

Table 19 Contingency actions for noise and vibration management at Mesa K

Trigger	Action
1. Non-compliance with the DoIR noise requirements for mine safety and health.	1. Investigate cause. 2. Implement corrective actions, including repairing or replacing noise control equipment as required.

9. WASTE

9.1 DESCRIPTION

The proposal will be operated as a satellite project to the existing Mesa J operation. Activities at Mesa K will be limited to those directly associated with mining. As such, waste generated by the proposal will be limited in both volume and composition and will include:

- domestic solid and liquid waste (including food scraps and sewage)
- mineral waste.

Ablution facilities for the workforce at Mesa K will be temporary and transportable. Inert waste from the mine site and work areas will be disposed of to the existing landfill facility located at Mesa J, which is managed in accordance with the licence registration and appropriate landfill guidelines. Putrescible waste from the mine site and work areas will be disposed of to the Pannawonica townsite landfill.

Following clearing of vegetation and stripping of topsoil, waste rock material (overburden) will be removed from the surface to allow for the excavation of ore. This material will initially be directed to surface waste dumps and, thereafter, will be used in progressive backfilling of mine pits as far as practicable.

Liquid effluent will not be discharged at the Mesa K mine site, as maintenance works will be conducted in existing workshops and maintenance facilities located at Mesa J.

A detailed description of environmental aspects related to waste at Mesa K is included in Section 6.3.3 of the EPS.

9.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following wastes generated at Mesa K have been identified as requiring management additional to existing management practices at Mesa J:

- **ablution effluent**
- **mineral waste**.

9.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on waste management objectives at Mesa K (Table 20).

Table 20 Objectives, targets and performance indicators for waste management at Mesa K

Management objective	Target	Performance indicators
Ensure that wastes are disposed of correctly.	No incorrect disposal of wastes throughout the duration of the proposal.	Inspection reports.
Maximise the backfilling of pit voids with mineral waste.	Opportunities to maximise the backfilling of pit voids with mineral waste are investigated and documented prior to commencement of mining.	Mine Plan.

9.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving waste management objectives (Table 21). The monitoring program for waste at Mesa K (Table 21) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets.

Table 21 Management actions required to achieve targets for waste management at Mesa K

Parameter	Action	Timing	Responsibility
Ablution effluent	1. Ablution effluent shall be collected in a septic tank at Mesa K, which shall be emptied by a licensed contractor and disposed of in an approved manner.	As required.	Infrastructure Superintendent.
Mineral waste dumps	2. Geochemical analysis of existing mineral waste material at Mesa K will be conducted in a two stage process: • determination of solid concentrations of multiple elements including iron, aluminium, arsenic, selenium and antimony. Comparison of solid concentrations with the median crustal abundance and with the United States Environmental Protection Authority Ecological Soil Screening Levels where available • undertake solid liquid extractions with analysis for any elements that exceed the United States Environmental Protection Authority Ecological Soil Screening Levels in the testing above.	Prior to commencement of productive mining.	Site Geologist.
	3. Waste rock material (overburden) shall initially be directed to surface waste dumps and, thereafter, shall be used in progressive backfilling of mine pits as far as practicable.	Ongoing.	Mine Planning Superintendent.
	4. All waste dumps shall be constructed in accordance with the Pilbara Iron Landform Design Guidelines, which include: • minimisation of dump height • shaping of dumps to blend in with the surrounding natural topography • construction to meet the requirements of the final rehabilitation design • drainage and erosion management features.	Ongoing.	Mine Planning Superintendent.
Monitoring	5. The level of effluent in the septic tank shall be monitored to determine when the tank requires emptying.	Monthly.	Infrastructure Superintendent.
	6. Waste rock landforms shall be monitored to ensure they are correctly located and comply with the Pilbara Iron Landform Design Guidelines.	Monthly.	Mine Planning Superintendent.

9.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for waste management at Mesa K are not being achieved (Table 22).

Table 22 Contingency actions for waste management at Mesa K

Trigger	Action
1. Incorrect disposal of waste.	1. Report as an Environmental Incident. 2. Implement corrective actions, including correct disposal of wastes and re-informing personnel of correct disposal procedures as required.
2. Non-compliance of mineral waste dumps with the Pilbara Iron Landform Design Guidelines.	1. Investigate cause. 2. Modify waste dumps to comply with Guidelines.
3. Geochemical analysis shows solid concentration exceeds the United States Environmental Protection Authority Ecological Soil Screening Levels.	1. Undertake solid liquid extraction and analysis for any elements that exceed the Soil Screening Levels. 2. Implement management actions in consultation with the DEC to prevent contamination of the surrounding environment.

10. HYDROCARBONS

10.1 DESCRIPTION

Vehicle fuel will be the only significant source of hydrocarbons at the Mesa K site. Minor sources include generator fuel, as well as oils and lubricants required for the operation of vehicles. The storage and use of these hydrocarbons will be managed to prevent spillages and leaks, which have the potential to cause contamination of soil, surface water and groundwater.

Fuel required for operations at Mesa K will be stored at the Mesa J site and will be supplied from Mesa J via a specialist service vehicle to the Mesa K equipment as required. All servicing will be carried out at dedicated facilities at Mesa J that contain appropriate hydrocarbon and surface water management features. Appropriate clean-up procedures will ensure any minor spills have minimal impact to the environment.

10.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring additional management to that which exists at Mesa J to minimise potential contamination of the environment by hydrocarbons:

- **refuelling** of vehicles and machinery.

10.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on hydrocarbon management objectives at Mesa K (Table 23).

Table 23 Objectives, targets and performance indicators for hydrocarbon management at Mesa K

Management objective	Target	Performance indicators
Prevent contamination of the environment by hydrocarbons.	No hydrocarbon discharge to the environment during re-fuelling of vehicles and machinery throughout the duration of the proposal.	Hydrocarbon spills recorded as Environmental Incidents.
	Compliance with Australian Standard (AS) 1940 “The storage and handling of flammable and combustible liquids” and the Explosives and Dangerous Goods (Handling and Storage) Regulations 1992, throughout the duration of the proposal	Non-compliances recorded as Environmental Incidents.

10.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving hydrocarbon management objectives (Table 24). The monitoring program for hydrocarbons at Mesa K (Table 24) is designed to ensure that operations are consistent with the prescribed management actions. Monitoring will measure the success of these actions in accordance with the management objectives and targets.

Table 24 Management actions required to achieve targets for hydrocarbon management at Mesa K

Parameter	Action	Timing	Responsibility
Re-fuelling	1. Re-fuelling at Mesa K shall be undertaken in accordance with AS 1940.	At all times.	Mine Production Superintendent.
Hydrocarbon spills	2. Appropriate spill response equipment shall be located nearby, such that it is available for immediate use.	At all times.	Mine Production Superintendent.
	3. Any hydrocarbon contaminated soil and/or spill response material shall be remediated or disposed of as appropriate at the Mesa J facilities.	At all times.	Mine Production Superintendent.
Generator	4. The site generator shall be located on a fully bunded platform to contain any fuel leaks.	At all times.	Mine Production Superintendent.
Monitoring	5. The integrity of valves and seals on the specialist service vehicle shall be monitored.	Daily pre-start check	Specialist Service Vehicle Driver.
	6. Re-fuelling activities shall be monitored for leaks and spills.	During re-fuelling.	Specialist Service Vehicle Driver.

10.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for hydrocarbon management at Mesa K are not being achieved (Table 25).

Table 25 Contingency actions for hydrocarbon management at Mesa K

Trigger	Action
1. Hydrocarbon spill.	1. Report as Environmental Incident and initiate Incident Response Procedure, including as appropriate: a) preventing further loss of material by either addressing the process control problem or undertaking repair of faulty components b) immediately containing spillages by constructing earthen bunds or using other containment methods c) removing ponded hydrocarbons where possible by pumping into an appropriate storage facility, or withdrawing with an absorbent material d) removal of contaminated soils off-site for remediation.

11. FIRE

11.1 DESCRIPTION

A number of activities required at the Mesa K site during day-to-day operations (particularly those that involve fuels or explosives) have the potential to cause fires. Fire poses a significant danger to mine personnel and can result in severe damage to the environment and mine equipment. Effective management procedures are required to prevent any outbreak of fire in the first instance and to control and extinguish any fires that occur.

11.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to reduce the potential for fires:

- **ignition of fuel or oil spills/leakages** during re-fuelling of equipment
- **ignition of other material** during welding, grinding and other activities with an ignition source
- **blasting** or incorrect storage or handling of explosives required for blasting.

11.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on fire management objectives at Mesa K (Table 26).

Table 26 Objectives, targets and performance indicators for fire management at Mesa K

Management objective	Target	Performance indicators
Prevent fires occurring during re-fuelling of equipment or as a result of blasting.	No fires during re-fuelling of equipment or as a result of blasting throughout the duration of the proposal.	All fires recorded as Incidents.
Fast and effective control and extinguishing of accidental fires.	No instances of fire spreading beyond the Mesa K mining lease boundary.	All fires recorded as Incidents.

11.4 IMPLEMENTATION STRATEGY, MANAGEMENT ACTIONS AND MONITORING

Specific actions have been identified to assist in achieving fire management objectives (Table 27). Re-fuelling will be monitored to detect any potential for accidental fire outbreaks. Management actions regarding re-fuelling of equipment are outlined in Section 10.4. Hydrocarbon spill contingency actions are outlined in Section 10.5.

Table 27 Management actions required to achieve targets for fire management at Mesa K

Parameter	Action	Timing	Responsibility
Blasting	1. Blasting shall be supervised to detect any potential for accidental outbreaks of fire.	During each blast.	Drill and Blast Supervisor.
Fire restrictions	2. Open ground fires shall be prohibited throughout the entire project area (except for fire training purposes).	At all times.	Mine Operations Manager.
Fire fighting	3. Dry chemical fire extinguishers shall be available in all buildings and vehicles on-site to control localised outbreaks of fire. Extinguishers shall be tagged by an approved inspector prior to mobilisation.	At all times.	Emergency Services Advisor.
	4. Fire fighting equipment shall be maintained to comply with relevant fire safety standards.	As required by standards.	Emergency Services Advisor.
	5. Site personnel shall be required to complete basic fire-fighting training.	Prior to commencement of operations.	Emergency Services Advisor.
Firebreaks	6. Firebreaks shall be established around the explosives storage and crib/office facilities and shall be maintained on a regular basis.	Annually.	Mine Operations Manager.
Mine equipment	7. All mine equipment shall be maintained and operated to comply with relevant fire safety standards.	As required.	Maintenance Superintendent.
Monitoring	8. Re-fuelling shall be monitored for fire outbreaks.	During re-fuelling.	Specialist Service Vehicle Driver.

11.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for fire management at Mesa K are not being achieved (Table 28).

Table 28 Contingency actions for fire management at Mesa K

Trigger	Action
1. Fire incident.	1. Report as Incident and initiate Incident Response Procedure, including as appropriate: a) immediately extinguishing fire b) investigating cause c) rehabilitating burnt area as required.

12. ABORIGINAL HERITAGE

12.1 DESCRIPTION

Nine archaeological sites, comprising mainly artefact scatters[2], have been recorded within the proposed remnant mining area. Six of these sites have been previously cleared under Section 18 of the *Aboriginal Heritage Act 1972*. The remaining three sites (MK04-05, MK04-06 and the P02101 complex) will not be disturbed by the proposal.

Water courses are generally recognised as being of ethnographic significance to Aboriginal people. The Robe River passes to the south of the proposed Gravel Yard pit.

Consultation with representatives of the Kuruma Marthudunera Native Title Claimant Group (Kuruma Marthudunera) has identified an area at the north-west end of the proposed West-North pit and an area at the south-east end of the proposed Gravel Yard pit as requiring further discussion with the group and possibly additional management measures. Robe will continue to discuss the proposed work with the Kuruma Marthudunera group and provide requested information regarding these two areas to the group as it becomes available.

A detailed description of Aboriginal heritage values at Mesa K is included in Section 11 of the EPS.

12.2 ENVIRONMENTAL ASPECTS TO BE MANAGED

The following aspects of the proposal have been identified as requiring management to ensure protection of heritage sites and ethnographic values:

- **physical disturbance of the land surface** during construction and operation of the mine and associated infrastructure
- **drainage** will have the potential to affect the Robe River and its associated ethnographic values (refer to Section 6).

12.3 ENVIRONMENTAL OBJECTIVES, TARGETS AND PERFORMANCE INDICATORS

Environmental targets and performance indicators have been developed based on Aboriginal heritage management objectives at Mesa K (Table 29).

[2] *Artefact scatter* refers to locations where a range of activities have occurred, such as the manufacture and maintenance of tools and the processing of foods. These sites will often contain a wider range of lithic materials than quarries and reduction scatters.

Table 29 Objectives, targets and performance indicators for Aboriginal heritage management at Mesa K

Management objective	Target	Performance indicators
Protect archaeological sites not approved to be disturbed.	MK04-05, MK04-06 and the P02101 complex are not disturbed throughout the duration of the proposal.	Any disturbance to MK04-05, MK04-06 and the P02101 complex recorded as an Incident.
Protect new (previously unrecorded) sites.	Manage new sites in accordance with the requirements of the *Aboriginal Heritage Act 1972* throughout the duration of the proposal.	Documentation regarding any newly recorded sites by the Pilbara Iron Heritage Liaison Group.

12.4 IMPLEMENTATION STRATEGY AND MANAGEMENT ACTIONS

Specific actions have been identified to assist in achieving Aboriginal heritage management objectives (Table 30). Management actions to control ground disturbance are outlined in Section 3.4. Management actions to protect surface water values (including ethnographic values associated with the Robe River) are outlined in Section 6.4.

Table 30 Management actions required to achieve targets for Aboriginal heritage management at Mesa K

Parameter	Action	Timing	Responsibility
Protection of sites	1. MK04-05, MK04-06 and the P02101 complex shall be protected through the installation of physical barriers as agreed with the Kuruma Marthudunera. The location of protected areas shall be documented in the Pilbara Iron Geographic Information System and made available to mine planners.	Prior to ground disturbance.	Superintendent Heritage Liaison.
	2. The Kuruma Marthudunera shall continue to be consulted regarding the proposed remnant mining activities.	Ongoing.	Superintendent Heritage Liaison.
Induction	3. The induction shall include information on: • the location of MK04-05, MK04-06 and the P02101 complex • requirements for protecting MK04-05, MK04-06 and the P02101 complex • procedures to report potential new sites.	Prior to personnel commencing work on site.	Environmental Advisor.

12.5 CONTINGENCIES

Contingency actions have been developed to be enacted if monitoring indicates that the environmental objectives and targets for Aboriginal heritage management at Mesa K are not being achieved (Table 31).

Table 31 Contingency actions for Aboriginal heritage management at Mesa K

Trigger	Action
1. Protected areas are not as shown in the Geographic Information System and/or Ground Disturbance Authorisation.	1. Stop work in the area immediately adjacent to the barrier. 2. Complete incident report and investigations. 3. Implement corrective actions, including amending Geographic Information System and/or Ground Disturbance Authorisation as required.
2. Disturbance within barriers.	1. Report as Environmental Incident and initiate Incident Response Procedure, including: a) stopping work in the vicinity of the barrier b) investigating cause c) implementing corrective actions, including re-establishing original or improved barriers as required. 2. If necessary, consult with relevant stakeholders (e.g. the Department of Indigenous Affairs [DIA]) to determine actions required to restore the site to its original condition.
3. Previously unrecorded Aboriginal heritage site/artefact uncovered or identified.	1. Stop work in the vicinity of the potential heritage site. 2. Notify the Pilbara Iron Heritage Liaison Group to determine further actions.

13. STAKEHOLDER CONSULTATION

Key stakeholders identified and consulted during the planning and design of the Mesa K Remnant Mining Project were:

- **State and Local Government**
  - Department of Environment and Conservation (DEC)
  - Department of Indigenous Affairs (DIA)
  - Department of Industry and Resources (DoIR)
  - Environmental Protection Authority (EPA) and Environmental Protection Authority Service Unit (EPASU)
  - Shire of Ashburton
- **Indigenous groups**
  - Kuruma Marthudunera Native Title Claimant Group
- **Non-government organisations and special interest groups**
  - Conservation Council of Western Australia
  - Wildflower Society of Western Australia
  - Yalleen Station and Yarraloola Station.

Robe initiated a stakeholder consultation program for the proposal towards the end of 2006, prior to the submission of the environmental referral of the proposal to the EPA in April 2007. The main topics raised by stakeholders related to the flora and vegetation of Mesa K, subterranean fauna (troglofauna) and habitat retention, retention of the southern escarpment adjacent to the Robe River, Aboriginal heritage and rehabilitation. The timing of the consultation program enabled the topics raised to be taken into account during the planning and design of the proposal and in the determination of appropriate management measures.

Robe will continue to consult with relevant stakeholders throughout the duration of the proposal to ensure that the environmental aspects of the proposal are adequately managed.

14. COMMUNICATIONS AND TRAINING

14.1 COMMUNICATIONS

14.1.1 Internal communications

Internal communication methods may include the following, as applicable:

- meetings
- project reports
- performance assessments reports
- notice boards
- on-site personnel inductions, training and toolbox sessions (as required)
- sub-contractor coordination meetings.

These mechanisms will be used to address concerns and questions raised by mine personnel, address any Incidents that may have occurred and to communicate any new environmental management procedures or information to personnel.

14.1.2 External communications

External communications may include the following, as applicable:

- meetings and correspondence with appropriate regulatory authorities and stakeholders
- discussions and consultation with adjoining landowners
- handling of, and responding to, complaints or requests (emails, faxes, telephone and letters).

14.2 INDUCTION AND TRAINING

Employees shall receive suitable environmental training to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally acceptable manner.

Environmental requirements shall be explained to all on-site personnel during a site induction. On-going instruction shall be provided via regular toolbox meetings. Completion of site inductions shall be recorded.

On-site personnel (including contractors) shall receive awareness instruction in the following areas:

- environmental policies
- management plan and related documents
- site environmental objectives and targets
- understanding the regulatory requirements applying to the proposal and their consequent responsibilities as a member of the project team
- potential consequences of departure from procedures
- emergency procedures and responses
- identification of their obligations.

Personnel required to perform tasks that may cause significant impacts to the environment must be certified as having completed required induction and training processes, and/or as having gained appropriate experience before undertaking such tasks.

15. REPORTING AND RESPONSE

15.1 PERFORMANCE REPORTING

Performance reporting will be implemented to produce systematic, comprehensive and informative reports on the environmental management and monitoring operations at Mesa K. Performance will be reported as part of the Annual Environmental Report (AER) prepared for all Robe operations, which will be provided to the relevant regulatory authorities and made available on the company website. The AER will:

- describe the status of work activities and environmental management
- identify any significant environmental activities that occurred over the previous 12 months
- present monitoring results from the previous 12 months
- outline developments likely to occur in the next 12 months
- outline the effectiveness of the environmental management measures currently implemented.

15.2 ENVIRONMENTAL INCIDENTS

Environmental incidents are events or occurrences that result in, or have the potential to result in, unacceptable impacts to the environment, for example:

- unauthorised clearing of vegetation
- spill of hydrocarbons.

Incidents will be reported on an Incident Report Form and/or registered in an electronic database. Incidents will be tracked to ensure that the appropriate corrective actions and measures to prevent the incident from reoccurring are taken. Environmental incidents will be reviewed on a monthly and annual basis to determine incident trends. This will enable areas that require further management to be targeted and will assist in preventing future incidents.

Incidents will be reviewed immediately to determine if external reporting to the appropriate authority is required. If reporting is required, it will be carried out in writing as required to the appropriate authority.

An Emergency Response Plan will be implemented to deal with any major environmental incidents.

16. AUDITING

Robe will submit regular compliance reports to the DEC, which will address:

- the current status of the implementation of the proposal
- evidence of compliance with any conditions and commitments
- the performance of the EMP.

To assist in the preparation of compliance reports, Robe will undertake audits of the implementation of environmental management commitments as follows:

- periodic review of environmental performance from a corporate point of view
- audits of key contractors' environmental management (as per audit schedule)
- regular assessments of environmental performance and compliance.

Persons responsible for environmental auditing shall be suitably qualified.

Where auditing determines environmental management actions to be ineffective, the auditors may recommend changes to procedures. The DEC Audit Branch is likely to undertake regular audits to assess compliance with all relevant conditions and commitments.

17. REVIEW AND REVISION

The Environmental Advisor will review the EMP as part of the annual environmental reporting. If revision is required it will be coordinated by the Environmental Advisor with input from the Environment Superintendent, the Mine Production Superintendent and other personnel as required. Site personnel will be notified of the changes to the EMP via a site briefing or other suitable method as required. In addition, continued improvement of the plan will occur in response to environmental incident resolutions, audit findings, monitoring results, continuous improvement and changes in regulatory and corporate requirements.

The DEC will be advised of any minor changes to the plan and provided with the revised document. Major changes will not be undertaken without consultation with DEC.

18. REFERENCES

Biota Environmental Sciences (Biota) 2007a, *A Vegetation and Flora Survey of the Mesa K Mine Site, near Pannawonica*, unpublished report prepared for Robe River Iron Associates, March 2007.

Biota Environmental Sciences (Biota) 2007b, *Mesa K Targeted Fauna Survey*, unpublished report prepared for Pilbara Iron, April 2007.

Biota Environmental Sciences (Biota) 2007c, *Mesa K Remnant Mining Project Troglobitic Fauna Survey*, unpublished report prepared for Pilbara Iron, June 2007.