BROCKMAN RESOURCES LTD MARILLANA IRON ORE PROJECT

PROJECT ENVIRONMENTAL MANAGEMENT PLAN



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Glossary

AER	Annual Environmental Report
ANZMEC	Australian and New Zealand Minerals and Energy Council
BOM	Bureau of Meterology
CALM	Department of Conservation and Land Management
CAMBA	China-Australia Migratory Bird Agreement
CHMP	Cultural Heritage Management Plan
DEC	Department of Environment and Conservation
DMP	Department of Mining and Petroleum
DolR	Department of Industry and Resources
DoW	Department of Water
EA	Environment Australia
EIA	Environmental Impact Assessment
EM	Environmental Manager
PEMP	Project Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERA	Environmental Risk Assessment
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
ISO	International Organization for Standardization
ISO14001	International standard for environmental management systems
JAMBA	Japan-Australia Migratory Bird Agreement
MCA	Minerals Council of Australia
MIB	Martu Idja Banyjima
µS/cm	Microsiemens per centimetre
mbgl	Meters Below Ground Level
Mt	Million Tonnes
Mtpa	Million Tonnes per Annum
MW	Megawatt
NEPM	National Environmental Protection Measure
PAF	Potentially Acid Forming
PER	Public Environmental Review
POW	Program of Works
SRE	Short Range Endemic





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1.0 INTRODUCTION

1.1 PURPOSE

Brockman Resources Ltd (Brockman) proposes to develop the Marillana Iron Ore Project (the Project) to mine and produce up to 19 million tonnes per annum (19 Mtpa) of iron ore for export. The Project is located in the Hamersley Iron province in the Pilbara region of Western Australia, about 100 km northwest from the town of Newman.

The mine development has a number of potential environmental impacts that must be managed to fulfil obligations under the *Mining Act 1978* and the *Environmental Protection Act 1986*. A number of other legislative requirements related to individual environmental impacts are discussed in subsequent sections of this document.

This Project Environmental Management Plan (PEMP) has been developed as a supporting document for the Project Public Environmental Review (PER), and provides an overview of the environmental risk assessment process and structured procedures to guide environmental management and rehabilitation, monitoring, and reporting for the Project. This document will be updated periodically throughout the life of the mine to address changes to management strategies and any environmental short-comings or non-conformances.

The PEMP should be read in conjunction with Brockman's Environmental Management System (EMS) procedures manual.

1.2 PROJECT OVERVIEW

Brockman proposes to develop the Project which consists of a 700-750 Mt iron ore mine, processing facility and associated infrastructure Hamersley Iron province in the Pilbara region of Western Australia, about 100 km from the town of Newman. The Project is located within E47/1408 and mining leases M47/1414 and M47/1419. The Project will comprise:

- An open cut iron ore mine producing 17-19 Mt of beneficiated ore per annum.
- Above ground overburden and fines rejects storage facilities.
- In-pit disposal of mine waste after year two of operation.
- In-pit disposal of fines rejects after year seven of operations.
- Crushing, screening and processing facilities.
- A train loading facility.
- An accommodation camp for 550 personnel.
- A borefield to supply potable water to the accommodation and offices.
- Offices, workshops, a laboratory and supporting infrastructure including an explosives facility, landfill, water treatment plant and bulk fuel storage.

The Project is expected to run for a period of 20 years, with construction scheduled to commence in Q1, 2011.

Baseline surveys and investigations for environmental aspects have been conducted as part of the current project, with management plans for significant aspects of the project developed in compliance with regulatory guidelines. Ongoing consultation



with regulators, relevant stakeholders and interested members of the public has been undertaken to incorporate community concerns as part of the assessment process.

Potential impacts in implementing the project include the generation of dust and gases, alteration of visual amenity and social amenity, noise and vibration issues, waste material control, impacts to local flora and fauna and impacts to surface and ground water bodies.



2.0 ENVIRONMENTAL MANAGEMENT OVERVIEW

2.1 REGULATORY REQUIREMENTS

This PEMP has been developed to demonstrate compliance with the *Environmental Protection Act 1989* and supports the Environmental Impact Assessment currently being undertaken by the EPA for the Project.

The Project may also be subject to further state and federal legislation, including, but not limited to that in Table 2-1.

Legislation	Responsible Government Authority	Aspect	
Commonwealth Legislation			
Environmental Protection & Biodiversity Conservation Act 1999	Department of Environment, Water, Heritage and the Arts	Rare flora and fauna, Cetaceans.	
Native Title Act 1993	National Native Title Tribunal	Aboriginal rights	
Protection of Moveable Cultural Heritage Act 1986	Protection of Moveable Cultural Heritage Act 1986	Protection of moveable cultural artefacts	
National Greenhouse and Energy Reporting Act 2007	Department of Climate Change	Climate change	
State Government Legislation			
Aboriginal Heritage Act 1972	Department of Indigenous Affairs	Archaeological and ethnographic heritage	
Agricultural and Related Resources Protection Act 1976	Department of Agriculture, Western Australia	Weeds and feral pest animals	
Bush Fires Act 1954	Bush Fires Board	Wild fire control	
Conservation and Land Management Act 1984	Department of Environment and Conservation	Flora and fauna / habitat / weeds / pests / diseases	
Contaminated Sites Act 2003	Department of Environment and Conservation	Management of pollution	
Country Areas Water Supply Act 1947.	Department of Water	Water resources supply	
Dangerous Goods Safety Act 2004	Department of Consumer and Employment Protection	Dangerous goods management	
Environmental Protection Act 1986	Department of Environment and Conservation	Environmental impact assessment and management	
Health Act 1911	Department of Health	Human health management	
Heritage of Western Australia Act 1990	Heritage Council of Western Australia	European heritage management	
Land Administration Act 1997	Department of Land Administration	Land administration	
Local Government Act 1995	Western Australia Local Government Association,	Development approvals and management	

 Table 2-1
 Legislation that may be Applicable to the Project





Legislation	Responsible Government Authority	Aspect
	Shire of East Pilbara	
Local Government (Miscellaneous Provisions) Act 1960	Shire of East Pilbara	Community issues / resources / facilities
Mining Act 1978	Department of Mines and Petroleum	Land access, mining
Mines Safety and Inspection Act 1994	Department of Mines and Petroleum	Mine safety
Occupational Safety and Health Act 1984	Department of Consumer and Employment Protection	Occupational safety and health
Public Works Act 1902	Department of Housing and Works	Development approvals and management
Rights in Water and Irrigation Act 1914	Department of Water	Access to and use of water resources
Soil and Land Conservation Act 1945	Department of Agriculture	Protection of soil resources
Waterways Conservation Act, 1976	Department of Water	Protection of surface and groundwater
Wildlife Conservation Act 1950	Department of Environment and Conservation	Protection of indigenous wildlife

2.2 ENVIRONMENTAL MANAGEMENT SYSTEM

This PEMP is a component of Brockman's Environmental Management System (EMS). The EMS sets out systems or overarching procedures which manage areas such as staff training, communications, document control, management review and reporting. Below is an overview of the EMS framework utilised by Brockman to manage the environmental impacts of this proposal.

2.2.1 Environmental Policy

Brockman's Environmental Policy outlines the following objectives:

- Abide by and complying with the *Environmental Protection Act 1986* and all other applicable environmental laws, regulations, policies, standards and codes of practice.
- Establish the Company's Environmental Management System to conform with the requirements of the International Standard ISO 14001.
- Provide employees with the necessary training, education and resources to fulfil their environmental responsibilities and ensure that operations are performed with appropriate respect for the environment.
- Specify the need for all contractors to perform the work in accordance with this policy and to supervised such compliance.
- Conduct regular review of the Company's environmental performance and acting on the results.

All company personnel and contractors are accountable for the implementation of this policy.



2.2.2 Planning and Risk Management

Legal and other requirements relevant to Brockman's activities are identified and will be documented in an obligations register. These requirements form an important component of Brockman's risk management process, which involves the systematic identification of environmental aspects of activities over which Brockman's has an influence. Risk assessment takes into consideration risk to the environment (i.e. the potential for pollution) and risk to the company, (i.e. inability to achieve targets and non-compliance with legal or other requirements).

Significant risks are addressed through the setting of objectives and targets, and the implementation of management programs. The risks associated with changes to process, plant, organisation, personnel or procedure are identified and managed in the same way.

2.2.3 Implementation

To ensure that risk management requirements are effectively implemented, personnel holding roles that could have a significant interaction with the environment are experienced, qualified or trained to competency in managing their environmental risks. Internal and external communications are maintained to facilitate discussions on risks and environmental performance.

Aspects associated with significant environmental risks have documented operational controls in place to minimise impacts arising from inconsistent work practices. These procedures together with all other documents and records essential to the environmental management system are controlled and maintained.

This PEMP has been developed to facilitate implementation by Brockman employees on site by structuring the main body of the plan as a set of environmental management procedures. These procedures should be read together with the EMS procedures and respond to the activities that have the potential to have a significant environmental impact.

The implementation of the PEMP will be the responsibility of the Manager Operations / SHE, and outcomes of this plan will be reported at least annually to the regulatory authorities via an Annual Environmental Review and to Brockman Management.

2.2.4 Corrective Actions

Environmental performance is monitored at various levels through inspection (Monitoring and Review Procedure), reporting, investigation and analysis of incidents and non-conformances (Incident Management Procedure; Non-conformance Management Procedure) and regular audits (Audits Procedure). Corrective actions are implemented to address the non-conformances.

2.2.5 Audit and Management Review

Performance results are discussed at management level (Management Review Procedure) to ascertain the appropriateness of the Policy, objectives and targets, and the adequacy and effectiveness of elements of the EMS.

An Annual Environmental Report (AER) will be undertaken and a report submitted to the DEC outlining performance against environmental objectives and targets, further biological assessments undertaken, environmental management improvements and ongoing stakeholder consultation.





2.2.6 Continual Improvement

The cyclic nature of the EMS structure described above facilitates continual improvement in Brockman's environmental performance, and provides the mechanism for managing significant risks, achieving targets and complying with legal and other requirements.



Figure 2-1 Process Improvement Cycle Underpinning the EMS





3.0 EXISTING ENVIRONMENTAL VALUES

3.1 BIOGEOGRAPHY

The project area is located in the Pilbara Biogeographic Region on the border of the Fortescue Plains (PIL2) and Hamersley (PIL3) subregions. The region experiences an arid-tropical climate with two distinct seasons; a hot summer from October to April and a mild winter from May to September, with the average annual rainfall in the study region being 337 mm, occurring over 40 rain days (BOM, 2008).

The Fortescue Plains subregion is characterised by alluvial plains, hard pan wash plains and sandplains, with stony plains, floodplains and some salt lakes, on alluvial deposits over the sedimentary rocks of the Hamersley Basin (Kendrick 2001). The soils associated with these habitat types include red deep sands, red loamy earths and red-brown non-cracking clays with some red shallow loams and hard cracking clays.

The areas of the tenement that extend into the hills and dissected plateaus of the Hamersley Ranges have stony soils with red shallow loams, some red-brown non-cracking clays and red-loamy earths.

3.2 VEGETATION AND FLORA

The Pilbara is a region of considerable environmental significance as it lies on the southern limits of the Northern Botanical Province and thus includes species from both the north-west and the arid interior, as well as numerous species which are either endemic to the Pilbara or have restricted geographic distributions (Beard, 1975). This means that the Pilbara has some of the richest and most unusual biodiversity on earth (DEC, 2009).

In recent botanical surveys of the area, *ecologia* (2009a) identified eight vegetation units, with some units further classified into subunits, totalling seventeen. The vegetation units were associated with the following landforms: creekline; minor drainage channels on footslope; clay pan; minor channel/depression; floodplain; longitudinal sand dunes; swale between dunes; and sandy plain/minor footslope.

Whilst the vegetation of the project area is generally classified as being of poor condition (significantly disturbed), there are patches of native vegetation in good condition and thought to be regionally significant (*ecologia*, 2009a) that must be managed and preserved where possible.

3.3 FAUNA

The Pilbara is home to a diverse range of fauna species, as it's a biogeographic transition zone between the tropical north and semi-arid desert (DEC, 2009).

ecologia (2009b) identified five main fauna habitat types in the project area during their 2008 surveys. Open plain habitat makes up the majority of the project area south-west of Weeli Wolli Creek, covering much of the Hamersley Range alluvium deposits. The open plains fall on two different land systems, Divide and Boolgeeda, providing two similar but sufficiently distinct fauna habitat types: sandy spinifex grassland and stony spinifex plains.

Seventeen species of conservation significance potentially occur in the project area, including six mammal species, nine bird species and two reptile species.

Two species of conservation significance, the Australian Bustard (*Ardeotis australis*) and Rainbow Bee-eater (*Merops ornatus*) were recorded in the project area.



Subterranean invertebrate fauna (troglofauna and stygofauna) are found within the project area. Stygofauna are invertebrates living within the spaces between soil particles below the water table, whereas troglofauna occupy the spaces above the water table. Stygofauna generally occur in low densities throughout the Pilbara, whereas some troglofauna may be more restricted in their habitat and occur in smaller communities more locally.

Within the Marillana project area, six species of definitive troglofauna (*ecologia* 2009c) and three species of stygofauna were recorded (*ecologia* 2009d). One of the stygofauna is known to occur off tenement, throughout the Weeli Wolli drainage channel, and the others, whilst they cannot be identified to a species level, are believed to be able to move as or more freely through this larger system due to their smaller size.

Positive troglofauna records extend from the base of the range to the southern boundary of Weeli Wolli Creek and suitable habitat is believed to extend east and west along the length of the range and out towards the marsh. This assessment is based upon regional geological data and drill cores collected from on and offtenement.

3.4 SURFACE AND GROUNDWATER

The project area is located in the catchment of the Fortescue Marsh in an area subject to flooding during heavy rainfall, typically one to three events per year. However, following above average wet seasons, the ephemeral Weeli Wolli Creek, the main waterway which flows through the site can flow for a period of several months. Numerous short creeks emerge from the Hamersley Ranges immediately to the south of the tenement and flow into the Weeli Wolli Creek. The surrounding catchments, other than some Hamersley Range creeks, have been moderately disturbed.

Weeli Wolli Creek is recharged mainly from Weeli Wolli Springs, located approximately 40 km upstream of the mine site, and Yandicoogina and Marillana Creeks which discharge into Weeli Wolli Creek at approximately 25 km upstream of the mine site. Upon exiting the ranges, the creek has formed an extensive delta with numerous flow paths in major events.

From this delta, the Weeli Wolli Creek channels extend northwards into the Fortescue Marshes, which is an extensive intermittent wetland located on the floor of the Fortescue River valley. The Fortescue Marsh is listed on the national list of important wetlands, being both an important wetland for migratory birds, as well as being significant to the local indigenous peoples.

It is expected that regional groundwater flow is in a north easterly direction from the Hamersley Ranges to the Fortescue Marsh. Groundwater levels vary from 10 - 40 meters below ground level (mbgl) and between 1000 mg/L and 2500 mg/L TDS (Total Dissolved Solids) within the project area.

3.5 INDIGENOUS HERITAGE

For more than 45,000 years Indigenous people have left signs of their occupation in Australia. Their heritage is of continuing significance, creating and maintaining continuous links with the people and the land.

Places that hold great meaning and significance to Indigenous people include:

• Places where Aboriginal people have camped, lived and moved through country.





- Places associated with Dreaming stories depicting the laws of the land and how people should behave;
- Places that are associated with their spirituality;
- Places where other cultures came into contact with Indigenous people; and places that are significant for more contemporary uses.

It is likely that the north-west of Western Australia was the point where Aborigines first entered Australia. The long history of Aboriginal people in Western Australia is found in the many significant archaeological sites (DIA, 2009).

No archaeological or ethnographic sites have been identified within the project footprint and none of the sites identified within the broader project area are in areas proposed to be developed by Brockman.





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4.0 POTENTIAL IMPACTS AND MANAGEMENT

4.1 RISK ASSESSMENT

This risk assessment identifies the aspects of the Project activities associated with construction and operation that require management and assigns a level of risk to each. Specific management programmes have been developed for those activities that have Medium to High level of risk of impact.

To prevent or minimise impacts, management strategies (controls) have been placed on pathways (aspects) in the following order of priority:

- elimination of the risk;
- substitution with a lower risk;
- strategies to reduce the impact of the risk; and
- impact mitigation.

The identification of potential environmental risks associated with a project requires a well-structured and comprehensive approach. Risk identification is an important first step as if risks aren't identified they cannot be treated or mitigated. In this assessment possible events (aspects) associated with a broad project activity (i.e. transport) were listed alongside potential impacts resulting from these.

Risks were evaluated using the matrices below. Evaluation assists in separating the insignificant risks from those that require treatment. Risks are given a rating according to the likelihood (L) of the occurrence of the impact as a result of a particular event and the potential consequences (C) of the impact on the receiving environment. The consequence or severity of a particular impact occurring was determined as a function of the sensitivity of the receiving environment and the magnitude of the impact (see Table 4-1). All of the below tables were provided to risk assessment participants during the assessment process.

LEVEL		CONSEQUENCE (EXAMPLE)
1	Insignificant	No lasting effect. Low level impacts on biological or physical environment. Limited damage to minimal area of low significance.
		Individual mortality (i.e. roadkill).
2	Minor	Minor effects on biological or physical environment. Minor short-medium term damage to small area of limited significance.
2		Removal of a small proportion of habitat for a short period of time.
2	Moderate	Moderate effects on biological or physical environment but not affecting ecosystem function. Moderate short-medium term widespread impacts.
3		Removal of a large proportion of habitat that will be rehabilitated as suitable habitat in the future.
4	Major	Serious environmental effects with some impairment on ecosystem function. Relatively widespread medium-long term impacts.
-		Removal of habitat to the threshold required to maintain a viable population.
5	Catastrophic	Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment

 Table 4-1
 Consequence Ranking





Marillana Iron Ore Project Project Environmental Management Plan

LEVEL		CONSEQUENCE (EXAMPLE)
		Excessive removal of habitat beyond the threshold required to maintain a viable population.

Table 4-2Likelihood Ranking

LEVEL		LIKELIHOOD
5	Almost certain	The incident is expected to occur most of the time (<i>i.e.</i> every time).
4	Likely	The incident will probably occur in most circumstances (<i>i.e.</i> quarterly).
3	Moderate	The incident should occur at some time (<i>i.e.</i> once every few years)
2	Unlikely	The incident could occur at some time during the life of the project.
1	Rare	The incident may occur only in exceptional circumstances and may never happen.

Table 4-3 Risk Matrix

			со	NSEQUENC	CES	
		1	2	3	4	5
LIKEI	LIHOOD	Insignificant	Minor	Moderate	Major	Catastrophic
5	Almost certain	5	10	15	20	25
4	Likely	4	8	12	16	20
3	Moderate	3	6	9	12	15
2	Unlikely	2	4	6	8	10
1	1 Rare		2	3	4	5

Table 4-4Impact Definitions

 High impact	Senior management involvement, planning and significant DEC / EPA input will be required.
Moderate impact	Senior management attention required and the DEC / EPA must be consulted with.
Low impact	Manage by routine procedures.

Table 4-5Other Definitions

DEFINITIONS	
Activity	broad mine site activity, operation
Aspect	interaction with the environment, contributing factor, cause
Event	risk event, result of the aspect
Impact	outcome of the risk occurring
Management	operational control to mitigate impact
Residual Risk	level of risk assigned to an activity after management controls are taken into account

Residual risk was evaluated once management strategies or controls were designed to reduce or mitigate each risk. Residual risk is a function of the reduction in likelihood and/or consequence of the impact occurring once controls are in place.



4.2 SUMMARY OF SIGNIFICANT IMPACTS

Local surface hydrology (minor creeks originating from the Hamersley Ranges) will be altered as a result of the excavation of the pit and placement of infrastructure. The mine layout has been designed to ensure that any direct impact on the Weeli Wolli Creek is avoided and impacts to all watercourses are minimised. Diversions will be limited to the downstream reaches of the unnamed creeks draining the Hamersley Range. The operational life of diversion drains and bunds will vary from a few years to permanent structures. Overall, there will be no impact upon the net volume of water, or the frequency of flows, as a result of drainage path diversions.

Troglofauna may be directly impacted by excavation of the mine pit and vibration and may be indirectly impacted by clearing of vegetation and changes to surface and subterranean hydrology. A habitat risk assessment undertaken by Brockman indicates that up to 12.8% of the mapped habitat available to troglofauna will be impacted by this development. It is not anticipated that this impact will significantly affect the connectivity of the troglofauna community nor its viability.

Predicted impacts to stygofauna populations are expected to be minimal as the species found within the project area are expected to occur throughout the wider Weeli Wolli drainage channel, as the species that could be identified has been found in other locations (ecologia, 2009d).

Impacts on flora and vegetation from the proposed mine site are likely to be the direct result of clearing of native vegetation, the loss of a small percentage (<0.6%) of the small Fortescue land system and associated vegetation, loss of some of the vegetation of the colluvial fan areas (Unit 8a), and potentially the loss of individuals of the Priority Three species Goodenia nuda. There is also the potential for groundwater drawdown to affect the phreatophytic vegetation lining the Weeli Wolli Creek. Secondary impacts may include the spread of weed species, dust, accidental fires or changes to surface or groundwater as a result of dewatering and the pit.

Vertebrate fauna are not expected to be significantly impacted upon due to the availability of habitat on the adjacent lands. Vertebrate fauna are most likely to be affected by clearing and land disturbance associated with excavation, construction and ongoing operations of the proposed mine. Secondary impacts to native fauna include the introduction of or spread of feral fauna, dust, weeds, fire, light and noise pollution.

The following activities have been identified as the key components of the Project that are likely to contribute to environmental impacts:

- Clearing of 2,985 ha of native vegetation- will impact the available vertebrate fauna habitat, subterranean invertebrate fauna habitat through limiting nutrient input and may facilitate the introduction or spread of weed species and the frequency of wild fires.
- Ground disturbance the stripping of topsoil, if stored incorrectly may reduce its viability as a rehabilitation resource. Ground disturbance may generate dust emissions, alter soil structure and facilitate the dispersal and spread of weed species.
- Alteration of surface hydrology- could locally impact upon vegetation downstream of where small creeks currently emerge from the Hamersley Ranges and south of the Weeli Wolli Creek. However changes to surface flows will not significantly impact the Fortescue Marsh.





• Excavation of ore- will directly impact on troglofauna habitat within the project area, generate dust emissions and permanently alter the landforms of the project area.



Table 4-6 Risk Assessment of Project Activities

ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
1.	Exploration	Drilling	Contamination of soil, groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	3	1	3	Program of Works requirements / conditions, Exploration management procedures (see Appendix 1).	3	1	3
2.		Off-road vehicles	Compaction of soil, erosion	Reduction in native vegetation, spread of weeds	5	1	5	Program of Works requirements / conditions. Vehicles to stay on established tracks, Exploration management procedures (see Appendix 1).	3	1	3
3.		Track/pad preparation	Clearing of native vegetation	Reduction in native vegetation, spread of weeds	5	1	5	Program of Works requirements / conditions. PEMP 5.2, PEMP 5.3, PEMP 5.15, Exploration management procedures (see Appendix 1).	4	1	4
4.	Infrastructure placement and design	Change in surface hydrology	Surface water flow pattern altered	Reduced availability of water to vegetation dependant on sheet flow and surface water systems.	2	3	6	Surface water modelling has informed infrastructure design and location to minimise environmental impacts. Management will include diversion drains, water management structures (PEMP 5.4). A Surface Water Management Plan will be implemented over the life	2	2	4





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								of the Project.			
5.		Change in surface hydrology	Surface water flow pattern altered	Reduced flow to Fortescue Marshes.	1	2	2	Surface water modelling has informed infrastructure design and location to minimise environmental impacts. Modelling shows that there will be negligible impact on the Marsh as a result of changes to surface water flow.	1	2	2
6.		Change in surface hydrology	Surface water flow pattern altered (Hamersley Range gullies)	Changes to local vegetation	5	3	15	Management will include diversion drains, water management structures (PEMP 5.4). A Surface Water Management Plan will be implemented over the life of the Project.	5	1	5
7.		Change in surface hydrology	Erosion, sedimentation	Reduced quality of water entering the creek.	4	2	8	Watercourse management structures and sedimentation basins will be applied to ensure water quality entering Weeli Wolli creek is the same as the pre-mining quality. A surface water quality monitoring program will be implemented (PEMP 5.4).	3	1	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
8.		Change in surface hydrology	Erosion, sedimentation	Changes to local vegetation	4	2	8	Watercourse management structures and sedimentation basins will be applied to avoid changes to vegetation where possible. Surface drainage will be reinstated in a staged	3	1	3
								closure process (PEMP 5.4).			
9.		Changes in flood flows/velocity	Erosion, sedimentation	Loss of land stability	3	3	9	Surface water modelling has informed infrastructure design and location to minimise environmental impacts. PEMP 5.4.	2	2	4
10.		Placement of wastewater treatment plants	Contamination of soil/surface and/or groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	2	3	6	Waste water will be treated effectively before spray disposal. Spray field will be managed so as to limit nutrient mobilisation into surface waters. PEMP 5.13	1	3	3
11.		Placement of hydrocarbon storage	Contamination of soil/surface and/or groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	2	3	6	Siting considers proximity to sensitive receptors. The storage facilities will comply with AS 1940. PEMP 5.12.	1	3	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
12.		Placement of explosives storage	Contamination of soil/surface and/or groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	1	1	1	Siting considers proximity to sensitive receptors. PEMP 5.12.	1	1	1
13.		Placement of workshops	Contamination of soil/surface and/or groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	3	1	3	A Flood Study has informed placement planning to minimise environmental impacts.	2	1	2
14.		Placement of Fines Rejects Facility	Contamination of soil/surface and/or groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	1	1	1	A Flood Study and groundwater modelling has informed placement planning to minimise environmental impacts.	1	1	1
15.		Placement of landfill	Contamination of soil/surface and/or groundwater	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	3	1	3	A Flood Study has informed placement planning to minimise environmental impacts.	3	1	3
16.		Bridge crossing	Disturbance of bed and banks	Alterations of stream flows, sedimentation.	4	2	8	A Bed and Banks permit will be sought and bridge design will endeavour to minimise alterations to stream flow during both normal and flood events. A Surface Water	4	1	4





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								Management Plan will be implemented over the life of the Project.			
17.	Ground disturbance	Alterations to soil structure (i.e. compaction)	Movement of heavy machinery	Modification of soil fauna habitat	5	1	5	Traffic will be restricted to existing roads and tracks. A Traffic Management Plan will be developed.	4	1	4
18.		Stripping topsoil	Excavation	Loss of rehabilitation resource.	4	2	8	PEMP 5.14 and PEMP 5.15.	3	1	3
19.		Vehicle movement	Weed dispersal	Spread of weeds changes community composition and alters fire regimes.	5	1	5	Vehicle movement will be restricted to established paths and tracks. Weed hygiene procedures will be followed. PEMP 5.3.	4	1	4
20.		Stripping topsoil	Weed dispersal	Spread of weeds changes community composition and alters fire regimes.	5	1	5	Topsoil will be managed to limit spread of weeds. PEMP 5.3, PEMP 5.15	4	1	4
21.		Clearing of native vegetation	Native fauna habitat destroyed	Loss of fauna species of conservation significance.	2	1	2	PEMP P5.2, site clearing permits (EMS F8), employee training program (EMS P6).	2	1	2
22.		Movement of soil/earth	Dust generation	Dust deposition impairs	4	2	8	Water trucks will be utilised where appropriate.	3	1	3





ID	ACTIVITY	ASPECT	EVENT	ІМРАСТ	L	С	R	CONTROLS	L	С	R
				vegetation health.				Vegetation will be used to stabilise areas no longer in use. PEMP 5.9.			
23.		Vehicle movement	Fire ignition	Loss of significant flora and vegetation in good condition.	2	3	6	Vehicles will carry fire fighting equipment complying with the relevant standards and staff will be trained in the use of this equipment. PEMP 5.6 and PEMP 5.7.	2	2	4
24.		Vehicle movement	Fire ignition	Loss of significant fauna habitat	2	2	4	Vehicles will carry fire fighting equipment complying with the relevant standards and staff will be trained in the use of this equipment. PEMP 5.6 and PEMP 5.7.	2	1	2
25.		Generation of noise from machinery.	Noise	Alteration of native fauna behaviour	4	1	4	Minimal blasting will be required. PEMP 5.10.	3	1	3
26.		Clearing native vegetation	Removal of native vegetation, fauna habitat	Loss of significant fauna habitat	2	1	2	PEMP 5.2, PEMP 5.7. Site clearing permits (EMS F8), employee training program (EMS P6).	2	1	2
27.		Clearing native vegetation	Removal of native vegetation	Loss of significant flora and vegetation	5	2	10	The Flora and Vegetation survey has informed appropriate infrastructure placement to avoid direct	2	2	4





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								impacts to Priority Flora and regionally significant dune vegetation.			
								Internal permits (EMS F8) and an employee training program (EMS P6) will minimise accidental clearing.			
			Subterranean	Indirect long term				A combination of surveys and an analysis of the local and regional geology have assisted in predicting the extent of the community on and off the tenement.			
28.		Clearing native vegetation	habitat altered, loss of nutrients	impact to the troglofauna community	4	2	8	The predicted impact as a result of clearing for infrastructure is 4.6 % of the available habitat based upon risk assessment	4	1	4
								Clearing procedures (PEMP 5.2) will prevent unauthorised clearing.			
29.	Construction	Use of concrete	Operation of concrete batch plant	Loss of environmental values of sensitive receptors (i.e. Fortescue Marsh)	5	1	5	A Part V license will be sought from the DEC.	4	1	4
30.		Bridge crossing	Disturbance of bed and banks	Erosion and sedimentation	4	2	8	Clearing of slopes near/leading to watercourses will be	4	1	4





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								delayed until construction of the crossing is imminent.			
								Erosion control and stabilising structures will be applied.			
								A Bed and Banks permit will be obtained from the DoW.			
				Dust deposition				Water trucks will be utilised where appropriate.			
31.		Construction traffic and earthmoving	Dust generation	may impair vegetation health.	5	1	5	Vegetation will be used to stabilise areas no longer in use. PEMP 5.9.	4	1	4
32.		Construction waste disposal	Waste generation	Soil, water contamination, loss of amenity.	5	1	5	Construction waste will be recycled and where possible and where not disposed of in accordance with relevant legislation. PEMP 5.13.	4	1	4
33.		Construction water requirements	Groundwater abstraction	Loss of stygofauna habitat.	3	2	6	The appropriate licenses will be sought from the DoW. PEMP 5.5.	2	2	4
34.		Sewage disposal	Nutrient disposal	Soil, water eutrophication	5	1	5	Waste water will be treated effectively before spray disposal.	3	1	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								The facility will be licensed under Part V of the <i>EP Act</i> <i>1986.</i> PEMP 5.4 and PEMP 5.13.			
35.		Dangerous goods storage	Spills/release to environment	Soil, water contamination	4	2	8	Storage facilities will comply with AS 1940 and Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007. PEMP 5.12.	2	2	4
36.		Mobilisation of equipment	Weed importation from off-site	Loss of native flora/fauna	4	2	8	Vehicle movement will be restricted to established paths and tracks. Weed hygiene procedures will be followed. PEMP 5.3 and EMS F10.	2	2	4
37.		Construction fabrication activities	Fire	Loss of native flora/fauna	2	3	6	Emergency response personnel will be trained in fire fighting. PEMP 5.6	1	3	3
38.		Heritage values	Clearing affects heritage and amenity	Loss of heritage values and indigenous amenity of the land	2	3	6	Cultural Heritage Management Plan. Ongoing consultation. PEMP 5.1.	1	3	3
39.		Noise	Generation of noise from machinery.	Alteration of native fauna	4	1	4	The quietest practicable plant and machinery will	3	1	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	с	R	CONTROLS	L	с	R
				behaviour				be selected consistent with construction and operational requirements.			
								A noise assessment indicates that operational noise from machinery will not reach the Marsh. PEMP 5.10.			
								Groundwater quality monitoring will be undertaken to ensure no significant changes to water quality occur as a result of mining (PEMP 5.5).			
40.	Groundwater abstraction	Mine de- watering	Changes to groundwater levels or quality	Loss of stygofauna habitat.	3	2	6	Contingency plans to ensure adequate groundwater monitoring of impacts, improved forward predictions of future impacts, and development of appropriate impact management strategies (PEMP 5.5, Groundwater Management Plan)	2	2	4
41.		Mine de- watering	Changes to groundwater levels	Reduced water availability to phreatophytic vegetation.	4	2	8	Literature review and soil moisture studies indicate that dewatering will not significantly impact plant available water content of the soil. A monitoring program will	2	2	4





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								be established and appropriate management measures undertaken if a decline in tree health is detected.			
42.		Mine de- watering	Significant changes to groundwater quality	Loss of stygofauna habitat.	2	2		Modelling suggests that groundwater quality will not change significantly as a result of dewatering. PEMP 5.5.	1	2	2
								Contingency Plans and Monitoring are outlined within the Groundwater Management Plan.			
43.		Mine de- watering	Changes to soil humidity	Indirect long term impact to the troglofauna community through loss of suitable habitat.	3	3	9	Literature review and soil moisture studies indicate that dewatering will not significantly impact soil moisture and thus humidity. PEMP 5.5 and PEMP 5.8.	1	3	3
44.		Mine de- watering	Changes to groundwater levels or quality	Reduced water quality or quantity in the	2	4	8	Modelling indicates that groundwater abstraction will not affect the Marsh ecosystem. PEMP 5.5.	1	4	4
				Fortescue Marsh				Contingency plans to ensure adequate monitoring of any impacts, improved forward			





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								predictions of future impacts, and development of appropriate impact management strategies (PEMP 5.5, Groundwater Management Plan)			
45.		Cumulative drawdown	Groundwater drawdown on neighbouring tenements	Reduced water availability to local phreatophytic vegetation.	2	2	4	Literature review and soil moisture studies indicate that dewatering will not significantly impact plant available water content of the soil. A monitoring program will be established and appropriate management measures undertaken if a decline in tree health is detected.	1	2	2
46.		Cumulative drawdown	Groundwater drawdown on neighbouring tenements	Loss of stygofauna habitat.	2	2	4	Brockman will make data available to regulators for cumulative impact modelling.	2	2	4
47.		Cumulative drawdown	Groundwater drawdown on neighbouring tenements	Reduction in availability for other users	2	2	4	Brockman will make data available to regulators for cumulative impact modelling.	2	2	4
48.		Heritage values	Groundwater drawdown affects heritage and amenity	Loss of heritage values and indigenous amenity of the land	2	3	6	Cultural Heritage Management Plan. Ongoing consultation. PEMP 5.1.	1	3	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								Groundwater modelling, injection distribution pattern will be designed to minimise impacts.			
								A MAR Management Plan will be developed as part of the Operational Strategy.			
49.	Surplus water disposal	Re-injection (MAR)	Significant changes to groundwater quality	Loss of troglofauna habitat.	2	2	4	The selection of sites for reinjection of dewatering volumes in early stages of the project will be optimised to mitigate effects beyond the proposed mine area.	1	2	2
								Contingency planning to cover both short term maintenance requirements and the unlikely possibility that surplus water volumes are larger than predicted			
								PEMP 5.5, Groundwater Management Plan			
50.	Mining of Ore	Surface extraction of ore	Dust generation	Dust deposition may impair vegetation health.	5	1	5	Water trucks will be utilised where appropriate. PEMP 5.9.	2	1	2
51.		Excavation of ore body	Subterranean habitat removed/destroyed	Direct loss of troglofauna community	5	3	15 —	A combination of surveys and an analysis of the local and regional geology have assisted in predicting the extent of the	5	2	10





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								community on and off the tenement.			
								The pit occupies 8.2% of the available contiguous habitat indicated by risk assessment.			
								Adequate habitat is considered to be available outside of the impact area to limit the effects of diversity.			
52.		Generation of greenhouse gas emissions	Use of fossil fuels	Contributes of atmospheric carbon	5	1	5	Brockman will consider the use of energy efficient technology, improvements in process energy efficiency, energy consumption as a criterion in equipment selection; and the utilisation of alternative energy sources. PEMP 5.11.	4	1	4
53.	Mine Waste Storage	Storing acid- forming material	Acid generation	Loss of environmental values	1	4	4	A sulphur content assessment has indicated that the risk of acid generation is minimal.	1	1	1
54.		Movement of soil/earth	Dust generation	Soil contamination, surface water contamination, vegetation health	5	1	5	Water trucks will be utilised where appropriate. PEMP 5.9.	3	1	3




ID	ACTIVITY	ASPECT	EVENT	ІМРАСТ	L	С	R	CONTROLS	L	С	R
55.		Poor design / construction	Poor slope gradient, lack of stability	Increase in surface water turbidity	4	2	8	Surface water management structures such as bunding, drains and settling ponds will be employed to manage surface water flow (PEMP 5.4). Also see Surface Water Management Plan.	2	2	4
56.		Construction of waste storages	Placement of waste storage structures on the landscape	Visual amenity of the area is affected.	5	1	5	A visual amenity study has informed the placement of waste dumps. PEMP 5.14 and PEMP 5.15.	4	1	4
57.	Fines Rejects Storage	Seepage/leaks	Significant changes to groundwater quality	Loss of stygofauna habitat.	2	3	6	The appropriate design of the fines rejects facilities are based upon current standards and guidelines and controls are in place to ensure seepage is minimised. The FRS will be operated according to <i>Guidelines for</i> <i>Safe Design and</i> <i>Operating Standards for</i> <i>Tailings Storage.</i>	2	2	4
58.		Seepage/leaks	Significant changes to groundwater quality	Groundwater contamination	2	2	4	The appropriate design of the fines rejects facilities are based upon current standards and guidelines and controls are in place	1	2	2





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
								to ensure seepage is minimised.			
								Analysis has indicated low sulphur levels and unlikely for soluble contaminants to be present in the FRS			
								The FRS will be operated according to <i>Guidelines for</i> <i>Safe Design and</i> <i>Operating Standards for</i> <i>Tailings Storage.</i>			
59.		Poor design	Poor slope gradient, lack of stability	Increase in surface water turbidity	2	3	6	FRS is designed according to appropriate guidelines and standards.	1	3	3
60.		Fauna interactions	Fauna trapped	Loss of native fauna	4	2	8	Sumps and FRS will be managed to exclude fauna. PEMP 5.7.	3	1	3
61.	Stockpiling of topsoil	Poor design	Erosion, sedimentation	Loss of topsoil, suitable habitat for rehabilitation.	3	1	3	Stockpiles will be designed based on best practice industry standards, topsoil management procedure. Seeding or other stabilisation techniques (watering) will be used.	2	1	2
62.		Seed management	Loss of native seed stock	Poor regeneration after	4	2	8	Stockpile topsoil Progressive rehabilitation Progressively spread	3	1	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
				rehabilitation				topsoil (PEMP 5.14, PEMP 5.15).			
63.		Poor design	Dust generation	Loss of topsoil, suitable habitat for rehabilitation.	3	1	3	Stockpiles will be designed based on best practice industry standards. Seeding or other stabilisation techniques (watering) will be used.	2	1	2
64.		Rehabilitation	Topsoil stripping	Lack of topsoil for rehabilitation	4	2	8	Ensure additional topsoil is stripped from lower lying regions where available to reduce the likelihood of shortages.	3	1	3
65.	Stockpiling (general)	Wind-blown fine sediments	Dust generation	Dust deposition may impair vegetation health.	5	1	5	Apply stabilisation if required. PEMP 5.9.	2	1	2
66.	ROM stockpiling	Movement of soil/earth, plant operations	Dust generation	Dust deposition may impair vegetation health.	5	1	5	Apply stabilisation if required. PEMP 5.9.	2	1	2





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
67.	Hydrocarbons	Hydrocarbon storage	Inappropriate management leads to significant spillage	Soil, surface water and groundwater contamination	2	3	6	Hydrocarbon management procedure, Hydrocarbons will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations, Australian Standards (i.e. AS 1940 – 1993) and DMP Guidelines.	1	3	3
68.		Hydrocarbon transport	Inappropriate management leads to significant spillage	Soil, surface water and groundwater contamination	2	3	6	Hydrocarbon management procedure, Hydrocarbons will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations, Australian Standards (i.e. AS 1940 – 1993) and DMP Guidelines.	1	3	3
69.	Ammonium Nitrate storage	Hazardous materials	Inappropriate management leads to significant spillage ammonium nitrate	Soil, surface water and groundwater contamination	2	1	2	Dangerous goods procedure, explosives will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations, Australian Standards (i.e. AS 1940 – 1993) and DMP Guidelines.	1	1	1
70.	Ore processing	Crushing of ore	Dust generation	Soil contamination, surface water	5	1	5	The plant will be engineered with a dust	2	1	2





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
				contamination, reduction in vegetation health				suppression system. PEMP 5.9.			
71.		Use of fossil fuels	Generation of greenhouse gas emissions	Contributes of atmospheric carbon	5	1	5	Brockman will consider the use of energy efficient technology, improvements in process energy efficiency, energy consumption as a criterion in equipment selection; and the utilisation of alternative energy sources.	4	1	4
72.		Process water and slurry handling	Spillage	Soil, water contamination	3	2	6	Bunding, plant design to recover water, ongoing maintenance plans. P5.4.	2	2	4
73.	Operation of workshops	Hazardous materials storage	Inappropriate management of hydrocarbons leads to significant spillage	Soil, surface water and groundwater contamination	4	1	4	Dangerous goods procedure, explosives will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations, Australian Standards (i.e. AS 1940 – 1993) and DMP Guidelines. PEMP 5.12 and PEMP 5.13.	3	1	3
74.		Vehicle wash down	Waste water containing hydrocarbons	Water and soil contamination	5	1	5	Potentially hydrocarbon polluted runoff such as from workshop areas will	4	1	4





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
			spillage into the environment					be directed to basins fitted with baffle mechanisms to trap possible pollutants before discharge to the downstream environment.			
								down areas will be directed to oil separators. PEMP 5.12.			
75.	Road transportation	Vehicle movement	Road kill	Direct loss of native species	5	1	5	Speed limits will be applied and traffic will be restricted to existing roads and tracks. PEMP 5.7. Traffic Management Plan.	4	1	4
76.		Vehicle movement	Dust generation	Reduction in vegetation health	5	1	5	Traffic will be restricted to existing roads and tracks. PEMP 5.9.	2	1	2
77.		Off-road vehicles	Compaction of soil	Poor establishment of native vegetation.	5	1	5	Traffic will be restricted to existing roads and tracks. PEMP 5.9.	3	1	3
78.		Off-road vehicles	Weed dispersal	Loss of native species	5	1	5	Traffic will be restricted to existing roads and tracks. PEMP 5.3	3	1	3
79.	Rehabilitation	Rehabilitation	Poor topsoil management,	Poor establishment of native	3	1	2	Topsoil will be placed directly onto areas for rehabilitation where	2	1	2





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
			species selection	vegetation.				possible. PEMP 5.15.			
80.		Rehabilitation	Rehabilitation not done progressively	Erosion, poor establishment of species.	4	2	8	Topsoil will be placed directly onto areas for rehabilitation where possible. PEMP 5.15.	2	1	2
81.		Final landforms	Not stable, safe	Erosion, land degradation	3	2	6	Waste Rock Stockpiles will be constructed in accordance with the Environmental Notes on Mining Waste Rock Dumps (DMP, 2001) and Landform Design for Rehabilitation (Environment Australia, 1998). FRS facility constructed for long term stability in compliance with the Guidelines on the Safe Design and Operating Standards for Tailings Storage (DMP. 1999) and The Strategic Framework for Tailings Management (DMP, 2003) PEMP 5.14.	2	2	4
82.	Waste water treatment	Improper operation of treatment	Excess nutrient discharge	Local soil/groundwater	4	1	4	Waste water will be appropriately treated	3	1	3





ID	ACTIVITY	ASPECT	EVENT	IMPACT	L	С	R	CONTROLS	L	С	R
		facility		contamination				before disposal.			
83.	Solid waste management	Inappropriate storage and disposal of waste	Inappropriate management leads to leaks, spillage	Soil, surface water and groundwater contamination	4	1	4	Waste will be disposed of appropriately in the on-site landfill. PEMP 5.13.	3	1	3
								Backfilling to above the water table.			
84.	Decommissioning	Mine pit	Residual open water body	Salinisation of groundwater	4	3	12	will inform closure strategies.	1	3	3
								See Conceptual Closure Plan.			
85.		Waste/fines rejects	Seepage/leaks to groundwater	Significant changes to groundwater quality over time	2	4	8	There are no chemicals present in fines residue (other than a flocculent). Modelling, monitoring program, appropriate FRS design based upon relevant standards.	1	4	4
86.		Disposal of non-valued waste	Generation of waste (concrete etc)	Soil, water contamination, loss of amenity.	4	1	4	The Conceptual Closure Plan details waste disposal options. Waste will be recycled where possible and where not, disposed of in accordance with relevant legislation.	3	1	3





4.3 ENVIRONMENTAL OBJECTIVES AND PERFORMANCE INDICATORS

Table 4-7 summarises the environmental objectives and performance indicators that will be applied to manage the environmental aspects of the project.

Aspect	Management Objectives	Performance Indicators
Indigenous Heritage	Meet or exceed statutory obligations in relation to the management of cultural heritage items, places or issues within the project area Avoid disturbance to cultural and heritage sites. Respect the rights of land owners. Identify all heritage sites and/or culturally-significant plants, sites and artefacts using heritage surveys and local knowledge.	No unauthorised disturbance of sites or artefacts. Effective protection of identified sites is provided. Proportion of employees who have undertaken training.
Vegetation Clearing	Avoid or manage adverse impacts to vegetation and flora during the construction and operation phases of the Project. Avoid excavation and clearing to the dune community (Units 6 and 7). Minimise the loss of native vegetation and plant communities. Protect Priority flora species within the project area. Minimise the risk of introducing and spreading noxious weeds.	Number of hectares cleared. Number of flora species present in project area. Proportion of employees who have undertaken training.
Weed Management Surface Water Management	Prevent the introduction and transfer of weed species both inside and outside the project area. Control and/or reduce any existing infestation of target weed species in the project area. Maintain the quality and quantity of surface and groundwater so that existing and potential environmental values, including ecosystem maintenance, are protected. Maintain the integrity, ecological functions and environmental values of wetlands.	No weed species to be introduced to the project site as a result of mine operations. Known weed infestations in the area shall be contained. Compliance with all relevant DEC licenses and water sampling guidelines. No significant change to the volume of water reaching the Fortescue Marsh from the Weeli Wolli catchment over time. No significant change to water
	Ensure that the quality of water returned to local and regional surface waters does not result in the	No significant change to water quality entering the Weeli Wolli creek system.

Table 4-7 Environmental Aspects, Management Objectives and Performance Indicators





Aspect	Management Objectives	Performance Indicators
	deterioration of these. Prevent or minimise project related impacts to Weeli Wolli creek.	
Groundwater Management	Prevent or minimise detrimental impacts on the groundwater system resulting from mining operations. Ensure that the quality of water returned to local and regional groundwater resources will not result in significant deterioration of the beneficial use of those resources. Prevent or minimise mining related impacts to Weeli Wolli Creek and Fortescue Marsh.	Compliance with all relevant DEC / DoW licenses and monitoring guidelines. No significant change to groundwater quality returned to local groundwater resources. No significant change to the health of vegetation lining Weeli Wolli creek.
Fire Management	To prevent bushfires resulting from mining operations.	Fire fighting equipment present at stipulated locations on site. Details of bushfire frequency and previous bushfire details kept as a current record on site.
Terrestrial Fauna Management	Maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge. Undertake project activities in a manner which minimises the adverse impacts to fauna.	No breaches of the <i>Wildlife</i> <i>Conservation Act 1950</i> or the <i>Environmental Protection and</i> <i>Biodiversity Conservation Act</i> <i>1999.</i>
Subterranean Invertebrate Fauna Management	Minimise the impact on the abundance, diversity, geographic distribution and productivity of troglofauna and stygofauna at species and ecosystem levels. Protect rare or priority fauna (listed under the <i>Wildlife Conservation Act</i> 1950 or the Environmental Protection and Biodiversity Conservation Act 1999) habitat.	No greater than 15% impact to predicted troglofauna habitat as a result of the Project.
Dust Management	Ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards. Minimise dust associated with the construction and operation of the mines.	Total suspended particulates (TSP) do not exceed NEPM criteria at sensitive receptors (i.e. accommodation camp). Dust deposition does not increase on natural (already occurring levels) measured in mass/area/time at sensitive receptors.





Aspect	Management Objectives	Performance Indicators
	Minimise exposed surfaces through clearing minimisation, staged clearing and progressive rehabilitation.	
Noise Management	Minimise the noise and vibration associated with the construction and operation of the proposal. Ensure the noise and vibration levels meet statutory requirements and acceptable levels. Minimise the potential for light spill to adversely affect native fauna.	Noise does not exceed appropriate standards and guidelines. Appropriate technology is adopted to reduce effects of light spill.
Greenhouse Gas Emissions Management	Comply with relevant inventory and reporting regulations. Minimise emissions to levels as low as practicable on an on-going basis and consider offsets to further reduce cumulative emissions.	The project complies with all statutory requirements. Greenhouse gas emissions are reduced where practicable over the life of the project. Energy efficiency is considered in the selection of machinery and operations.
Hydrocarbon and Chemical Management	Minimise the impact of hydrocarbons/chemicals (solvents, cleaning fluids etc) on the local and regional environment through the appropriate use, storage, transport and disposal of hydrocarbons and chemicals. Comply with the <i>Environmental</i> <i>Protection Act 1986</i> and the <i>Health</i> <i>Act 1911</i> . Ensure that spills are properly contained, treated, transported and reported.	Compliance with specified EPA and DEC Guidelines. Reporting, investigation and clean up of spills in a prompt and timey manner. The transport, storage, handling and disposal of hydrocarbons and chemicals on site comply with relevant legislation and guidelines. Records of spills or related incidents will be kept and reported to the Management team monthly.
Municiple Waste and Sewage Management	Minimise the impact of municipal and sewage waste on the local and regional environment and prevent pollution to the air, land and water. Comply with the <i>Environmental</i> <i>Protection Act 1986</i> and the <i>Health</i> <i>Act 1911</i> and other applicable standards. All site generated waste is appropriately contained within the on-site landfill. Reduce the volume of waste through product selection, reuse and recycling.	Percentage of waste reused, recycled or recovered. Number of incidents of fauna scavenging for food. Number of incidents of site contamination. Nutrient load of sewage output.





Aspect	Management Objectives	Performance Indicators
	To meet the post-construction expectations of the various stakeholders involved.	
Landform Restoration	orm of landforms and geology.	Landforms are reconstructed and rehabilitated to meet
	Minimise permanent landform alterations and establish stable, sustainable landforms that will not compromise post-disturbance land uses.	closure requirements.
	Ensure that rehabilitation achieves a long term safe, stable and functioning landform which is consistent with the surrounding	Acceptance of rehabilitation by DMP. Area rehabilitated per annum.
Rehabilitation	landscape and other environmental values.	All available topsoil and vegetation will be directly
	Fulfil commitments made to stakeholders and regulators regarding closure outcomes.	returned to an area prepared for rehabilitation or stockpiled for later use.

The PEMP is proposed for the life of the mine and has been devised in order to manage and where possible prevent adverse environmental impacts of mine construction and associated activities.

The below procedures detail the objectives and targets, performance indicators, management actions, monitoring and reporting requirements for each relevant environmental aspect associated with the project. These procedures are largely aspect-specific and should be read alongside the EMS Manual which outlines process-specific procedures which may be applied to numerous aspects.

A periodic review and document revision will be undertaken to ensure applicability and effectiveness of management procedures.

4.4 MANAGEMENT PROCEDURE STRUCTURE

Each management procedure underpinning the issues outlined above incorporates the following headings:

Procedure number: Identifies the specific management programme.

Potential Impacts: Identifies the potential impacts associated with the Project.

Objectives: Outlines key aims of the management programme.

Performance Indicators: qualitative or quantitative measure that shows the degree to which targets are being met.

Regulatory and Other Requirements: highlights government and internal company requirements relating to the potential impacts.

Management: Outlines specific tasks to be undertaken to minimise environmental impacts and to achieve the objectives of both the specific procedure and the overall PEMP.

Monitoring and Reporting: Outlines specific monitoring and reporting required.





5.0 MANAGEMENT PROCEDURES





5.1 INDIGENOUS HERITAGE MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Direct (clearing) or indirect (groundwater abstraction) disturbance of heritage or culturally significant sites, artefacts or species.
- Alterations to the use of traditional or sacred places, animals or resources.
- **Objectives** Meet or exceed statutory obligations in relation to the management of cultural heritage items, places or issues within the project area

Avoid disturbance to cultural and heritage sites.

Respect the rights of land owners.

Identify all heritage sites and/or culturally-significant plants, sites and artefacts using heritage surveys and local knowledge.

Key Performance
IndicatorsNo unauthorised disturbance of sites or artefacts.Effective protection of identified sites is provided.Proportion of employees who have undertaken training.

Regulatory and other requirements

Aboriginal Heritage Act 1972.

Aboriginal Heritage Regulations 1974.

Guidance Statement No 41: Assessment of Aboriginal Heritage (EPA, 2004).

Native Title Act 1993.

Brockman's Native Title Agreements with Traditional Owners.

Brockman's Cultural Heritage Management Plan (CHMP).

Guidelines for Consultation with Indigenous People by Mineral Explorers (DoIR, 2004).

Management Tasks

- Heritage surveys are undertaken prior to site disturbance.
- All identified heritage sites will be demarcated and fenced appropriately and their location is communicated to all site personnel.
- Training/induction will comprise a heritage component, to be developed and delivered by local landowner groups where possible.
- Ongoing communications and collaboration will be maintained with the Martu Idja Banyjima (MIB) people and the Nyiyaparli people to ensure that heritage values are understood and recognised.
- A full Cultural Heritage Management Plan (CHMP) will be developed in liaison with Traditional Owners.





• The Interim CHMP will be implemented.

- Internal monitoring and reporting of KPI's to Brockman Management (EMS P13 and EMS P19).
- Discovery of any heritage sites on site will be immediately reported to Brockman Management Team and subsequently to the Department of Indigenous Affairs (DIA). All work will cease around that site until further investigated.
- Any unauthorised disturbance will be reported to the Brockman Management Team and the MIB / Nyiyaparli people.





5.2 VEGETATION CLEARING

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Loss of the Priority 3 Flora, Goodenia nuda.
- Clearing of vegetation resulting in the loss of regionally significant vegetation associations and fauna habitat.
- Spread of weed species through the removal of native vegetation cover.
- Increased rate of soil erosion and dust deposition.
- Increased susceptibility to wildfire.

Objectives	Avoid or manage adverse impacts to vegetation and flora during the construction and operation phases of the Project.
	Avoid excavation or clearing of the dune community (vegetation units 6 and 7).
	Minimise the loss of native vegetation and plant communities.
	Protect Priority flora species within the project area.
	Minimise the risk of introducing and spreading noxious weeds.
Key Performance Indicators	Number of hectares cleared.
	Number of flora species present in project area.
	Proportion of employees who have undertaken training.

Regulatory and other requirements

Approval from the DEC and the DMP must be sought and obtained prior to clearing of significant flora or vegetation of conservation significance.

Environmental Protection and Biodiversity Conservation Act 1999

Soil and Land Conservation Act 1945

Environmental Protection Act 1986

Environmental Protection (Clearing of Native Vegetation) Regulations 2004

Position Statement No. 2 Environmental Protection of Native Vegetation in WA (EPA, 2000)

Position Statement No. 3. Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002)

Position Statement No. 9 Environmental Offsets (EPA, 2006)

Guidance Statement No. 3. Separation Distances between Industrial and Sensitive Land Uses (EPA, 2005)

Guidance Statement No. 51. Terrestrial Flora and Vegetation Surveys Environmental Impact Assessment in WA (EPA, 2004)

CALM Policy Statement No 9, Conserving Threatened Species and Ecological Communities (CALM, 1999).Environmental Protection Act 1986





- Areas of known *Goodenia nuda* occurrence will be avoided where possible and the locations clearly demarcated and communicated to contractors and Brockman employees.
- Clearing will be planned and undertaken in a progressive, staged manner to ensure adequate time and habitat is available to facilitate fauna movement away from disturbed areas.
- Clearing will be planned such that it minimises unnecessary movement between areas.
- Approval for clearing will be sought from the Site Manager and a Site Disturbance Permit (EMS F8) will be completed and submitted prior to work commencing.
- The boundaries of the working area will be clearly demarcated to ensure only the approved area is cleared.
- All employees/contractors will be inducted on the importance of minimising vegetation clearing and disturbance, and the avoidance of weed infested areas as per EMS P6 and P7.
- Large, mature trees will be avoided where possible.
- Riparian vegetation lining Weeli Wolli creek will not be cleared. This vegetation will be demarcated as a 'no go' area on site maps and communicated to all site staff as per EMS P6 and P7.
- The sand dunes (vegetation units 6 and 7) form part of a regionally significant Priority Ecological Community (PEC) and these units will not be cleared or excavated. This vegetation will be demarcated as a 'no go' area on site maps and communicated to all site staff as per EMS P6 and P7.
- Erosion and sedimentation will be minimised by the construction of erosion control berms and roadside drains will be constructed and maintained to prevent runoff onto native vegetation.
- Dust will be managed in accordance with PEMP 5.9.
- Where large areas of vegetation are disturbed resulting in exposed soil, soil stabilising techniques will be employed to minimise dust and soil erosion.
- All clearing will be scheduled to minimise the time between initial clearing and rehabilitation as per PEMP 5.15.
- Vehicles and machinery will only use designated tracks/roads.
- Any target weed populations identified as being a result of construction and operational activities will be managed as per PEMP 5.3.
- Cleared vegetation will be stockpiled away from streams/creeks and separately from stockpiled topsoil.
- Stripped topsoil will be placed directly onto areas requiring rehabilitation if possible. If not, it will be stockpiled and managed to maintain seed stock.
- Work will be carried out in accordance with PEMP 5.6 to avoid wildfire.





Monitoring and Reporting

The Site Manager will regularly inspect the site to ensure:

- Only authorised clearing is being undertaken.
- Significant flora and vegetation is not impacted without prior written approval from the Department of Environment and Conservation.
- Personnel induction and training is undertaken and recorded.

Reporting will include:

- Internal monitoring and reporting of KPI's to Brockman Management (EMS P13 and EMS P19).
- Unauthorised impacts to Significant Flora will be investigated using internal incident and non-conformance procedures (EMS P15).
- Unauthorised impacts to significant vegetation associations demarcated as 'no go' will be investigated using internal incident and non-conformance procedures (EMS P15).
- Incidents and monitoring activities will be reported as part of the Annual Environmental Review (EMS P8).





5.3 WEED MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Loss of Priority 3 Flora, Goodenia nuda.
- Transport and spread of identified alien (weed) species from vegetation clearing, earthmoving activities, removal of native vegetation and increased vehicle traffic.
- Habitat degradation resulting from the introduction of weed species.
- Increased susceptibility to wildfire.

Objectives	Prevent the introduction and transfer of weed species both inside and outside the project area.
	Control and/or reduce any existing infestation of target weed species in the project area.
Key Performance Indicators	No weed species to be introduced to the project site as a result of mine operations.
	Known weed infestations in the area shall be contained.

Regulatory and other requirements

Conservation and Land Management Act 1984 Environmental Protection Act 1986 Wildlife Conservation Act 1950 Agriculture and Related Resources Protection Act 1976

- A flora register and weed map will be produced and updated as required to assist with training and weed monitoring.
- A weeds identification guide will be provided to all relevant on-site personnel and induction/training (as per EMS P6) will incorporate weed control measures.
- All vehicles, earthmoving/mobile plant and construction equipment will be washed down and cleaned of all vegetative, soil and rock material, prior to arrival on site.
- The location of suspected new weed outbreaks will be reported to the Operations / SHE Manager.
- Stockpiles will be inspected for weeds as per PEMP 5.15.
- Approval by the Site Manager will be required before entering or leaving known weed infested quarantine areas.
- Revegetation will occur as soon as possible after clearing to limit weed mobility as per PEMP 5.15.
- Vehicle movement will be restricted to existing tracks and roads.
- Quarantine areas will be established and demarcated surrounding known infestations/outbreaks of declared weed species and the outbreak reported to the





DEC.

- *Argemone ochroleuca subsp. ochroleuca and *Datura leichhardtii are listed as declared weeds in other districts in Western Australia but not in the Marillana area. Areas that contain these weed species will be noted and additional precautionary measures taken to ensure transportation of these species does not occur.
- At completion of the construction phase, weed infestation status surveys will be commissioned by Brockman using suitable qualified external consultants.

- The Operations / SHE Manager (or delegate) will monitor weed hygiene compliance using EMS F7.
- New infestations of weeds or pests will be reported as an environmental incident to the Operations / SHE Manager.
- Work sites will be inspected regularly in accordance with the Audit schedule as per EMS P18.
- Brockman will report on weed species distribution, status and weed management undertaken in the Annual Environmental Review.





5.4 SURFACE WATER MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Interruption to existing surface water flow patterns.
- Runoff loss to downstream environment.
- Increased risk of erosion and sedimentation.
- Contamination of surface water by chemicals or hydrocarbons.
- Increase in mosquito populations due to the increased availability of standing waters.

Objectives Maintain the quality and quantity of surface and groundwater so that existing and potential environmental values, including ecosystem maintenance, are protected.

Maintain the integrity, ecological functions and environmental values of wetlands.

Ensure that the quality of water returned to local and regional surface waters does not result in the deterioration of these.

Prevent or minimise project related impacts to Weeli Wolli creek.

Key PerformanceCompliance with all relevant DEC licenses and water sampling
guidelines.

No significant change to the volume of water reaching the Fortescue Marsh from the Weeli Wolli catchment over time.

No significant change to water quality entering the Weeli Wolli creek system.

Regulatory and other requirements

AS 3500: 1 - 2003 Plumbing and Drainage

Australian Drinking Water Guidelines (NHMRC, 2004)

Guidelines for the Use of Recycled Water in Western Australia (DoH, 2007)

Australian New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC / ARMCANZ, 2000)

Environmental Water Provisions for Western Australia; Statewide Policy No. 5 (WRC, 2000)

Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2005)

Mosquito Management (DoH Mosquito Management Manual)

Management

• Vehicle movements will be kept to the minimum necessary and existing tracks





will be used where possible.

- Adequate buffer zones will be provided between the areas of disturbance and the natural drainage lines to protect the drainage lines from impacts resulting from construction activities.
- Vegetation clearing will be minimised and will be cleared progressively as per PEMP 5.2.
- Construction on or near natural flowpaths will be planned for the dry season where practicable. Temporary stabilisation measures will be used in areas where there is a high risk of erosion.
- Internal stormwater provisions for the developed areas including formalised drainage networks will be installed to mange increased localised flow velocities of internal stormwater runoff.
- Surface water flows from undisturbed areas will be kept separate from disturbed areas.
- Bunding around waste dumps and stockpiles will be provided as appropriate to contain internal surface water runoff for treatment, plus to divert external surface water runoff.
- Temporary erosion and sediment control structures will be provided such as diversion banks, drains and sediment traps.
- Hydrocarbon storage areas will be bunded to prevent uncontrolled release to the environment.
- A contingency plan will be developed to manage waste water in cases where unexpected volumes and/or quality of waste water are produced.
- The potential for mosquito's to inhabit standing waters (ie. rejects storage facility) will be managed using the Department of Health's Mosquito Management Manual and in liaison with the Department of Health (DoH) and DEC.
- The waste water treatment plants will be designed considering AS/NZS 1547:2000 and will produce liquid waste compliant with Department of Health standards.
- The surface irrigation disposal systems shall be planned and operated in such a manner as to encourage rapid evaporation, prevent spray drift, misting, pooling and run-off from the surface irrigation disposal area (see PEMP 5.13).

- The establishment and construction of drainage structures and sedimentation ponds will be monitored to ensure compliance with the design specifications.
- Monitoring of discharge points from hydrocarbon storage areas will be undertaken.
- Inspections of sumps, sedimentation ponds, drainage structures and erosion control measures will be carried out as soon as possible after periods of heavy rainfall to assess structural integrity.
- Major erosion events will be reported immediately by submitting a Hazard and Incident Report to the Operations / SHE Manager and repair works commenced as soon as possible.





5.5 GROUNDWATER MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Decline in groundwater levels in the area around the dewatering borefield and a reduction in groundwater outflow to adjacent areas.
- Pollution from chemical and hydrocarbon materials and waste water streams from the operation.
- Increases in salinity caused by the lateral movement of groundwater from the Fortescue Valley alluvial sequence, or by the up-coning of saline groundwater from within the underlying basement.
- Increases in salinity caused by the concentration of salts by evaporation of water in mined-out pit voids.
- Disturbance to natural groundwater flow patterns from the mine pit.
- Ecological impacts from the drawdown as a result of the pit dewatering.

Objectives Prevent or minimise detrimental impacts on the groundwater system resulting from mining operations.

Ensure that the quality of water returned to local and regional groundwater resources will not result in significant deterioration of the beneficial use of those resources.

Prevent or minimise mining related impacts to Weeli Wolli Creek and Fortescue Marsh.

Key PerformanceCompliance with all relevant DEC / DoW licenses and
monitoring guidelines.

No significant change to groundwater quality returned to local groundwater resources.

No significant change to the health of vegetation lining Weeli Wolli creek.

Regulatory and other requirements

Mine Void Water Issues in WA (WRC, 2003).

Environmental Notes on Mining Acid Mine Drainage (DoIR, 2006).

Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2005).

Australian Drinking Water Guidelines (NHMRC, 2004).

DoH (Draft) Guidelines for the Use of Recycled Water in Western Australia.

Australian New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC / ARMCANZ, 2000).

Environmental Water Provisions for Western Australia; Statewide Policy No. 5 (WRC, 2000).





- Brockman will continue to pursue an off-take agreement with a neighbouring operation in line with the DoW hierarchy of water management options.
- When dewatering is generating more water than required for project activities, this excess will be re-injected back into the orebody aquifer via a Managed Aquifer Recharge (MAR) scheme.
- Contingency plans have been developed (see Groundwater Management Plan) to reduce the potential for impacts to groundwater from dewatering, and these include:
 - Integrating mine dewatering and water supply abstraction to reduce, as much as possible and practicable, overall groundwater abstraction;
 - Extensive monitoring of local and regional drawdowns and further investigation of key hydrogeological features;
 - Ongoing validation of prediction models and ongoing revised prediction;
 - Modification to pumping and MAR discharge as/when required;
 - Infilling of all pits to facilitate full and rapid recovery of post-mining groundwater levels; and
 - Continued involvement in ongoing research programmes on the hydrogeological nature of the Fortescue Marsh.
- Contingency plans have been developed (see Groundwater Management Plan) to cover the possibility of surplus water disposal for short term maintenance requirements and the unlikely event where surplus water volumes are larger than predicted, and these include:
 - Monitoring to validate prediction models and refine predictions of surplus discharge requirements;
 - Extra capacity built into the start-up injection borefield;
 - Use of pre-stripped areas of the mine path as infiltration ponds; and
 - Use of open mine voids and/or infilled voids as temporary storage areas.
- Contingency planning, to cover the unlikely event that dewatering discharge water quality deteriorates to a level that makes it unsuitable for beneficiation processing use (>7,000 mg/L TDS) or dewatering related drawdowns induce a change in water quality for other groundwater users, and these include the following:
 - Blending with supplementary water source.
 - Aquifer re-injection of saline water to source.
 - Providing "fresh" water to other users if required.
- The selection of sites for reinjection of dewatering volumes in early stages of the project will be optimised to mitigate drawdown effects beyond the proposed mine area.
- A monitoring program to asses the potential impacts of dewatering on phreatophytic vegetation will be undertaken. Appropriate management actions will be undertaken if results show an adverse effect.





- Backfilling of the pit (as per PEMP 5.14) will prevent long term salinisation of groundwater.
- Hydrocarbon and chemical management will be performed as per PEMP 5.15.
- A comprehensive Groundwater Management Plan will be implemented throughout the life of the Project.

Monitoring and Reporting

The proposed monitoring programme will include:

- Regional groundwater levels on a monthly basis;
- Pumping bore water levels and pumping volumes from abstraction bores on a monthly basis;
- Reinjection bore water levels and re-injection volumes on a monthly basis;
- Installation of monitoring piezometers between the Project and the southern Fortescue Marsh boundary to allow for ongoing assessment of background seasonal fluctuations in groundwater levels and quality, monitoring of longer term drawdowns and confirming the nature of the calcretes;
- Recharge volumes to the MAR operations on a monthly basis;
- Quarterly water quality sampling and analysis from pumping bores and a selection of piezometers (screened in alluvial and basement sequences). Samples to be analysed for major ions, salinity and pH as a minimum.
- Annual review and assessment of all monitoring data, including validating and updating the groundwater model to confirm that predictions remain valid on the basis of operational data





5.6 FIRE MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Loss and damage to terrestrial flora and fauna from bushfire.
- Loss and damage to human property and infrastructure due to bushfires.
- Danger to human life resulting from bushfire and smoke inhalation.

Objectives To prevent bushfires resulting from mining operations.

Key PerformanceFire fighting equipment present at stipulated locations on site.IndicatorsDetails of bushfire frequency and previous bushfire details kept
as a current record on site.

Regulatory and other requirements

Bush Fires Act 1954

Wildlife Conservation Act 1950

Brockman's health, safety and emergency procedures

Management

- Emergency response personnel will be trained in fire fighting as per EMS P6.
- Vehicles will carry fire fighting equipment complying with the relevant standards and staff will be trained in the use of this equipment.
- Fire fighting equipment will be located at campsite, worksites, and at powered equipment such as generators and pumps.
- Fire safety inspections will be periodically undertaken by the Site Manager as per EMS P12 and EMS P18.
- An adequate firebreak will be constructed and maintained around the accommodation village.
- Diesel powered vehicles will be used on site, unleaded fuel vehicles fitted with catalytic converters will be avoided in order to reduce the chance of fire.

- Regular inspections and routine maintenance of fire fighting equipment will be undertaken by the Site Manager
- All equipment that may cause fires will be inspected and potential fire hazards addressed. Pre-start checks are to be recorded on the appropriate daily inspection form.
- Bushfire frequency and details will be recorded and reported to Fire and Emergency Services Authority of WA (FESA).





5.7 TERRESTRIAL FAUNA MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Habitat disturbance and fragmentation as a result of construction.
- Loss of individuals from road kill, uncapped drill holes.
- Introduction of exotic fauna species resulting in predation.
- Loss of individuals and habitat from vegetation clearance.
- Loss of genetic biodiversity.

Objectives	Maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.
	Undertake project activities in a manner which minimises the adverse impacts to fauna.
Key Performance Indicators	No preventable fauna fatalities.
	No breaches of the <i>Wildlife Conservation Act 1950</i> or the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> .

No net loss of native flora species found within the project area.

Regulatory and other requirements

Environmental Protection Act 1986

Wildlife Conservation Act 1950

Environmental Protection and Biodiversity Conservation Act 1999

Guidance Statement No. 56. Terrestrial Fauna Surveys for Environmental Impact Assessment in WA (2004)

Position Statement No. 3. Terrestrial Biological Surveys as an Element of Biodiversity Protection (2002)

Biodiversity Management (DoIR, 2007)

Policy Statement No 9, Conserving Threatened Species and Ecological Communities (CALM, 1999)

- Drill holes will be capped to prevent fauna entrapment and fatalities.
- Vehicles will only use designated tracks and vehicle speeds will be limited to 40 km/hr on tracks and to 90 km/hr on haul roads to minimise fauna deaths.
- Native fauna will not be captured, disturbed, fed or harmed unless an appropriate permit has been issued by the DEC.
- Introduction of feral/domesticated animals onto the project site will be prohibited





and a feral animal management program will be developed if required in ongoing collaboration and consultation with the DEC.

- Disturbed areas will be rehabilitated as soon as practicable to facilitate fauna habitat restoration as per PEMP 5.15.
- Wherever possible, mature trees containing hollows will be retained as they provide habitat for a large number of mammal and bird species present in the area.
- Native vegetation will be cleared progressively as per PEMP 5.2
- The use of barbed wire will be prohibited on site.
- Sumps and drains will be covered to restrict access by native fauna and potential drowning or poisoning (see PEMP 8.4).
- Light spill and noise will be managed as per PEMP 5.10.

- Areas that have been disturbed will be checked for rehabilitation progress on a regular and ongoing basis by the Operations / SHE Manager (or delegate).
- Any native animal injures/deaths will be reported as soon as possible and investigated by the Operations / SHE Manager (or delegate) as per EMS P14 and EMS P15.
- Any death of fauna of conservation significance will be reported to DEC as per EMS P8 and EMS P14.





5.8 SUBTERRANEAN INVERTEBRATE FAUNA MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate impacts on subterranean invertebrate fauna resulting from:

- clearing and habitat destruction;
- alterations to water availability;
- alterations to soil structure;
- alterations to soil humidity; and
- alterations to groundwater level.

Objectives Minimise the impact on the abundance, diversity, geographic distribution and productivity of troglofauna and stygofauna at species and ecosystem levels.

Protect rare or priority fauna (listed under the *Wildlife Conservation Act* 1950 or the *Environmental Protection and Biodiversity Conservation Act* 1999) habitat.

Key Performance No greater than 15% impact to predicted troglofauna habitat as a result of the Project.

Regulatory and other requirements

Environmental Protection Act 1986

Wildlife Conservation Act 1950

Guidance Statement No. 56. Terrestrial Fauna Surveys for Environmental Impact Assessment in WA (EPA, 2004)

Guidance Statement No. 54a: Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia

Guidance Statement 54: Consideration of Subterranean Fauna in Groundwater and Caves during Environmental Impact Assessment in Western Australia

Position Statement No. 3. Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002)

Biodiversity Management (DMP, 2007)

- Ensure clearing of native vegetation is carried out in accordance with PEMP 5.2 and EMS F8.
- Disturbed areas will be rehabilitated as soon as practicable to facilitate habitat restoration as per PEMP 5.15.
- Hydrocarbons will be transported, stored, used and disposed of in accordance with PEMP 5.12 and appropriate regulations.
- Hydrocarbon or chemical spills will be promptly cleaned up and the affected soil





bagged and disposed of according to PEMP 5.12.

- Surface water diversions will be re-directed and re-spread to match predisturbance runoff as per the Surface Water Management Plan, PEMP 5.4 and PEMP 5.15.
- Waste dumps will be rehabilitated as soon as practicable to replace nutrient input (i.e. vegetation) into the subterranean environment.
- The pit will be backfilled progressively to reinstate habitat conditions suitable for subterranean fauna. The pit will be backfilled in such a way as to facilitate groundwater through flow.
- The potential for the rehabilitation of subterranean fauna habitat will be investigated in liaison with the DEC over the life of the mine.

Monitoring and Reporting

• Brockman will liaise with the DEC to develop a suitable ongoing monitoring program and reporting regime for subterranean fauna at Marillana.





5.9 DUST MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- reduce visual amenity;
- reduced employee work conditions and general health;
- loss of local flora and potentially fauna; and
- increased sedimentation of surface water.
- **Objectives** Ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

Minimise dust associated with the construction and operation of the mines.

Minimise exposed surfaces through clearing minimisation, staged clearing and progressive rehabilitation.

Key Performance
IndicatorsTotal suspended particulates (TSP) do not exceed NEPM
criteria at sensitive receptors (i.e. accommodation camp).Dust denseitien dees not increase on poturel (closed), accommodation

Dust deposition does not increase on natural (already occurring levels) measured in mass/area/time at sensitive receptors.

Regulatory and other requirements

Guidance Statement No. 18 Prevention of Air Quality Impacts from Land Development Sites (EPA, 2000)

Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2008)

National Environmental Protection Measure (NEPM) Ambient Air Quality 1998

Draft guideline for development and implementation of dust management program (DEC, 2008)

All Ambient Air – Guide for the Siting of Sampler Units AS 2922

All Workplace Atmospheres – Methods for Sampling Respirable Dust AS 2985

All Workplace Atmospheres – Methods for Sampling Inspirable Dust AS 3640

Total Suspended Particles (TSP) Determination of Total AS 2724.3

- Water trucks will be used on a needs basis for dust suppression on unsealed roads, stockpiles and operational surfaces.
- Clearing will be staged (as per PEMP 5.2) and progressive rehabilitation undertaken (as per PEMP 5.15) to minimise exposed areas.
- Topsoil will be managed as per PEMP 5.15.





- Dust control systems will be installed on fixed plant.
- Dust generating activities will be modified where practicable.
- Site personnel will visually monitor dust levels during construction and operation and dust suppression measures implemented when necessary.
- All site personnel will be informed of their responsibilities and dust management practices as part of environmental induction/training as per EMS P6.
- Any blasting will occur only under favourable climatic conditions.

- Depositional and TSP dust monitoring will be undertaken at sensitive receptors and results reported to the DEC and DMP through the Annual Environmental Report.
- Breaches in this procedure will be recorded and reported to the Management Team as per EMS P13 and EMS P19.
- Water quality entering Weeli Wolli creek will be monitored as per PEMP 5.4.





5.10 NOISE, VIBRATION AND LIGHT MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- noise effects on-site personnel and/or native fauna.
- light spill effects on native fauna.

Objectives	Minimise the noise and vibration associated with the construction and operation of the proposal.
	Ensure the noise and vibration levels meet statutory requirements and acceptable levels.
	Minimise the potential for light spill to adversely affect native fauna.
Key Performance Indicators	Noise does not exceed appropriate standards and guidelines. Appropriate technology is adopted to reduce effects of light spill.

Regulatory and other requirements

Environmental Protection (Noise) Regulations 1997

AS 2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites

EPA Draft Guidance No 8 Environmental Noise

Noise, Vibration and Airblast Control, (EA, 1998)

Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2005)

Statement of Planning Policy Road and Rail Transport Noise (WAPC, 2005)

AS2670:2001 Evaluation for human exposure to whole body vibration

Mines Safety and Inspection Act 1994

- Equipment will be fitted with appropriate noise reduction or abatement devices and maintained in good working order.
- Design and layout of mine site (e.g. stockpile locations) to minimise the impacts of noise and vibration emissions on the camp accommodation.
- The quietest practicable plant and machinery will be selected consistent with construction and operational requirements.
- All dedicated mining equipment will be purchased new and specified to comply with DMP requirements for noise and emission levels.
- Regular maintenance of plant and machinery.
- Noise emissions from the mining operations will comply with the assigned noise levels for industrial and utility premises as determined in the *Environmental Protection (Noise) Regulations 1997*.





- Blasting (if required) will be carried out during daylight hours and strictly controlled to minimise air blast and ground vibration issues.
- Management of employee noise exposure will be in compliance with the *Mines Safety and Inspection Act 1994*.
- All bare bulbs and any lighting pointing upward will not be used on site.
- Only the minimum amount of light needed for safety will be used.
- Narrow spectrum bulbs will be used where possible to lower the range of species affected by lighting.
- Only high-risk stretches of roads, such as crossings and mergers will be lit.

- Noise impacts on the accommodation village will be monitored through using sound level meters on the southern boundary of the village.
- Regular monitoring and maintenance of machinery will be undertaken to ensure machinery remains in good working condition, minimising noise emissions.
- Monitoring and reporting of noise emissions will occur to ensure emissions meet design criteria and statutory requirements.





5.11 GREENHOUSE GAS EMISSIONS MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Greenhouse gas emissions within the project area may have the potential to contribute to anthropogenic global warming.
- Fuel combustion also contributes to atmospheric pollution through generating emissions such as carbon monoxide, nitrogen oxides, carbon dioxide and benzene.
- **Objectives** Comply with relevant inventory and reporting regulations.

Minimise emissions to levels as low as practicable on an ongoing basis and consider offsets to further reduce cumulative emissions.

Key Performance The project complies with all statutory requirements.

Greenhouse gas emissions are reduced where practicable over the life of the project.

Energy efficiency is considered in the selection of machinery and operations.

Regulatory and other requirements

National Greenhouse and Energy Reporting Act 2007

Guidance Statement No. 12. Guidance Statement for Minimising Greenhouse Gas Emissions (EPA, 2002)

Guidance Statement No. 18 Prevention of Air Quality Impacts from Land Development Sites (EPA, 2000)

Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2005)

Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks 2006 Series (AGO, 2002)

Draft National Carbon Offset Standard (AGO, 2008)

Environmental Protection (NEPM -NPI) Regulations 1998

Western Australian Greenhouse Strategy (WA Government, 2004)

- Construction and operation phases of the proposal will be designed to minimise vehicle movements and duplication of activities to reduce cost, greenhouse gas emissions and increase efficiency.
- Energy consumption will be considered as a criterion in equipment selection.
- Greenhouse gas emission minimisation will be incorporated into mine planning in accordance with Guidance Statement for Minimising Greenhouse Gas Emissions (EPA, 2002).





- Design of power infrastructure will focus on energy efficiency and all innovative methods for reducing the carbon footprint of the site, such as waste heat recovery will be investigated in lieu of reasonable economics.
- The construction and permanent camp will be located on site to reduce the number of vehicles used in association with the Project.
- Vegetation clearing has been minimised where practicable (as per PEMP 5.2). Vegetation to be cleared at the mine site will be cleared progressively and stockpiled for use in rehabilitation as per PEMP 5.15. Progressive rehabilitation of open areas will result in partial offsets of emissions over the life of the Project.
- Alternatives fuels will be investigated for use for on-site power.
- A Greenhouse Reduction Program will be implemented on-site to identify and reduce greenhouse emissions on an ongoing basis.

- Brockman will report under the National Greenhouse and Energy Reporting Act 2007.
- Regular (e.g. biannual) energy efficiency audits will also be conducted for the Project as required under the Energy Efficiency Opportunities (EEO) programme.
- Atmospheric emissions will also be reported to the National Pollutant Inventory (NPI) if they meet the reporting threshold values.




Indicators

5.12 HYDROCARBON AND CHEMICAL MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Contamination of the surrounding environment resulting from incorrect use, storage and transport of hydrocarbons and chemicals.
- **Objectives** Minimise the impact of hydrocarbons/chemicals (solvents, cleaning fluids etc) on the local and regional environment through the appropriate use, storage, transport and disposal of hydrocarbons and chemicals.

Comply with the *Environmental Protection Act 1986*, the *Health Act 1911* and other applicable standards.

Ensure that spills are properly contained, treated, transported and reported.

Key Performance Compliance with specified EPA and DEC guidelines.

Reporting, investigation and clean up of spills in a prompt and timey manner.

The transport, storage, handling and disposal of hydrocarbons and chemicals on site comply with relevant legislation and guidelines.

Records of spills or related incidents will be kept and reported to the Management team monthly.

Regulatory and other requirements

Water Quality Protection Guidelines No. 10 Mining and Mineral Processing Aboveground fuel and chemical storage (Department of Water, 2000)

Australian Standard 1940-2004 : The storage and handling of flammable and combustible liquids

Guidance Note S301, Storage of Dangerous Goods Licensing and Exemptions (DoIR, 2004)

Dangerous Goods Safety Act 2004 and associated regulations

Australian Dangerous Goods Code (Road and Rail) 7th Ed, (Australian Government, 2008)

Environmental Protection (Controlled Waste) Regulations 2004

Used Tyre Strategy for Western Australia, Waste Management Board, 2005

Contaminated Sites Act 2003

Health Act 1911

Management

• Hydrocarbons and chemicals will be stored, used, transported and disposed of in accordance with Dangerous Goods Regulations 2007, Australian Standards (i.e.





AS 1940 – 1993) and DMP guidelines.

- Material Safety data Sheets (MSDS) will be available for all chemicals used on site. Handling, use and storage of chemicals will be compliant with the relevant MDSD's.
- Bunded and lined storage facilities are located away from watercourses (at least 50 m), and surface water management procedures will be implemented in accordance with PEMP 5.4 and the Surface Water Management Plan.
- Diesel generators shall be situated in bunded areas or shall be self-bunded to prevent loss of fuels and oils.
- Storage areas will be regularly inspected and maintained as per EMS P18. Inspection records will be maintained as per EMS P16.
- Enclosed facilities will have a bund capacity equal to or greater than the hydrocarbon storage capacity. Where the bund is not enclosed, the capacity must be 110% of the hydrocarbon storage capacity.
- Drip trays will be used at re-fuelling stations. The re-fuelling station will be attended at all times.
- Equipment and vehicles will be maintained to reduce hydrocarbon leaks.
- Oily or contaminated water around wash-down areas will be cleaned up and/or directed to sumps to reduce fauna interactions.
- Regular reviews of waste management practices and storage of hydrocarbons and chemicals will be undertaken as per EMS P18 and EMS P19.
- Spill response equipment will be readily accessible in each work area to enable quick response to spills. As a minimum, spill response equipment will be located at fuel storage and transfer facilities, work areas, near open water bodies, and at maintenance workshop areas.
- Relevant personnel will be trained in spill response.
- The spill will be contained and the leak stopped as soon as possible. This will include blocking the source of the spill, blocking access to waterways and building dams/dykes around the spill.
- Spills will be cleaned up, bagged and transported off site to an appropriate facility within 24 hours of the spill occurring.
- Potentially hydrocarbon polluted runoff such as from workshop areas will be directed to basins fitted with baffle mechanisms to trap possible pollutants before discharge to the downstream environment.
- All controlled wastes will be removed from site by a licensed contractor and disposed off appropriately.
- Contractors will prepare and submit to Brockman a Hazardous Materials Management Plan prior to commencing activities on site.

- Housekeeping inspections will be undertaken by the Operations / HSE Manager. This will include inspection of storage areas for leaking bunds, drums or containers and inventories of spill response equipment and materials.
- Details of quantities and type of hydrocarbons and chemicals will be recorded by





the Operations / HSE Manager for reporting purposes.

- Accidental spills will be reported immediately as an environmental incident by completing a Hazard and Incident Report. Investigations will be undertaken if required.
- A contaminated sites register will be kept recording known and potential contaminated sites and the locations of hydrocarbon and chemical storage.





5.13 MUNICIPLE WASTE AND SEWAGE MANAGEMENT

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Contamination of the surrounding environment through the generation and incorrect storage of solid and liquid wastes.
- Excess nutrient loading of soil or surface waters resulting from liquid effluent disposal.

Objectives	Minimise the impact of municipal and sewage waste on the local and regional environment and prevent pollution to the air, land and water.
	Comply with the <i>Environmental Protection Act</i> 1986 and the <i>Health Act</i> 1911 and other applicable standards.
	All site generated waste is appropriately contained within the on-site landfill.
	Reduce the volume of waste through product selection, reuse and recycling.
Key Performance Indicators	Percentage of waste reused, recycled or recovered.
	Number of incidents of fauna scavenging for food.
	Number of incidents of site contamination.
	Nutrient load of sewage output.

Regulatory and other requirements

Water Quality Protection Guidelines No. 10 Mining and Mineral Processing Aboveground fuel and chemical storage (Department of Water, 2000)

Australian Standard 1940-2004 : The storage and handling of flammable and combustible liquids

AS/NZS 1547:2000. On-site domestic wastewater management

EPA Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2005)

Guidance Note S301, Storage of Dangerous Goods Licensing and Exemptions (DoIR, 2004)

Dangerous Goods Safety Act 2004 and associated regulations

Australian Dangerous Goods Code (Road and Rail) 7th Ed, (Australian Government, 2008)

Environmental Protection (Controlled Waste) Regulations 2004

Environmental Protection (Rural Landfill) Regulations 2002

Used Tyre Strategy for Western Australia, Waste Management Board, 2005

Health Treatment of Sewage and Disposal of Effluent and Liquid Waste Regulations (DoH, 1974)





Water Quality Protection Note- Irrigation with nutrient-rich wastewater (DoW, 2008)

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000)

Metropolitan Water Supply, Sewerage and Drainage By-Laws 1981

Water Services Licensing Act 1995

Contaminated Sites Act 2003

Health Act 1911

Management

- Vehicles and worksites will have secure (lidded) rubbish containers for the containment of waste to prevent contamination of the site and spread of wind blown litter.
- Camp facilities will have secure (lidded) putrescible waste facilities to prevent access by fauna.
- Waste separation will be facilitated by recycling bins located near offices and accommodation.
- Employees will undergo induction/training outlining the types and importance of waste disposal methods.
- Where waste can not be reused or recycled it will be disposed of at a licensed waste disposal facility.
- The effluent spray areas will be located at least 500 m downwind of the prevailing wind direction (E/SE) from offices and the accommodation village and will be fenced to Department of Health requirements. Appropriate signage will be placed around these facilities.
- Flood protection will be implemented as per PEMP 5.4 to ensure waste water facilities are not impacted by floodwaters.
- To ensure that the surface irrigation disposal areas operates at its maximum efficiency, media such as pinebark, wood chips, scoria etc will be applied to the soil and suitable plants capable of effecting a high evapo-transpiration rate, will be maintained at all times.
- Vegetative buffers may be utilised to separate the mine site spray area from the Weeli Wolli Creek.

- Housekeeping inspections will be undertaken by the Site Manager or delegate. This will include inspecting putrescible and intractable waste storage containers and areas.
- Spills or other environmental impacts associated with minor servicing and maintenance of vehicles and equipment will be reported to the Site Manager or delegate.
- Effluent water quality will be monitored to ensure nutrient levels stay within acceptable limits as determined by the DEC under Part V of the *EP Act 198*6.





5.14 LANDFORM RESTORATION

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- inadequate reconstruction of safe and stable landforms;
- permanent landform modification as a result of the mine pit;
- permanent new landforms as a result of the FRS and waste dump areas; and
- short to medium term changes to the landscape as a result of construction of infrastructure.
- **Objectives** To meet the post-construction expectations of the various stakeholders involved.

Maintain the integrity, ecological functions and environmental values of landforms and geology.

Minimise permanent landform alterations and establish stable, sustainable landforms that will not compromise postdisturbance land uses.

Key Performance Landforms are reconstructed and rehabilitated to meet closure requirements.

Regulatory and other requirements

Environmental notes on Mining Waste Rock Dumps (DME, 2001);

Mine Void Water Issues in WA (WRC, 2003);

Environmental Notes on Mining Waste Rock Dumps (DMP, 2001)

Landform Design for Rehabilitation (EA, 1998); and

Guidance No. 33 Environmental Guidance for Planning and Development (EPA, 2006)

Guidelines on the Safe Design and Operating Standards for Tailings Storage (DMP. 1999)

The Strategic Framework for Tailings Management (DMP, 2003)

Management

- Waste Rock Stockpiles will be constructed in accordance with the Environmental Notes on Mining Waste Rock Dumps (DMP, 2001) and Landform Design for Rehabilitation (EA, 1998).
- FRS facility constructed for long term stability in compliance with the Guidelines on the Safe Design and Operating Standards for Tailings Storage (DMP. 1999) and The Strategic Framework for Tailings Management (DMP, 2003).
- Waste facilities will be reshaped to mimic natural landforms, provide a safe final landform, reduce erosion potential and facilitate revegetation outcomes.
- Topsoil removed from the waste dump areas during the construction of the facilities will be redeployed on the final surfaces of the dumps to assist with





rehabilitation.

- The downstream slopes of the final embankments will be covered with topsoil, contour ripped, seeded with native species and fertilised as appropriate.
- A spillway will be constructed to control the release of excess water on the facility surface resulting from large rainfall events.
- Drainage lines will be redirected
- A Conceptual Closure Plan will be implemented and reviewed as required.

Monitoring and Reporting

• Landform restoration activities will be reported to the DMP and DEC as part of the Annual Environmental Report.





5.15 **RESTORATION AND REHABILITATION**

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Inappropriate/inadequate rehabilitation, which does not establish suitable habitat and resources.
- **Objectives** Ensure that rehabilitation achieves a long term safe, stable and functioning landform which is consistent with the surrounding landscape and other environmental values.

Fulfil commitments made to stakeholders and regulators regarding closure outcomes.

Key Performance Acceptance of rehabilitation by DMP.

Indicators Area rehabilitated per annum.

All available topsoil and vegetation will be directly returned to an area prepared for rehabilitation or stockpiled for later use.

Regulatory and other requirements

AMEC - AMEC Mine closure Guidelines (AMEC, 2000).

Strategic Framework for Mine Closure (ANZMECC, 2000).

Mine Closure Guideline for Minerals Operations in WA. (DoIR, 2000).

Guidance Statement No 6: Rehabilitation of Terrestrial Ecosystems (EPA, 2006).

Mine Closure and Completion (DITR, 2006).

Mine Rehabilitation (DITR, 2006)

Planning for Integrated Mine Closure: Toolkit (ICMM).

Management

- Disturbed areas will be progressively rehabilitated throughout the life of the project.
- Topsoil will be stripped and where practicable, directly transferred to exposed surfaces requiring rehabilitation.
- Where the above is not practical, topsoil will be stockpiled, and vegetation debris, logs and leaf litter will be retained where possible for reuse during rehabilitation.
- Topsoil storage will be located away from drainage lines and upstream of sediment basins. Topsoil will be stored such that it is protected from internal rainfall and runoff using temporary vegetation or mulching, and protected from external runoff using diversion banks/drains.
- Topsoil stockpiles will be stabilised by encouraging the growth of native vegetation and/or appropriate stabilising practices will be implemented.
- Surface water drainage will be re-instated through or around the post-closure mine site. Diversions will be designed to return surface water to its natural drainage course where possible.





- Compacted areas will be ripped on the contour.
- Deep ripping will be undertaken where the soil or waste material is of low permeability. In areas where the soil or waste material is of high permeability scarifying on contours will be undertaken. On steep slopes this may require terracing or benching. All ripping, terracing or benching will be surveyed to ensure that they are on contours.
- Direct seeding and/or planting will be undertaken to encourage vegetation growth to stabilise surfaces and aid the integration of landforms into the surrounding landscape and ecosystems. Seeding and/or planting will be undertaken prior to the wet season (as soon as possible after earthworks) using seed and plants native to the project area.
- Local provenance seeds will be collected from the impacted project area prior to disturbance. Local provenance seeds will be stored separately and used in their respective local areas during rehabilitation.
- Soil contaminated with hydrocarbons will be removed and bioremediated as per PEMP 5.12.
- Rehabilitation areas will be subject to restricted access.
- All rehabilitation will be completed in accordance with the Conceptual Closure Plan and the Final Closure Plan.

- Regular site inspections will be undertaken to ensure progressive rehabilitation is undertaken.
- Stockpiles will be monitored for weed growth and erosion and remedial actions taken where necessary.
- Success of rehabilitation will be monitored and remedial actions undertaken where necessary.
- A register of topsoil stockpiles will be maintained on-site recording location, stockpile number, the date placed, the source location, the type topsoil/subsoil) and comments (including rehandling/relocation, seeding etc).
- Compliance with this procedure will be reported to the DEC and the DMP during and at the end of operations in the Annual Environmental Report.





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6.0 STAKEHOLDER CONSULTATION

A range of stakeholders have been consulted regarding the Marillana Iron Ore Project and their feedback and suggestions incorporated into the Project design and management plans.

Public and Non-Government Organisation Consultation

This has occurred via statutory reporting, through the publication of quarterly reports, half yearly reports, annual reports, ASX announcements, and information available on the company website.

Indigenous Consultation

Indigenous consultation is ongoing with the Nyiyaparli and Martu Idja Banyjima (MIB) Native Title Claimants. Brockman have executed Mining Compensation Agreements with the MIB and the Nyiyaparli people, which contain clauses aimed at protecting the natural and cultural environment.

Private Industry Consultation

This has occurred via statutory reporting, through the publication of quarterly reports, half yearly reports, annual reports, ASX announcements, and website available information. Additionally, Brockman have initiated correspondence with neighbouring land and tenement holders, particularly surrounding issues of access and tenure and subterranean invertebrate fauna.

Landowner Consultation

The Marillana station owner has been consulted throughout the Project's development and has been kept abreast of issues relating to the land use.

Regulator Consultation

The DEC, DMP, DoW and DIA have been involved throughout the EIA process and have been approached individually with respect to particular issues relevant to each department. Feedback from these departments has been incorporated into project planning and issued have been addressed within the EMP.

Table 5-1	Summary of Stakeholders Consulted	
		_

STAKEHOLDER GROUP	STAKEHOLDER CONTACT
Shire of East Pilbara	Peter Edward, Oliver Shaer, Bill Hardy
Department of Water	Gary Humphries, Darryl Abbott
Department of Environment and Conservation (Karratha)	Suzanne Roworthe
Department of Environment and Conservation	Tania Jackson, Bradley Durrant, Nick Woolfrey, Murray Baker, Anthea Jones, Stephen Van Leeuwin.
Department of Mines and Petroleum	Demelza Dravnieks
Environmental Protection Authority Service Unit	Vanessa Angus, Ray Claudius





Department of Indigenous Affairs	Jaqueline Brienne, Cesar Rodriguez
Department of Health	Ryan Janes
Neighbouring Landowners / tenement holders	Marillana Station- Barry Gratte, Lee Bickell, BHPBIO- Mike Fitzpatrick, Rio Tinto- Leon Staude, FMG- Julian Tapp
WA Museum	Bill Humphries, Ron Oliver
Native Title Claimants and representatives	Rick Callaghan (MIB), Adam Slattery (PNTS), Nyiyaparli People (site meeting)



7.0 REVIEW AND REPORTING

In order to ensure the management commitments made within the environmental management plan are met and that new activities or aspects are encompassed in the plan, an annual review of the document will be undertaken.

This PEMP will be provided to the DMP and the DEC as part of the environmental assessment process and will be revised based on comments made by the DMP and DEC.

An audit and reporting program shall be developed in consultation with the DEC. Compliance with the commitments set out in this document will be internally audited by Brockman, and externally audited by the DEC, DMP and relevant regulatory authorities. Brockman shall submit an annual audit Compliance Report, indicating the compliance with the conditions set out in the approval.

The annual Compliance Report shall address:

- The major environmental issues associated with implementing the Project; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives.
- The level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable.
- Significant improvements gained in environmental management, including the use of peer reviews.
- Stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed.
- The proposed environmental objectives over the next two years, including improvements in technology and management processes.

Compliance Reports shall be prepared in accordance with compliance monitoring guidelines, and shall:

- describe and provide evidence of the status of the implementation of the proposal;
- include evidence of compliance with the conditions, procedures and commitments of this statement;
- provide a review of the effectiveness of corrective and preventative actions contained in the PEMP and programs;
- provide verifiable evidence of the fulfilment of requirements specified in the PEMP and programs;
- identify all confirmed non-conformities and non-compliances and describe the related corrective and preventative actions taken; and
- identify potential non-conformities and non-compliances and provide evidence of how these are being determined for corrective action.





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APPENDIX 1 EXPLORATION PROCEDURES





8.1 DRILLING

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Hydrocarbon spills;
- Oily water;
- Spread of weeds;
- Wildfire;
- Fauna deaths or injury;
- Dust emissions.

Objectives To ensure that drilling operations are planned and conducted in a responsible manner that minimises their impact on the environment.

Key PerformanceDrilling Contractor is performing to the standards specified in
the contract.

Drill sites are left clean and tidy.

There are no adverse environmental impacts as a consequence of the drilling activities.

Regulatory and other requirements

Environmental Protection Act 1986

Refer to the relevant Program of Works (PoW)

Management

Tendering and Contract Requirements

When selecting a drilling contractor, the following elements are to be considered at the tendering/contract review stage:

- Drill rigs and support vehicles are suitable for the type of drilling.
- Inclusion of relevant environmental clauses specified in the drilling contract with appropriate penalties (not possible) to ensure that these are complied with.
- The level of implementation and use of any environmental management systems by the contractor.
- Environmental performance demonstrated with previous mining companies.
- Previous records for conducting exploration work in a responsible manner.
- Drill rigs and support vehicles must be cleaned of dirt and seeds prior to arrival on site.

• Drilling and support vehicles must have fire suppression measures installed.

Pre-Drilling

• The Senior Geologist must lodge a PoW application and receive DMP



approval of proposed exploration work that involves clearing of vegetation prior to the commencement of eathworks.

- The Exploration Manager must ensure that the area to be cleared is cleared for Heritage values prior to earthworks.
- The local pastoralist must be notified of planned drilling activities by the Senior Geologist. If activities are within 400m of Weeli Wolli Bore or 100m of the stockyard consent must be sought from Marillana Station.
- Clearing will be done in accordance with PEMP 5.2.

Drilling

- Frequent preventative maintenance checks will be undertaken on equipment to minimise the chance of hydrocarbon leaks (eg. from hydraulic lines), leaks will be recorded as part of maintenance procedures. Drilling will be suspended until serious leaks have been repaired.
- Only biodegradable drilling additives will be used where ever possible.
- Drilling contractors must have available hydrocarbon containment and clean up materials (eg. drip trays, absorbent matting) and be familiar with their proper use.
- No litter or waste will be disposed down drill holes.
- Drilling will be conducted in a manner that minimises dust and noise.
- Drilling will not be conducted on the banks of or within watercourses.
- Rigs will utilise existing roads or tracks where possible.

Water Management during Drilling

- Water generated during drilling operations will be reused in the drilling process wherever possible, ie if water is struck attempt to utilise this during further drilling at the existing site or those in close proximity.
- The release of any water down-slope or into vegetation, or its entry into drainage channels or improper collection around the rig will be avoided;
- The Electrical Conductivity (EC) of the water will be measured using a Conductivity Meter to determine salinity levels. If identified as being saline (>16 mS/cm) it must be prevented from contacting vegetation.
- Drilling will be suspended if the groundwater is saline or in significant amounts, until appropriate and approved containment sumps have been constructed PEMP-8.4.

Water Containment

- Water used or encountered during drilling activities will be contained.
- Before drilling commences, suitably sited sumps will be constructed for Diamond drill holes, and all Reverse Circulation (RC) drilling in areas where significant and/or saline water is likely to be encountered.
- Sumps will be located perpendicular to the track on the down-slope side of the pad.
- Small amounts of fresh groundwater encountered during RC drilling may be contained by digging bund walls.
- Sumps will not be used as a refuse/litter dump.





Sample Management

• Drill samples will be spaced approximately 20cm apart in neat rows to promote the regrowth of grasses and vegetation in between sample piles

If sample bags are used for drilling:

• Sample bags will be secured at all times to prevent their loss to wind gusts. Any bags that become wind borne will be retrieved immediately.

Capping of Drill Holes

• RC and Diamond drill holes will be temporarily 'capped' immediately after drilling until PVC collars are cut and holes permanently plugged during rehabilitation. A conical plug will be placed into the collar effectively sealing the hole.

Material Left in the Drill Hole

- The Exploration Manager will be informed in the event that any material is left in a drill hole; eg bogged drill rods or shanked drill bits; and
- A record will be made of any material left in a drill hole must be made on the driller daily plod and recorded in the drilling database.

Recording

• Rehabilitation will be recorded on the Drill Hole Rehabilitation work sheet.

Monitoring and Reporting

• Drill sites will be periodically checked as part of site inspection.





8.2 POST DRILLING CLEANUP

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Soil and/or water contamination;
- Fauna death and/or injury.

Objectives	To ensure that drill sites are left in a clean and safe state, and progressively rehabilitated.
Key Performance Indicators	Drill Sites are left clean and tidy. Any environmental issues that may require rehabilitation in the future have been noted.
	Rehabilitation has been completed.

Regulatory and other requirements

Environmental Protection Act 1986

Refer to the relevant Program of Works

Management

- Collars will be cut to below ground level then plugged.
- PVC tubing will be removed from hole plugs prior to use to prevent cattle pulling the plug out of the hole.
- The ground will be re-levelled to the pre-drilling contour without leaving a hole or depression.
- The plug will be covered with mounded topsoil. Settling will be allowed for over time, with the plug tapped firmly to shed any future surface run-off.
- Sumps used during drilling will be allowed to drain until dry and then will be backfilled (see PEMP 8.4).
- Prior to commencing rehabilitation earthworks drill pad sites will be tidied. All evidence of exploration activities will be removed from the site and appropriately disposed of.
- All sample bags will be removed from site.
- Drill sample piles will be buried or rehabilitated.
- All hydrocarbon spills will be cleaned up and all contaminated soil collected and removed from the site as per PEMP-5.12.
- Oil absorbent products will be removed from the site and appropriately stored prior to disposal.
- Cyclone spoil, slurry and earthen bunds will be re-levelled and broken up where the surface has been capped, to allow vegetation to re-establish.
- Any areas that are required to remain open past six months after drilling ceases will be subject to a deferral request which must be submitted to the Department





of Mines and Petroleum prior to the six month period being reached.

- Inspections will be conducted regularly to ensure drill holes have been capped, topsoil replaced, drill holes have been mounded and sites have been tidied; and
- Observations, including drainage off drill pads will be carried out to provide specific instructions/requirements to equipment operators during earthworks rehabilitation.





8.3 EXPLORATION TRACKS AND PADS

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Unnecessary clearing of native vegetation;
- Clearing of conservation significant flora;
- Disturbance to areas of cultural or heritage significance; and
- Poor ecosystem renewal due to loss of seed stock or soil viability.

Objectives	To minimise direct and indirect adverse impacts on the flora, fauna, vegetation and surface water drainage systems from the development and maintenance of access tracks and pads.
Kev Performance	A Site Disturbance Permit (EMS F8) is completed after verbal

Key PerformanceA Site Disturbance Permit (EMS F8) is completed after verbalIndicatorsapproval of clearing boundaries from Geologist and/orExplorationManager and prior to work commencing in
undisturbed areas.

Area demarcated and cleared as per PEMP 5.2.

Topsoil and vegetation direct returned or stockpiled for later use

Progressive rehabilitation of available areas.

Regulatory and other requirements

Environmental Protection Act 1986

Refer to the relevant Program of Works

Management

Planning

- Where practicable, existing roads and tracks will be used in preference to developing new tracks.
- Track development along valleys, drainage lines, dense vegetation, natural drainage systems, rough terrain, rocky outcrops, and steep slopes will be avoided.
- Mature trees will be avoided.
- Clearance of vegetation along natural drainage systems will be minimised.
- In areas that have not been cleared previously, the route will be clearly marked by flagging tape or tracked on GPS to ensure that all relevant employees and contractors know the width and location of proposed track or pad.
- Significant flora species and heritage sites will be avoided areas associated with these species will be demarcated by the Exploration Manager or delegate prior to the commencement of any work.

Mobilisation

• Clearing will be kept to a minimum required by using equipment suited to the





task.

- Access tracks will be constructed to the minimum width possible without threatening driver safety.
- Tracks will avoid unnecessary impact on natural drainage.
- Where possible, clearing will not be carried out for tracks which are intended for 'once-only use'.
- Erosion will be prevented by breaking windrows to allow drainage.
- Runoff will be directed to the surrounding vegetation and not into drainage lines.
- Deep cutting into the soil profile will be avoided.

Drill Site Preparation:

- Machines are to be free of soil and plant propagules on entry to site, and Brockman will provide instruction, supervision, and education of drill crews on environmental commitments and vegetation significance;
- All machine operators will be supervised, especially at start up, and they will understand, be familiar with and comply with all clearing conditions and specifications. Compliance with environmental conditions will be a condition of employment for contractors;
- Gridlines and tracks will be confined to one grading blade or vehicle width.
- Erosion will be minimised by avoiding long, straight tracks and gridlines, and follow contours as much as possible. Tracks will also be constructed under dry soil conditions.
- Brockman will avoid creating windrows of soil and disturbance to topsoil and root stock.
- Drill pads are to be kept to the minimum possible size required for safe and practical drilling operations.
- Drill pads will be located away from stands of mature vegetation and if possible, pads will be located in an area that requires minimal or no clearing.
- Drill pads will be situated away from drainage lines and watercourses with a suitable buffer zone established, and located to avoid direct and indirect impacts (ie. runoff, dust etc) on sensitive areas.
- Vegetation and topsoil disturbed during the site preparation will be managed in accordance with PEMP 5.2 and PEMP 5.15.
- If a side cut is necessary for drill sites that lie on sloping ground, the pad will be out-sloped to allow for water run off.
- Sump preparation procedures are documented under PEMP 8.4.

Rehabilitation

- Pads and associated tracks that are no longer required will be rehabilitated as per PEMP 5.15 within six months after the completion of drilling.
- Areas no longer in use will be scarified/ripped and access to these areas restricted.
- Prior to scarification/ripping, any cleared vegetation will be spread over the site.
- Ripping/scarifying will be carried out parallel to the natural ground contours





wherever possible.

- Drill sites and access tracks will be inspected by Department of Mines and Petroleum environment following clearing practices, and the supervisor responsible for site clearing will be communicated to regulators.
- The Exploration Manager or delegate will undertake regular inspections to ensure that tracks are established, used and maintained according to the above procedures.





8.4 SUMPS AND CONTAMINATED WATER

Potential Impacts

This procedure aims to avoid, minimise or mitigate the following impacts:

- Soil and/or water contamination;
- Fauna death and/or injury.
- **Objectives** Undertake drilling activities in a manner which minimises adverse impacts to the environment from drilling muds/fluids.

Contain and control contaminated water.

Key Performance No fauna deaths as a result of sumps.

Indicators Spill kits are located in the vicinity of all operative sumps and oily films/spills managed in accordance with PEMP 5.12 Hydrocarbon and Chemical Management.

No evidence of drilling mud/fluid runoff to undisturbed areas.

Progressive rehabilitation of dry sumps.

Regulatory and other requirements

Environmental Protection Act 1986

Refer to the relevant Program of Works

Management

Drilling Muds/Fluids

- Evaporation sumps will be constructed to collect drilling muds and fluids.
- The size of evaporation sumps will be no larger than required for the containment of drilling muds and fluids.
- If necessary, evaporation sumps will be lined with an impermeable membrane where discharge material from drilling operations contains saline water.
- Drill rigs will be fitted with containment devices to direct drilling muds/fluids to the evaporation sump.
- Drill rigs will be fitted with spill response kits for use in the event of spillage of hydrocarbons during discharge of muds/fluids.
- Mesh shade cloth (or suitable alternative) will be placed over sumps to exclude birds where oily residue is apparent.

All Sumps

- Hydrocarbon Spill kits will be located in the vicinity of all operative sumps.
- Oily films/spillage will be removed immediately from sumps in accordance with PEMP-5.12.
- Sumps will be located down slope of the activity site to ensure capture of all runoff.





- Water will be allowed to evaporate before sumps are backfilled.
- Sumps will be covered to reduce the potential for wildlife interactions.
- Stockpiled substrates will be returned in the reverse order to that of removal (subsoil first followed by topsoil).
- Sumps will be backfilled as soon as practicable but no longer than six months after drilling has ceased.
- Sump sites will be scarified and rehabilitated in accordance with PEMP-18.

- The construction of each sump will be inspected to ensure that the structure matches acceptable design parameters.
- Inspections of sumps, drainage structures and erosion control measures will be carried out as soon as possible after periods of heavy rainfall to assess structural integrity.
- Major erosion events of sumps will be reported to the Exploration Manager or delegate and remedial works undertaken.
- Drilling muds/fluids entering adjacent vegetation will be reported to the Exploration Manager or delegate.

