Spinifex Ridge Molybdenum Project

MOLY MINES LIMITED

Environmental Management Programme

August 2007

Contents

Document history and status

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Part A: Introduction and Overview

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1. Introduction

This Environmental Management Programme (EMP) has been developed by Moly Mines Australia Pty Ltd (Moly Mines) for the construction, operation and decommissioning phases of its Spinifex Ridge Molybdenum Project (Spinifex Ridge) which is located approximately 50 km north east of Marble Bar in Western Australia (53' 0.79"S, 7' 5.84"E). This plan is approved by Moly Mines and defines the minimum standards of environmental performance and management for all construction, commissioning, operational and decommissioning activities.

1.1 Scope of the Environmental Management Programme

The Spinifex Ridge Project, as outlined in the Public Environmental Review (PER), involves the development of an open pit, transport tunnel, processing plant and associated utilities, services and infrastructure to support a nominal 12 year life of mine. This EMP is a dynamic document that will be continually reviewed and updated. Currently the EMP is not designed to include:

- an extension to the 12 year life of mine beyond closure activities. Moly Mines may consider at a later date the possible extension of the life of mine to 20 years or greater. While there are indications that the ore body may support a longer life of mine, this will be dependent on the world market demand for molybdenum. If in the future Moly Mines proposes to extend the life of mine, all necessary environmental approvals, licences and permits will be sought at that time;
- downstream processing of either the molybdenum or copper concentrate products. It is possible that Moly Mines will establish a downstream processing facility to treat concentrate produced by Spinifex Ridge. Possible sites near to existing port facilities would be investigated locally within the Pilbara and also offshore. Should the preferred location for a downstream processing facility reside within Western Australia, detailed environmental and other investigations will be completed and the necessary approvals, licences and permits will be sought;
- impacts associated with the management of product at the port, shipping and consumption of products from the project; and
- end use of the products, in any form.

1.2 Objective

1.3 How to Use this Environmental Management Programme

The Spinifex Ridge operations will be undertaken in accordance with the Moly Mines' Management System (MMMS), which establishes an overall framework for the site to meet all operational requirements.

This EMP provides a specific reference document with objectives, guidelines and minimum standards of environmental performance and management for the project. The development of

this EMP has been based on a broad assessment of project environmental risks. As such, it is not intended that this EMP specify all daily activities and procedures.

Day-to-day management of activities will be achieved through the use of the work procedures and the Job Hazard Analysis (JHA) process.

Section A of this EMP provides an introduction and overview of the project. Included in this section are the underlying elements of the MMMS, including legal obligations, responsibilities, and requirements for auditing, reviewing and reporting.

Section B of this EMP provides the individual Environmental Management Plans (EM Plans) detailing management strategies for each identified environmental aspect.

In addition to this document, additional task/issue specific procedures will be developed where required.

1.4 Environmental Management Programme Background

This EMP document outlines environmental issues that have been identified for the Spinifex Ridge site and the management actions that have been developed to address these issues

This EMP applies to all mining, processing and associated activities undertaken by Moly Mines, including contractors and consultants on all valid Pilbara tenements.

The management plans in this document will be regularly reviewed (at least annually) and updated to ensure that each plan is effective in adequately addressing identified issues and reflects changing expectations and knowledge over time.

The MMMS has been developed to be consistent with the requirements of ISO 14001:2006, the international standard for environmental management systems.

In writing of the EMP and the EM Plans consideration was given to the requirements stated in the Department of Environment and Conservation (DEC) draft guidelines "*Compliance Monitoring – Guidelines for Proponents"* (DoE, 2005).

As part of the site management systems a comprehensive review of the operations will be undertaken to assess all environmental aspects and impacts and determine the risk posed by each. The continual improvement process required by the management system will ensure improvement actions will be assigned and monitored for higher risk aspects.

2. Project Background

Spinifex Ridge is a mining and processing project in the Pilbara which will produce molybdenum and copper concentrate products for export. The project will use conventional open pit mining and metallurgical processing techniques.

The main components of the project include:

- open cut pit;
- waste landforms;
- crushing facilities;
- conveying and access tunnel through Spinifex Ridge;
- process plant;
- tailings storage facility;
- administration, office and storage buildings;
- workforce accommodation camp (375 person);
- airstrip;
- access and internal service roads including through Kitty's Gap;
- water supply borefield and pipeline; and
- establishment of a 500 GWh/a onsite gas power plant with reciprocating engines.

The key characteristics of the project are shown in Table 1.

Table 1 Key Characteristics of the Spinifex Ridge Project

Element	Characteristics
Nominal Mine life	12 Years
Manpower	375 including contractors
Capital cost	A$600 – A$700 M
Total footprint	Approx. 1650 ha
Construction commencement	Q1 2008
Commence production	June 2009
Strip ratio	1:1.2 excluding 40Mt pre strip
Final depth of pit	Approximately 400 m from creek level
Treatment rate	Nominal 15 Mtpa (with potential 15% debottlenecking)
Mo concentrate production	Average 17 000 tpa (max ~25,000t)
Cu concentrate production	Average 36 000 tpa
Power requirements	500 GWh/a
Water requirements	15 GL/yr
Processing plant	Secondary and tertiary crushing, grinding and milling circuit, float and leach circuits
Tailings storage facility	660 ha circular TSF

2.1 Environmental Impact Assessment and Approvals

Prior to initiating the environmental impact assessment process, Moly Mines submitted a referral document (in the form of a Project Definition Document (PDD) to the Office of Development Approvals Coordination (ODAC) on 26 July 2006. The PDD was reviewed by the Inter-Agency Implementation Group, which comprises representatives from the Environmental Protection Authority (EPA) Services Unit (representing the EPA), the DEC, and the Departments of Consumer and Employment Protection (DoCEP), Health (DoH), Indigenous Affairs (DIA), Industry and Resources (DoIR), and Planning and Infrastructure (DPI). Following the review by the Inter-Agency Implementation Group, the amended PDD was formally referred to the EPA on 22 August 2006.

On 9 October 2006, the EPA determined the level of assessment for this project at the PER level with a six week public review period. This is a formal approval process that requires community consultation and a public review of the PER document. This level of assessment also required Moly Mines to prepare an Environmental Scoping Document to outline the project characteristics; the environmental setting of the project area; potential environmental impacts; the environmental studies proposed to investigate the significance of the impacts; and, preliminary management strategies.

In 2005, Moly Mines referred the Spinifex Ridge Project to the Commonwealth Department of Environment and Water Resources (DEW) under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the presence of protected fauna within the project area (Moly Mines, 2006). The fauna species protected under the EPBC Act that have been identified to occur within the project area include the:

- Northern Quoll (*Dasyurus hallucatus*) – endangered.
- Orange Leaf-nosed Bat (Pilbara Form) (*Rhinonicteris aurantius*) – vulnerable.
- Rainbow Bee-eater (*Merops ornatus*) – migratory species listed under international agreements.

The fauna species protected under the *EPBC* Act that have the potential to occur within (or in the case of some avian species, to overfly) the project area include:

- Mulgara (*Dasycercus cristicauda*);
- Pilbara Olive Python (*Liasis olivaceus barroni*);
- Fork-tailed Swift (*Apus pacificus*) – aerial flyover species;
- Common Sandpiper (*Tringa hypoleucos*) – migratory species listed under international agreements;
- Marsh Sandpiper (*Tringa stagnatilis*) – migratory species listed under international agreements;

- Common Greenshank (*Tringa nebularia*) – migratory species listed under international agreements;
- Snipe (*Gallinago* sp) – migratory species listed under international agreements; and
- Great Egret *(Ardea alba*) – migratory species listed under international agreements.

Although no migratory waders and/or waterbirds listed on JAMBA and CAMBA were recorded during the surveys at Spinifex Ridge, some species have been recorded at the Goldworthy extension sites within persistent waterbodies. Waterbirds and migratory waders are also likely to utilise the De Grey River, approximately 25 km to the north of the project area. Although the watercourses of the project area are not ideal wader habitat, some of these species may occur from time to time, particularly after flooding events during the summer months. Species known from the region include Common Sandpiper *(Tringa hypoleucos),* Marsh Sandpiper *(Tringa stagnatilis),* Common Greenshank *(Tringa nebularia),* Snipe (*Gallinago* sp.*)* and the Great Egret *(Ardea alba).*

On 29 November 2006, the delegate for the Commonwealth Minister for Environment and Heritage determined that the project was a "*controlled action*" based on potential impacts to listed threatened species and communities and to listed migratory species. The Commonwealth agreed to assess the proposal under the bilateral agreement between the Australian Government and the Western Australian Government under section 45 of the *EPBC* Act. This effectively accredits the PER process to meet the Commonwealth assessment requirements.

3. Environmental Policy

Moly Mines is committed to minimising the environmental impact of their operations and to continually improve upon their environmental performance. The company environmental policy provides a framework for all company operations.

MOLY MINES LIMITED

ENVIRONMENTAL POLICY

Moly Mines is an independent Australian resource company focused on the exploration and development of major speciality, base and precious metals projects. We are committed to minimising the environmental impact of our operations and to continually improving our environmental performance.

To accomplish this, Moly Mines will:

- Ensure compliance with all environmental laws, regulations and other requirements as the minimum standard for its management practices.
- Identify activities with the potential to have an environmental impact and to implement management measures to address associated risks.
- Establish annual environmental objectives and targets designed to facilitate continual improvement of the operations.
- Pursue positive co-operative relationships with government agencies that regulate its business.
- Operate in accordance with management systems that include procedures, processes and standards designed to protect the environment.
- Train employees and contractors to a standard where they are capable of meeting their individual responsibilities and those of the company.
- Implement an audit and monitoring program to measure environmental performance, and where necessary make improvements to practices and performance.
- Consult with stakeholders, particularly the local community.
- Promote the efficient use of resources, including the reuse and recycling of goods.
- Promote the concept that sound environmental management is a shared responsibility between the employer and employee.

DEREK FISHER
Managing Director

March 2007

Note: This Policy is subject to periodic review
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Compliance with the policy is the responsibility of all employees and contractors of Moly Mines.

4. Planning

4.1 Identification of Environmental Aspects

A key component of this document is the issue specific environmental management plans. The development of the Spinifex Ridge Project will be conducted in a manner that will minimise impacts on the surrounding biophysical and social environments. Specific management commitments have been identified through the environmental impact assessment process. These commitments are concerned with the following aspects of the project:

- Flora and Vegetation.
- Fauna.
- Groundwater.
- Surface Water and Drainage.
- Coppin Gap.
- Mine Closure.

Prior to commencing construction and commissioning activities on site, environmental risk workshops will be held to review the operations and assess the risks associated with activities to be undertaken. Where appropriate, the EMP or specific EMPs will be modified based on the risk assessment process.

4.2 Legal and other Requirements

Moly Mines has committed to ensuring compliance with all laws, regulations and other requirements as a minimum standard. A summary of statutory requirements and other obligations applicable to the environmental management for the construction, operation and decommissioning of the Spinifex Ridge Molybdenum Project is provided below.

4.2.1 Ministerial Conditions

Once the project has been assessed and approved by the State and Commonwealth Minster for the Environment any Ministerial Conditions which arise from these processes will be incorporated into Moly Mines' EMP.

4.2.2 Relevant Legislation

Aside from gaining environmental approval, the project is also required to comply with other legislation and regulations applicable to construction and operational activities. A summary of key environmental State legislation and regulations considered for the project is provided in **Table 2** and relevant Federal legislation and regulations are contained in **Table 3**.

Table 2 State Legislation

Statute / Regulation	Application	Administrator
Aboriginal Heritage Act 1972	Protects Aboriginal places and objects of cultural and/or spiritual significance from disturbance.	Department of Indigenous Affairs
Bush Fires Act 1954	Manages fire safety including prevention, control and extinguishment of bush fires.	Fire and Emergency Services Authority of Western Australia.
Conservation and Land Management Act 1984	Regulates the use, protection and management of nature reserves, state forest, and marine parks including the flora and fauna within these areas.	Department of Environment and Conservation
Contaminated Sites Act 2003	Regulates the identification, recording, management and remediation of contaminated sites.	Department of Environment and Conservation
Contaminated Sites Regulations 2006	Provides forms for reporting known or suspected contaminated sites, a process for requesting public access to information, matters incidental to the formation of the Contaminated Sites Committee and matters concerned with the accreditation, functions and powers of auditors.	Department of Environment and Conservation
Dangerous Goods (Transport) Act 1998	Provides guidance for the safe transport of dangerous goods by vehicles.	Department of Consumer and Employment Protection
Dangerous Goods (Transport) (Dangerous Goods in Ports) Regulations 2001	Provides guidance on the handling and transport of dangerous cargo.	Department of Consumer and Employment Protection
Environmental Protection Act 1986	Provides guidance for the prevention, control and abatement of pollution; and for the conservation, protection, enhancement and management of the environment.	Department of Environment and Conservation
Environmental Protection Regulations 1987	Provides guidance on the control of pollution and monitoring. Regulates landfill levies, penalties and infringements.	Department of Environment and Conservation
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Provides procedures and protocols for clearing native vegetation for mining, for infrastructure maintenance and within existing transport corridors.	Department of Environment and Conservation
Environmental Protection (Controlled Waste) Regulations 2004	Provides procedures and protocols for the generation, transport and disposal of 'controlled waste'.	Department of Environment and Conservation
Environmental Protection (Noise) Regulations 1997	Provides guidance on noise limits and methods for noise assessment and control.	Department of Environment and Conservation
Explosives and Dangerous Goods Act 1961	Regulates the import, manufacturing, classification, storage, sale and use of explosives and dangerous goods.	Department of Consumer and Employment Protection
Explosive and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992	Regulates the management and handling of dangerous goods including packaging, labelling and storage.	Department of Consumer and Employment Protection

Statute / Regulation	Application	Administrator
Heritage of Western Australia Act 1990	Provides for the conservation of places which are of significance to the cultural heritage of the State and for the establishment of the Heritage Council of Western Australia.	Heritage Council of Western Australia
Health Act 1911 and Regulations	Provides regulation for the protection of public health e.g. sewage disposal	Department of Health
Mines Safety and Inspection Act 1994	Covers occupational health and safety issues	Department of Industry and Resources
Mines Safety and Inspection Regulations 1995	Covers occupational health and safety issues	Department of Industry and Resources
Mines Safety and Inspection Amendment Regulations 1996	Covers occupational health and safety issues	Department of Industry and Resources
Native Title (State Provisions) Act 1999	Provides alternative provisions to the *Commonwealth Native Title Act 1993*.	Department of Treasury and Finance
Rights in Water in Irrigation Act 1914	Provides guidance on the ownership, use, protection, regulation and management of water resources.	Department of Water
Soil and Land Conservation Act 1945	Provides guidance on the conservation of soil and land resources including mitigation of the effects of erosion, salinity and flooding. Prevents disturbance to soil without authority.	Department of Agriculture and Food
Soil and Land Conservation Regulations 1992	Regulates the draining or pumping of water from land, primarily due to salinity.	Commissioner of Soils and Land Conservation
Waterways Conservation Act 1976	Provides guidance on the conservation and management of water and the associated land and environment.	Department of Environment and Conservation
Wildlife Conservation Act 1950	Provides for the conservation and protection of native, rare and endangered flora and fauna.	Department of Environment and Conservation

Table 3 Commonwealth Legislation and Guidelines

Statute / Regulation	Application	Administrator
ANZECC Guidelines for Fresh and Marine Water Quality 2000	Outlines water quality guidelines and management framework for natural and semi-natural marine and fresh water resources.	Department of Environment and Water Resources
Australian Heritage Commission Act 1975	Identifies areas of national heritage significance	Australian Heritage Commission
Environment Protection and Biodiversity Conservation Act 1999	Protects matters of national environmental significance	Department of Environment and Water Resources
Environment Protection and Biodiversity Conservation Regulations 2000	Regulates the administration and management of matters of national significance.	Department of Environment and Water Resources
National Environmental Protection (Assessment of Site Contamination) Measure 1999	Provides national framework for the assessment of site contamination including assessment principles and reporting requirements.	Environment Protection and Heritage Council
National Greenhouse Strategy	Outlines the national strategy for limiting	Department of

Statute / Regulation	Application	Administrator
1998	net greenhouse gas emissions and adapting to climate change.	Environment and Water Resources Australian Greenhouse Office
Water Quality Targets Online 2002	Provides specific water quality targets for general Australian regions and types of water bodies (including marine onshore and offshore). Includes a series of indicators that can be used to monitor water quality.	Department of Environment and Water Resources

Note: Legislation changes periodically and the above should not be relied upon as a complete list.

4.3 Objectives and Targets

As part of the project planning process, objectives and targets will be established for the Spinifex Ridge operation. These objectives and targets will form part of the overall annual business planning process. Progress against objectives and targets will be regularly reviewed, typically on a quarterly basis.

4.4 Management Plans

Six issue specific EM Plans have been developed for the Spinifex Ridge project, based on a preliminary assessment of the key environmental issues. These EM Plans are:

- Flora and Vegetation Management Plan.
- Terrestrial Fauna Management Plan.
- Groundwater Management Plan.
- Surface Water and Drainage Management Plan.
- Coppin Gap Management Plan.
- Conceptual Mine Closure Management Plan.

These EM Plans will be reviewed and updated as appropriate. Other EM Plans will be developed where required e.g. if risk assessment processes indicate a level of risk for an issue that requires more formalised management.

The system elements of the EMP including the individual EM Plans are structured so as to take into account the requirements of the DEC (Draft) *Compliance Monitoring – Guidelines for Proponent*, (DoE, 2005). The individual management plans ensure that all of the following information is addressed.

Element/Issues - the aspect of the project or component of the environment that are to be managed (e.g. surface water, terrestrial fauna).

Current – provides a background to the particular issue in relation to the project and a summary of potential impacts and issues that may arise from that particular environmental factor, if not managed appropriately.

Objectives – details the aim of the management plan and provides a summary of any environmental outcomes which are targeted for the successful management of the environmental aspect of interest.

Relevant Legislation, Regulations and Performance Indicators – legislation relevant to the environmental aspect and any relevant criteria or indicators that will be used to track progress in achieving the objectives. These include possible indicators such as ANZECC water quality criteria, Australian Standards and regulatory standards.

Contingency Actions – the mechanisms for identifying actual and apparent non-conformance with the EMP will be detailed. Any actions that may occur if non-conformances are identified will be included in the 'Management Actions Table'.

Implementation Strategy/Management Actions – a concise table of management actions that will be implemented to achieve the agreed environmental objectives, so as to ensure that environmental impacts are minimised. This section also includes the timing of the activity and the delegated responsibility for the task.

5. Implementation and Operation

5.1 Roles and Responsibilities

All employees, including contractors, are required to work in accordance with the MMMS. Certain key personnel, including the Resident Manager, will have the responsibility of ensuring that management tasks are undertaken to a satisfactory standard and that all personnel are aware of their responsibilities with respect to environmental matters. The organisational chart (**Figure 1**) indicates the management structure and the linkages between the various levels.

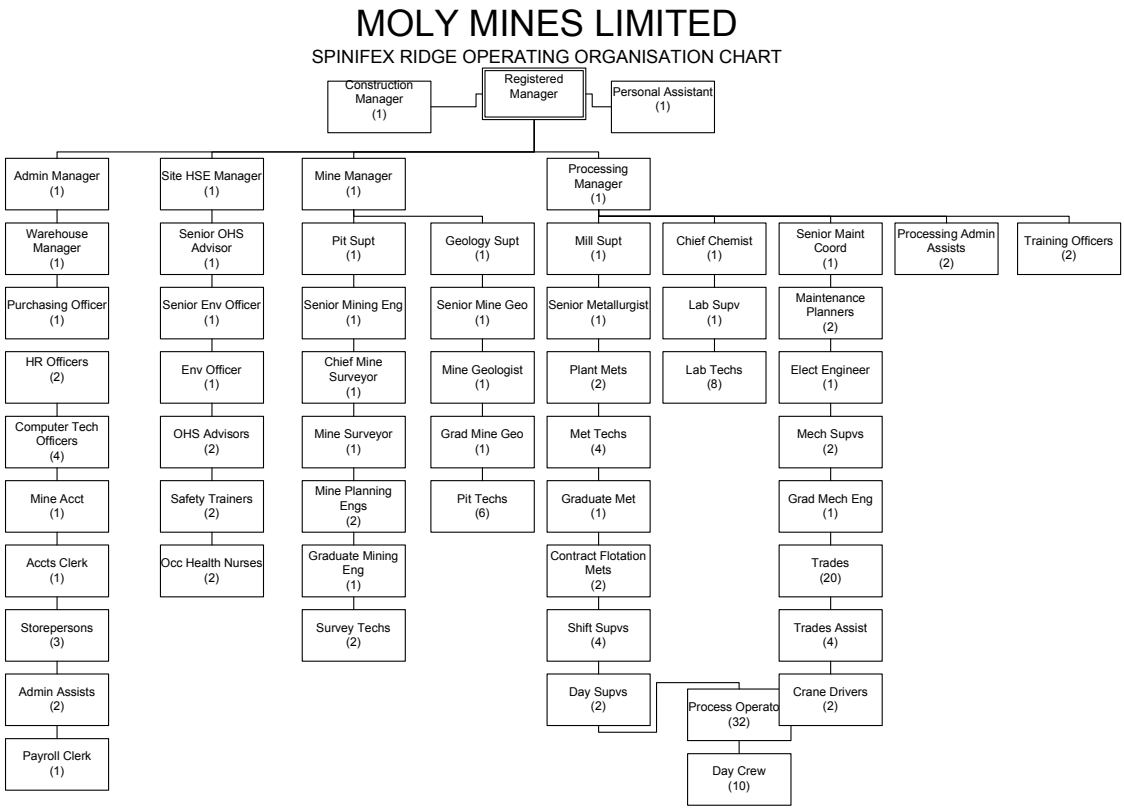

Figure 1 Moly Mines' Operating Organisational Chart

The roles and responsibilities of the key personnel, in relation to environmental performance, are detailed below.

Resident Manager

The Resident Manager reports to the Moly Mines Corporate General Manager. Specific responsibilities of the Resident Manager related to environmental performance include:

- Implementing the EMP and appropriate elements of the environmental management system.
- Communicating effectively.

- Providing sufficient resources to manage environmental aspects.
- Providing effective management and control of environmental risks from design through to installation.
- Timely and accurate reporting to the Board and stakeholders, including monthly reports and incident reports.
- Achieving agreed project outcomes and objectives.
- Capturing and disseminating lessons learnt.

Processing Manager

The Processing Manager reports to the Resident Manager and is responsible for environmental performance in the processing aspects of the project. The Processing Manager is responsible for the following:

- Providing sufficient resources to manage environmental aspects.
- Participating in environmental incident investigations related to their particular team or as appropriate.
- Communicating effectively.
- Overall leadership and co-ordination of all processing activities and interfaces with contractors.
- Confirming environmental and safety-in-design requirements are incorporated in design of processing equipment.
- Undertaking inspections of the areas within their immediate area of responsibility.
- Confirming relevant permits are in place prior to the commencement of work.
- Reviewing JHA forms on their presentation.
- Participating in environmental risk workshops.
- Final approval of design to ensure that contract requirements, including environmental design criteria are met.
- Preparing and issuing change notices to the HSE Manager for consideration and approval.
- Timely and accurate reporting to the Resident Manager, including monthly reports and incident reports.
- Attending the Site HSE Committee meetings.

Mining Manager

The Mining Manager reports to the Resident Manager for environmental performance in the mining aspects of the project. The Mining Manager is responsible for the following:

- Planning and directing the work to ensure compliance with the EMP.
- Communicating effectively

- Participating in environmental incident investigations related to their particular team or as appropriate.
- Undertaking inspections of the areas within their immediate area of responsibility.
- Reviewing all mining area related JHA forms on their presentation.
- Confirming relevant permits are in place prior to the commencement of work.
- Preparing and issuing change notices to the HSE Manager for consideration and approval.
- Attending the Site HSE Committee meetings.
- Participating in environmental risk workshops.
- Preparing and issuing change notices to the HSE Manager for consideration and approval.
- Timely and accurate reporting to the Resident Manager, including monthly reports and incident reports.

Health Safety and Environment Manager

The Health Safety and Environment (HSE) Manager reports to the Resident Manager and is responsible for the following:

- Facilitation and management of environmental studies.
- Facilitating the stakeholder consultation program, including consultation with DEC and other interested parties.
- Preparation of documentation required to obtain environmental approvals.
- Ongoing tracking of progress of environmental approval processes.
- Management of the EMP.
- Assistance in implementation of the EMP for design, construction, commissioning, operation and decommissioning activities, including facilitation of risk workshops, development of site induction material, auditing and induction processes.
- Development of management system documentation.
- Supporting community consultation processes.
- Statutory reporting.
- Providing advice on environmental matters to the Resident Manager and site management teams.
- Monitoring quality of JHA forms for compliance with EMP requirements.
- Undertaking inspections of the areas within their responsibility.
- Conducting identified training where required.
- Providing project environmental performance statistics monthly to the Resident Manager.
- Attending the monthly Site HSE Committee meetings.

Administration Manager

The Administration Manager reports to the Resident Manager and is responsible for environmental performance in the administration aspects of the project. The Administration Manager is responsible for the following:

- Managing the site induction process.
- Assisting with the investigation of all reportable incidents.
- Tracking and managing of corrective actions from audits, inspections, incidents and community contacts.
- Maintenance of site training records.
- Maintaining the environmental incident reporting system.
- Change management (schedule, cost, organisational, technical).
- Establishing and maintaining a site documentation and correspondence filing system.

All Personnel

All personnel are responsible for:

- Reporting all environmental incidents.
- Following the EMP and associated management plans.
- Complying with written work procedures where they exist.
- Undertaking and participating in risk assessment processes that include consideration of potential environmental impacts.
- Maintaining a high standard of housekeeping at all times.
- Preparing and presenting JHA forms, where appropriate.

5.2 Training, Awareness and Competence

5.2.1 Site Induction

Prior to entering the Moly Mines' Spinifex Ridge site, personnel will be required to complete specified inductions and training related to their tasks, scope of work and duration of intended stay on site. All personnel are classified into two categories, namely:

Project Visitors – those personnel intending to visit the project site for a period of less than 12 hours (one shift) and not undertake any physical work activity.

Project Personnel – all personnel required to work at the project site for a period of more than 12 hours.

The site induction is used for many purposes. With respect to environmental matters, the induction will aim to make inductees aware of:

- the presence of relevant obligations;
- commitments made in the EMP and associated management plans;

- Ministerial conditions;
- legislation and regulations;

- clearly identify the site boundary and any relevant Moly Mines' requirements that may affect onsite work.
- introduce the site HSE personnel;
- reinforce awareness of the presence of the EMP and its objective of providing guidance for complying with the above obligations;
- describe key issues and management strategies, as outlined in the EMP;
- highlight the responsibility of all personnel for implementing the EMP;
- outline the process for reporting environmental incidents;
- describe reporting requirements, internal and external audits and corrective actions; and
- make inductees aware of the potential penalties or consequences for non-conformances to specified management tasks, regulations, commitments and other obligations.

5.2.2 Employee Training

Each permanent position (including contractor positions) will have HSE training requirements identified. A training schedule will be developed and implemented to ensure each employee will be trained against the position requirements in a timely manner.

5.3 Communication

5.3.1 Internal

To ensure that a high level of environmental awareness is maintained within the workforce, a number of communication tools will be used throughout the life of the project. These are described in the sections below.

5.3.2 HSE Incident Reports

An incident report will be used to capture all incidents on site. The information contained within the Incident Reports will be communicated to various contractor groups through HSE meetings and the HSE notice boards.

A copy of all HSE incident reports will be forwarded to Moly Mines' HSE Manager. Any significant incident must be notified by the HSE Manager to Moly Mines' Resident Manager by phone as soon as practical.

5.3.3 HSE Notice Boards

Each work area is required to provide and maintain notice boards displaying current HSE information relevant to their work group. The notice boards will be located in a prominent position in each work area's designated amenity area.

5.3.4 Meetings

Regular HSE meetings will be convened to assist in the communication of environmental information including potential environmental issues, environmental initiatives and environmental programs. These meetings will take the form of:

- Pre-start meetings.
- Toolbox meetings.
- Monthly HSE Committee meetings.

The purpose of all meetings is to assist in the communication of HSE information within the workforce.

5.3.5 Monthly Reports

Monthly project reports will include a summary of main activities for the period, non-compliances, corrective actions, environmental incidents, compliance to management plans, and environmental performance of individual work areas against key environmental objectives and targets. Evidence, in the form of incident reports, photographs, and waste tracking data will be included, where appropriate.

Some of the specific information required to be reported in the monthly report will be monitoring data such as waste volumes, water use, inspection reports, incident reports and corrective actions.

Monthly reports will be developed by each area manager and the HSE Manager.

5.3.6 External

Moly Mines has developed a stakeholder consultation plan for the Spinifex Ridge Project that identifies the key stakeholders and triggers for both scheduled and routine consultation, including quarterly community meetings in the town of Marble Bar. Moly Mines is committed to continuing consultation throughout the life of the project and into post-closure. Stakeholders are inherently important, providing valuable input to develop and implement acceptable completion criteria for mine closure.

The key stakeholders for the project are presented below.

Federal Government Departments

Department of Environment and Water Resources

State Government Departments

Department of Environment and Conservation
Main Roads Western Australia
Office of Development Approvals Co-ordination
Department of Planning and Infrastructure
Department of Industry and Resources
Department of Health
Department of Indigenous Affairs
Department of Water

Local Government Authorities

Shire of East Pilbara
Town of Port Hedland

Non-Government Organisations

Care for Hedland Environmental Association
Conservation Council of Western Australia
Wildflower Society of Western Australia

Indigenous Stakeholders

Pilbara Native Title Service
Njamal People

Other Stakeholders

Pilbara Development Commission
Yarrie/ Muccan Station
Oakover Gold
Dampier Port Authority
Warrawagine Station
Port Hedland Port Authority
Marble Bar Police
Marble Bar Community
Muccan Minerals

5.4 Records and Document Control

5.4.1 Document Control

A comprehensive document control system will be developed and implemented to efficiently manage relevant documentation essential for the implementation of the project.

The document control system will apply to documents relating to the environmental management of the site.

5.4.2 Records

Records include:

- incident reports;

- audit results;
- training records;
- information on significant aspects;
- monitoring, inspection, calibration and maintenance records;
- management system reviews; and
- correspondence with regulatory bodies.

These records will be managed to protect against damage, deterioration and loss. Copies of all incident reports and audit results will be provided to the Resident Manager, all other records will be available for review if requested.

5.4.3 Emergency Response and Preparedness

Emergency response capability will be developed and maintained on site. An Emergency Response Plan will be developed and a detailed response will be provided for identified high risk emergency situations.

6. Checking and Corrective Action

6.1 Monitoring and Measurement

Monitoring and measurement activities will include:

- Auditing – as described in **Section 6.3.**
- Inspections – Regular inspections will be conducted by the various site personnel. Inspection items will include but are not limited to the following:
  - Performance of dust control measures;
  - Performance of noise control measures; and
  - Litter and general waste management within and around the site.

  Contractors must also perform ongoing performance inspections.
- Environmental Monitoring - Monitoring tasks for dust, noise, water (quantity) and waste (quantity) are described in the specific environmental management plans.

6.2 Non-conformance Reporting and Corrective/Preventative Action

A non-conformance could be identified through inspections, environmental auditing processes and will be managed through the incident reporting system. The incident reporting process is described in **Section 6.2.1** and the auditing processes are described in **Section 6.3**. The HSE Manager will track and manage corrective actions resulting from environmental incidents, community complaints and audits during the life of the project.

6.2.1 Incident Reporting

An environmental incident is an event or incident that negatively impacts, or has the potential to negatively impact, on the surrounding environment (air, water and land). Examples of environmental incidents which must be reported are:

- spills of hydrocarbons (greater than 20L);
- excessive generation of dust;
- excessive noise onsite;
- nuisance odour;
- an incident resulting in fire;
- injury to fauna;
- unapproved waste disposal;
- excessive water use; and
- monitoring results higher than prescribed limit.

All incidents are to be reported on the Moly Mines' incident reporting system.

Incident reports will be used to summarise details and corrective/preventative actions relating to environmental incidents.

Internal and external complaints will be raised as an incident report. Incident reports will record corrective and preventative actions. Investigations must be carried out promptly and corrective/preventative actions identified.

6.3 Auditing

Auditing is required to ensure that all management tasks, commitments and other obligations are being implemented and adhered to. In particular, auditing will focus on compliance with:

- Licence Conditions
- Ministerial Conditions.
- Mining Proposal conditions.
- Specific management system requirements and management plans (project EMP, and Contractor EMPs).

6.3.1 Internal Audits

A trained environmental professional will undertake internal compliance audits. **Table 4** lists the minimum internal auditing that will be undertaken for the project. Additional internal audits may be undertaken at Moly Mines' discretion.

Table 4 Minimum Internal Auditing

Audit Element	Audit Protocol	Timing	Responsible
Construction Phase			
Compliance (with Ministerial Conditions and Mining Proposal Conditions)	Construction phase actions in DEC audit table	During construction	Moly Mines
Operation Phase			
Compliance (with Ministerial Conditions Licence Conditions and Mining Proposal Conditions)	Operational phase actions in DEC audit table	Annually	Moly Mines
Decommissioning Phase			
Compliance (with Ministerial Conditions and Mining Proposal Conditions)	Decommissioning phase actions in DEC audit table	End of decommissioning	Moly Mines

A tailored audit protocol will be developed prior to each particular audit.

Corrective actions will be implemented as required after the audits to ensure future compliance of the project.

7. Management Review

Optimal environmental performance is achieved through continual revision of the EMP by auditing and implementation of corrective actions.

Amendments to the EMP may be made because of changes to the project, construction or operational experience, new initiatives in environmental management or changes in Regulations. The EMP will be reviewed at key stages of the project (e.g. prior to commissioning) based on requirements from the annual planning process; review of incidents and audits; legislative changes; and review of monitoring results.

7.1 Making Changes to the EMP

Moly Mines' Resident Manager and the HSE Manager must endorse any proposed changes to the EMP. Relevant decision making authorities will also be consulted and/or notified where required.

Part B: Specific Management Plans

Introduction

This section of the EMP details the key implementation tasks relevant to each of the significant environmental aspects. The information detailed in the following sections does not repeat the system elements included in **Section A** of this EMP (e.g. training, incident reporting etc). Each environmental management plan contains the following subsections:

- background;
- objectives;
- relevant legislation (guidelines and performance indicators); and
- management actions.

This document is intended for use during the construction, commissioning, operation and decommissioning phases of the Moly Mines' Spinifex Ridge Project. Management strategies have been identified through the development of the PER submitted to government. A Construction Risk Assessment Workshop and, prior to commissioning, a Commissioning Risk Assessment Workshop will identify additional management strategies, that may be required to address environmental issues.

The strategies identified in this section should be considered minimum requirements.

1. Flora and Vegetation Management Plan

1.1 Background

Impacts currently affecting vegetation communities over the project area include altered fire regimes, grazing by introduced herbivores, and weed invasion. Some sections of Coppin Creek, particularly those upstream of the proposed pit have been impacted by grazing. As a result bank erosion and Buffel Grass (*Cenchrus ciliaris*) are widespread within the creek. Currently minor clearing due to the ongoing drilling programme and for vehicle tracks has been undertaken. Cattle grazing also occurs across the project area.

The proposal will result in approximately 1,650 ha of vegetation clearing required to accommodate the operations footprint. In order to minimise disturbance to vegetation, all areas of vegetation to be cleared will be clearly defined on maps and delineated in the field. All clearing activities will be supervised. Where possible, existing access tracks will be utilised, and widened if required, across the operations to limit unnecessary clearance of vegetation.

Overall vegetation condition over the project area was rated from 'very good' to 'excellent' using a standard condition scale, with some areas such as the upper slope (mesic area) of the Talga Range considered 'pristine'.

Disturbance and potential hydrological changes due to the Coppin Creek diversion and pit de-watering have the potential to impact phreatophytic (groundwater using) flora such as eucalypts and melaleucas. Avoidance and mitigation of hydrological impacts to surface water and groundwater are discussed in the Surface Water Management Plan (SWMP) and the Groundwater Management Plan (GWMP).

There are no listed Threatened Ecological Communities (TEC) in or within close proximity to the project area or associated infrastructure corridors and borefields and no Declared Rare Flora (DRF) or Priority Flora have been identified during floristic surveys.

Potential impacts of the operations on flora and vegetation include:

- direct clearance or disturbance of vegetation and flora;
- alterations to hydrology;
- effects of dust;
- potential to introduce or facilitate the establishment of weeds and exotic species;
- reduction of habitat connectivity; and
- secondary impacts (e.g. off-road vehicles and changed fire regime).

1.2 Objectives

Objectives for the management of terrestrial flora and vegetation are as follows:

- Minimise removal of native and screening vegetation.
- Maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.
- Protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act 1950*.
- Protect flora listed under the *EPBC* Act.

1.3 Relevant Legislation

The following legislation, documents, guidelines, regulations and performance indicators are applicable to this management plan:

- *Wildlife Conservation Act* 1950.
- *Environment Protection and Biodiversity Conservation Act* 1999.
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.
- *Conservation and Land Management Act* 1984.
- *Soil and Land Conservation Act* 1945.
- *Agriculture and Related Resources Protection Act* 1976.
- EPA Guidance Statement No. 6: *Rehabilitation of Terrestrial Ecosystems* (2006).
- EPA Guidance Statement No 51: *Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia* (2004).
- EPA Position Statement No 2: *Environmental protection of native vegetation in Western Australia* (2000).
- EPA Position Statement No. 3: *Terrestrial biological surveys as an element of biodiversity protection* (2002).
- EPA Position Statement No. 5. *Environmental Protection and Ecological Sustainability in Rangelands in Western Australia* (2004).
- EPA Position Statement No. 7. *Principles of Environmental Protection* (2004).
- EPA Position Statement No. 9. *Environmental Offsets* (2006).

1.4 Management Actions

Table 5 Flora and Vegetation Management Actions

Ref	Management Actions	Timing	Delegated Responsibility
Direct Clearance			
FVMP 1.	All clearing will require completion of an internal "Permission to Clear" permit that will include prompts to minimise clearing and ensure clearing is undertaken in accordance with environmental approvals.	Construction – prior to clearing	Resident Manager

FVMP 2.	Use existing roads where available for the alignment of the service corridors	Construction	Resident Manager
FVMP 3.	Position waste landforms and TSF at least 750m from riverine sections of the project area	Construction	Mining Manager
Rehabilitation			
FVMP 4.	Mulch vegetation and re-use mulched material where appropriate	Construction	Resident Manager
FVMP 5.	Undertake progressive rehabilitation of disturbed areas.	Construction and Ongoing	Resident Manager and HSE Manager
FVMP 6.	Develop site specific rehabilitation completion criteria in consultation with key stakeholders.	Pre-construction	HSE Manager
FVMP 7.	Store and utilise topsoil and propagules sourced from the cleared areas along Coppin Creek as the basis for establishing similar vegetation along the newly created diversion channel.	Construction	HSE Manager
Altered Hydrology (also see Groundwater and Surface Water Management Plans)			
FVMP 8.	Where disturbance is unavoidable to minor drainage lines install culverting to maintain surface water flows.	Construction and Ongoing	Resident Manager
FVMP 9.	Implement a phreatophytic vegetation monitoring programme that will facilitate the detection and minimisation of deleterious impacts associated with dewatering operations.	Operation	HSE Manager
FVMP 10.	Implement a comprehensive bi-annual ecological monitoring program to assess the health of riparian vegetation downstream of the diversion channel. The program will include strategies to differentiate between impacts attributable to the proposal and those associated with natural variability.	Construction and Operation	HSE Manager
FVMP 11.	Implement contingency plans detailed in Section 1.6 if monitoring results reveal that drawdown is affecting riparian vegetation.	Operation	HSE Manager
Dust			
FVMP 12.	Water tankers will water construction areas, haul roads, unsealed roads and any areas which have the potential to produce dust.	Construction and Ongoing	Mining Manager
FVMP 13.	Fit water sprays to the primary crusher, conveyor and stockpile feed points	Construction and Operation	Processing Manager
FVMP 14.	Store and load concentrate within an enclosed facility	Operation	Processing Manager
FVMP 15.	Use covered trailers on transport trucks (for copper concentrate) and shipping containers (for molybdenum)	Operation	Resident Manager
FVMP 16.	Speed limits will be established and enforced on un-sealed surfaces.	Construction and Operation	Resident Manager
Weeds and Exotic Species			
FVMP 17.	Disturbance areas will be progressively rehabilitated to avoid colonisation of weed species	Construction and Ongoing	Resident Manager
FVMP 18.	Weed management procedures will be developed which outline vehicle hygiene requirements for new equipment to site, reporting of identified weed populations, weed control processes and restriction of vehicle movement.	Construction and Ongoing	HSE Manager
FVMP 19.	Topsoil and mulch containing known weed species shall	Construction	HSE Manager

	be stored and utilised separately.	and Ongoing	
FVMP 20.	All Moly Mines employees and contractors shall undergo a site induction to reinforce awareness of procedures and measures in place to prevent and control the spread of weed species.	Construction and Operation	HSE Manager
Secondary Impacts			
FVMP 21.	Driving will be restricted to designated access and haul roads and off-road driving will be prohibited.	Construction and Ongoing	Resident Manager
FVMP 22.	Areas containing vegetation or flora of local significance will be identified and access to these areas will be regulated	Construction and Ongoing	HSE Manager
FVMP 23.	Fire management will be based upon fire exclusion within the project area. A regional approach will be adopted to fire management and suppression in liaison with neighbours, including the local pastoralist, DEC, and FESA.	Construction and Ongoing	HSE Manager

1.5 Monitoring

Monitoring methodologies for the Coppin Creek riparian system will be established based upon previous work undertaken during baseline studies. On completion of the diversion an annual monitoring program will be implemented to assess the health of downstream riparian vegetation. The program will incorporate phreatophytic vegetation monitoring which will facilitate the detection and minimise any deleterious impacts which may be associated with dewatering operations.

De Grey Borefield

Monitoring methodologies for the De Grey Borefield will be established. A bi-annual monitoring program will be implemented to assess the health of riparian and phreatophytic vegetation.

1.6 Contingency Plans

Project Area

If monitoring reveals that water levels at Coppin Gap are affected by the de-watering of the pit or that riparian vegetation is being impacted, appropriate strategies to minimise the impacts of drawdown will be considered, such as:

- Artificially maintaining the water levels at the Coppin Gap by the addition of appropriate, high-quality water.
- Artificially recharging the upper alluvial or calcrete aquifers with water of equivalent quality.
- Implementing an engineering solution that confines or separates the aquifer around the vicinity of the pit from Coppin Gap so that drawdown does not occur.

De Grey Borefield

A De Grey borefield groundwater management program will be implemented whereby a sustainable abstraction regime is employed. If local impacts are attributed to abstraction then:

- Abstraction quantities and timing will be adjusted internally within the De Grey Borefield and quantity and timing ratios adjusted between the De Grey and Canning supplies.

2. Terrestrial Fauna Management Plan

2.1 Background

Threatening processes currently affecting biodiversity over the project area include altered fire regimes, grazing by introduced herbivores, impacts of introduced predators and weed invasion.

Project Area

Comprehensive vertebrate fauna surveys have been undertaken over the project area and six major terrestrial vertebrate fauna habitats were delineated. They are:

- Spinifex plains.
- Basalt ridges.
- Rocky slopes.
- Riverine communities.
- Minor drainage lines.
- Rocky gullies.

The project area is located within a working pastoral lease and all habitats have been impacted upon significantly by frequent broadscale wildfires, with up to four fires occurring within the last eight years. Grazing pressure, and weed invasion along riparian zones, is also evident.

Key habitats over the project area comprised those habitats with potentially narrow distributions, and those that provide potential fire-refuges, such as rugged slopes and mesas and riparian zones. Coppin Gap (Rocky Gully habitat) is a local refugia that possesses a particular microclimate with a dependable supply of moisture and nutrients. It possesses important ecological qualities for a range of fauna species including semi-permanent water with riparian vegetation of dense sedges, large eucalypts and melaleucas within close proximity to rocky cliffs containing caves and fissures.

Water Supply Areas and Service Corridors

Nine broad fauna habitats have been delineated over the proposed water supply areas of Woodie Woodie mine site, DeGrey borefield, and Canning borefield as well associated service corridors. These are:

- Spinifex Plains.
- Plains supporting Shrublands.
- Plains Supporting Woodlands.
- Rocky Slopes and Hills Supporting Shrublands.
- Rocky Slopes and Hills Supporting Woodlands.
- Rocky Slopes and Hills supporting spinifex hummock grassland.
- Riverine Communities.

- Minor Drainage Lines.
- Clay Depressions.

The De Grey River has been listed by the DEW in the Directory of Important Wetlands in Australia (De Grey River – WA065), and is also a recognised refugia in semi-arid Australia.

Vertebrate Fauna within the Project Area

Herpetofauna

Thirty-four species of herpetofauna from ten families were identified from the project area; including 30 reptiles from eight families and four amphibians from two families.

The thirty reptile records comprised four species of Agamidae (dragon lizards), six species of Gekkonidae (geckos), three species of Pygopodidae (legless lizards), ten species of Scincidae (skinks), two species of Varanidae (monitor lizards), one species of Typhlopidae (blind snakes), one species of Boidae (pythons) and three species of Elapidae snakes.

Mammals

Evidence of 26 species of mammal, representing 11 families, was recorded during the surveys. These comprised six carnivorous mammals (Dasyuridae), two kangaroos / wallabies (Macropodidae), four native rodents (Muridae), at least nine bats, as well as the Dingo, feral Cat, One-humped Camel, and Cattle.

Avifauna

Sixty-three bird species representing 28 families were recorded from the project area, or areas immediately adjacent, during the surveys. The number of birds recorded is probably a reflection of the diversity of habitats over the project area and the favourable seasonal conditions experienced at the time of the surveys. For example, several migratory/nomadic species were recorded that would not be present at other times.

Fish (not directly covered under this management plan)

Three species of native freshwater fish, representing three families, were identified from freshwater pools along Coppin Creek. No exotic species were recorded. Species recorded were the Western Rainbowfish (*Melanotaenia australis)*, Spangled Perch *(Leiopotherapon unicolour)* and Hyrtl's Tanden (*Neosilurus hyrtlii).* All species were identified from a riverine pool and tributary leading directly into Coppin Gap. Fish do not occur, or only irregularly occur, within the Kookenyia Creek catchment including Kitty's Gap due to extended periods of drying.

Potential Impacts

Project Area

Potential impacts of the operations on terrestrial fauna and/or fauna habitat over the Spinifex Ridge project area include those arising from:

- direct clearance or disturbance of fauna habitat;
- reduced connectivity of fauna populations, and/or isolation of local habitats;
- alterations to hydrology;
- operation of the tailings storage facility (TSF);
- effects of dust and light;
- effects of noise;
- potential to increase populations of exotic species; and
- secondary impacts, such as off-road vehicles, increased access to sensitive habitats, and fire.

Water Supply Areas and Service Corridors

Potential impacts of the operations on terrestrial fauna and/or fauna habitat over water supply areas and service corridors include those arising from:

- Introduction and spread of weeds along the length of the pipeline.
- Temporary loss of habitat, and disturbance to sensitive habitats such as riparian zones during construction.
- Fauna mortality due to entrapment in excavated trenches.
- Potential drawdown affects of the De Grey borefield.

2.2 Objectives

Objectives for the management of terrestrial fauna are as follows:

- 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;
- protect Specially Protected (Threatened) and Priority Fauna and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- protect fauna listed on the relevant schedules of the *EPBC* Act.

2.3 Relevant Legislation

The following legislation, documents, guidelines, regulations and performance indicators are applicable to this management plan:

- *Wildlife Conservation Act* 1950.
- Wildlife Conservation Regulations 1970.
- *Environment Protection and Biodiversity Conservation Act* 1999.
- *Conservation and Land Management Act* 1984.
- Environmental Protection (Noise) Regulations 1997.
- EPA Draft Guidance Statement No 8: *Environmental Noise* (1998).
- EPA Guidance Statement No. 6: Rehabilitation of Terrestrial ecosystems (2006).
- EPA Guidance Statement No. 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (2004).
- EPA Position Statement No. 3: *Terrestrial biological surveys as an element of biodiversity protection* (2002).
- EPA Position Statement No. 5. *Environmental Protection and Ecological Sustainability in Rangelands in Western Australia* (2004).
- EPA Position Statement No. 7. *Principles of Environmental Protection* (2004).
- Australian Standard AS 4282-1997 *Control of Obtrusive Effects of Outdoor Lighting*.

2.4 Management Actions

Table 6 Terrestrial Fauna Management Actions

Ref	Management Actions	Timing	Delegated Responsibility
Direct Clearance, Reduced Connectivity or Disturbance to Fauna Habitat			
TFMP 1.	Identification of all active mounds of the Western Pebble-mound Mouse in Basalt Ridge habitat with active mounds avoided wherever possible.	Construction – prior to land clearance	HSE Manager
TFMP 2.	Hollow logs and branches are to be reused as part of the rehabilitation planning.	Construction and Ongoing	Resident Manager
TFMP 3.	Important habitat entities such as trees and large termite mounds will be marked and avoided wherever possible.	Construction	HSE Manager
TFMP 4.	Service corridor alignments will follow existing tracks or clearings wherever possible.	Construction	HSE Manager
TFMP 5.	Pipeline crossings over the De Grey River, Oakover River, Nullagine River and Yilgalong Creek will avoid key riparian habitats of large eucalypts and sedgelands wherever possible.	Construction	HSE Manager
TFMP 6.	A 'fauna clearing team' will be established for the duration of pipeline construction and will inspect open trenches each morning.	Construction	HSE Manager
TFMP 7.	Drill holes will be temporarily capped on completion of drilling and permanently capped when no longer required.	Construction and Operation	Mining Manager
TFMP 8.	A rehabilitation plan that aims to mimic the predominant faunal habitat attributes of the D3 Vegetation Association will be developed and implemented.	Operation	HSE Manager

Altered Hydrology (also see Groundwater and Surface water Management Plans)			
TFMP 9.	Provide culverts as required to maintain flows and prevent ponding.	Construction	HSE Manager
Tailings Storage Facility and Waste Landforms			
TFMP 10.	The TSF will be fenced to exclude stock and other large vertebrates.	Construction	Mining Manager
TFMP 11.	The decant pond in the TSF will be situated away from the bank of the TSF. Water recycling from the TSF will be maximised by keeping the pond as small as practicable, thereby minimising the attractiveness to waterbirds.	Construction and Operation	Processing Manager
Dust and Light			
TFMP 12.	Ore concentrate will be stored and loaded within an enclosed facility.	Operation	Processing Manager
TFMP 13.	Transport trucks will use covered trailers (for copper concentrate) and shipping containers (for molybdenum).	Operation	Resident Manager
TFMP 14.	Speed limits will be established and enforced on un-sealed surfaces.	Construction and Operation	Resident Manager
TFMP 15.	Light impacts will be managed in accordance with Australian Standard AS 4282-1997 *Control of Obtrusive Effects of Outdoor Lighting*.	Construction and Operation	HSE Manager
TFMP 16.	Direct lighting at targeted work areas will be installed, preferably in a downward direction.	Construction	Resident Manager
TFMP 17.	Light will be directed away from sensitive areas such as caves in Talga Range and riparian zones.	Construction	Resident Manager
TFMP 18.	Workforce awareness training in relation to reducing light emissions will be conducted.	Construction and Operation	HSE Manager
Noise			
TFMP 19.	Buffer zones between mining, construction activities and caves will be established.	Construction and Operation`	Resident Manager
TFMP 20.	Avoid blasting during night time hours	Construction and Operation	Resident Manager
TFMP 21.	Staff will be educated on the effects of noise and the use of quiet work practices.	Construction and Operation	HSE Manager
Exotic Species			
TFMP 22.	Ensure that food and putrescible wastes are not accessible to wildlife, including exotic species.	Construction and Operation	HSE Manager
TFMP 23.	Implement feral animal control program in collaboration with local pastoralist, Department of Agriculture and DEC.	Operation	HSE Manager
TFMP 24.	No pets to be allowed on site.	Construction and Operation	Resident Manager
Secondary Impacts			
TFMP 25.	Driving will be restricted to designated access and haul roads, off-road driving will be prohibited. All vertebrate fauna deaths over the project area will be reported through the site incident management procedures.	Construction and Operation	Resident Manager

TFMP 26.	Establish and enforce speed limits on access and haul roads.	Construction and Operation	Resident Manager
TFMP 27.	Establish and maintain on-site fire fighting capability.	Construction and Operation	Resident Manager
TFMP 28.	Information related to fauna of conservation significance, and interactions with fauna, will be included in all site inductions.	Construction and Operation	HSE Manager

2.5 Monitoring

A monitoring program will be developed and implemented that regularly measures molybdenum and other metals within the supernatant pond, as well as within aquatic flora and invertebrates.

Standardised fortnightly surveys of all fauna utilising all artificial surface waters will be undertaken, including the TSF. Surveys will record 'effects' and 'incidents'. An effect is where behaviours of fauna are considered a response to the facility. An incident is where the facility is having a negative impact on individuals.

If warranted, additional measures will be implemented to deter waterbird and/or other fauna use of the TSF.

3. Groundwater Management Plan

3.1 Background

Potential groundwater impacts have been identified through the Environmental Impact Assessment (EIA) for the following four areas of the project:

- Canning Borefield;
- Woodie Woodie (Cracker Pit);
- De Grey River Borefield; and
- Spinifex Ridge Minesite;

The project requires approximately 15 GL/yr of water, of which 11 GL of this is for process water. Four water supply options have been investigated for the project. These are:

- Canning Basin Groundwater Province: through a borefield accessing groundwater from the Wallal and possibly the Callawa aquifers, including a pipeline approximately 70 km long;
- Woodie Woodie aquifer: water abstraction from an abandoned mining void, including a pipeline approximately 170 km long;
- De Grey River alluvium; and
- any combination of the above.

Investigations into the Canning Basin indicated a large groundwater resource, with significant additional capacity for new users. This option is the preferred option subject to confirmation of the resource availability and identification of any environmental constraints for abstraction and pumping to site.

Studies on the De Grey alluvium suggested that the sustainable volumes present were inadequate for the full allotment, however the De Grey is considered suitable for a smaller abstraction rate.

Woodie Woodie is an operating manganese mine approximately 170 km from the project area. Groundwater modelling suggests that there is adequate capacity to provide a sustainable water source for the duration of the project.

After the completion of the investigations, the Canning option will be progressed for the bulk of the project water requirements, subject to completion of the outstanding investigations. In the event of the Canning failing to meet expectations, Woodie Woodie will be the main water source for the project. The Woodie Woodie option is fully discussed in this document.

In either case, a borefield will be established in the De Grey alluvium to supply approximately 4 GL/year. This will be used as the initial water source during construction and while the main source is commissioned and will also provide water during periods of peak water demand.

Local Aquifer Characteristics

Canning Borefield

The Broome and Wallal Sandstones are the identified aquifers in the western margin of the Canning Basin. For a majority of the area the Wallal Sandstone is confined beneath the Jarlemai Siltstone, while the overlying Broome Sandstone is unconfined. In the western extent of the basin the Broome Sandstone is found to unconformably overlie the Wallal Sandstone. All units are interpreted to dip at less than 1 degree to the north and no post-deposition folding or faulting events are believed to deform the sediments.

Woodie Woodie (Cracker Pit)

The Pinjian Chert Breccia and the Upper Carawine Dolomite are the major aquifer units present in the vicinity of the Cracker Pit. The reported hydraulic test results and derived aquifer parameters for the Woodie Woodie area show a highly transmissive aquifer, capable of delivering high bore yields.

De Grey River Borefield

Two main aquifer systems were identified in this area during the groundwater exploration programme undertaken in support of the Preliminary Feasibility Study (PFS) (Rockwater, 2006). These include a shallow alluvial aquifer system associated with the active drainage network and a deeper basal aquifer system associated with a buried palaeo-channel. These aquifer units are separated by a potentially leaky aquitard unit.

Spinifex Ridge Minesite

The groundwater system at the Spinifex Ridge site is broadly defined by three surface water catchments. Of these three, the two catchments that drain through Coppin Gap also directly influence the groundwater system of the proposed open-cut mine.

The surface water catchment affecting the plant site is constrained within the immediate footprint of the site and bounded by the ridge to the south. Both groundwater and surface water flow in this area is to the north. Recharge to groundwater within the catchments is limited to direct infiltration from rainfall within the catchment. There are no identified sources of groundwater inflow from outside the surface water catchment boundaries. Analyses of monthly water levels demonstrate that the groundwater profile broadly follows the overall trend of the surface water drainage system, converging at Coppin Gap. The groundwater system at Coppin Gap is a dynamic system with large seasonal fluctuation. To simulate the variability, modelling of both

average and climatic extremes have been considered and presented as flow through Coppin Gap and water level change at Coppin Gap.

Within the catchment of Spinifex Ridge, the identified aquifer types are:

- Fractured bedrock.
- In-situ calcretes, overlying ultramafic bedrock.
- Alluvial sediments associated with recent drainage lines.

3.2 Objectives

The management objectives necessary to mitigate the possible groundwater response to development of the Spinifex Ridge project are:

- Preserve the existing surface water expressions at Coppin Gap to within natural variation.
- Maintain the seasonal surface and groundwater flow through Coppin Gap to within natural variation.
- Ensure the groundwater quality surrounding the mine, processing plant and tailings storage facility is maintained to ensure the currently identified beneficial uses are preserved.
- Continuously improve the understanding of surface and groundwater systems to ensure timely management and remediation of any deleterious impact.

3.3 Relevant Legislation

The following legislation, documents, guidelines, regulations and performance indicators are applicable to this management plan:

- *Environmental Protection Act 1986;*
- *Rights in Water and Irrigation Act 1914;*
- ANZECC/ARMCANZ *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCAZ, 2000);
- *Water Quality Protection Guidelines* (No. 1-11) (DoW & DoIR, 2000); and
- *State Water Quality Management Strategy* (ANZECC and ARMCANZ, 2001).

3.4 Management Actions

Table 7 Groundwater Management Actions

Ref	Management Actions	Timing	Delegated Responsibility
Water Supply (De Grey and Woodie Woodie or Canning)			
GWMP 1.	Assess the sustainability of the groundwater systems at each water supply location with the aid of a numerical groundwater model.	Design	HSE Manager
GWMP 2.	Develop a Borefield Operating Strategy to sustainably manage borefield abstraction.	Construction	HSE Manager
GWMP 3.	Install a monitoring system capable of measuring the performance of the borefield against modelled predictions.	Construction	Mining Manager
GWMP 4.	Undertake a comprehensive monitoring programme that includes water level, water quality and flow rate.	Operation	HSE Manager
GWMP 5.	Review annually the performance of the borefield against modelled predictions and implement any corrective actions.	Operation	HSE Manager
GWMP 6.	Devise a mine water supply operating strategy to effectively coordinate the abstraction from all water sources.	Operation	Resident Manager
Spinifex Ridge Minesite			
GWMP 7.	Assess the sustainability of the groundwater system with the aid of a groundwater model.	Design	HSE Manager
GWMP 8.	Install a groundwater monitoring system capable of monitoring the groundwater system regionally and specifically between the mine and Coppin Gap.	Construction	HSE Manager
GWMP 9.	Implement a monitoring programme that samples groundwater levels, quality and abstraction volumes.	Operation	HSE Manager
GWMP 10.	Identify and monitor all activities that could impact on the groundwater system (including contamination risks).	Design	HSE Manager
GWMP 11.	If any deleterious impacts to water levels at Coppin Gap are measured or predicted, design and install a suitable water management system to manage impacts.	Operation	Mining Manager
GWMP 12.	Review annually the minesite groundwater system and potential impacts and implement a continuous improvement programme.	Operation	HSE Manager
GWMP 13.	Recover and reuse any surplus water to effectively maintain an internally balanced water system.	Operation	HSE Manager

3.5 Monitoring

The proposed monitoring schedules for Canning, Woodie Woodie and De Grey River are detailed in **Table 8, Table 9** and **Table 10,** respectively. The monitoring programme to measure the net abstraction from the pit is outlined in **Table 11**, the monitoring frequency and constituents to be analysed to allow assessment of the aims of the programme are described in **Table 12** and the water level monitoring that will be undertaken for the Spinifex Ridge minesite is outlined in **Table 13.**

Table 8 Canning Monitoring Schedule

Parameter	Monitoring / Sampling Site	Frequency
Water Quantity		
Water Supply Abstraction	Flow meter at each water supply bore	Monthly
Water Use	Minesite potable	Monthly
	Mine process	Monthly
Water Levels		
Water Levels - Operational	Water supply	Monthly
Water Levels - Regional	Monitoring bores[1]	Monthly
Water Quality		
Salinity (EC) and pH	Water supply bores	Monthly
Water Supply - Hydrochemistry	Water supply bores	Quarterly
Salinity (EC) and pH	Dewatering bores	Monthly
Dewatering - Hydrochemistry	Dewatering bores	Annually

1 Monitoring sites to be established

Other groundwater related monitoring maybe stipulated when the project's DoW operating licence is issued.

Table 9 Woodie Woodie Monitoring Schedule

Parameter	Monitoring / Sampling Site	Frequency
Water Quantity		
Water Supply Abstraction	Flow meter at each water supply bore	Monthly
Dewatering	Flow meter on each dewatering bore	Monthly
Water Use	Mine site potable	Monthly
	Mine process	Monthly
Discharge	Dewatering outfall	Monthly
Water Levels		
Water Levels - Operational	Water supply & dewatering bores	Monthly
Water Levels - Regional	Monitoring bores[1]	Monthly
Water Quality		
Salinity (EC) and pH	Water supply bores	Monthly
Water Supply - Hydrochemistry	Water supply bores	Quarterly
Salinity (EC) and pH	Dewatering bores	Monthly
Dewatering - Hydrochemistry	Dewatering bores	Annually

[1] Monitoring sites to be established.

Other groundwater related monitoring maybe stipulated when the project's DoW operating licence is issued.

Table 10 De Grey River Monitoring Schedule

Parameter	Monitoring / Sampling Site	Frequency
Water Quantity		
Water Supply Abstraction	Flow meter at each water supply bore	Monthly
Water Use	Mine site potable	Monthly
	Mine process	Monthly
Water Levels		

Parameter	Monitoring / Sampling Site	Frequency
Water Levels - Operational	Water supply bores	Monthly
Water Levels - Regional	monitoring bores[1]	Monthly
Water Quality		
Salinity (EC) and pH	Water supply bores	Monthly
Water Supply - Hydrochemistry	Water supply bores	Quarterly

[1] Monitoring sites to be established including in the shallow aquifer

Other groundwater related monitoring maybe stipulated when the project's DoW operating licence is issued.

Table 11 Dewatering Volume Monitoring Plan

Abstractive Source	Measure	Method	Frequency
Direct abstraction (sumps or bores)	kL	Direct measurement	Weekly
Blasting (vaporisation)	Insitu storage estimate (m^3)	Calibrated measurement from test work	Monthly total of wet blasts
Evaporation	mm/day	Onsite measure of pan evaporation	Daily
In-pit dust suppression	kL	Direct measurement	Daily

Table 12 Groundwater Chemistry Monitoring Plan

Area	Sample Frequency	Analytes	Purpose
Coppin Gap	Monthly	pH, Ec, TDS, Na, K, Ca, Mg, Fe, Cl, SO_4, NO_3, HCO_3, CO_3 Al, As, Mn, Si, Pb, Cd, Mo, Cr(VI), NH_3, Sb, Ba, Br, Cu, Hg, Ni, Se, Ag, Zn	Influence of mining activities
Mine East	Quarterly	pH, Ec, TDS, Na, K, Ca, Mg, Fe, Cl, SO_4, NO_3, HCO_3, CO_3 Al, As, Mn, Si, Pb, Cd, Mo, Cr(VI), NH_3, Sb, Ba, Br, Cu, Hg, Ni, Se, Ag, Zn	Influence of mining activities
Regional Monitoring and Coppin Gap North	Biannually	pH, Ec, TDS, Na, K, Ca, Mg, Fe, Cl, SO_4, NO_3, HCO_3, CO_3	Influence of mine dewatering
Dewatering Abstraction	Monthly	pH, Ec, TDS, Na, K, Ca, Mg, Fe, Cl, SO_4, NO_3, HCO_3, CO_3 Al, As, Mn, Si, Pb, Cd, Mo, Cr(VI), NH_3, Sb, Ba, Br, Cu, Hg, Ni, Se, Ag, Zn	Influence of mining activities
Remedial Discharge/Injection	Monthly	pH, Ec, TDS, Na, K, Ca, Mg, Fe, Cl, SO_4, NO_3, HCO_3, CO_3 Al, As, Mn, Si, Pb, Cd, Mo, Cr(VI), NH_3, Sb, Ba, Br, Cu, Hg, Ni, Se, Ag, Zn	Influence of mining activities
Tailings Storage Facility	Biannually	pH, Ec, TDS, Na, K, Ca, Mg, Fe, Cl, SO_4, NO_3, HCO_3, CO_3 Al, As, Mn, Si, Pb, Cd, Mo, Cr(VI), NH_3, Sb, Ba, Br, Cu, Hg, Ni, Se, Ag, Zn	Influence of tailing deposition

Table 13 Water Level Monitoring Plan for the Spinifex Ridge Minesite

Area	Monitoring Installation Type		Target Aquifer / Aquitard	Monitoring Frequency (Operational)[1]	Installation Status (commenced)	Management Trigger Tool	Possible Action to Correct Impact[2]	Comments
	Water Level	Pressure Profile						
Spinifex Ridge Regional	X		Fractured rock (fresh and weathered)	Monthly	Yet to commence	Groundwater model	Make good any decrease in water supply to pastoral bores.	Monitoring of pastoral bores and additional bores to be installed.
Coppin Gap	X		Fractured rock	Monthly	Current (Dec 2006)	Groundwater model	Artificially manage water levels within natural variation, develop and demonstrate closure solutions while operating.	A detailed understanding of the hydrogeological interaction of the mine and Coppin Gap is to be developed during operation of the mine and a closure plan demonstrated within 5 years of operation.
Coppin Gap North	X		Alluvial and fractured rock (weathered)	Monthly	Yet to commence	Groundwater model	Make good any decrease in water supply to pastoral bores.	Monitoring of pastoral bores and additional bores to be installed.
Mine East	X	X	Alluvial, calcrete, fractured rock (weathered & fresh)	Bimonthly	Current (Dec 2006)	Groundwater model	Artificially manage water levels to sustain GDE's while operating.	A detailed understanding of the hydrogeological interaction of the mine and area to the east of the mine is to be developed during operation of the mine and a closure plan demonstrated within 5 years of operation.
Mine West	X		Fractured rock (weathered & fresh)	Bimonthly	Current (Dec 2005)	Groundwater model	N/A	The hydrology and hydrogeology will be altered by the mine infrastructure.
Mine Walls		X	Fractured rock (fresh)	Bimonthly	Current (Dec 2005)	Slope design	Horizontal drainholes.	The requirement to install horizontal drainholes may increase the area of influence the mine void has on the surrounding environment. This increase is not expected to significantly alter dewatering predictions.
Open Cut Pit	X		Fractured rock (fresh)	Monthly	Current (Dec 2005)	Mining schedule	Increased dewatering	A change (increase) in the mining rate may increase the vertical advance and therefore dewatering rate. This is not expected to significantly alter the groundwater profile.
Tailings Storage Facility	X		Fractured rock (weathered and fresh)	Monthly	Preliminary	Unexplained change in level	Installation of recovery bores	An unexplained change is a variation to groundwater level that cannot be readily explained by natural events (e.g. rainfall). Interpretation of groundwater monitoring must be performed by a suitability experienced professional in tailings management.

1. Recommended monitoring frequency for reporting. Higher frequencies may be required for operational management.
2. Suggested remedial measures to possible outcomes. The remedial measures are not limited to these suggestions.

3.6 Contingency Plans

A summary of potential impacts and associated remedial measures is provided below in **Table 14**.

Table 14 Summary of Impacts and Remedial Measures

Potential Impacts	Measures to Reduce Impacts	Monitoring of Impacts
TSF impact on water levels	Install internal water reclaim systems and, if required, external groundwater recovery systems.	Downstream monitoring bores
TSF impact on water quality	If monitoring indicates significantly elevated contaminant levels, use bores to return groundwater beneath the TSF to the water circuit.	Downstream monitoring bores
Lowering of water levels in Coppin Gap	Initiate artificial recharge of the pool with water of equivalent quality, if excessive drawdown (greater than natural variation) within the upper alluvial or calcrete aquifers is identified during mining resulting in impact on the water level in the Coppin Gap pool. Given that the water volumes required for dewatering are expected to be modest (5 to 20 L/s) it follows that the rates required to manage water levels within a required range, will not be excessive and well within the surplus capacity of the mine water supply. Direct the mode of discharge into an existing drainage line at a point that maximises infiltration and does not create an area of accelerated vegetative growth or change in the type of vegetation preferentially supported. Monitor and investigation whether aquifer grouting is required to ensure the maintenance of the Coppin Gap pool post-mining. Aquifer grouting is a widely practised engineering process in civil engineering.	Groundwater monitoring bores installed in all aquifers. Groundwater volume monitoring of both recharge and dewatering. Continuous calibration of the groundwater model with the monitoring data collected. Monitoring of climatic data (rainfall, temperature, evaporation).
Lowering of water levels in creek systems between the mine and Coppin Gap	Water levels within the creek system between the mine and Coppin Gap are expected to lower within the basement rocks and to some extent within the alluvial and calcrete aquifers. Maintenance of water levels will not be sustainable between the creek diversion bund and the open-cut pit. Establish local native vegetation over areas where riparian vegetation is not sustainable and riparian vegetation along the diversion channel.	Groundwater monitoring of water levels. Groundwater monitoring of recharge rates. Monitoring of vegetation response to water level changes.
Change in groundwater chemistry between the mine and Coppin Gap	There is no anticipated deleterious impact to down gradient groundwater due to development of the open-cut pit. Presently the ore deposit is a suspected source of As and Mo which may be the source of elevated levels of As and Mo observed in groundwater monitoring performed between the deposit and Coppin Gap.	Groundwater monitoring bores installed in all aquifers.

4. Surface Water Management Plan

4.1 Background

The project is located within the De Grey River catchment, which is the main drainage system in the northeast Pilbara area. In the study area, a ridge 100 to 150m high, known as Spinifex Ridge, is the dominant feature in the landscape. Two breaks in Spinifex Ridge, known as Coppin Gap and Kitty's Gap, concentrate flow from the upstream catchment and allow it to pass through the ridge. Floodwaters downstream from these two gaps then flow approximately 25km northwards before discharging via Kookenyia Creek into the De Grey River.

Potential impacts have been identified through the Environmental Impact Assessment (EIA) for the following aspects of the project:

- pit;
- diversion channel;
- Coppin Gap;
- waste landforms;
- tailings storage facility (TSF); and
- camp site, plant site and airstrip

Pit

The main impact of the proposed pit will be the alteration of natural surface water drainage lines. The pit footprint will intersect Coppin Creek, just upstream of Coppin Gap, and minor tributaries that flow into Coppin Creek. To provide flood protection to the pit area, a diversion channel will redirect flows from Coppin Creek around the pit to rejoin the creek downstream of the pit and upstream of Coppin Gap. As a result of this diversion, a portion of the pre-mining catchment will no longer drain to Coppin Creek.

Flood protection bunding will be required upstream and downstream of the proposed pit. Upstream of the pit, earth embankments will prevent water from Coppin Creek entering the pit area and will assist in redirecting water to the diversion channel. Downstream of the pit, bunding will prevent backflow of water from Coppin Gap entering the pit area. The construction of these bunds may potentially impact adjacent flood levels.

Diversion Channel

The purpose of the diversion channel is to redirect surface water from Coppin Creek around the pit area. Flow diversions may result in a loss of flow volume and peak discharge for a certain distance downstream in the natural channel as a portion of the catchment is bypassed. Immediately upstream of Coppin Gap, flow volumes and peak discharges will potentially decrease due to a smaller contributing catchment area. However, the diversion channel route is

approximately 900m shorter than the existing Coppin Creek route through the pit area. As such, the mainstream length of the Coppin Gap catchment is reduced by around 5% which will reduce catchment response time and potentially increase peak discharges. To some degree, the potential for increased peak discharge as a result of reduced catchment response time will be somewhat offset by the reduced catchment area.

The diversion channel has the potential to experience high flow velocities. These high velocities together with the disturbance of soil and removal of vegetation are likely to result in erosion within the diversion channel. Erosion of the excavated faces is likely to be the principle source of eroded materials while the base of the channel is expected to have a lower potential for erosion as a result of the base being mostly rock. Deposition in the channel bed would likely occur during low/reducing flow events. It is likely that erosion will not be extensive, as the diversion channel and the downstream tributary are located in a typically rocky area, which are resistant to erosive forces.

Erosion along the diversion route is also likely to increase at locations outside the excavation zone due to the increased flood discharges and velocities. The tributary that the diversion channel is proposed to discharge into has a relatively small pre-mining catchment area of 2.2km^2. After construction of the diversion channel, this catchment increases to 50km^2. As such, there will be a substantial increase in peak discharges and velocities downstream of the diversion channel, with a resultant increase in the potential for erosion in this tributary.

Impact on flow volumes and peak discharges upstream of the diversion channel are not expected to be significant.

Coppin Gap

Eroded material from the diversion channel route is likely to be transported and deposited just upstream or just downstream of Coppin Gap. Modelling of Coppin Creek before and after the construction of the diversion drain showed that flood depths do not change for the 2-year ARI flood event and decline by 0.03m (less than 0.5%) during the 100-year ARI flood event. Hence flood levels and flow velocities through Coppin Gap are expected to be effectively unchanged after the construction of the diversion drain. As sediment levels in Coppin Gap are governed by the flow regimes, long term sediment levels in Coppin Gap are not expected to be different from current levels.

Waste Landforms

The waste landforms have been positioned such that they are located outside the floodway of major waterways. However, they will intersect minor creeks. This can potentially result in water ponding on the upstream side of the waste landforms, creating a safety hazard and potentially causing inundation and loss of vegetation.

Waste landforms can also be a large source of sediments. Rainfall and surface water runoff around the waste landforms have the potential to distribute sediment laden water to the environment. Additionally, any diversion channels or flood bunds placed around the waste landforms may concentrate sheet flow and potentially increase local flow velocities and soil erosion.

Waste landforms 1 and 2 will contain PAF material which has a potential to produce acidic runoff or runoff that may contain elevated concentrations of metals.

Tailings Storage Facility

The TSF will be located downstream of Spinifex Ridge, between Coppin Creek and Kookenyia Creek. The TSF will be positioned outside the main Coppin Creek floodway but will intersect smaller tributaries to the creek which may potentially result in minor upstream ponding against the tailings but should not have a significant impact on water levels during a 100 year ARI event.

However, the TSF has the potential to impact the Kookenyia Creek floodway. The topography downstream of Kitty's Gap is relatively flat, and during major rainfall events, Kookenyia Creek will likely have large flood fringe areas as water from the main floodway spreads out and overspills into adjacent creeks. The proposed footprint of the TSF is currently located on several of these adjacent creeks and a small section of the TSF protrudes into the Kookenyia Creek floodway. This may potentially impact flow volumes and peak discharges in Kookenyia Creek.

Increased peak flows through the creek have the potential to increase velocities and erosion. However, the velocities through Kookenyia Creek are relatively low (<1.5m/s) and minor increases in velocity after construction of the TSF (0.1-0.3m/s in the 100 year ARI event) are not expected to significantly increase erosion around the TSF.

Ponding around the TSF could potentially occur. The TSF will receive water from minor catchments on Spinifex Ridge which drain northwards and likely pond along the southern edge of the tailings facility. The TSF will also increase the risk of surface water contamination as it has the potential to discharge various chemicals, reagents and unrecovered metals to the environment.

The TSF has the potential to impact on water quality through the inclusion of PAF material or process chemicals.

Camp Site, Plant Site and Air Strip

The camp site, plant site and air strip are also located downstream of Spinifex Ridge and are outside of major floodways. Chemicals generated by these sites have the potential to be distributed to the environment by smaller creeks flowing through these areas. To redirect minor flow paths and to prevent flooding of the infrastructure, diversion channels, flood bunds and

raised pads will be used. However, these structures may potentially increase local flow velocities and hence soil erosion around the infrastructure.

4.2 Objectives

The objectives of this management plan are to:

- Manage watercourses so as to maintain the integrity, ecological functions and environmental values of watercourses and sheet flow.
- Ensure that emissions do not adversely affect environmental values or the health, welfare or amenity of people and land uses by meeting statutory requirements and acceptable standards for surface water quality.
- Minimise the potential for surface water contamination.
- Minimise water consumption, where feasible.

4.3 Relevant Legislation

The following legislation, documents, guidelines, regulations and performance indicators are applicable to this management plan:

- *Environmental Protection Act 1986;*
- *Rights in Water and Irrigation Act 1914*;
- ANZECC/ARMCANZ *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCAZ, 2000);
- *Water Quality Protection Guidelines* (No. 1-11) (DoW & DoIR, 2000); and
- *State Water Quality Management Strategy* (ANZECC and ARMCANZ, 2001).

4.4 Management Actions

Table 15 Surface Water Management Actions

Ref	Management Actions	Timing	Delegated Responsibility
SWMP 1.	Design the channel to replicate the natural conditions prior to minesite development so as to mitigate potential impacts of the diversion channel on surface water drainage.	Design	Resident Manager
SWMP 2.	Design all sections along the diversion channel to drain out.	Design	Resident Manager
SWMP 3.	Include a sediment trap at haul road crossing in the diversion channel design.	Design	Resident Manager
SWMP 4.	Remove sediments from the road sediment trap prior to each wet season, to avoid sediment remobilisation during a large flood.	Construction and Operation	Mining Manager
SWMP 5.	Design the diversion channel to include flood plain zones	Design	Resident Manager

	and produce flow velocities close to natural velocities.		
SWMP 6.	Install sediment traps/basins and containment bunding (where appropriate), to reduce sediment loads from mining infrastructure.	Construction	Mining Manager
SWMP 7.	Install diversion structures such as flood bunds and diversion channels to prevent water from flowing into the pit.	Construction	Mining Manager
SWMP 8.	Re-direct inflows from the catchment that drain into the pit back into Coppin Creek.	Construction and Ongoing	Resident Manager
SWMP 9.	Store all hydrocarbons and chemicals according to Australian Standards AS1940 to minimise contamination.	Construction and Ongoing	HSE Manager
SWMP 10.	Induct all personnel regarding water quality management onsite.	Construction and Operation	HSE Manager
SWMP 11.	Maintain a record of all water quality sampling results, including any discharges occurring above water quality criteria and the duration for which the discharge was maintained.	Construction and Operation	HSE Manager
SWMP 12.	Summarise all water quality sampling results in the annual environmental report, identifying any opportunities for improvement in water and groundwater management.	Operation	HSE Manager

4.5 Monitoring

Surface water monitoring of Coppin Gap pool is undertaken on a monthly basis for pH, EC, TDS, TSS, major cations, major anions and metals.

The surface water monitoring will be reviewed during the detailed design phase of the operation with additional locations and monitoring parameters specified.

4.6 Contingency Plans

Coppin Creek/Gap

If negative impacts attributed to the Coppin Creek diversion are detected then design elements of the diversion will be re-assessed and mitigation strategies implemented. Alternatives considered may include:

- implementation of an artificial aquifer recharge system designed to supplement the system at volumes similar to those abstracted during dewatering. Re-injection will be at a point where recirculation is minimised and environmental flow is maximised;
- artificially maintaining the water levels at the Coppin Gap by the addition of appropriate, high-quality water; and
- an engineering solution that confines or separates the aquifer around the vicinity of the pit from Coppin Gap so that drawdown does not occur.

5. Coppin Gap Management Plan

5.1 Background

Coppin Gap is a semi-permanent water body of local significance visited by tourists during the cooler months of the year. The area is used by both day-trippers from Port Hedland and Marble Bar as well as longer term holidaymakers passing through the region. There are no visitor facilities at Coppin Gap and the area is used infrequently. It is estimated that between 60 and 100 vehicles visit Coppin Gap every year.

Coppin Gap has significant value to the indigenous and non-indigenous community and is also protected as an A-Class Reserve for the Preservation of Natural Formations, vested with the Shire of East Pilbara. In relation to indigenous heritage Coppin Gap will not be directly impacted by project infrastructure or proposed activities and no significant indirect impacts are anticipated. To raise awareness of the importance of this site, Aboriginal heritage and cultural sensitivity issues will be included in all site inductions.

Liaison with the Shire of East Pilbara (SoEP) and the pastoral leaseholder will be undertaken on overall management of the Coppin Gap reserve to ensure the vesting purpose is not compromised.

Potential impacts have been identified through the Environmental Impact Assessment (EIA) for the following aspects:

- groundwater and surface water quantity;
- groundwater and surface water quality;
- biota;
- tourism, recreation and public access;
- visual amenity; and
- security/public safety.

In relation to Coppin Gap, groundwater (quality and quantity) is addressed in the Groundwater Management Plan (GWMP), surface water (quality and quantity) in the Surface Water Management Plan (SWMP), flora and vegetation in the Flora and Vegetation Management Plan (FVMP) and terrestrial fauna in the Terrestrial Fauna Management Plan (TFMP).

5.2 Objectives

The objectives of this management plan are to:

- Ensure that visual amenity and aesthetic values are considered and measures are adopted to minimise visual impacts on the surrounding environment to as low as reasonably practicable.

- Ensure that existing and planned tourism and recreation uses are not compromised by the project.
- Ensure that the public access road to Coppin Gap is maintained and managed to meet an adequate standard of service and safety.

Strategies and Design Criteria

Certain strategies and design criteria have been proposed to ensure that the planned creek diversion is designed to function in a similar manner to the existing creek. Some of these strategies include:

- Undertaking channel design to mimic as close as possible the natural creek channel and adjacent floodplain;
- Where excavation is required design the channel to minimise the potential for erosion and downstream sedimentation;
- Construction of a creek channel profile that allows for vegetation establishment;
- Ensure that the majority of the channel is cut into competent rock material with a low potential for additional sediment generation; and
- Creation of a suitable creek bed and creek bank surfaces with low potential erodibility.

5.3 Relevant Legislation

The following legislation, documents, guidelines, regulations and performance indicators are applicable to this management plan:

- EPA Environmental Guidance for Planning and Development (Draft) 2006, Guidance Statement No 33; and
- EPA Assessment of Aboriginal Heritage 2004, Guidance Statement No 41.

5.4 Management Actions

Table 16 Coppin Gap Management Actions

Ref	Management Actions	Timing	Delegated Responsibility
Tourism, Recreation and Access (also see Terrestrial Fauna and Flora and Vegetation Management Plans)			
CGMP 1.	Develop a new access track to ensure seasonal access to Coppin Gap is maintained throughout the operation.	Construction	Registered Manager
CGMP 2.	Erect appropriate signage to ensure that visitor access to Coppin Gap is maintained.	Construction	Registered Manager
CGMP 3.	Liaise with SoEP and the pastoral leaseholder prior to establishing the access track to Coppin Gap.	Construction	Registered Manager
CGMP 4.	Maintain the Coppin Gap access track to a similar standard as the existing track.	Operation	Mine Manager
CGMP 5.	Restore access through Kitty's Gap following mining.	Decommissioning	Registered Manager
Visual Amenity			
CGMP 6.	Align the new access track to reduce visual impact of mining operations for visitors.	Construction	Registered Manager
CGMP 7.	Maintain riparian vegetation along creeks within the reserve and adjacent areas to maximise screening of the pit area from the reserve.	Construction and Operation	HSE Manager
Public Safety/Security			
CGMP 8.	Erect fencing to prevent unauthorised access from Coppin Gap into active mining areas.	Construction	Mine Manager
CGMP 9.	Install appropriate signage and security gates to prevent visitor access to identified areas of risk within the Coppin Gap area during times of blasting.	Construction	Resident Manager
CGMP 10.	Develop blast clearance procedures that include checking the Coppin Gap area to ensure that any visitors are aware of impending blasts and are outside from any areas of risk prior to blasting.	Construction	Mine Manager
CGMP 11.	Develop blast clearance procedures that will be implemented on an ongoing basis.	Operation	Mine Manager

6. Conceptual Mine Closure Management Plan

6.1 Background

The Spinifex Ridge Project is designed for a nominal life of mine of 12 years. Any possible extension on the life of mine beyond this period will be determined at a later date. Should Moly Mines choose to close the mine, the decision will likely be determined by any number of influencing factors, such as:

- exhaustion of the mineral resource;
- economic feasibility, such as low commodity prices or high costs;
- geological feasibility, such as unanticipated decrease in grade or size of the ore body;
- technical feasibility, such as adverse geotechnical conditions or mechanical/equipment failure;
- social or community pressures; and
- closure of downstream industry or markets.

Potential impacts of the operations for consideration during mine closure include:

- unstable and/or unsafe post-mining landforms from physical, geochemical and ecological perspectives;
- contamination of surrounding groundwater, surface water or soil;
- poor visual amenity and landscape value;
- loss of socio-economic benefits, (e.g. post-mining land use is adversely affected by any of the above impacts);
- community and stakeholder dissatisfaction; and
- insufficient allocation of funds and/or resources for closure, particularly in the event of unforeseen or sudden closure.

6.2 Objectives

The objective for closure, decommissioning and rehabilitation is to ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform that is consistent with the surrounding landscape and other environmental values.

6.3 Relevant Legislation

The following legislation, documents, guidelines, regulations and performance indicators are applicable to this management plan:

- *Mining Act 1978;*
- *Mines Safety and Inspection Act 1994;*

- *Mines Safety and Inspection Regulations 1995;*
- *Environmental Protection Act 1986;*
- *Contaminated Sites Act 2003;*
- *Contaminated Sites Regulations, 2006;*
- Strategic Framework for Mine Closure (ANZECC and MCA, 2000);
- Mine Closure and Completion (DITR, 2006);
- Mine Closure Guideline for Minerals Operations in Western Australia (CME, 2000)
- Guidelines for Consultation with Indigenous People by Minerals Explorers (DoIR, W.A. 2004); and
- Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (1996).

Rehabilitation Completion Criteria

The development of site specific completion criteria is important and this will commence during the design and construction phase of the project. The key stakeholders currently identified to participate in site closure planning and the development of completion criteria for Spinifex Ridge are presented in **Table 17**. This list of stakeholders will be updated periodically throughout the life of the project.

Table 17 Key Stakeholders in Closure Planning

State Government	
Department of Environment and Conservation	Department of Industry and Resources
Department for Planning and Infrastructure	Department of Water
Local Government	
Shire of East Pilbara	
NGOs	
Care for Hedland Environmental Association	
Indigenous	
Njamal People	
Other	
Warrawagine Station	Yarrie/Muccan Station
Marble Bar Community	Moly Mines Management and Staff
Moly Mines contractors	

Post-Mining Land Use

The post-mining land use for the project area is proposed to be re-incorporation within the existing Yarrie pastoral activities. It is anticipated that the current level of visitation to Coppin Gap will continue post-mining. No new land uses are proposed for the site, although alternative uses may be identifies during the stakeholder consultation process

6.4 Management Actions

The Mine Closure Management Plan will be reviewed annually to incorporate changes to the disturbance footprint, progressive rehabilitation, legislative requirements, technical improvements, cost increases, changes to the needs of stakeholders and changes to environmental practice techniques.

Table 18 Conceptual Mine Closure Management Actions

Ref	Management Actions	Timing	Delegated Responsibility
Pit			
CCMP 1.	Install an abandonment bund around the pit.	Decommissioning	Mining Manager
CCMP 2.	Install safety and access hazard signage around the pit.	Decommissioning	Mining Manager
CCMP 3.	Revise options for re-establishing the hydrological connection between the pit and the hydrology of the surrounding area.	Operation and Decommissioning	Resident Manager
Waste Landforms			
CCMP 4.	Construct waste landforms with a mesic (concave) shape.	Operation	Mining Manager
CCMP 5.	Progressively rehabilitate all disturbed soils and vegetation associated with the waste landforms.	Operation and Decommissioning	HSE Manager
CCMP 6.	Undertake characterisation of waste materials, especially the identification of soils conducive to rehabilitation.	Operation and Decommissioning	HSE Manager
Process Plant Site			
CCMP 7.	Remove all buildings and structures.	Decommissioning	Processing Manager
CCMP 8.	Rehabilitate the process plant site after buildings structures have been removed.	Decommissioning	Mining Manager
CCMP 9.	Retain roads and other infrastructure as per agreement with the pastoral leaseholder.	Decommissioning	Mining Manager
Contaminated Sites			
CCMP 10	Identify all contaminated sites.	Operation and Decommissioning	HSE Manager
CCMP 11	Report all contaminated sites as per *Contaminated Sites Act 2003* and *Contaminated Sites Regulations 2006*.	Operation and Decommissioning	HSE Manager
CCMP 12	Remediate all contaminated sites.	Operation and Decommissioning	HSE Manager
CCMP 13	Clean up any hydrocarbon spills taking into account guidance from the APPEA Code of Environmental Practice (1996).	Operation and Decommissioning	HSE Manager
CCMP 14	Establish a bioremediation farm and develop an operating	Operation and	HSE Manager

	procedure.	Decommissioning	
Rehabilitation			
CCMP 15	Develop site specific completion criteria for rehabilitation.	Operation	HSE Manager
CCMP 16	Develop and implement a progressive Rehabilitation Plan	Operation and Decommissioning	HSE Manager
Administration			
CCMP 17	Review Closure Plan annually and make changes as necessary.	Operation and Decommissioning	Resident Manager