



P O L A R I S
M E T A L S N L

CARINA IRON ORE MINE:
PROJECT ENVIRONMENTAL MANAGEMENT PLAN

OCTOBER 2009

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1. INTRODUCTION

Polaris Metals NL (Polaris) is an Australian Stock Exchange listed company, holding iron ore tenements across Western Australia. In 2006, Polaris acquired iron ore tenements in the Yilgarn area of Western Australia.

Recent exploration drilling has identified the Carina deposit as being prospective for iron ore mining. The project, known as the Carina Iron Ore mine, involves open pit mining, crushing and screening and export of iron ore through the Port of Esperance.

The Carina iron ore project has been described in detail in other documents, principally the Public Environmental Review and the Mining Proposal. These documents cover elements such as project description and existing environment, and are not repeated in this document.

1.1 PURPOSE

The Project Environmental Management Plan (PEMP) details the framework for managing environmental impacts during the operational phase of the mine.

1.2 IMPLEMENTATION

This plan is to be implemented on commencement of project activities at the site and continue throughout the operating life of mine. It will be reviewed on a regular basis to ensure that it remains current and addresses changes as they occur in mine conditions. On completion of the project this plan will be superseded by the Mine Closure Plan.

The construction phase for mine infrastructure is not a lengthy process involving construction of large processing plants or tailings dams. Much of the infrastructure is portable or modular, being constructed off site before transport and assembly on site. This plan includes the construction phase of the project

2. RESERVES AND PROTECTED AREAS

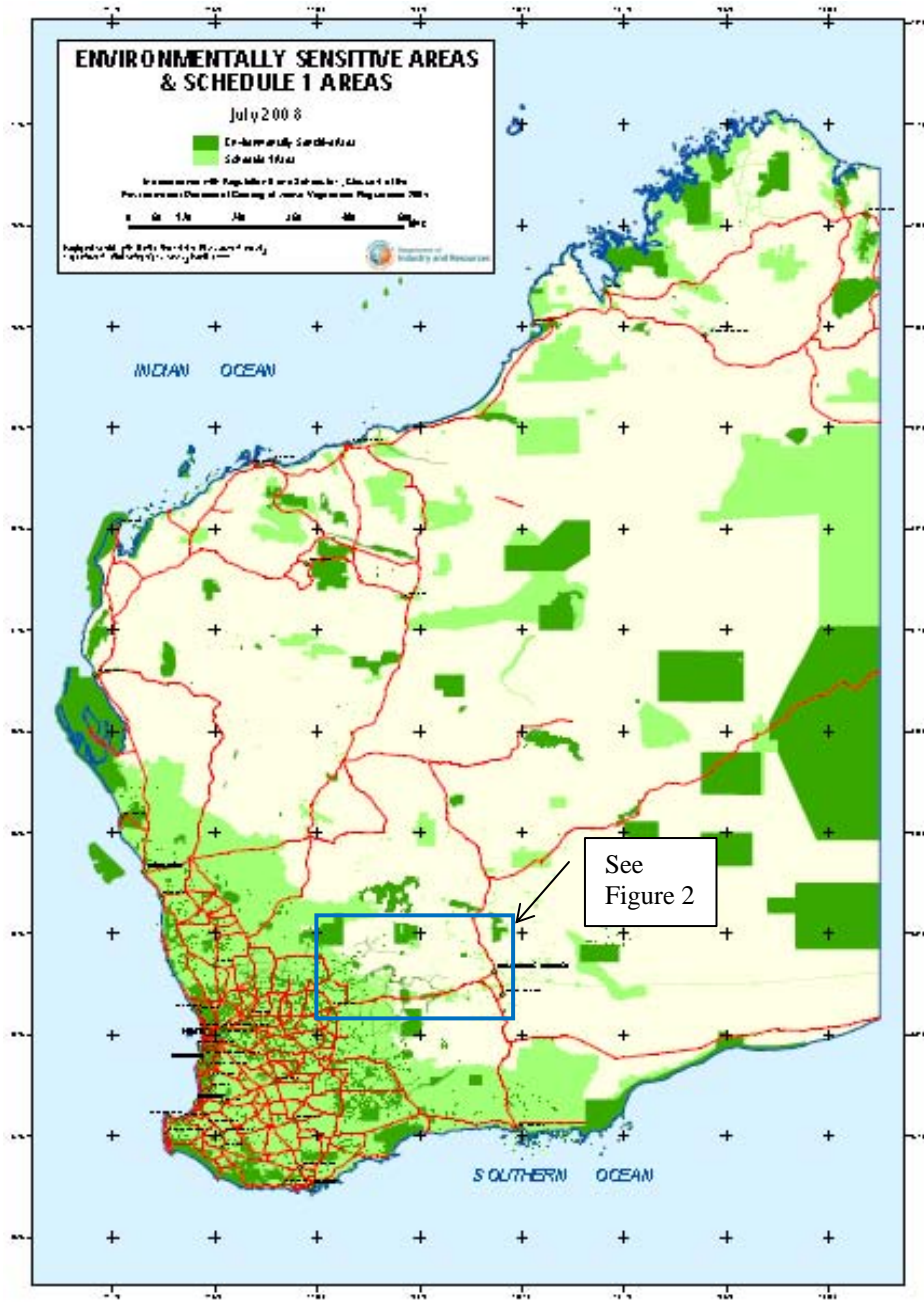
The Carina iron ore mine will not impact any of the following Reserves or other protected areas:

- National Parks or Nature Reserves.
- Wetlands, including Ramsar wetlands.
- Environmental Protection Policy areas.
- Declared surface water protection area.

Figure 1 and Figure 2 show Carina is not in or adjacent to any Environmentally Sensitive Area (ESA) or Schedule 1 Area, as described in Regulation 6 and Schedule 1, clause 4 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Carina is approximately 15 kilometres south of the nearest Schedule 1 area (Figure 2).

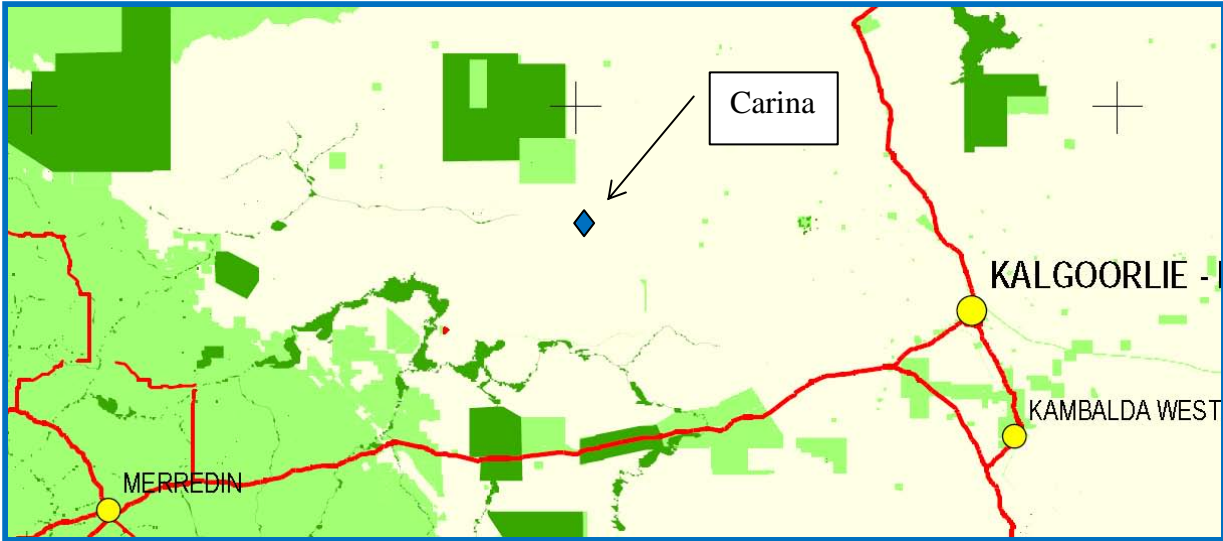
Carina is located in the former Jaurdi pastoral station, proposed in EPA Bulletin 1256 for inclusion in the extended Yilgarn conservation reserve system as the Jaurdi Conservation Park. This proposal has not yet been implemented by Government.

Figure 1: ESA and Schedule 1 areas



Source: DoIR (July 2008)

Figure 2: Figure 1 insert



3. PROJECT ENVIRONMENTAL MANAGEMENT PLAN

Polaris has developed a Project Environmental Management Plan (PEMP), consistent with the principles of the ISO 14000 family of standards. ISO 14001 provides a framework for the management of environmental issues. It ensures the operation implements industry best practice to reduce its environmental impact. The PEMP is a dynamic document that is reviewed during the life of mine to meet the needs of the company and stakeholders. The PEMP includes the following 11 components:

1. Environmental Policy

Polaris' Environmental Policy provides objectives for the conduct of all operations, employees and contractors. The Policy details Polaris' commitment to continuous improvement in environmental performance, pollution prevention, and compliance with environmental legislation (section 4).

2. Legal obligations and other requirements

Statutory requirements set the minimum standard for compliance. A Compliance Register detailing applicable legal requirements, as well as voluntary commitments made by the Company has been developed to assist in monitoring compliance with these requirements and commitments (Appendix 1).

3. Management commitment

Polaris management recognise the importance of leading by example. Senior management have committed to active involvement in implementation of this system.

The executive management team reviews the PEMP annually, to ensure that it remains effective and appropriate. The review takes into account results of environmental audits, the extent to which environmental objectives and targets have been met, its continued relevance to changing conditions and concerns of interested parties.

4. Key Responsibilities and Reporting Structure

Environmental management is a line accountability, but every employee and contractor is responsible for conducting activities in an environmentally acceptable manner. Successful implementation of the PEMP depends on commitment of all employees and contractors. Individual responsibilities and authorities have been defined in relevant documents and communicated to personnel through inductions and meetings.

5. Induction and Training

It is recognised that personnel who carry out work which may have significant environmental impacts will need to have appropriate induction, training and/or experience.

6. Communication

Polaris commits to ongoing consultation with both internal and external stakeholders. This includes reports to government agencies, meetings and written correspondence.

7. Environmental Aspects

Environmental issues and risks associated with the company's activities are identified, evaluated and managed (section 7). Operational control documents have been

developed to reduce environmental risks during construction, normal operations and emergency situations as far as practicable.

8. Operational Control

Polaris will ensure that plans, procedures, permits, forms and checklists are implemented to reduce environmental impact of activities (section 8). Environmental monitoring will provide ongoing feedback on the effectiveness of control strategies.

9. Contractor Management

Polaris will implement an inspection program to ensure contractor's performance is consistent with requirements of the PEMP.

10. Environmental Performance

Monitoring (section 9) provides data on site's performance against targets, compliance with regulatory requirements, voluntary commitments and with the PEMP. Systems have been established for internal and external reporting and communication of environmental monitoring results.

11. Environmental Audits and Inspections

Audits, inspections and reviews (section 12) allow the operation to identify opportunities for improvement to enable the operation to continually improve its performance. Inspections focus on the practical implementation of company procedures. Audits are conducted to ensure specific components of the PEMP are being complied with. Reviews are conducted to ensure requirements of the PEMP are practicable and assist the operation in meeting its regulatory and voluntary environmental commitments.

3.1 REQUIREMENT FOR A PEMP

The Carina iron ore mine is located in a wider land precinct with existing and proposed conservation parks. To minimise potential environmental impacts during the exploration phase, Polaris, in consultation with the Department of Environment and Conservation (DEC), prepared an Exploration Environmental Management Plan (EEMP), to provide generic management and mitigation measures to be adopted during exploration drilling activities.

The EEMP structure provided a document that met the requirements of regulators, which can be applied effectively in the field and formed an integral part of supporting documentation to applications for exploration Program of Work (PoW) to the Department of Mines and Petroleum (DMP).

As the Carina project moved from exploration to mining, management practices must also evolve to reflect changing circumstances and issues. The PEMP is consistent with industry best practice environmental management for the construction and operation of the Carina iron ore project.

3.2 RELATED DOCUMENTS

This PEMP is not a stand-alone document, independent of other reports, surveys and studies on the Carina project. The PEMP is an operational level plan, designed to implement requirements identified in other related processes and documents. The PEMP is also a 'live

document', incorporating changes in subsequent revisions that are identified by further studies and monitoring. The list of related documents, that support the PEMP, is therefore an integral component of the PEMP and comprises the following documents:

1. Public Environmental Review (PER).
2. Mining Proposal (MP).
3. Conceptual Mine Closure Plan.
4. Emergency Response Plan (ERP)

4. ENVIRONMENTAL POLICY

Polaris has a formal Company Policy on environmental matters as follows:



Environmental Policy

Polaris is committed to achieving the best balance between economic development and protection of the environment. Polaris recognises that we cannot continue to operate or be successful without fully integrating environmental considerations with regard for the aspirations of all stakeholders into our daily processes. To achieve this, Polaris will aim to:

- Comply with and, where appropriate, exceed the requirements of applicable legislation, regulations and other policies, codes and standards to which we subscribe
- Promote environmental awareness among our personnel and contractors to increase understanding of their roles and responsibilities in environmental management
- Develop our people and provide resources to meet our environmental objectives
- Ensure that the environmental issues are integrated into the decision making process of all aspects of exploration and project development.
- Identify and assess the potential environmental effects of our activities and manage environmental risk
- Continually improve and regularly monitor, audit and review our environmental performance, and practice wherever possible the waste reduction principles of 'reduce, reuse, recycle'
- At all time maintain an open and honest relationship with all stakeholders
- Promote our environmental progress and performance through liaison with and public reporting to the Government and community

A blue ink signature, appearing to read 'JL', written in a cursive style.

Jonathan Lea
Managing Director

A black ink signature, appearing to read 'Alan Tough', written in a cursive style.

Alan Tough
Executive Director Operations

5. LEGISLATION AND COMPLIANCE

Statutory requirements are the minimum compliance standard. A Compliance Register for each operating site shall be maintained that contains a list of approval conditions, tenement conditions, voluntary commitments and current copies of relevant licences and permits (Appendix 1).

The compliance register records:

- Statutory conditions that include:
 - Ministerial conditions from the EIA process
 - DEC licence conditions
 - Tenement conditions
 - Water licence conditions
 - Clearing permit conditions
- Mining Proposal commitments
- Commitments in other documents (eg; closure plan)
- Date of commencement and expiry of all licences and permits.
- Status of the condition.

6. RESPONSIBILITIES

The Registered Mine Manager has ultimate statutory responsibility for activities undertaken on the mine.

Departmental Managers are responsible for their respective areas' compliance with regulatory requirements and internal company standards. The Environmental Manager and site Environmental Officer will actively assist Departmental Managers in fulfilling these responsibilities.

Polaris' Environmental Manager has overall responsibility for ensuring that environmental activities undertaken are consistent with statutory requirements and company commitments. Key site responsibilities are outlined in Table 1.

7. RISK ANALYSIS

The Australian and New Zealand Standard on Risk Management (AS/NZS 4360) defines risk as the product of the likelihood of an event occurring and the consequence of that event. Polaris has developed a risk matrix based on AS/NXS 4360:2004 to assess the risk of activities undertaken in its operation (Figure 3).

To maximise the benefit in pro-active management of environmental issues, it is important that manpower and other resources are allocated on a priority basis to issues. It is normally accepted that the highest risk issues receive the highest priority.

Table 1: Environmental Responsibilities

Personnel	Responsibilities
Mine Manager (MM)	<ul style="list-style-type: none"> • Appoint the Environmental Manager to oversee implementation of the PEMP. • Ensure the PEMP is effectively implemented. • Review performance of the PEMP on an annual basis. • Review any environmental non-conformances and remediation actions; • Allocate resources to manage environmental issues; and • Ensure contractors comply with environmental requirements.
Departmental Managers (DM)	<ul style="list-style-type: none"> • Implement the PEMP on site. • Liaise with the Environmental Manager and/or Site Environmental Officer on environmental issues and non-conformances. • Ensure that site personnel are aware of their environmental obligations. • Take corrective action to resolve non-conformances.
Environmental Manager (EM)	<ul style="list-style-type: none"> • Assigned responsibility for the PEMP's compliance. • Implement an appropriate environmental induction programme and assist site personnel to implement the programme. • Prepare Annual Environmental Report (AER), with Environmental Office, for external reporting. • Liaise with relevant local authorities to maintain effective communication. • Liaise with the general public and key stakeholders, as required. • Review and update the PEMP and associated documentation.
Site Environmental Officer (EO)	<ul style="list-style-type: none"> • Ensure the PEMP is implemented and required records are maintained. • Prepare Quarterly Environmental Report (QER) for Mine Manager. • Prepare Annual Environmental Report (AER), with Environmental Manager, for external reporting. • Ensure prestart/ toolbox meetings address environmental issues as required and these are documented in meeting minutes. • Ensure that appropriate communications are in place between Polaris and the contractors. • Confirm all personnel have been inducted prior to commencing work. • Implement environmental monitoring and audit programmes. • Ensure that environmental records and files are maintained.
Employees	<ul style="list-style-type: none"> • Employees are expected to conduct all activities in an environmentally responsible manner during the course of their employment. • Supervisors shall make all employees aware of their responsibilities for environmental management. • Employees will comply with any environmental instruction relating to work practices. • Employees will report and rectify unacceptable environmental conditions and practices when they are identified. • Employees are encouraged to take ownership of environmental issues through participation in decision-making and accountability in all areas of their workplace.
Contractors	<ul style="list-style-type: none"> • Contractors are required to uphold Polaris' environmental standards and commitments referred to in the PEMP. • Relevant Departmental Managers shall ensure that all contractors in their area of responsibility are informed of their environmental responsibilities and that their performance is monitored.

A risk analysis has been undertaken of key functions for the Carina project. This is included in the PEMP as Appendix 2.

The header in the risk level table in Figure 3 identifies the 4 risk categories being contained in the Australian/New Zealand Standard (AS/NZS) Number 4360. Polaris has adopted these same 4 categories in a 5 x 5 risk matrix.

The document *Review of the EIA process in WA – Appendix 2* (EPA March 2009) included a 5x6 risk matrix with 5 risk categories. Polaris has modified these 5 categories to best fit the 4 categories used in AS/NZS 4360.

The priority risk rating from this analysis shows that almost all site activities have an inherent risk level of moderate or low. Polaris considers this generally low level of risk is consistent with the nature and scale of the project, which includes factors such as:

1. Operations are restricted to open pit mining and physical processing of ore (crushing and screening). No chemical treatment of ore, processing/beneficiation of ore or storage of process tailings is required.
2. Ore being mined (iron) is essentially benign, and has no inherent environmental or human health concerns that are associated with some other metals or ores concentrated through a processing/beneficiation process.
3. Relatively small scale of overall disturbance. Approximately 500 hectares in a region mostly uncleared.
4. Most potential impacts have only a localised affect, usually confined to the mine boundaries. In most cases these can be readily controlled or remediated.
5. Vegetation communities impacted by the project are widely represented in the region.
6. No populations of flora or fauna are unique to the project area, eliminating the risk of catastrophic or major consequences to specific environmental factors.
7. Located in an isolated area of the State with no neighbours resident within a minimum of 20 kilometres from the mine and the nearest regional town 100 kilometres from the mine.
8. Located in an arid environment (less than 300 millimetres of rainfall per year), with no permanent surface water bodies in the vicinity. This results in low risk of surface water contamination and no risk to wetlands.
9. Deep local groundwater (approximately 60 metres below surface) with naturally high salinity (approximating sea water). This results in low risk of contamination for other uses.

The EPA outlined the proposed use of risk analysis in the environmental impact assessment process. The methodology is described in discussion papers Appendix 2 and Appendix 3 of the report *Review of the Environmental Impact Assessment Process in Western Australia*. (EPA March 2009). The EPA report proposed that aspects with low risk can be managed through routine controls, documented in the project's EMP.

Polaris has established a comprehensive set of routine controls in this document that comprise plans, procedures, permits, forms, maps and inspection checklists, which provide control measures to reduce environmental impacts of site activities. These are detailed in section 8: Operational controls.

Figure 3: Polaris Risk Matrix

Based on AS/NZS 4360: 2004 5 x 5 Risk Matrix					Consequence descriptors (risks may present consequences to multiple descriptors)					
					Extent of impact		Species	Critical asset		
12	8	6	3	1	Consequence	5	Catastrophic	Irreversible impact at regional level	Extinction of a species regionally	Loss of major portion of a critical asset at the regional level
15	13	7	5	2		4	Major	Serious long term impact at regional level	Major loss to significant species at the local level. Disturbance with long term impact to >50% of individuals at the local level.	Critical asset is significantly affected
19	18	10	9	4		3	Moderate	Major but reversible short term impact. Little/no impact on ecosystem function. Off site/regional disturbance	A significant species is affected but not significantly. Disturbance, but reversible, short term impact to <50% of individuals in the local population.	A critical asset is affected but not significantly A high value asset is significantly affected
24	22	17	14	11		2	Minor	Minor reversible short term impact at local level	Small number(<10%) of individuals in the local population of non-significant or significant species may be affected	A minor affect to a critical or high value asset
25	23	21	20	16		1	Insignificant	Limited /rectifiable impact within project boundary	very small number of individuals (1%) in local population of non-significant or significant species may be affected	will not affect a critical or high value asset
Likelihood										
1	2	3	4	5	Likelihood scale					
Rare	Unlikely	Possible	Likely	Almost certain	Likelihood descriptor					
<1%	1-5%	5-40%	40-75%	>75%	Probability (%)					
May occur only under exceptional circumstance	Envisaged /known under other conditions but should not occur here	Envisaged /known under other conditions and could occur here	Envisaged /known under current conditions and probably occur here	Expected to occur or reoccur under current conditions	Likelihood definition					

Risk level	AS/NZS 4360: 2004 guideline	Risk treatment
Extreme	Immediate action required	potentially unacceptable, major modification of proposal required
High	Senior management accountability.	Substantial modification and/or mitigation required
Moderate	Management responsibility specified	Some mitigation required
Low	Manage by routine procedures	Minor mitigation may be required but usually adequately addressed in EMP as routine controls

8. OPERATIONAL CONTROLS

Table 2 details the operational controls aimed at providing control measures to reduce environmental impacts from site activities. These include specific plans, procedures, permits, forms, maps and inspection checklists. These are compiled in separate documents dealing with relevant environmental factors (eg; flora, fauna, water, and dust) and attached as appendices to this PEMP.

9. MONITORING

Monitoring programs are to be established for a range of site activities that can have a significant impact on the environment. Site environmental officers are to assess data collected from monitoring activities and compare against relevant standards and targets. Results of routine monitoring shall be included in the site's internal quarterly report and external annual report (Section 11). Table 3 lists the routine monitoring requirements for the site. Additional requirements will be added as approval and licence conditions are known.

10. RECORDING

The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register -for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form -for more significant issues that require formal investigation and corrective actions.

Incident Reports are to be maintained by the site Administration/Safety Manager in the document control library and kept for a minimum of three years.

The environmental officer is to maintain relevant registers, spreadsheets and the like to record results of monitoring as detailed in section 9.

11. REPORTING

An internal Quarterly Environmental Report (QER) is required from the site Environmental Officer to the Mine Manager, summarising:

- Environmental monitoring data and identifying trends.
- Anomalous monitoring records and actions resulting.
- Environmental incidents and outcomes.
- Environmental commitments and conditions relevant for the period and actions taken.

An external Annual Environmental Report (AER) is normally required by regulatory agencies (DEC, DMP, DoW), as an audit tool against compliance with licence or tenement conditions. The AER presents monitoring data collected during the reporting period, identify trends, identify reasons for any anomalous results recorded and describe any changes proposed to environmental monitoring programs.

Table 2: Environmental control documents

Document	Located	Control function	Application	Report in...
(What)	(Where)	(How)	(When)	
Vegetation and flora				
Vegetation management procedure	Appendix 3	Documents the process for vegetation clearing, topsoil management and weed control.	Ongoing through the life of mine	QER
Clearing procedure	Appendix 3	Clearing process and issue of permit, topsoil stockpiling	When undertaking clearing	
Weed procedure	Appendix 3	Equipment hygiene, confine vehicle movement to designated areas.	When undertaking clearing	QER
Clearing permit	Appendix 3	Regulates clearing on site	Prior to clearing	QER
Weed inspection checklist	Appendix 3	Routine site inspection for weeds	6 monthly	Every second QER
Terrestrial fauna				
Fauna management procedure	Appendix 4	Documents the process for fauna management.	Ongoing through the life of mine	QER
Significant fauna sighting form	Appendix 4	Records sightings of significant fauna species	As required	
Subterranean fauna	Appendix 4	Documents the process for subterranean fauna surveys.	Ongoing through the life of mine	AER
Waste				
Waste management procedure	Appendix 5	Documents the process for waste management.	Ongoing through the life of mine	QER
Acid rock drainage				
Acid rock management procedure	Appendix 6	Documents the process for potential acid forming mine waste management.	Ongoing through the life of mine	AER
Water				
Water monitoring procedure	Appendix 7	Documents the process for water monitoring.	As required by licences / approvals.	QER
Chemicals				
Hydrocarbon and chemical procedure	Appendix 8	Documents the process for hydrocarbon and chemical management.	Ongoing through the life of mine	QER
Dust				
Dust procedure	Appendix 9	Documents the process for dust control.	Ongoing through the life of mine	QER

Document	Located	Control function	Application	Report in...
(What)	(Where)	(How)	(When)	
Rehabilitation				
Rehabilitation plan	Appendix 13	Documents the process for rehabilitation.	Ongoing through the life of mine	AER
Aboriginal heritage				
Aboriginal heritage procedure	Appendix 14	Documents the process to identify and protect Aboriginal heritage sites.	Ongoing through the life of mine	AER
Registers and Forms				
C3: Hazard/Incident register	Appendix 10	Records minor incidents and corrective actions	As required	QER
C6: Incident form	Appendix 10	Documents incident and investigation process	As required	QER
Surface disturbance and clearing register.	Appendix 10	Documents progressive clearing against permits/approvals	Ongoing through the life of mine	QER
Checklists				
Vehicle inspection checklist	Appendix 11	Records inspection of vehicles for soil, weeds and safety items.	As required	QER
Monthly inspection of Contractors area	Appendix 11	Records housekeeping and routine reporting requirements.	Monthly	QER
Maps				
Site constraints map	Appendix 12	Records environmental / heritage sites and buffer areas.	Ongoing through the life of mine	QER

Table 3: Monitoring schedule

What	How	Who	Reference / Link	Report in ...
Daily / or as required.				
Record rainfall	Record level in rain gauge and enter into rainfall spreadsheet	EO	Rainfall spreadsheet	QER
Surface water monitoring	Sample surface water courses after significant rainfall events	EO	Appendix 7	QER
Vehicle Inspection Report	Inspect all new vehicles entering the mine site (beyond the Administration car park) and complete the inspection checklist.	Safety Coordinator	Appendix 11	QER
Hazardous materials delivery	Record delivery of all bulk hazardous materials (diesel, oils etc) and disposal of waste oil, etc in the hazardous materials register.	Purchasing supervisor	In Appendix 8	QER
Environmental Incidence	On the C6: Incident Report form	All personnel	Appendix 10	QER
Weekly				
TBA				
Monthly				
Bore flow meter readings	Record meter readings of bores and water network on site.	EO	Appendix 7	QER
Groundwater levels	Take standing water levels (SWL) of monitoring bores around the site	EO	Appendix 7	QER
Potable water sampling	Take samples from potable water locations	EO	Appendix 7	QER
Contractor checklist	Inspection of work areas to record general housekeeping and compliance with Polaris requirements	Contractors and Polaris EO	Appendix 11	QER
Quarterly				
Water quality	Take samples from bores and water network on site.	EO	Appendix 7	QER
6 monthly				
Clearing reconciliation	Record any additional clearing undertaken in the clearing register	EO	Appendix 10	Every second QER
Annually				
TBA				
				AER

12. AUDIT AND REVIEW

Regular inspections, audits and reviews are an essential component of the PEMP. The audit and review program is summarised in Table 4.

The site environmental officer shall audit the site against the compliance register on an annual basis. Results of the compliance audit are to be submitted to the Environmental Management as part of the annual system review.

Departmental Managers, in conjunction with the Environmental Manager, shall develop an action plan to address identified non-compliances within their areas. Responsibilities and timeframes for completion of tasks shall be allocated and documented in the action plan.

Table 4: Audit and review schedule

Activity	Document	Frequency	Auditor/Reviewer
Inspection	Scheduled inspections of site	Monthly	Environmental officer or delegate
Inspection	Scheduled inspections of site	Quarterly	Environmental officer or delegate
Audit	Compliance Register	Annually	Site Environmental Officer
Audit	PEMP compliance	Annually	Environmental Manager
Review	Procedures, permits and guidelines	Annually	Document custodians.
Review	Position Responsibilities	Annually	Employee's line Manager
Review	Environmental Policy	Biennially	Polaris MD

13. EMERGENCY RESPONSE

The Carina Emergency Response Plan (ERP) is a separate document to the PEMP. This plan includes provisions for response to major accidents and injuries, major spills of hazardous substances and natural emergencies (bushfires, cyclones, flooding).

The ERP details roles and responsibility of key site personnel in emergency situations. The mine manager is to ensure that members of the site Emergency Response Team (ERT) are trained to respond to all potential emergencies. The ERP includes the following provisions:

- Installation of appropriate warning systems/devices.
- Purchase and maintenance of necessary emergency equipment.
- Regular testing of warning systems/devices and emergency response equipment.
- Training of Emergency Response Team members for emergencies.
- Communication of information to external stakeholders.
- Review the effectiveness of procedures and actions after an incident.

The existence of the ERP and its key requirements are communicated to all employees and contractors as part of the site induction.

14. MINE CLOSURE

The Carina Conceptual Mine Closure Plan (CMCP) is a separate document to the PEMP. The CMCP describes strategies for final rehabilitation and closure at the completion of operations. The strategies are designed to ensure maintenance free or “walk away” closure over the long term.

The document is consistent with the Australian and New Zealand Minerals and Energy Council / Minerals Council of Australia (ANZMEC/MCA) (2000) *Strategic Framework for Mine Closure*. To that end, the current document sets out a conceptual closure strategy for the project. At the end of mine life, the five basic steps involved in closure planning are:

- The removal and disposal of all infrastructure not required for other uses.
- The remediation of any soil or water contamination.
- Rehabilitation of remaining disturbances.
- Post-closure maintenance and monitoring.
- Tenement relinquishment / bond retirement.

The conceptual closure plan will be revised every two years during site operations to ensure it remains accurate and relevant. Subsequent revisions will contain more detailed information concerning actual infrastructure, rehabilitation and closure strategies, as well as estimated closure costs, as the project moves through its operational life.

APPENDICES

**APPENDIX 1:
COMPLIANCE REGISTER**

	Condition	Compliance Status (√/x)	Comments
		√	

Commitment	Action	PER Page No.
Commitment 1	Prior to construction, make a decision between infrastructure areas 1 and 2 for the final location of the mine infrastructure area.	24
Commitment 2	implement an 'employ local - source local' policy where possible, to maximise employment opportunity and flow on benefits to local towns in the region.	68
Commitment 3	to implement the Project Environmental Management Plan.	82
Commitment 4	to undertake further botanical surveys in the sandplain vegetation type, to improve knowledge of significant flora populations in the region. Results of surveys conducted will be included in the Annual Environmental Report.	102
Commitment 5	to undertake further troglofauna surveys in the region, to improve knowledge of troglofauna populations in the region and those found at Carina. Results of surveys conducted will be included in the Annual	108
Commitment 6	to undertake progressive rehabilitation during the life of mine.	115
Commitment 7	during the life of mine, review the possibility of partial backfilling the open pit with mine waste.	116
Commitment 8	to continue to revise and implement the Mine Closure Plan.	119
Commitment 9	to implement a vegetation health monitoring program to quantify indirect effects to adjacent vegetation from dust and the use of saline water.	123
Commitment 10	Prior to construction, submit a Section 18 application to disturb the archaeological site and obtain permission from the Minister for Indigenous Affairs.	126
10		

Carina compliance register_V2
DOW licence

10/03/2010
12:25 PM

No.	Condition	Audit date	Compliance (y/n)	Valid from	Valid to
	GWL 169652(1) - 12,500kL per year			1/08/2009	4/08/2014
1	that should the licensee's draw adversely affect the aquifer or other users in the area, the DoW may reduce the amount that may be drawn		y		
2	approval by the DoW is to be obtained prior to the construction of additional and replacement wells and the modification or refurbishment of existing wells		y		
3	the licensee must not, in any water year, take more water than the annual water entitlement specified in the licence		y		
4	the annual water year for water taken under this licence is defined as 12:pm at 30 Junr to 12:pm at 30 June twelve months later		y		
4			4		

APPENDIX 2:
RISK ANALYSIS

Risk analysis

No.	Factor	Aspect (activity that impacts factor)	Potential impacts	L	C	Inherent Risk	P	Cause	Control (mitigation)	L	C	Residual risk	P
General													
1	Biodiversity, vegetation, flora, weeds, terrestrial fauna, heritage, surface water	Clearing for mine activities (open pit, waste landform, haul roads, infrastructure)	Vegetation loss Loss of fauna habitat Interference to Aboriginal heritage sites Alter natural drainage lines and divert surface water flows. Dust generation from exposed areas and machinery movement.	5	2	High	11	Clearing Clearing. Vehicle/machine disturbance. Drainage shadow causing vegetation loss in areas where vegetation is reliant on sheet flow. Dust deposition on vegetation.	Implement clearing procedure Undertake heritage survey Implement Vegetation Management Procedure. Water sprays used in active areas for dust suppression	3	1	Low	21
2	Surface water,	Storm water contaminated with sediment running off site.	Erosion off disturbed areas Sedimentation of surface water channels.	3	2	Moderate	17	Ineffective containment of materials Inefficient drainage.	Inspection and maintenance of stormwater facilities	2	1	Low	23
3	Air quality (dust)	Dust emissions from active / disturbed areas	Dust deposition on vegetation	3	1	Low	21	Blasting, vehicle movement, loading/unloading of trucks, stockpiles	Water sprays on active areas Progressive rehabilitation of disturbed areas	3	1	Low	21
4	Soil, surface water	Minor hydrocarbon spillages	Localised contamination of soil and surface water.	4	1	Low	20	Refuelling / transferring spills. Machinery breakdown-burst hoses Pipeline / joint leaks.	Inspection, maintenance of equipment. Implement spill cleanup procedure Supply of bioremediation agents on site Bunding of bulk hydrocarbon storage areas compliant with AS 1940:2004.	3	1	Low	21
5	Soil, surface water	Vehicle accident	Spillage of hydrocarbons (diesel / oil) Spillage of product (ore, explosives, fuel)	3	2	Moderate	17	Ruptured fuel tank / lines Overturned truck	Speed limits on site Emergency response procedure	3	1	Low	21
6	Vegetation, flora, soil	Use of saline water as dust suppressant on active areas	Impact to adjacent vegetation and soil from saline water.	3	1	Low	21	Saline water overspray from water truck Saline water flow off disturbed areas in rainfall events	Dribble bars used to water haul roads Sumps used to contain water in moderate rainfall events	3	1	Low	21
7	Vegetation, flora, soil	Saline water in dams Piping saline water	Impact to adjacent vegetation and soil from saline water overflow, seepage, spills. Fauna fatalities	4	1	Low	20	Overflow, seepage from pond Pipe rupture / leaks Fauna unable to get out of dams.	Use of pond liners. Pipeline inspections. Fauna egress mats	3	1	Low	21
8	Air quality (greenhouse emissions)	Combustion products from engine exhausts	Greenhouse gas emissions	5	1	Moderate	16	Engines required for power supply and use of machinery	Compact mine layout, close sighting of accommodation village and direct haulage route reduces vehicle use and greenhouse gas emissions Service / maintain engines for efficient combustion	4	1	Low	20
Exploration													
9	Terrestrial fauna	Drill holes become fauna traps.	Subsidence Fauna injury / fatality	3	1	Low	21	Oxidised /soft soils Unplugged holes	PVC collars on drill holes Plug holes immediately after use.	2	1	Low	23
10	Biodiversity, vegetation, flora, weeds, terrestrial fauna, heritage, surface water	Surface disturbance for drill pads, and other exploration activities.	Dust. Vegetation loss. Weeds may colonise disturbed areas. Diversion of natural flows	4	1	Low	20	Removal of vegetation leaving bare soil Interception of drainage lines.	Water Spray. Raised blade to minimise surface disturbance. Progressive rehabilitation.	2	1	Low	23
11	Surface water, soil	Drill cuttings and soil samples.	Contamination of soil and surface water.	4	1	Low	20	RC Drilling. The use of various drilling fluids.	Collect cuttings in bags and remove or bury cuttings in drilling sumps.	2	1	Low	23

No.	Factor	Aspect (activity that impacts factor)	Potential impacts	L	C	Inherent Risk	P	Cause	Control (mitigation)	L	C	Residual risk	P
12	Terrestrial fauna, soil, surface water	Sumps for drilling.	Fauna drowning/ injury. Contamination of soil due to poor water quality. Overflow of sump.	3	1	Low	21	Fauna can't egress sump. Saline groundwater. Volume of sump insufficient.	Slope sump walls to allow fauna egress Maintain freeboard during drilling. Rehabilitate sumps.	2	1	Low	23
13	Visual amenity	Field storage of sample bags.	Aesthetics	5	1	Moderate	16	Requirement for bags to be left near hole for further analysis if required.	Use calico bags for longer storage life Do not use bags at all All bags collected from field and sites rehabilitated at conclusion of programme.	2	1	Low	23
14	Soil, surface water	Hydrocarbon spillage during exploration.	Contaminated soil, surface water	4	1	Low	20	Oils and grease in engines Grease used to join rods Oil and grease spillage through transfers.	Clean up spills Remove large areas of contaminated soil	2	1	Low	23
15	Biodiversity, vegetation, flora, terrestrial fauna	Fires from exhausts and hot work activities.	Bush fires	3	4	High	7	Hot work activities Hot exhausts of equipment and vehicles setting dry bush alight.	Hot work permit Vehicle maintenance / inspections Emergency response	2	1	Low	23
Surface Mining													
16	Vegetation, flora, soil	Loss of topsoil during pit, waste landform development.	Insufficient topsoil available for rehabilitation.	3	1	Low	21	Lack of awareness of requirement to stockpile topsoil Topsoil used for other application Topsoil covered by other material.	Stockpile topsoil and mark stockpiles	2	1	Low	23
17	Biodiversity, vegetation, flora, terrestrial fauna	Clearing for surface mining operations	Loss of a few individuals of Priority species in project areas. Many others in surrounding landscape. Loss of small amount of S2 community in open pit area. More of this community in surrounding landscape. Loss of one population of SRE millipede. Other population recorded nearby and in another location of the State.	5	1	Moderate	16	Some Priority plants, the S2 community and one SRE population are in a location that cannot be avoided (inside the open pit boundary)	Implement clearing procedure to ensure only those areas necessary are cleared	2	1	Low	23
18	Groundwater, subterranean fauna	Surface mining operations; excavation, blasting Dewatering impacts on local / regional aquifer.	Direct impact to troglofauna habitat by excavating open pit. Decrease in groundwater level which may impact subterranean fauna in the area. Change in groundwater quality	3	2	Moderate	17	Pit excavation. Dewatering	Monitor groundwater levels and surrounding subterranean fauna populations during life of mine Investigate groundwater reinjection if significant impacts are detected	2	2	Low	22
19	Groundwater, subterranean fauna, terrestrial fauna	Impact over time after pit closure.	Change in groundwater levels and quality (primarily salinity and pH) Attract animals (native and introduced) to water source Pit wall collapse Fauna trap Third party use.	5	2	High	11	Evaporative concentration. Permanent pit lake Pit wall instability Steep pit walls Access to open pit	Bores to monitor groundwater levels and quality over time. Creek diversion to dilute pit lake. Saline/hypersaline water not a preferred water supply for animals. Access ramps retained for fauna egress. Abandonment bund and signage installed at closure.	5	1	Moderate	16
20	Vegetation, flora, soil	Saline water discharge	Impacts on vegetation and soil.	3	1	Low	21	Pipeline failure, leaks. Spills.	Inspection of pipelines.	2	1	Low	23
21	Groundwater, subterranean fauna, terrestrial fauna	Generation of acid rock drainage from pit walls.	Increased acidity of groundwater in pit void.	3	1	Low	21	Pit wall rocks containing high sulphide levels exposed to increased weathering processes.	Monitor changes in pit lake quality over time.	3	1	Low	21

No.	Factor	Aspect (activity that impacts factor)	Potential impacts	L	C	Inherent Risk	P	Cause	Control (mitigation)	L	C	Residual risk	P
Waste Landform													
22	Visual amenity,	Visual impact of waste landforms on the surrounding landscape.	Aesthetics	2	1	Low	23	Inappropriate sighting and design of waste landforms	Isolated project location. Final design parameters reflect current topography. Revegetate landforms.	2	1	Low	23
23	Biodiversity, vegetation, flora, terrestrial fauna	Generation of acid rock drainage from mine waste.	Acid drainage from waste landform impacting surrounding vegetation, soil and surface water.	3	1	Low	21	Sulphidic mine waste incorrectly placed in waste landform	Encapsulate sulphidic mine waste in the waste landform	2	1	Low	23
24	Biodiversity, vegetation, flora, terrestrial fauna	Erosion of battered faces on waste landforms.	Sediment in surrounding vegetation and surface water systems. Visual impact	3	1	Low	21	Insufficient earthworks on slopes to stabilise batter Insufficient revegetation on slopes to help stabilise batter Poor soil stability of mine waste.	Progressive rehabilitation Water control design of waste landform and install toe bund. Use rocky waste (if available) to increase surface stability of waste landform	2	1	Low	23
ROM – crushing, screening, stockpiles													
25	Air quality (dust), vegetation, flora	Dust from crushers, stockpiles, belts and screens.	Dust to workforce and adjacent vegetation	4	2	Moderate	14	Exposed areas, truck loading, stockpiles, transfer between conveyor belts, crushing, and screening.	Water sprays on active works areas. Water sprays on conveyor systems. Enclosed conveyors and transfer points.	3	1	Low	21
Ore haulage													
26	Terrestrial fauna	Ore haulage by truck to rail siding	Fauna injury / mortality on haul road	4	1	Low	20	Fauna collision with haul trucks	Speed limits on haul roads	3	1	Low	21
27	Land use	Third party use of haul road	Risk to third parties	4	1	Low	20	Third parties access haul road from side tracks	Signs placed on side roads	3	1	Low	21
Rail siding													
28	Air quality (dust), vegetation, flora	Dust from siding area.	Dust to other rail users Dust to workforce and adjacent vegetation	4	2	Moderate	14	Dust from stockpiles, train loading, active areas.	Water sprays on active works areas. Water sprays on conveyor systems. Enclosed conveyors and transfer points.	3	1	Low	21
Powerhouse													
29	Soil, surface water	Hydrocarbon spillage during fuel transfer	Contamination of soil and surface water	3	1	Low	21	Leaking valve, hoses, pipelines. Spillage	Concrete apron and sump on loading area to contain spills Fuel suppliers have trained operators and procedures.	2	1	Low	23
30	Soil, surface water	Hydrocarbon leakage from storage areas, pipelines (including underground pipelines).	Contamination of soil and surface water.	3	1	Low	21	Damaged pipelines, flanges, valves. Failure of automatic shutdown valves on “day” tank, causing overflow of tank.	Bunding of bulk hydrocarbon storage areas compliant with AS 1940:2004. Regular maintenance, inspection of automatic shutdown valves and lines.	2	1	Low	23
31	Soil, surface water	PCB Contamination.	Contamination of soil and surface water	3	1	Low	21	Transformers may contain	Steel bunding around all transformers. Steel casing around all transformers to be transported offsite for disposal.	2	1	Low	23

No.	Factor	Aspect (activity that impacts factor)	Potential impacts	L	C	Inherent Risk	P	Cause	Control (mitigation)	L	C	Residual risk	P
Workshop Facilities													
32	Soil, surface water	Hydrocarbon contamination from fuel and oil storage, work areas	Contamination of soil and surface water	3	1	Low	21	Ruptured or damaged containers Spills and leaks	Self bunded (double lined) storage tanks or bunded areas compliant with AS 1940:2004 Floor drainage in the workshop and other bunded areas are drained to a pit which is transferred by pump to an oil separator.	2	1	Low	23
33	Soil, surface water	Contamination from wash down bay	Contamination of soil and surface water	3	1	Low	21	Overflow of system	Inspection and maintenance of system	2	1	Low	23
Explosive Facilities													
34	Soil, surface water	Spillage of ANFO	Contamination of soil and surface water. Flammable	2	1	Low	23	Transferring product to magazine and from magazine to truck.	Appropriate MSDS information and clean up spills.	1	1	Low	25
Waste Management													
35	Waste disposal	Landfill site.	Windblown litter Odour Attract fauna	4	1	Low	20	Inappropriate sighting and operation of landfill site. Disposal of inappropriate waste into landfill site. Not covering waste disposed to landfill	Landfill site situated in the waste landform. Rubbish is buried with mine waste on at least a weekly basis	2	1	Low	23
36	Waste disposal	Tyre disposal	Hazard in fire situation Source of pollution if disposed incorrectly	2	1	Low	23	Large stockpiles of old tyres Inappropriate disposal	Return to suppliers where possible Tyres used to delineate 'dump-to' boundary of the waste landform and then buried by mine waste Some tyres used as safety bollards / barriers Bury remaining tyres in site landfill	2	1	Low	23
37	Waste disposal	Disposal of contaminated soil.	Contamination of soil and surface water.	3	1	Low	21	Disposal in inappropriate area.	Small areas of soil contamination to be remediated in situ Large areas, volumes of contaminated soil to be removed to a dedicated bioremediation facility (if required) on the waste landform	1	1	Low	25
Rehabilitation													
38	Landform, vegetation, flora, terrestrial fauna	Ineffectual rehabilitation	Poor revegetation Slow growth rates	3	2	Moderate	17	Lack of rain Poor timing of rehabilitation Cyclone Use of inappropriate species.	Research into appropriate species and times of the year for optimum rehabilitation results	2	1	Low	23
39	Landform, vegetation, flora, terrestrial fauna	Erosion on waste landform	Sediment in surface water. Inability to stabilise waste landform	4	1	Low	20	Lack of stormwater control systems. Lack of vegetation on slopes	Interim (during construction) and final stormwater design on the waste landform	2	1	Low	23
40	Landform, vegetation, flora, terrestrial fauna	Grazing of rehabilitation by animals	Native and feral animals grazing young rehabilitation and trampling slopes,	4	2	Moderate	14	Inability of plants to establish. erosion on slopes	Monitor extent of grazing on waste landforms, If excessive, install fencing	2	1	Low	23

Risk priorities

No.	Aspect (activity that impacts factor)	Inherent risk		Residual risk	
		Level	P	Level	P
15	Fires from exhausts and hot work activities.	High	7	Low	23
1	Clearing and excavation for mine activities (open pit, waste landform, haul roads, infrastructure)	High	11	Low	21
19	Impact over time after pit closure.	High	11	Moderate	16
25	Dust from crushers, stockpiles, belts and screens.	Moderate	14	Low	21
28	Dust from siding area.	Moderate	14	Low	21
40	Grazing of rehabilitation by animals	Moderate	14	Low	23
8	Combustion products from engine exhausts	Moderate	16	Low	20
13	Field storage of sample bags.	Moderate	16	Low	23
17	Clearing for surface mining operations	Moderate	16	Low	23
2	Storm water contaminated with sediment running off site.	Moderate	17	Low	23
5	Vehicle accident	Moderate	17	Low	21
18	Surface mining operations; excavation, blasting	Moderate	17	Low	22
38	Ineffectual rehabilitation	Moderate	17	Low	23
4	Minor hydrocarbon spillages	Low	20	Low	21
7	Saline water in dams	Low	20	Low	21
10	Surface disturbance for drill pads, and other exploration activities.	Low	20	Low	23
11	Drill cuttings and soil samples.	Low	20	Low	23
14	Hydrocarbon spillage during exploration.	Low	20	Low	23
26	Ore haulage by truck to rail siding	Low	20	Low	21
27	Third party use of haul road	Low	20	Low	21
35	Landfill site.	Low	20	Low	23
39	Erosion on waste landform	Low	20	Low	23
3	Dust emissions from active / disturbed areas	Low	21	Low	21
6	Use of saline water as dust suppressant on active areas	Low	21	Low	21
9	Drill holes become fauna traps.	Low	21	Low	23
12	Sumps for drilling.	Low	21	Low	23
16	Loss of topsoil during pit, waste landform development.	Low	21	Low	23
20	Saline water discharge	Low	21	Low	23
21	Generation of acid rock drainage from pit walls.	Low	21	Low	21
23	Generation of acid rock drainage from mine waste.	Low	21	Low	23
24	Erosion of battered faces on waste landforms.	Low	21	Low	23
29	Hydrocarbon spillage during fuel transfer	Low	21	Low	23
30	Hydrocarbon leakage from storage areas, pipelines (including underground pipelines).	Low	21	Low	23
31	PCB Contamination.	Low	21	Low	23
32	Hydrocarbon contamination from fuel / oil storage, work areas	Low	21	Low	23
33	Contamination from wash down bay	Low	21	Low	23
37	Disposal of contaminated soil.	Low	21	Low	25
22	Visual impact of waste landforms on surrounding landscape.	Low	23	Low	23
34	Spillage of ANFO	Low	23	Low	25
36	Tyre disposal	Low	23	Low	23

APPENDIX 3:
VEGETATION MANAGEMENT PROCEDURE



P O L A R I S
M E T A L S N L

VEGETATION MANAGEMENT PROCEDURE

AUGUST 2009

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1. INTRODUCTION

This vegetation management procedure has been prepared to reduce potential impacts to vegetation and flora in operational areas of the Carina iron ore project. It is a requirement that the actions contained in this procedure are complied with at all times by site personnel.

Vegetation management is important for the following reasons:

1. **Reduce vegetation clearing** to as small as necessary to undertake site activities. This minimises disturbance to surrounding vegetation and also reduces the area subsequently requiring rehabilitation.
2. **Manage topsoil** removal, stockpiling and return operations. Topsoil is a critical factor in achieving successful rehabilitation of disturbed areas, as it contains the majority of seeds, soil micro-organisms, organic matter and nutrients. It is a limited resource and especially important at Carina as rocky areas on exposed ridgelines contain little if no recoverable topsoil.
3. **Control weed infestations** that have the potential to take over and smother native plant regeneration or rehabilitation.
4. **Support rehabilitation** programmes over completed areas.

1.1 OBJECTIVES

The objectives of vegetation management are:

1. Minimise vegetation clearing and disturbance in the project area.
2. Protect vegetation and flora of conservation significance.
3. Maximise benefit and use from cleared areas.
4. Conserve available topsoil for use in rehabilitation.
5. Monitor the effectiveness of procedures and controls.
6. Review outcomes to ensure management measures remain relevant to the operation.

1.2 OTHER RELEVANT INFORMATION

Guidance documents:

- DoIR (2007b) Guidelines for Mineral Exploration/Rehabilitation Activities.
- DoIR (1998) Mining Environmental Management Guidelines. Mineral Exploration and Mining within Conservation Reserves and other Environmentally Sensitive Lands in Western Australia.
- DEC – Guidelines for Resource Exploration on the Conservation Estate in the South West Region (as provided by DEC).

Procedures:

- Vegetation clearing Appendix 1
- Weeds Appendix 2

Forms and checklists

- Polaris clearing permit Appendix 3
- Vehicle inspection Appendix 4
- Weed checklist Appendix 5

2. POTENTIAL IMPACTS

It is acknowledged that some flora and vegetation will be disturbed as a result of mining operations. Potential impacts to vegetation include:

- Direct loss or degradation;
- Impact on specific significant flora species or vegetation communities;
- Indirect impacts on adjacent vegetation from dust and use of saline water.
- Introduction and/or spread of weeds;
- Soil erosion off cleared areas;
- Disruption of natural water courses and flow paths

Polaris is committed to minimising areas of vegetation disturbance through:

- Staged approach to activities, therefore only clearing areas as necessary.
- Internal clearing permits are required prior to vegetation disturbance.
- Clearing activity will maximise salvage and retention of topsoil and cleared vegetation.
- Restrict personnel and vehicles outside designated areas.
- Use existing tracks and disturbed areas where possible.

3. MANAGEMENT ACTIONS

Actions to be undertaken to manage vegetation and flora are outlined in Table 1.

Table 1: Management actions

Action	Who	When
Induction and training		
All personnel will be inducted on the significance of vegetation and flora in the project area and management actions established to reduce impacts.	All personnel	Commencement on site
Clearing activities		
Submit an internal clearing permit (Appendix 3) prior to conducting clearing.	All personnel	Prior to clearing
Comply with the clearing procedure (Appendix 1) and any permit conditions.	All personnel	During clearing
Clearing permits are to conform to approved clearing areas, in Ministerial Statements or CPS clearing permits.	Environmental officer	Ongoing
Communications		
An environmental constraints map will be located on notice boards through the site. The map will show environmentally sensitive areas, with associated buffers if required, which are to be avoided.	Environmental officer	Ongoing

4. TARGETS AND PERFORMANCE

Table 2 provides targets and performance criteria to be used to track progress in achieving the flora management objectives.

Table 2: Targets and Performance

Objectives	Target	Performance
Minimise vegetation clearing and disturbance in the project area.	No unplanned vegetation clearing. All site activities are undertaken within approved project disturbance boundaries.	Extent of site clearing is within approved boundaries.
	All personnel have undertaken the site induction and are aware of the need to minimise clearing.	All personnel inducted.
	All personnel are aware that traffic is not permitted off designated roads / areas	Extent of site clearing is within approved boundaries.
	No modification to existing drainage.	Drainage patterns are not altered.
Protect vegetation and flora of conservation significance.	Removal of mature trees, (nominally those over 6 m) only when necessary to implement the work programme.	Mature trees retained where possible.
	No disturbance to significant communities or priority flora	No unplanned impact to flora of conservation significance.
Maximise benefit and use from cleared areas.	Salvage seed, nesting hollows, timber, sandalwood and firewood where possible	Document use of cleared resources
Conserve available topsoil for use in rehabilitation.	Topsoil salvaged and stored for use in rehabilitation	All stored topsoil reused in rehabilitation
Monitor the effectiveness of procedures and controls.	Vegetation monitoring within target parameters. No environmental incidents of unplanned clearing	Monitoring data within target parameters No incidents of unplanned clearing recorded
Review outcomes to ensure management measures remain relevant to the operation.	Annual review of plans, procedures, forms, incidents.	Review confirms above objectives are being met.

5. MONITORING AND AUDITING

The site environmental officer will conduct 6 monthly audits of the site to assess compliance with this plan. This will involve:

- Reconciliation that areas approved for clearing conform to surveyed boundaries of cleared areas.
- Visual inspection that topsoil and vegetation stockpiles conform to approved locations and design.
- Inspection for weed infestations and success of any control actions.
- Inspection of vegetation health along haul road from saline water or dust.
- Inspection of vegetation health around mine area from saline water or dust.

6. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

Table 3 details corrective actions that will be implemented for identified non compliances.

Table 3: Corrective actions

Subject	Issue	Actions
Vegetation clearing and Priority Flora.	Clearing native vegetation outside designated area. Damage to significant flora outside designated area.	Fill out the environmental incident report form. Report the unplanned area of disturbance to DMP. Report unplanned disturbances of Priority Flora to DEC. Reinstate fencing, barriers or flagging to delineate clearing boundaries. Place removed vegetation over cleared area to provide erosion control and seed stock. Include area in annual rehabilitation program.
Vegetation management	Fire	Follow fire management procedures. Fill out the environmental incident report form. Report the fire to DMP / DEC.
Weeds	Weed species previously not recorded in the area.	Record location of the weed species and implement control measures.
Altered drainage patterns.	High sediment runoff, erosion and decline in the health of vegetation in and around the project area.	Implement corrective drainage measures. Include area of disturbance into annual rehabilitation program.
Vegetation health	Indirect impact to surrounding vegetation	Increase management of causal factor to reduce/eliminate indirect impact. Rehabilitate affected area.

7. RECORDS AND REPORTING

Reporting to regulatory agencies on compliance with this plan, including components such as areas cleared and environmental incidents is undertaken through the annual Environmental Report (AER) process.

APPENDICES

**APPENDIX 1:
CLEARING PROCEDURE**

Vegetation Clearing Procedure

Purpose

This procedure provides generic information to be implemented during clearing activities. For other information relating to vegetation clearing, refer to the vegetation management procedure and clearing permit conditions.

Risks

The key risks for unplanned disturbance of native vegetation are:

- Insufficient planning to avoid environmentally significant areas.
- Failure to identify and communicate access tracks, gridlines, work area and exclusion zones.
- Insufficient planning to avoid indirect impacts by such things as changing drainage patterns.
- Introduction or spread of weeds.

Procedure

To ensure vegetation clearing is conducted in a responsible manner and to avoid unacceptable environmental impacts, the following procedure must be followed both during the planning of clearing and during clearing activities. This is outlined below.

Prior to Clearing

- Prior to undertaking clearing activities the Polaris clearing permit form **must be completed**.
- All personnel are to be inducted on the importance of minimising clearing and disturbance.
- Persons undertaking clearing activity and the Polaris supervisor will walk the area to verify the area to be cleared and any exclusion zones to be avoided.
- Exclusion areas are to be flagged in the field prior to any clearing.
- Salvage of seed, timber etc is to be scheduled. These activities are to be confined to the clearing area.
- No clearing is to commence until personnel implementing the clearing have been provided with a map (drawings) that indicate:
 - Designated locations to be avoided, which include;
 - Declared Rare Flora or Priority species and any associated buffer.
 - Nominated mature trees.
 - Significant fauna habitats and any associated buffer (see Fauna Management for specific details).
 - The location of heritage sites.
 - Any other identified feature.
 - The location of access tracks.
 - The extent of the clearing area.
 - The location of drill pads, gridlines and associated infrastructure.

During Clearing

- All clearing will be supervised by the Polaris Representative / Supervisor.
- Where practicable, clearing will be undertaken with either a raised blade or scrub rake (to minimise soil disturbance and preserve seed stock).
- Cleared vegetation is to be stockpiled adjacent to the area it was cleared from for use during rehabilitation.
- Topsoil removal (where required), will be removed to a depth of approximately 50 mm to 100 mm and stored immediately adjacent to the area where it was cleared and separate to any subsoil or vegetation stockpiles.
- All vegetation and topsoils stockpiles will be positioned away from any watercourses and drainage paths. Stockpiles are to be no higher than 2 m.
- Vehicles and machinery will only use designated roads, tracks and gridlines. Off-road traversing into bush areas is prohibited.
- Erosion will be minimised by the construction of berms where required.
- No burning of cleared vegetation is permitted.
- Relevant aspects of standard procedure 2 (weed), 3 (Heritage) and 5 (Fire) are to be complied with.

Rehabilitation

- Rehabilitation is to follow procedures outlined in the rehabilitation plan.

Monitoring

The Polaris Representative / supervisor will monitor the clearing activities to ensure compliance with requirements.

Reporting

- If unauthorised clearing occurs, the incident must be reported to the Polaris Environmental Officer within 24-hours of the incident occurring using the Accident Incident (AI) report form.
- Any weed populations identified must be reported to the Polaris Representative within 24-hours of the sighting occurring using the C3: Hazard Register.
- Any feral animals sighted (camels, goats, cats, dogs and foxes) must be reported to the Polaris Representative within 24-hours of the sighting using the feral animal report form.

**APPENDIX 2:
WEED PROCEDURE**

Weed Procedure

Purpose

This procedure provides generic information to be implemented to control the introduction or spread of weeds. For other information relating to weeds, refer to the vegetation management procedure and the Off-road Driving procedure.

Risks

The risks associated with mining activities in relation to weeds include:

- Machinery and equipment introducing weeds to the site from previous work areas.
- Vehicle access within the project area may spread weeds.
- Removal of vegetation and soil providing opportunity for weed invasion.
- Delayed or ineffective revegetation, which may increase the risk of weed invasion.

Procedure

The following actions are required to be implemented by project personnel:

- All employees and contractors are required to participate in the site induction, which will provide an awareness of weeds including, risk species and response to weed infestation.
- All machinery is to be cleaned prior to arrival on site, ensuring it is free of soil and organic material on tyres, tracks, undercarriage and buckets (Appendix 4).
- Limit movement of vehicles to designated access routes and areas, especially during wet conditions.
- Personnel and vehicles are to avoid identified areas of weed infestation.

Monitoring

- The site environmental officer is to conduct periodic site inspections for weed infestations (Appendix 5).

Reporting

- Any non-compliance with the above procedure is to be reported within 24-hours of the incident occurring using the C3: Hazard Register.
- Any new sightings of weeds shall be reported within 24-hours using the C3: Hazard Register.

APPENDIX 3:
INTERNAL CLEARING PERMIT



Internal Clearing Permit

No: _____

Procedure:

1. This Clearing Permit relates to vegetation clearing within the area shown on Attachment 1 (map to be provided).
2. Strictly no clearing is to occur outside the area shown on Attachment 1.
3. Applicant to complete Application section, sign in Signoff section and submit to site Environmental Officer.
4. Environmental Officer to complete Conditions section, sign in Signoff section and return to applicant.
5. No clearing is to commence until Signoff section has been completed by all parties.
6. A copy of the completed Form and Attachment 1 is to be filed by the Environmental officer for annual reporting purposes.

Application -(applicant to complete this section)

Requested by (print name): _____ Company/Dep't: _____
 Clearing contractor: _____
 Reason for clearing: _____

Area to be cleared: _____ ha
 Clearing location (give coordinates): _____
 Topsoil stockpile location (give coordinates): _____
 Proposed duration(date): Commence: _____ Complete: _____
 Map submitted: Yes No
 Is a Dig Permit required?: Yes No
 Is Aboriginal heritage clearance required?: Yes No
 Has Clearing procedure been complied with?: Yes No

Conditions - (Polaris Environmental Officer to complete)

Vegetation clearing conditions: Clearly mark the area to be cleared.
 Clear and stockpile vegetation in designated area.
 Topsoil stockpiling conditions: Remove topsoil (top 100 mm where available) and stockpile in designated area.
 Topsoil stockpiles maximum 2 m high.
 Drainage design conditions: Protect stockpiles from surface runoff and flooding.
 Special conditions: _____

Signoff (all parties to complete this section)

Applicant:	Name	Signature	Date:
Environmental Officer:	Name	Signature	Date:

APPENDIX 4:
VEHICLE INSPECTION CHECKLIST

MACHINERY AND VEHICLE INSPECTION CHECKLIST

It is important that earthmoving machinery is in an acceptable condition before it enters site working areas in relation to safety, weeds, hydrocarbons, emissions and noise.

This inspection must be completed by the Site Supervisor in the presence of the machinery Supervisor.

Date of arrival/inspection:

Name of machinery Supervisor:

Name of person conducting inspection:

What kind of machine is it?
Please list any problem weeds at the last site.

Was the machine cleaned before it left the last site? Yes No

Are buckets, tracks, blades etc free of soil and vegetation? Yes No

Are the tyres free of seeds? Yes No

Is machine free of fuel and oil leaks? Yes No

Is the exhaust/muffler in good working order? Yes No

Work required/comments:
.....
.....
.....

If you have answered NO to any of these questions, please carry put the required cleaning and/or maintenance before the machine enters the site. This form must be signed by the machine Supervisor and Site Supervisor when all cleaning and/or maintenance is completed.

Signed
Machine Supervisor Date

Vehicle Wash down Procedure

- Wash down machine in designated wash down bay.
- Remove all soil and vegetation including seeds.
- Ensure runoff, soil and any seeds are contained on the hardstand or directed to the sediment basin.
- Carry out final inspection with site personnel before moving into site.

INSPECTION EQUIPMENT AND VEHICLE COMPLIANCE

CHECK	YES	NO	N/A	ACTION REQUIRED	BY WHO/DATE
Are project vehicles fitted with relevant safety stickers prior to use?					
Do relevant cabins have an Australian Standard approved rollover structure?					
Are earthmoving equipment and vehicles equipped and maintained with suitable brakes?					
Are earthmoving equipment and vehicles fitted with adequate headlights?					
Do vehicles have suitable audible warning devices?					
Are vehicles equipped with an adequate flashing light?					
Are vehicles equipped with an 'In Service' fire extinguisher?					
Are earthmoving equipment and vehicles fault/defect inspected and maintained as per manufacturers specifications?					
Are there up to date records of inspections and maintenance?					
Do contractors earthmoving equipment and vehicles comply with these requirements?					

DATE: _____

AREA: _____

INSPECTOR: _____

SIGNATURE: _____

**APPENDIX 5:
WEED INSPECTION CHECKLIST**

SITE WEED INSPECTION CHECKLIST

Name of Inspector (Print): _____ Date: _____

Weather Conditions Prior to Inspection: _____

Weed Inspection Areas	Weeds Present (Yes/No)	Actions Taken
Village		
Village recreation areas		
Sewage irrigation area		
Production bore surrounds		
Storage areas		
Workshop area		
Landfill area		
Wash down bay		
Lay down areas		
Office buildings		
Haul road		
ROM Product stockpile areas		
Rail siding		
Open pit		
Waste landforms		
Other		

Eradication	Record
Weed Species	
Probable cause of occurrence (vehicle)	
Area (m2)	
Location	
Photo or sample of weed attached	
Eradication method	
Name (print) Signature Date	
Post Eradication	Follow up Actions
Weed Species	
New weed population (y/n)	
New growth (y/n)	
Follow up of eradication	
Evidence of weed death (photo)	
Name (print) Signature Date	

APPENDIX 4:
FAUNA MANAGEMENT PROCEDURE



P O L A R I S
M E T A L S N L

FAUNA MANAGEMENT PROCEDURE

AUGUST 2009

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- Appendix 1: Clearing Procedure
- Appendix 2: Off road driving procedure
- Appendix 3: Significant fauna sighting form

1. INTRODUCTION

This fauna management procedure has been prepared to reduce potential impacts to fauna in operational areas of the Carina iron ore project. It is a requirement that the actions contained in this procedure are complied with at all times by site personnel.

Fauna management is important for the following reasons:

1. **Minimise direct impact** by removing habitat (via vegetation clearing) and collisions with vehicles.
2. **Reduce indirect impact** by minimising barriers to movement, and control of feral predators.

1.1 ENVIRONMENTAL OBJECTIVES AND STANDARDS

The objectives for fauna management are:

- Minimise potential impacts of site activities on fauna species.
- Minimise potential impacts to species of conservation significance (including terrestrial and subterranean fauna).

1.2 LEGISLATION

Fauna protection is subject to legislation at both the state and federal level. Table 1 lists relevant legislation, its relevance and regulatory authority.

Table 1: Legislation

Legislation	Relevance	Regulatory Authority
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)	Protection on environmental matters of national significance	Department of Environment, Heritage, Water and the Arts (DEHWA)
<i>Conservation and Land Management Act 1984</i> (WA)	Protection and management of nature reserves, state forest, marine parks etc.	DEC
<i>Environmental Protection Act 1986</i> (WA)	Prevention, control and abatement of pollution and conservation protection and enhancement of environment	DEC
<i>Wildlife Conservation Act 1950</i> (WA)	Provides for the conservation and protection of wildlife (flora and fauna). Special provisions and schedules cover protection and management of gazetted rare flora and fauna.	DEC

1.3 OTHER RELEVANT INFORMATION

The following list of other documents is also applicable to fauna management.

- Clearing Procedure Appendix 1
- Off road driving procedure Appendix 2
- Significant fauna sighting form Appendix 3

2. POTENTIAL IMPACTS

Database searches of significant fauna that could possibly occur in the project area are provided in the PER.

It is acknowledged that some fauna will be disturbed as a result of site activities. It is anticipated that, due to the relatively localised nature of site activities, impacts to fauna will also be localised. Potential impacts to fauna include:

- Habitat loss through clearing and vegetation degradation
- Direct impact on fauna.
- Indirect impacts such as barriers to movement, and feral predators.

3. MANAGEMENT ACTIONS

Actions to be undertaken to manage fauna are outlined in Table 2.

Table 2: Management actions

Action	Who	When
Induction and training		
All personnel will be inducted on the significance of fauna in the project area and management actions established to reduce impacts.	All personnel	Commencement on site
Obtain appropriate training and licenses for fauna handling.	Environmental officer	Ongoing
Project actions		
Ensure barriers to native fauna movement are kept to a minimum.	Environmental officer, project engineer	Ongoing
Minimise time trenches are left open. If necessary for a trench to remain open for extended periods, install escape ramps at regular intervals along the trench;	Project engineer	During construction
For trenches open for extended periods, check them within 2 hours of sunrise and remove trapped fauna. Record number and type of relocated fauna.	Environmental officer	Ongoing
Comply with speed limits on site.	All personnel	Ongoing
Install fauna egress matting in lined dams/ponds	Environmental officer	During construction
Fauna will not be intentionally captured or harmed.	All personnel	Ongoing
Do not feed fauna.	All personnel	Ongoing

Action	Who	When
Implement feral predator control programme in conjunction with DEC and DAF.	Environmental officer	Ongoing
Fauna surveys for significant species		
Malleefowl are known to occur in the wider area but have not been recorded in the Carina project area. An annual survey of a 500 metre radius around the project site will be searched for malleefowl nest mounds. Any mounds located will be photographed, have GPS coordinates recorded and be located on the environmental constraints map.	Environmental officer	Ongoing
Sightings of significant fauna		
Sightings of malleefowl or nest mounds are to be recorded using the fauna record form.	All personnel	Ongoing
Sightings of feral animals are to be recorded using the fauna record form.	All personnel	Ongoing
Communications		
An environmental constraints map will be located on notice boards through the site. The map will show environmentally sensitive areas, with associated buffers if required, which are to be avoided.	Environmental officer	Ongoing

4. TARGETS AND PERFORMANCE

Table 3 provides targets and performance criteria to be used to track progress in achieving fauna management objectives.

Table 3: Performance Criteria

Objectives	Target	Performance
Minimise potential impacts of site activities on native fauna species.	No significant barriers for native fauna.	Number of fauna trapped in trenches.
	Minimise injury or mortality to fauna.	Number of fauna injured or killed
	No feral predators recorded on site	Number of feral predators recorded.
Minimise potential impacts to species of conservation significance	No detrimental impacts to fauna of conservation significance.	No disturbance to active Malleefowl nesting mounds.

5. MONITORING AND AUDITING

The site environmental officer will conduct 6 monthly audits of the site to assess compliance with this plan. This will involve providing a brief report to the Environmental Manager summarizing data on:

- Recorded sightings of significant fauna.
- Log of fauna trapped in trenches.
- Records of injured or killed fauna from C3: Hazard/Incident register or C6: Accident/Incident form.

6. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

The annual environmental report (AER) will include a summary of all environmental incidents recorded for the period and documented remedial actions. This includes incidents associated with fauna.

7. RECORDS AND REPORTING

Reporting to regulatory agencies on compliance with this plan is undertaken through the Annual Environmental Report (AER) process.

APPENDICES

**APPENDIX 1:
CLEARING PROCEDURE**

Vegetation Clearing Procedure

Purpose

This procedure provides generic information to be implemented during clearing activities. For other information relating to vegetation clearing, refer to the vegetation management procedure and clearing permit conditions.

Risks

The key risks for unplanned disturbance of native vegetation are:

- Insufficient planning to avoid environmentally significant areas.
- Failure to identify and communicate access tracks, gridlines, work area and exclusion zones.
- Insufficient planning to avoid indirect impacts by such things as changing drainage patterns.
- Introduction or spread of weeds.

Procedure

To ensure vegetation clearing is conducted in a responsible manner and to avoid unacceptable environmental impacts, the following procedure must be followed both during the planning of clearing and during clearing activities. This is outlined below.

Prior to Clearing

- Prior to undertaking clearing activities the Polaris clearing permit form **must be completed**.
- All personnel are to be inducted on the importance of minimising clearing and disturbance.
- Persons undertaking clearing activity and the Polaris supervisor will walk the area to verify the area to be cleared and any exclusion zones to be avoided.
- Exclusion areas are to be flagged in the field prior to any clearing.
- Salvage of seed, timber etc is to be scheduled. These activities are to be confined to the clearing area.
- No clearing is to commence until personnel implementing the clearing have been provided with a map (drawings) that indicate:
 - Designated locations to be avoided, which include;
 - Declared Rare Flora or Priority species and any associated buffer.
 - Nominated mature trees.
 - Significant fauna habitats and any associated buffer (see Fauna Management for specific details).
 - The location of heritage sites.
 - Any other identified feature.
 - The location of access tracks.
 - The extent of the clearing area.
 - The location of drill pads, gridlines and associated infrastructure.

During Clearing

- All clearing will be supervised by the Polaris Representative / Supervisor.
- Where practicable, clearing will be undertaken with either a raised blade or scrub rake (to minimise soil disturbance and preserve seed stock).
- Cleared vegetation is to be stockpiled adjacent to the area it was cleared from for use during rehabilitation.
- Topsoil removal (where required), will be removed to a depth of approximately 50 mm to 100 mm and stored immediately adjacent to the area where it was cleared and separate to any subsoil or vegetation stockpiles.
- All vegetation and topsoils stockpiles will be positioned away from any watercourses and drainage paths. Stockpiles are to be no higher than 2 m.
- Vehicles and machinery will only use designated roads, tracks and gridlines. Off-road traversing into bush areas is prohibited.
- Erosion will be minimised by the construction of berms where required.
- No burning of cleared vegetation is permitted.
- Relevant aspects of standard procedure 2 (weed), 3 (Heritage) and 5 (Fire) are to be complied with.

Rehabilitation

- Rehabilitation is to follow procedures outlined in the rehabilitation plan.

Monitoring

The Polaris Representative / supervisor will monitor the clearing activities to ensure compliance with requirements.

Reporting

- If unauthorised clearing occurs, the incident must be reported to the Polaris Environmental Officer within 24-hours of the incident occurring using the Accident Incident (AI) report form.
- Any weed populations identified must be reported to the Polaris Representative within 24-hours of the sighting occurring using the C3: Hazard Register.
- Any feral animals sighted (camels, goats, cats, dogs and foxes) must be reported to the Polaris Representative within 24-hours of the sighting using the feral animal report form.

APPENDIX 2:
OFF ROAD DRIVING PROCEDURE

Off-road driving procedure

Purpose

This procedure details the actions required for responsible off road driving by all personnel on site.

Background

The project's environmental constraints map details exclusion zones to be avoided by vehicles during site activities.

Risks

Key risks to the project from inappropriate use of vehicles includes:

- Damage to vegetation, fauna habitat and drainage lines outside approved areas of disturbance.
- Damage to Aboriginal heritage sites.
- Introduction or spread of weeds.
- Increased likelihood of collision with fauna.

Procedure

The following procedure is required to be implemented by all project personnel:

Prior to driving on site

- All employees and contractors are required to participate in the site induction, which includes information on required driving practices.
- All employees and contractors are to complete a site driving competency test with their Polaris Supervisor before driving in active areas of the site.
- All vehicles must have effective communication (2 way radio and/or satellite phone) and operating instructions for their use.
- Undertake a pre-start vehicle check, complete the appropriate form and submit to the site supervisor.

During site activities

- Vehicles must not exceed designated speed limits on site.
- Vehicles must not leave designated project areas or access tracks without approval from the Polaris Supervisor.
- Any native animal injury or death is to be reported immediately to the Polaris Environmental Officer
- Any road kills are to be removed from the road, to avoid further mortality of scavenger species.
- Reduce speed during adverse road conditions, such as flooding and thick bush, to a speed suitable for the driving conditions.

Reporting

- Any non-compliance with this procedure is to be reported to the Polaris Supervisor within 24-hours of the incident occurring using the C3: Hazard Register.
- Any native animal injury/death is to be reported immediately as an environmental incident to the Polaris Supervisor.

APPENDIX 3:
SIGNIFICANT FAUNA SIGHTING FORM



Significant fauna sighting form

Procedure:

1. This form is used to record sightings of significant fauna (native or feral) in the project area.
2. Person sighting significant fauna to complete Sighting section and submit to site Environmental Officer.
3. Environmental Officer to complete Action section and file, for annual reporting purposes.

Sighting -(person sighting fauna to complete this section)

Name: _____ Company/Dep't: _____

Date: _____ Time: _____

Animal sighted (common name): _____

Number of animals sighted: _____

Description of sighting: _____

Action - (Environmental Officer to complete)

Significant native fauna location updated onto environmental constraints map:	Yes	No
Feral animal sighting updated to next control / baiting programme list:	Yes	No
DEC / DAF notified:	Yes	No
Further survey work required:	Yes	No

Comments:

APPENDIX 5:
WASTE MANAGEMENT PROCEDURE



P O L A R I S
M E T A L S N L

WASTE MANAGEMENT PROCEDURE

SEPTEMBER 2009

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Appendix 1: Spill clean-up procedure

1. INTRODUCTION

This waste management procedure has been prepared to reduce potential contamination of soil, water and areas surrounding operational locations of the Carina iron ore project. It is a requirement that the actions contained in this procedure are complied with at all times by site personnel. Waste management is important for the following reasons:

1. **Solid waste and rubbish** has potential to adversely affect the environment of the project area and its surrounds
2. **Liquid waste** has the potential to contaminate surrounding soil and water.
3. **Hazardous waste** includes hydrocarbon waste and other chemicals which have potential to contaminate surrounding soil and water.
4. **Prompt spill cleanup** limits the area immediately contaminated and the possibility of extended impact from contaminant transport to other areas.
5. **Recycling** reduces the amount of waste needed to be disposed on site and provides energy and material savings from the products reuse.

1.1 ENVIRONMENTAL OBJECTIVES

The overall waste management objective is to minimise waste, using the sequence of avoid, reuse, reduce, recycle, treat, dispose. More specific objectives include:

- Reuse / recycle materials where practicable
- Dispose of waste in an acceptable manner.
- Minimise the risk of spillage of hazardous materials.

1.2 LEGISLATION

Regulatory requirements applicable to the project site include but are not limited to the following:

- Environmental Protection Act 1986.
- Contaminated Sites Act 2003.
- Environmental Protection (Controlled Wastes) Regulations 2004.
- Dangerous Goods (Transport) (Road & Rail) Regulations 1999.
- Water Quality Protection Note – Toxic and hazardous substances (storage and use).
- Water Quality Protection Note – Containment spills emergency response.
- Australian Standard (AS) 1940-2004 The Storage and Handling of Flammable and Combustible Liquids.
- Health Act 1911 – Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste Regulations) 1974;
- Environmental Protection (Rural Landfill) Regulations 2002;
- Department of Environment Contaminated Sites Management Series Bioremediation of Hydrocarbon-Contaminated Soils in Western Australia (2004).

2. POTENTIAL IMPACTS

The key potential impact from inappropriate disposal or accidental release of hazardous materials is contamination of surrounding soil and water.

3. MANAGEMENT ACTIONS

Actions to be undertaken to manage fauna are outlined in Table 1.

Table 1: Management actions

Action	Who	When
Induction and training		
All personnel will be inducted on the significance of appropriate waste management in the project area. The induction to include information on: <ul style="list-style-type: none"> • Procedures for handling and storing fuels and chemicals. • Refuelling vehicles and machinery. • Waste disposal. • Spill clean-up procedure. • Location of the hazardous materials register. 	All personnel	Commencement on site
Waste collection and disposal		
Obtain appropriate licenses and permits for on-site waste disposal.	Environmental officer	Commencement on site
Provide appropriate waste collection, treatment and disposal facilities (e.g. bins, waste oil tank, sewage treatment, landfill, recycling facility).	Environmental officer, project engineer	Ongoing
Collect and empty waste disposal facilities regularly.	Project engineer	Ongoing
Putrescible and industrial waste will be collected and disposed to an onsite landfill located in the mine waste landform. The landfill will be managed in accordance with the Environmental Protection (Rural Landfill) Regulations 2002.	Environmental officer	Ongoing
The landfill site is to be designed as follows: <ul style="list-style-type: none"> • Landfill cell created in the mine waste landform • Tipping face no greater than 30 m. • Tipping face buried on at least a weekly basis using mine waste. • Safe access to the tipping face. 	Environmental officer, project engineer	Ongoing
Provide a recycling area for storage of recyclable materials, for collection and transport to a recycling facility off site. Recyclable materials include: <ul style="list-style-type: none"> • Heavy grade metal- located in a stockpile. • Batteries- on pallets in a bunded area; • Waste oil- in a bulk storage tank • Aluminium cans- in wire cage • Glass bottles- in a bulk bin. 	Environmental officer	Ongoing

Action	Who	When
Wastewater		
Sewage and grey water from the accommodation village will be treated in a package treatment plant. Treated wastewater will be irrigated or transferred to evaporation lagoons. Sewage from the mine offices and workshops will be treated in Biocycle units / septic tanks-leach drains or similar	Project engineer	Commencement on site
Hazardous materials		
Hazardous materials will be clearly labelled and will be handled, stored and disposed in accordance with the Material Safety Data Sheet (MSDS). MSDS sheets will be stored on site and available to all personnel.	Purchasing officer, safety manager	Ongoing
Spills and contamination		
Spills of hydrocarbons, other liquid wastes and hazardous chemicals are to be cleaned up according to the spill procedure (Appendix 1).	All personnel	Ongoing
Small areas of soil contaminated with hydrocarbons to be remediated in situ.	All personnel	Ongoing
Large quantities of hydrocarbon contaminated soil are to be removed to a dedicated bioremediation facility (if required) and treated according to DEC license conditions.	Environmental officer	Ongoing
Spill kits and shovels will be available for spillages. Spent spill kits will be handled as hazardous waste.	All personnel	Ongoing
The C6: incident report form will be used to record any spills of hydrocarbons or chemicals greater than 20 litres.	All personnel	Ongoing
Hydrocarbons		
Flammable and combustible liquids will be stored to requirements of Australian Standard AS 1940 – 2004.	Project engineer	Commencement on site
Equipment will be refuelled on contained pads in designated locations. Tracked vehicles and stationary plant (gensets etc) will be refuelled in the field by field service vehicles.	Open pit supervisor	Ongoing
Design		
Design workshop and washdown bay to be internally draining and routed through oil-water separators.	Construction manager	Prior to construction
Use self-bunded storage vessels and pallets where possible	Project engineer	Ongoing
Water collected in bunded facilities to be treated through an oil-water separator.	Project engineer	Ongoing

4. TARGETS AND PERFORMANCE

Table 2 provides targets and performance criteria to be used to track progress in achieving waste management objectives.

Table 2: Performance Criteria

Objectives	Target	Performance
Reuse / recycle materials where practicable.	Maximise quantity of material reused/recycled.	Register of reused / recycled materials recording quantities of materials
Dispose of waste in an acceptable manner.	All waste disposed in an acceptable manner	Annual report on landfill management. Fauna are not attracted to the area from poor waste management practices. Number of waste management incidents.
Minimise risk of spillage of hazardous materials.	No hazardous materials contamination to surrounding environment	Use of spill procedure. Number of C3 and C6 spill records.

5. MONITORING AND AUDITING

The site environmental officer will conduct an annual waste audit of the site, to assess compliance with this plan. This will involve providing a brief report to the Environmental Manager summarizing data on:

- Quantity of material reused or recycled.
- Report on landfill management.
- Report on bioremediation facility management (if active)
- Record of waste incidents from the C3: Hazard/Incident register or C6: Accident/Incident form.

6. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

The annual environmental report (AER) will include a summary of all environmental incidents recorded for the period and documented remedial actions. This includes incidents associated with fauna.

7. RECORDS AND REPORTING

The following records will be maintained on site:

- A hazardous materials register which details all hazardous goods brought to site, usage and remaining inventories. The relevant MSDS will be available for all hazardous goods.
- Where applicable, the collection of waste will comply with the Environmental Protection (Controlled Wastes) Regulations 2004. Where controlled waste tracking forms are required, the customer's copy is to be retained onsite.

Internal reporting requirements will be communicated to all staff as part of their site induction. The two processes used on site to report issues are the C3: Hazard Register and C6: Accident/Incident form.

Reporting to regulatory agencies on compliance with this plan is undertaken through the Annual Environmental Report (AER) process.

APPENDICES

**APPENDIX 1:
SPILL CLEAN-UP PROCEDURE**

Spill Procedure

Purpose

This procedure details steps to be taken to contain and clean up spills of hydrocarbons and other liquid and solid hazardous chemicals on site.

Safety

- All products and hazardous substances used and stored on site are to have their Material Safety Data Sheets (MSDS) included in the site's Hazardous Materials Register.
- Spill clean up actions are to follow relevant MSDS requirements for PPE and other safety precautions.

Action sequence

Spills of hazardous substances are to be treated using the following action sequence:

1. Isolate the spill area.
2. Identify the spilt substance.
3. Identify hazards and PPE requirements.
4. If safe to do so, the source of the spill should be restricted or stopped (eg; if a valve is open, close it).
5. Contain spill – to reduce the area of impact and prevent flow to other areas.
6. Collect spilt material (if possible).
7. Dispose of collected material in the appropriate manner.
8. Report the spill – either through the C3: Hazard Register or C6 Incident report form.
9. Remediate residual contamination in spilt area.

Actions

- Small hydrocarbon spills to soil in uncontained (unbunded) areas (< 20 litres or < 2m² in area) are to be remediated in situ by scarifying the surface soil, applying bioremediation additives and lightly watering.
- Large hydrocarbon spills to soil in uncontained (unbunded) areas (> 20 litres or > 2m² in area) are to be excavated and contaminated material taken to the site's bioremediation facility for treatment.
- Large spill areas that cannot be excavated for some reason (eg; buried pipelines/powerlines) are to be recorded on the site's environmental constraints map as a contaminated site, to be investigated and remediated during mine closure works.
- Spills of solid hazardous substances are to be immediately collected using spades / brooms. Collected material that is uncontaminated can be repackaged for use.
- Dispose of contaminated material in the appropriate manner – as described in the MSDS or hazardous materials register.
- Remediate any residual contaminated area in the appropriate manner – as described in the MSDS or hazardous materials register.

Techniques to collect spilled hydrocarbons

- On advice of the environmental officer or the safety coordinator, pump remaining liquids into a container for transfer to the waste oil tank for recycling.
- Use absorbent materials to soak up residual hydrocarbons.
- Use earthmoving equipment to excavate contaminated soil for treatment as directed by the environmental officer.
- Hydrocarbons contained in concrete bunds are to be transferred to the waste oil tank for recycling.
- If the spill has contaminated a water body, use mini booms to contain the spread of hydrocarbon on the surface of the water. Use a skimmer to collect contained hydrocarbon and pump to a waste oil tank or other safe container
- Hydrocarbon absorbents are to be collected and disposed of as advised by the environmental officer.

Technique to treat hydrocarbon contaminated soil

The most common technique for bioremediation is to thinly spread the contaminated soil and broadcast ammonium nitrate fertiliser over the soil at a rate not exceeding 100 kg/ha. The surface is scarified to mix in the fertiliser and regularly watered with potable quality water. Additional fertiliser and tilling applications may be required. Bioremediated soil is sampled to test for residual hydrocarbons. Once levels fall below specified threshold levels, the soil can be reused.

Reporting

- Small hydrocarbon spills to soil in uncontained (unbunded) areas (< 20 litres or 2m² in area) are to be recorded using the C3: Hazard Register.
- Large hydrocarbon spills to soil in uncontained (unbunded) areas (> 20 litres or > 2m² in area) are to be reported as an environmental incident using the C6: Accident/Incident form.
- Any non-compliance with this procedure is to be reported to the Polaris Supervisor within 24-hours of the incident occurring using the C3: Hazard Register.

APPENDIX 6:
ACID ROCK MANAGEMENT PROCEDURE



P O L A R I S
M E T A L S N L

ACID ROCK MANAGEMENT PROCEDURE

OCTOBER 2009

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Appendix 1: Encapsulation cell design

1. INTRODUCTION

This acid rock management procedure has been prepared to reduce potential impacts of acid rock drainage (ARD) from operational areas of the Carina iron ore project. It is a requirement that actions contained in this procedure are complied with at all times by site personnel.

Waste characterisation and potential acid formation (PAF) from waste types has been described in detail in the project's PER document. Salient points from this assessment are:

1. The general composition of mine waste is:
 - Mafic schist (mas) 60% by volume.
 - BIF/chert (bif/cht) 38 %
 - Fault contact/transition zone (TZ) 2%
2. Characterisation of mine lithology shows the weathered (oxidised) profile extends approximately 80 metres from the surface. The maximum design depth of the open pit is 170 metres, although two thirds of the open pit will be 100-102 metres deep. This indicates approximately 60% of mine waste will come from the oxidised zone and is unlikely to be acid forming.
3. Total sulphur analysis during exploration drilling showed that of 1,583 samples analysed, from a range of profiles throughout the orebody, only 185 recorded total sulphur values greater than 0.3%. This indicates almost 90% of the mine profile is likely to be NAF, containing insufficient sulphur to generate acidity to any significant level.
4. Some high sulphur content (pyritic material) has been identified in transition zone material around fault zones on the edge of the orebody. This material is located in specific profiles and is easily recognisable. The majority of this material is located at depth, in the fresh rock (unoxidised) zone of the pit. Some of this material will report as waste to the waste landform and some will remain exposed in the pit walls. This high sulphur content waste is only a small proportion of total mine waste.
5. Polaris intends to encapsulate high sulphur content material in the waste landform using NAF material, or if available, material with acid neutralising capacity (ANC).

1.1 ENVIRONMENTAL OBJECTIVES AND STANDARDS

The objectives for acid rock management are:

- To avoid or contain potential impacts of ARD from mine waste and the pit void.
- To recognise and appropriately manage any potentially acid forming materials during mining operations.

1.2 RELEVANT STANDARDS

Department of Industry and Resources (2006), Mining Environmental Management Guidelines, Mining in Arid Environments

Department of Industry and Resources, (2001), Environment Division, Environmental Notes on Mining, Waste Rock Landforms

Department of Industry and Resources, (2006), Environment Division, Environmental Notes on Mining: Acid Mine Drainage.

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

Water Quality Protection Guidelines No. 9 Mining and Mineral Processing, Acid Mine Drainage (WRC, 2000)

Water Quality Protection Guidelines No. 5 Mining and Mineral Processing, Minesite Water Quality Monitoring (WRC, 2000)

Department of Industry Tourism and Resources (2007) Managing Acid and Metalliferous Drainage

1.3 OTHER RELEVANT INFORMATION

The following list of other documents is also applicable to acid rock management.

- Encapsulation cell design Appendix 1

2. POTENTIAL IMPACTS

Potential impacts from acid rock drainage are:

- Acidic runoff or drainage from waste landforms impacting surrounding soil and vegetation.
- Acidic drainage from pit walls impacting water quality in pit void lakes and groundwater.
- Increased mobilisation of metals in acidic water.
- Rehabilitation failure due to acidic soil or water.

3. MANAGEMENT ACTIONS

Actions to be undertaken to manage acid rock are outlined in Table 1.

Table 1: Management actions

Action	Who	When
Induction and training		
All personnel will be inducted on the significance of acid rock in the project area and management actions established to reduce impacts.	All personnel	Commencement on site
Mine plan to map high sulphur waste zones within the open pit to enable appropriate management of this waste when it is intersected.	Mine engineer	Commencement on site
Construct floor and walls of encapsulation cell in the waste landform early, to enable PAF waste to be deposited in this location when it is identified.	Mine engineer	Commencement of waste landform construction

Action	Who	When
Design the encapsulation cell to include: <ol style="list-style-type: none"> 1. Located in a portion of the waste landform upstream of the open pit. 2. All drainage from this part of the waste landform is directed to the pit void, not into surrounding vegetation. 3. Foundation of the encapsulation cell to be a minimum of 3 metre above natural ground level, to avoid any interaction with groundwater at the base of the waste landform. 4. Encapsulation walls to be from NAF material. 5. Encapsulation cell located such that earthworks on the waste landform during rehabilitation does not intersect the cover, walls and floor of the encapsulation cell. 6. Compact a roof layer of AC or high ANC mine waste 1 metre thick, extending 3 metres beyond the outer boundary of the encapsulation cell walls. 7. Cap the compacted roof in mine waste to a minimum depth of 1 metre in a concave, water shedding, shape. The minimum capping depth allows ripping and rehabilitation of the capping layer without impacting the integrity of the compacted roof. 	Mine engineer	Commencement of waste landform construction
Construct groundwater monitoring bores around open pit and waste landform to monitor groundwater quality.	Environmental officer	Early in open pit development

4. TARGETS AND PERFORMANCE

Table 2 provides targets and performance criteria to be used to track progress in achieving acid rock management objectives.

Table 2: Performance Criteria

Objectives	Target	Performance
To avoid or contain potential impacts of ARD from mine waste and the pit void.	Construct encapsulation cell early in the mine development process to allow appropriate management of problematic material when encountered	No dumping of PAF material on external faces of waste landform.
	Groundwater containing increased acidic or metalliferous concentrations contained within the pit void / mine perimeter and not impact on surrounding soil, vegetation and groundwater.	Water quality monitoring within set limits and having no detrimental effect to off-site. No impact to surrounding vegetation and soil from acid drainage.
To recognise and appropriately manage any potentially acid forming materials during mining operations.	Map PAF material in the orebody prior to mining to identify zones of problematic material	No dumping of PAF material on external faces of waste landform.

5. MONITORING AND AUDITING

The site environmental officer will conduct surface and ground water monitoring as specified in the site's operating license. It is anticipated this will be on a quarterly basis.

The site environmental officer will conduct 6 monthly audits on operation of the encapsulation cell and the waste landform to ensure no inappropriate dumping of PAF waste has occurred.

6. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

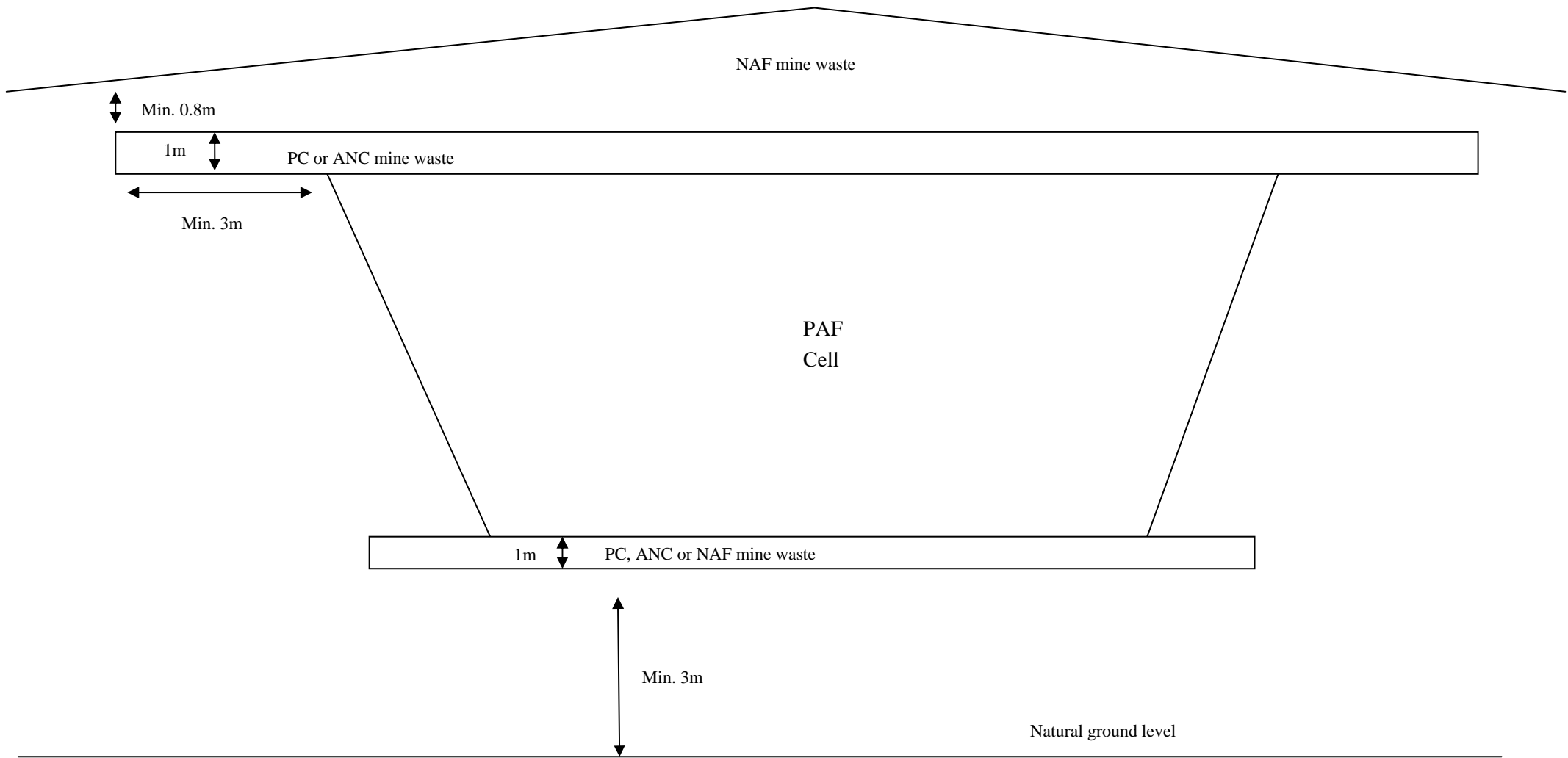
The annual environmental report (AER) will include a summary of all environmental incidents recorded for the period and documented remedial actions. This includes incidents associated with PAF material.

7. RECORDS AND REPORTING

Reporting to regulatory agencies on compliance with this plan is undertaken through the Annual Environmental Report (AER) process.

APPENDICES

**APPENDIX 1:
ENCAPSULATION CELL DESIGN**



APPENDIX 7:
WATER MONITORING PROCEDURE



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WATER MONITORING PROCEDURE

SEPTEMBER 2009

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Appendix 1: Water monitoring locations

Appendix 2: Meter reading spreadsheet

1. INTRODUCTION

A series of groundwater monitor bores and surface water monitoring locations are situated around the Carina site. Regular monitoring of water levels and quality is conducted to determine the impacts of mining on the local ground and surface water systems.

Monitoring of surface water is conducted opportunistically, as local drainage lines only flow for short periods after rainfall.

1.1 OBJECTIVES

The objectives for water monitoring are:

- Assess environmental effects of activities by regular monitoring and review of performance.
- Comply with all licence conditions.

1.2 LEGISLATION AND STANDARDS

Table 1 lists relevant legislation and standards relevant to water monitoring.

Table 1: Legislation and standards

Reference	Relevance	Regulatory Authority
AS NZS 5667.1.1998.	Water quality sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.	-
<i>Rights in Water and Irrigation Act 1914.</i>	Licensing of groundwater abstraction	DoW
Water Quality Protection Guidelines No 11.	Guidelines on mine dewatering	WRC, DMP and DEC
Water Quality Protection Notes.	Guidelines on protection of ground and surface waters.	DoW

2. POTENTIAL IMPACTS

It is anticipated that, due to the relatively localised nature of site activities, impacts to water will also be localised.

Potential impacts to water include:

- Groundwater level drawdown beyond modelled extent.
- Vegetation loss through groundwater level drawdown.
- Contamination of groundwater or surface water.

3. MANAGEMENT ACTIONS

Monitoring is to be undertaken according to DEC and DoW licence conditions. There must be no disturbance to the monitor bore (such as bailing or pumping) one week prior to water level measurement. Actions to be undertaken for water monitoring are outlined in Table 2.

Table 2: Management actions

Action	Who	When
Meter readings		
Reading of water meters is required to determine water production and usage on site.	Environmental officer	monthly
Site plan showing location of bores and of meter locations is attached as Appendix 1	Environmental officer	
Enter meter readings taken in the field in Appendix 2 and then transfer to water production spreadsheet.	Environmental officer	monthly
Water levels		
Check that the water level probe is operational.	Environmental officer	monthly
Lower the probe into the bore until contact with the water is confirmed by both the audible beep and/or visual red light.	Environmental officer	
Read the depth level to the top of casing (TOC) to within the nearest centimetre. Use of previous monitoring data will help to estimate the point of contact.	Environmental officer	
Ensure the 'stick-up' distance – the height of the TOC above ground level, is recorded for the bore. This allows measured results to be calibrated to 'ground levels'.	Environmental officer	
Note should be made if the bore is dry.	Environmental officer	
Groundwater (bore) samples		
Purge bores according to AS 5667.1.1998.	Environmental officer	quarterly
Take sample with bailer. Rinse bailer with RO water between samples	Environmental officer	
Place sample in plastic container and record Electrical Conductivity and pH.	Environmental officer	
Ensure that the bore cap is replaced.	Environmental officer	
Send samples to external laboratory for analysis.	Environmental officer	
On receipt of data from laboratory, enter data into the water production spreadsheet.	Environmental officer	
Surface water monitoring		
Opportunistic monitoring is required to be carried out at the established permanent surface water monitoring sites whenever surface water flows occur (to a maximum of 2 per quarter).	Environmental officer	Surface water flow
Sampling is to be undertaken in accordance with AS 5667.1.1998.	Environmental officer	
Electrical Conductivity and pH is to be monitored according to the steps set out under the bore water monitoring section.	Environmental officer	
Laboratory analysis to be conducted the same as groundwater.	Environmental officer	
On receipt of data from laboratory, enter data into the water production spreadsheet.	Environmental officer	

4. TARGETS AND PERFORMANCE

Table 3 provides targets and performance criteria to be used to track progress in achieving water monitoring objectives.

Table 3: Performance Criteria

Objectives	Target	Performance
Comply with all licence conditions.	Comply with all licence / permit water monitoring requirements.	All licence requirements met.
Assess environmental effects of activities by regular monitoring and review of performance.	Record all monitoring results and assess against standards / limits set.	All results within licence limits.
	Review monitoring results and provide regular internal reports to site managers.	Regular internal water monitoring reports circulated.

Table 4 shows trigger levels for metals in surface and groundwater, as detailed in the project's PER.

Table 4: Trigger levels of metals in water

Parameter	Fresh water ¹ (µg/L)	Marine water ¹ (µg/L) (Carina groundwater)
pH	6.5-8.0	8.0-8.4
Aluminium (pH>6.5)	55	ID ² -(0.5) ³
Arsenic III	24	ID ² -(2.3) ⁴
Copper	1.4	1.3
Lead	3.4	4.4
Mercury (inorganic)	0.6	0.4

5. MONITORING AND REVIEW

The site environmental officer will conduct 6 monthly review, to assess compliance with this plan. This will involve providing a brief report to the Mine Manager and Environmental Manager summarizing data on:

- Water abstraction against licence limit.
- Water quality parameters against licence limits.
- Commentary on important findings and notes.

6. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

The annual environmental report (AER) will include a summary of all environmental incidents recorded for the period and documented remedial actions. This includes incidents associated with water monitoring.

7. RECORDS AND REPORTING

Reporting to regulatory agencies on compliance with this plan is undertaken through the Annual Environmental Report (AER) and annual aquifer review process.

APPENDICES

**APPENDIX 1:
WATER MONITORING LOCATIONS**

**APPENDIX 2:
METER READING SPREADSHEET**

Water production
DATA

6/10/2009
10:09 AM

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1				Bore Monitoring Data											Calculated data from meter readings					
2		Ore processed		Bore 1	Bore 2	Bore 3	Bore 4	Bore 5	Standpipe 1	Standpipe 2	Standpipe 3	Standpipe 4	Standpipe 5		Pit dewatering	Village supply	HR watering	Rail Siding		DoW licence limit
3	METRE READINGS																			
4	december																			
5	january																			
6	february																			
7	march																			
8	april																			
9	may																			
10	june																			
11	july																			
12	august																			
13	september																			
14	october																			
15	november																			
16	december																			
17	MONTHLY VOLUME																			
18	january			0	0	0	0	0	0	0	0	0	0							
19	february			0	0	0	0	0	0	0	0	0	0							
20	march			0	0	0	0	0	0	0	0	0	0							
21	april			0	0	0	0	0	0	0	0	0	0							
22	may			0	0	0	0	0	0	0	0	0	0							
23	june			0	0	0	0	0	0	0	0	0	0							
24	july			0	0	0	0	0	0	0	0	0	0							
25	august			0	0	0	0	0	0	0	0	0	0							
26	september			0	0	0	0	0	0	0	0	0	0							
27	october			0	0	0	0	0	0	0	0	0	0							
28	november			0	0	0	0	0	0	0	0	0	0							
29	december			0	0	0	0	0	0	0	0	0	0							
30	Total	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31																				
32	DAILY VOLUME																			
33	january			0	0	0	0	0	0	0	0	0	0							
34	february			0	0	0	0	0	0	0	0	0	0							
35	march			0	0	0	0	0	0	0	0	0	0							
36	april			0	0	0	0	0	0	0	0	0	0							
37	may			0	0	0	0	0	0	0	0	0	0							
38	june			0	0	0	0	0	0	0	0	0	0							
39	july			0	0	0	0	0	0	0	0	0	0							
40	august			0	0	0	0	0	0	0	0	0	0							
41	september			0	0	0	0	0	0	0	0	0	0							
42	october			0	0	0	0	0	0	0	0	0	0							
43	november			0	0	0	0	0	0	0	0	0	0							
44	december			0	0	0	0	0	0	0	0	0	0							

APPENDIX 8:
HYDROCARBON AND CHEMICAL PROCEDURE



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HYDROCARBON AND CHEMICAL PROCEDURE

SEPTEMBER 2009

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Appendix 1: Hazardous materials register

Appendix 2: Spill procedure

1. INTRODUCTION

This procedure provides information for the storage and handling of hydrocarbons and bulk chemicals, including diesel fuel, oils, grease, chemicals and explosives. This procedure outlines the manner in which bulk and small containers of these substances should be stored and handled on-site. Bulk containers include 65 kilolitre fuel tanks, 1,000 litre ‘pods’, down to small containers of 20 L drums.

Implementing good hydrocarbon and chemical management practices will minimise environmental impacts from spills and accidents.

1.1 ENVIRONMENTAL OBJECTIVES

The objectives of hydrocarbon and chemical management are:

- To ensure no release of hydrocarbons to the environment as a result of storage or handling incidents.
- To ensure storage and handling of fuels and chemicals at the site does not pose a threat to the environment.
- To ensure that any spill or incident associated with fuels and chemicals will be cleaned up quickly and effectively.
- To monitor the effectiveness of this hydrocarbon and chemical management procedure.

1.2 LEGISLATION AND STANDARDS

Table 1 lists relevant legislation and standards.

Table 1: Legislation and Standards

Reference
Explosives and Dangerous Goods Act 1961.
Explosive and Dangerous Goods (Explosives) Regulations 1963.
Explosive and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992.
Dangerous Goods (Transport Road & Rail) Regulations 1999.
AS 1940 - The storage and handling of flammable and combustible liquids.
AS 3780 - The Storage and Handling of Corrosive Substances.
AS 4452 - The Storage and Handling of Toxic Substances.
AS 4681 - The Storage and Handling of Class 9 (miscellaneous) Dangerous Goods and Articles.

1.3 OTHER RELEVANT INFORMATION

The following list of other documents is also applicable to hydrocarbon and chemical management.

- Hazardous materials register Appendix 1
- Spill procedure Appendix 2
- Emergency Response Plan
- Monthly contractor inspection checklist

2. POTENTIAL IMPACTS

It is anticipated that, due to the relatively localised nature of site activities, impacts from hydrocarbons and chemicals will also be localised. Potential impact from hydrocarbons and chemicals is contamination of soil and water from spills and leaks.

3. MANAGEMENT ACTIONS

Actions to be undertaken to manage hydrocarbons and chemicals are outlined in Table 2.

Table 2: Management actions

Action	Who	When
Induction and training		
All personnel will be inducted on the appropriate precautions to minimise risk of chemical spillage and misuse. All employees are to be aware of the spill response procedure.	All personnel	Commencement on site
Product inventories		
Maintain a hazardous materials register which includes an inventory of all receivables and dispatches of hydrocarbon and chemical products. The register is to also include details of supplier, quantities, storage location and MSDS.	Supply department	Ongoing
Maintain an inventory of explosives and associated products used on site.	Mining department	Ongoing
Storage		
Storage facilities will be appropriate to the type of chemical and will, as a minimum, meet the relevant Australian Standards.	Project engineer	Ongoing
All storage facilities on site are to be recorded in the hazardous materials register (Appendix 1).	Supply department	Ongoing
Regular monitoring of facilities will be carried out on a monthly basis. Records of all inspections are maintained by the environmental officer.	Contractors	monthly
Auditing will be carried out on an annual basis. Records of all audits are maintained in the register.	Environmental officer	annually
All hydrocarbon containers will be stored in bunded areas compliant with licence conditions, Regulations, and relevant Standards.	Area managers	Ongoing
All 200 L drums will be stored in either: <ul style="list-style-type: none"> • A compacted earthen floor and bund with a spillage capacity of at least 20% of the total hydrocarbons stored in the bund, • A concrete floor and bund with a spill holding capacity of 20% of the total hydrocarbons stored in the bund. • On self contained spill pallets 	Area managers	Ongoing
All 200 L drums stored vertically will be held individually or by groups on self contained spill pallets.	Area managers	Ongoing
All 200 L drums stored horizontally will be located on suitable holding tables over a steel or plastic drip tray under each row of outlet (supply) valves, with a capacity of 220 L.	Area managers	Ongoing

Action	Who	When
Handling		
Wherever possible, hydrocarbons and chemicals will be purchased in re-useable or returnable bulk containers.	Supply department	Ongoing
Wherever possible, all oils and greases used in plant maintenance and servicing at workshops will have drip trays located under outlets.	Maintenance supervisor	Ongoing
Transfer points to or from bulk containers or permanent refuelling stations will be provided with a bunded concrete apron with collection of drainage discharging to a triple oil interceptor tank.	Project engineer	Ongoing
If a spill of hydrocarbons occurs, the spill response procedure is to be followed (Appendix 2). The incident is to be reported as required in the procedure.	All personnel	Ongoing
When waste oils are collected from servicing of equipment or machinery, they should be transferred immediately to a waste oil collection system in the relevant area.	Mechanic	Ongoing
Filters should be placed on a rack to drain before disposing	Mechanic	Ongoing
Conduct regular housekeeping inspections to determine when containers drip trays require emptying and to ensure area is kept clean and tidy with no fire hazards.	Area managers	Ongoing

4. TARGETS AND PERFORMANCE

Table 3 provides targets and performance criteria to be used to track progress in achieving hydrocarbon and chemical management objectives.

Table 3: Performance Criteria

Objectives	Target	Performance
To ensure no release of hydrocarbons to the environment as a result of storage or handling incidents.	No escape of hazardous materials to the environment. Integrity of bunds is maintained.	Inspections recording no spills or escape of hazardous materials. Environmental incidents arising from spills.
To ensure storage and handling of fuels and chemicals at the site does not pose a threat to the environment.	Compliance with licence conditions, Regulations and Standards	Environmental incidents arising from non conformance with requirements.
To ensure that any spill or incident associated with fuels and chemicals will be cleaned up quickly and effectively.	Spills are quickly and effectively cleaned up.	Environmental incidents arising from spills.
To monitor the effectiveness of this hydrocarbon and chemical management procedure.	Above targets are met.	Audit / review on the effectiveness of this procedure.

5. MONITORING AND AUDITING

Contractors will conduct monthly inspections of their work areas, which includes hydrocarbon facilities. Results of inspections are supplied to the site environmental officer.

The site environmental officer will conduct 6 monthly audits of the site to assess compliance with this procedure. This will involve providing a brief report to the Environmental Manager summarizing data on:

- Number of spill incidents recorded.
- Number of workplace inspections undertaken.

6. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

The annual environmental report (AER) will include a summary of all environmental incidents recorded for the period and documented remedial actions. This includes incidents associated with hydrocarbons and chemicals.

7. RECORDS AND REPORTING

Reporting to regulatory agencies on compliance with this plan is undertaken through the Annual Environmental Report (AER) process.

APPENDICES

APPENDIX 1:
HAZARDOUS MATERIALS REGISTER

**APPENDIX 2:
SPILL PROCEDURE**

Spill Procedure

Purpose

This procedure details steps to be taken to contain and clean up spills of hydrocarbons and other liquid and solid hazardous chemicals on site.

Safety

- All products and hazardous substances used and stored on site are to have their Material Safety Data Sheets (MSDS) included in the site's Hazardous Materials Register.
- Spill clean up actions are to follow relevant MSDS requirements for PPE and other safety precautions.

Action sequence

Spills of hazardous substances are to be treated using the following action sequence:

1. Isolate the spill area.
2. Identify the spilt substance.
3. Identify hazards and PPE requirements.
4. If safe to do so, the source of the spill should be restricted or stopped (eg; if a valve is open, close it).
5. Contain spill – to reduce the area of impact and prevent flow to other areas.
6. Collect spilt material (if possible).
7. Dispose of collected material in the appropriate manner.
8. Report the spill – either through the C3: Hazard Register or C6 Incident report form.
9. Remediate residual contamination in spilt area.

Actions

- Small hydrocarbon spills to soil in uncontained (unbunded) areas (< 20 litres or < 2m² in area) are to be remediated in situ by scarifying the surface soil, applying bioremediation additives and lightly watering.
- Large hydrocarbon spills to soil in uncontained (unbunded) areas (> 20 litres or > 2m² in area) are to be excavated and contaminated material taken to the site's bioremediation facility for treatment.
- Large spill areas that cannot be excavated for some reason (eg; buried pipelines/powerlines) are to be recorded on the site's environmental constraints map as a contaminated site, to be investigated and remediated during mine closure works.
- Spills of solid hazardous substances are to be immediately collected using spades / brooms. Collected material that is uncontaminated can be repackaged for use.
- Dispose of contaminated material in the appropriate manner – as described in the MSDS or hazardous materials register.
- Remediate any residual contaminated area in the appropriate manner – as described in the MSDS or hazardous materials register.

Techniques to collect spilled hydrocarbons

- On advice of the environmental officer or the safety coordinator, pump remaining liquids into a container for transfer to the waste oil tank for recycling.
- Use absorbent materials to soak up residual hydrocarbons.
- Use earthmoving equipment to excavate contaminated soil for treatment as directed by the environmental officer.
- Hydrocarbons contained in concrete bunds are to be transferred to the waste oil tank for recycling.
- If the spill has contaminated a water body, use mini booms to contain the spread of hydrocarbon on the surface of the water. Use a skimmer to collect contained hydrocarbon and pump to a waste oil tank or other safe container
- Hydrocarbon absorbents are to be collected and disposed of as advised by the environmental officer.

Technique to treat hydrocarbon contaminated soil

The most common technique for bioremediation is to thinly spread the contaminated soil and broadcast ammonium nitrate fertiliser over the soil at a rate not exceeding 100 kg/ha. The surface is scarified to mix in the fertiliser and regularly watered with potable quality water. Additional fertiliser and tilling applications may be required. Bioremediated soil is sampled to test for residual hydrocarbons. Once levels fall below specified threshold levels, the soil can be reused.

Reporting

- Small hydrocarbon spills to soil in uncontained (unbunded) areas (< 20 litres or 2m² in area) are to be recorded using the C3: Hazard Register.
- Large hydrocarbon spills to soil in uncontained (unbunded) areas (> 20 litres or > 2m² in area) are to be reported as an environmental incident using the C6: Accident/Incident form.
- Any non-compliance with this procedure is to be reported to the Polaris Supervisor within 24-hours of the incident occurring using the C3: Hazard Register.

**APPENDIX 9:
DUST PROCEDURE**



<p>Dust control procedure</p>
<p>Purpose</p> <p>This procedure details actions for managing dust emissions on site. Effective control of dust will achieve the environmental objective of protecting surrounding vegetation and the health and amenity of the workforce.</p>
<p>Background</p> <p>Wind speeds in the region are generally mild. The Carina PER document shows Bureau of Meteorology data which show the majority of wind speed experienced in the region is less than 30km/h, with a significant proportion less than 20km/h. This indicates the project area is not in a region that regularly experiences strong prevailing winds, so the risk of significant dust generation from work areas by erosive winds is considered low.</p>
<p>Risks</p> <p>Key Risks include:</p> <ul style="list-style-type: none"> • Risk to human health. • Smothering of surrounding vegetation. • Nuisance (amenity).
<p>Procedure</p> <p><i>Mine operational areas</i></p> <ul style="list-style-type: none"> • Keep cleared areas to the minimum necessary to undertake project works. • Progressively rehabilitate disturbed areas in accordance with the site rehabilitation plan, to reduce the potential for dust generation. • Apply water to active work areas to prevent dust emissions creating a nuisance or impacting adjacent vegetation. • Restrict vehicle access to dry, dust prone areas that are not active work areas or are being watered to prevent dust. • Apply water sprays to crushing, conveyor and stockpile systems to prevent dust. • Water trucks to apply water from dribble bars on the main haul road to minimise dust generation. • Vehicles must not exceed 60 km/h while driving on mine work areas. • Vehicles must not exceed 80 km/h on main haul road / access road. <p><i>Vegetation health monitoring</i></p> <ul style="list-style-type: none"> • Establish permanent monitoring sites for vegetation health, in locations adjacent to mine, haulage and rail siding work areas, as well as control sites, remote for work locations. Dust deposition gauges are to be located at each monitoring site. • Monitor dust deposition monthly and vegetation health quarterly over the first 12 months of operation. • After the first 12 months, report on results obtained and use this information to define interim dust target levels to ensure adjacent vegetation is not impacted by dust deposition. • Define an ongoing monitoring and review process in the annual environmental report.
<p>Reporting</p> <ul style="list-style-type: none"> • Any non-compliance with this procedure is to be reported within 24-hours of the incident occurring using the C3: Hazard Register.

**APPENDIX 10:
REGISTERS AND FORMS**

MACHINERY AND VEHICLE INSPECTION CHECKLIST

It is important that earthmoving machinery is in an acceptable condition before it enters site working areas in relation to safety, weeds, hydrocarbons, emissions and noise.

This inspection must be completed by the Site Supervisor in the presence of the machinery Supervisor.

Date of arrival/inspection:

Name of machinery Supervisor:

Name of person conducting inspection:

What kind of machine is it?

Please list any problem weeds at the last site.

- Was the machine cleaned before it left the last site? Yes No
- Are buckets, tracks, blades etc free of soil and vegetation? Yes No
- Are the tyres free of seeds? Yes No
- Is machine free of fuel and oil leaks? Yes No
- Is the exhaust/muffler in good working order? Yes No

Work required/comments:

.....

.....

.....

If you have answered NO to any of these questions, please carry put the required cleaning and/or maintenance before the machine enters the site. This form must be signed by the machine Supervisor and Site Supervisor when all cleaning and/or maintenance is completed.

Signed
Machine Supervisor Date

- Vehicle Wash down Procedure**
- Wash down machine in designated wash down bay.
 - Remove all soil and vegetation including seeds.
 - Ensure runoff, soil and any seeds are contained on the hardstand or directed to the sediment basin.
 - Carry out final inspection with site personnel before moving into site.

INSPECTION EQUIPMENT AND VEHICLE COMPLIANCE

CHECK	YES	NO	N/A	ACTION REQUIRED	BY WHO/DATE
Are project vehicles fitted with relevant safety stickers prior to use?					
Do relevant cabins have an Australian Standard approved rollover structure?					
Are earthmoving equipment and vehicles equipped and maintained with suitable brakes?					
Are earthmoving equipment and vehicles fitted with adequate headlights?					
Do vehicles have suitable audible warning devices?					
Are vehicles equipped with an adequate flashing light?					
Are vehicles equipped with an 'In Service' fire extinguisher?					
Are earthmoving equipment and vehicles fault/defect inspected and maintained as per manufacturers specifications?					
Are there up to date records of inspections and maintenance?					
Do contractors earthmoving equipment and vehicles comply with these requirements?					

DATE: _____

AREA: _____

INSPECTOR: _____

SIGNATURE: _____

6.1 REPORT FORM

Office Use Only	Derived from 6.5 / C3 <input type="checkbox"/>	6.1 ID: _____
------------------------	--	---------------

Reported By : _____ Report Date: _____

Incident Title: _____

Area Incident Occured In: _____

Incident Category <i>Select one only</i>	Status <i>Select one only</i>
<input type="checkbox"/> Information Only - Knowledge that may reduce workplace hazards. May not require an investigation.	<input type="checkbox"/> Staff Member
<input type="checkbox"/> Hazard - Something with potential to cause injury.	<input type="checkbox"/> Visiting Staff Member
<input type="checkbox"/> Near Miss - An incident that nearly caused an injury. Includes an incident that caused minor pain or discomfort.	<input type="checkbox"/> Contractor / Agency
<input type="checkbox"/> Injury - An incident where first aid/ medical attention was required.	<input type="checkbox"/> Volunteer / Visitor

Description of Incident and action(s) taken by you to eliminate any part of the hazard:
Full injury details to be recorded page 2

Hazard:

Describe Potential or Actual Injury:

Describe What You Did to Remove or Control the Hazard:

Date of Incident: _____	Time of Incident: _____	Start Time of Your Shift: _____	Duration of Your Shift: _____
-------------------------	-------------------------	---------------------------------	-------------------------------

Employee Recommendations to Reduce Future Risk:

Originator's Signature: _____

Mechanism - Possible or actual cause of injury *Tick one only*

<input type="checkbox"/> M1 Slip/ Trip	<input type="checkbox"/> M2 Struck By	<input type="checkbox"/> M3 Caught On or In	<input type="checkbox"/> M4 Contact With
<input type="checkbox"/> M5 Fall from Height	<input type="checkbox"/> M6 Struck Against	<input type="checkbox"/> M7 Vehicle Accident	<input type="checkbox"/> M8 Over Exertion (manual handling)
<input type="checkbox"/> M9 Work Environment Exposure	<input type="checkbox"/> M10 Other (specify): _____		

Agency - Possible or actual source of injury *Tick one only*

<input type="checkbox"/> A1 Buildings/ Structures	<input type="checkbox"/> A2 Ladder/ Platform	<input type="checkbox"/> A3 Lifting Equipment	<input type="checkbox"/> A4 Vehicle
<input type="checkbox"/> A5 Fixed Plant/ Machinery	<input type="checkbox"/> A6 Mobile Plant	<input type="checkbox"/> A7 Power Tool	<input type="checkbox"/> A8 Hand Tool
<input type="checkbox"/> A9 Sharps/ Broken Glass	<input type="checkbox"/> A10 Heat Source	<input type="checkbox"/> A11 Dust/ Fumes/ Smoke	<input type="checkbox"/> A12 Noise/ Vibration
<input type="checkbox"/> A13 Chemicals/ Substances	<input type="checkbox"/> A14 Water/ Inert Fluids	<input type="checkbox"/> A15 Biological Agent	<input type="checkbox"/> A16 Human Agent
<input type="checkbox"/> A17 Animals/ Insects	<input type="checkbox"/> A18 Other (specify): _____		

**ACCIDENT / INCIDENT REPORT FORM**

Incident Number: _____ - _____

In addition to the C4: 6.1 Incident report form, this form must also be completed for all accidents, incidents, near misses and hazardous situations. Please attach any additional pages and relevant maps.

Exploration Activity:						
<input type="checkbox"/> Vehicle	<input type="checkbox"/> Traversing	<input type="checkbox"/> Aviation	<input type="checkbox"/> Drilling Activities	<input type="checkbox"/> Camp Activities	<input type="checkbox"/> Office	<input type="checkbox"/> Other
Classification (More than one box may be ticked):						
<input type="checkbox"/> Hazard	<input type="checkbox"/> Near Miss	<input type="checkbox"/> First Aid	<input type="checkbox"/> Classified Injury*			
<input type="checkbox"/> Equipment Damage	<input type="checkbox"/> Lost Time Injury	<input type="checkbox"/> Fatality	<input type="checkbox"/> Environmental			
<input type="checkbox"/> Off The Job	* Able to work, but not undertake all normal duties					
Environmental (More than one box may be ticked):						
<input type="checkbox"/> Fire (indicate area)			<input type="checkbox"/> Chemical/Fuel spill			
<input type="checkbox"/> Damage to cultural/sensitive site			<input type="checkbox"/> Community complaint.			
<input type="checkbox"/> Water	<input type="checkbox"/> Air	<input type="checkbox"/> Flora	<input type="checkbox"/> Fauna	<input type="checkbox"/> Land		
Area/Volume affected: _____ m ² _____ m ³			Comments:			
If equipment or property was damaged, give details of items and describe the damage:						
Supervisor's assessment						
Notifiable to a Govt Agency	Inform department manager prior to notification					
Agency:	Date/time reported:					
Reporting method: phone email letter (circle)			To whom reported (name):			
Insurance Provider	Has this incident incurred and medical bills?					
Once possible – employee is to complete Workers Compensation form and submit to supervisor.						
Procedures						
Are there safety or operational Procedures written for this activity?			Yes / No / Not Applicable			
If so, were these Procedures being followed?			Yes / No / Not Applicable / Don't Know			
Do these Procedures need to be reviewed?			Yes / No / Not Applicable / Don't Know			
Was correct Personal Protective Equipment (PPE) being used?			Yes / No / Not Applicable			
Manager's Comments:						
Signature:			Date:			

INJURY REPORT

This report is to be completed by the first aider providing the treatment. You are not administer first aid to yourself unless there are no first aiders available. Both the first aider and injured person must sign this report.

Name of Injured Person: _____

Witness Report To be handwritten by each witness and signed. Attach additional signed reports on an extra page if required.	
Name:	Name:
Statement of what you saw:	Statement of what you saw:
Signed:	Signed:

Nature of Injury <i>Tick one only</i>			
<input type="checkbox"/> N1 Multiple Injuries	<input type="checkbox"/> N2 Cuts & Abrasions	<input type="checkbox"/> N3 Fatality	<input type="checkbox"/> N4 Poisons/ Toxins
<input type="checkbox"/> N5 Amputation	<input type="checkbox"/> N6 Dermatitis	<input type="checkbox"/> N7 Fracture	<input type="checkbox"/> N8 Puncture Wound
<input type="checkbox"/> N9 Bruising	<input type="checkbox"/> N10 Disease	<input type="checkbox"/> N11 Head Injury	<input type="checkbox"/> N12 Spinal Injury
<input type="checkbox"/> N13 Burns (thermal/ chem)	<input type="checkbox"/> N14 Dislocation	<input type="checkbox"/> N15 Hearing Loss	<input type="checkbox"/> N16 Strains & Sprains
<input type="checkbox"/> N17 Concussion	<input type="checkbox"/> N18 Exposure Effects	<input type="checkbox"/> N19 Heat Stress	<input type="checkbox"/> N20 Wound
<input type="checkbox"/> N21 Crush Injury	<input type="checkbox"/> N22 Eye Injury	<input type="checkbox"/> N23 Hernia	<input type="checkbox"/> N24 Other Injury
Other Injury: _____			

Bodily Location <i>Tick the location of the most severe injury only. Tick only one box</i>					Position <i>(Required)</i>
Head	Trunk	Upper Limbs	Lower Limbs	Other Areas	
<input type="checkbox"/> Ear	<input type="checkbox"/> Neck	<input type="checkbox"/> Arm	<input type="checkbox"/> Groin	<input type="checkbox"/> Multiple Locations	<input type="checkbox"/> Left
<input type="checkbox"/> Eye	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Elbow	<input type="checkbox"/> Leg	<input type="checkbox"/> Internal Location	<input type="checkbox"/> Right
<input type="checkbox"/> Head	<input type="checkbox"/> Back	<input type="checkbox"/> Wrist	<input type="checkbox"/> Knee	<input type="checkbox"/> Disease	<input type="checkbox"/> Upper
	<input type="checkbox"/> Hip/ Pelvis	<input type="checkbox"/> Hand	<input type="checkbox"/> Ankle	<input type="checkbox"/> Other	<input type="checkbox"/> Lower
	<input type="checkbox"/> Trunk		<input type="checkbox"/> Foot		<input type="checkbox"/> N/A
					<input type="checkbox"/> Other

Name of First Aider: _____
Details of Treatment Given: _____
Final Outcome of First Aid:
<input type="checkbox"/> Assessed/Treated by First Aid <input type="checkbox"/> Taken to Doctor <input type="checkbox"/> Sent Home <input type="checkbox"/> Taken to Hospital
Date and Time of Treatment: _____
First Aiders Signature: _____

Signature of Injured Person: _____

**APPENDIX 11:
CHECKLISTS**

Monthly contractors inspection checklist

Procedure.

Item	Action	Who
1	Polaris to supply all contractors on site with this procedure and instruct them to undertake monthly inspections of their areas.	Mine Manager
2	Contractors to complete the checklist below and return completed form to site Environmental Officer (EO).	Contractors
3	EO to enter inspection date in the Compliance Register, and file completed checklist.	EO
4	EO to follow up with contractors to ensure close out of all items raised.	EO

Contractor Area Inspection Checklist

Inspected by (Print Name):			
Contractor area:			
Date/Time:			
General item	Specific Criteria	Status Yes/No	Comments
Stores, Offices & laydown yards	Any weeds growing that require eradication?		
	All products correctly stored and labelled.		
	Rubbish removed		
Hydrocarbon facilities	All bunds intact.		
	Leaks and spills cleaned up.		
	All products correctly stored and labelled.		
	Hoses located inside bunds		
Parking areas	Any weeds growing that require eradication?		
	Minor leaks and spills cleaned up.		
Incidences	All environmental incidences reported.		
Plant area	Drains and sumps clear.		
	Dust management effective		
	Minor leaks and spills cleaned up.		
	Spill absorbent material available		
Vehicle washdown	Has all equipment entering the site been washed?		
	Form completed and submitted		
Personnel	Have all new employees been inducted?		
NPI reporting	Diesel use (litres)		
	Drilling (metres)		
	Heavy vehicle use (engine Kw & hrs)		
	Generators/lighting plants (engine Kw & hrs)		
Dust control	Is all dust control equipment operational		
Noise control	Is all noise control equipment operational		

SITE WEED INSPECTION CHECKLIST

Name of Inspector (Print): _____ Date: _____

Weather Conditions Prior to Inspection: _____

Weed Inspection Areas	Weeds Present (Yes/No)	Actions Taken
Village		
Village recreation areas		
Sewage irrigation area		
Mining workshop		
Production bore surrounds		
Storage areas		
Workshop area		
Landfill area		
Wash down bay		
Lay down areas		
Office buildings		
Haul road		
ROM Product stockpile areas		
Rail siding		
Open pit		
Waste landforms		
Other		

Eradication	Record
Weed Species	
Probable cause of occurrence (vehicle)	
Area (m2)	
Location	
Photo or sample of weed attached	
Eradication method	
Name (print) Signature Date	
Post Eradication	Follow up Actions
Weed Species	
New weed population (y/n)	
New growth (y/n)	
Follow up of eradication	
Evidence of weed death (photo)	
Name (print) Signature Date	

APPENDIX 12:
MAPS

APPENDIX 13:
REHABILITATION PLAN



P O L A R I S
M E T A L S N L

REHABILITATION PLAN

SEPTEMBER 2009

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APPENDICES

Appendix 1: Seed list

1. INTRODUCTION

The purpose of the rehabilitation plan is to describe rehabilitation processes and actions needed to undertake progressive and final mine rehabilitation. The strategies are designed to ensure maintenance free rehabilitation over the long term.

Like the PEMP, the rehabilitation plan is an adaptive document. Results of research trials will be incorporated into revisions of the document so that the rehabilitation prescription will evolve during the life of mine.

1.1 OBJECTIVES

The objective for mine rehabilitation is to ensure that the post mining landform is safe, stable and is compatible with the intended sequential land use and surrounding environment.

1.2 RELEVANCE TO OTHER PLANS

The Rehabilitation Plan is relevant to the Preliminary Mine Closure Plan.

The Public Environmental Review is relevant to the Rehabilitation Plan.

The Acid Rock Management Procedure is relevant the Rehabilitation Plan.

2. REHABILITATION EARTHWORKS

The waste landform and open pit are the two dominant landscape features that remain after mining, essentially in perpetuity.

2.1 WASTE LANDFORM

The Public Environmental Review contains details of the waste landform design. The design is repeated in this document as Section 2.1.1.

2.1.1 Waste landform design

Polaris intends to encapsulate the small quantity of PAF material anticipated to be extracted, in the waste landform. Most mine waste is non acid forming and contains some acid neutralising capacity. Some profiles have high acid consuming properties. This mine waste is to be utilised to construct the floor and roof of the encapsulation cell, providing buffering capacity against any acidity generated from encapsulated material.

Approximately 31 million lcm of mine waste will be excavated over the life of the Carina project. Waste will either be placed in a waste landform located adjacent to the pit or used to construct mine infrastructure. A waste landform with a total approximate area of 120 ha will be located adjacent to the open pit. It will be 30-35 m high, which is the height of the Yendilberin Hills, immediately to the south. Design of the waste landform is therefore consistent with the current surrounding landscape and topography.

Detailed design of the mine waste landform and the initial rehabilitation prescription is provided in the PEMP. A summary of key points on waste landform design is provided below.

- The waste landform will be shaped to form stable structures.
- The maximum height will be 35 metres, constructed in two 15 metre high lifts.
- Construct final batter slopes to less than 20 degrees, separated by a back sloping 10 metre wide berm between the lifts, to maximise retention of water.
- Construct 1 metre high bunds on the crown and leading edge of the berm to prevent water flowing down the batter slopes.
- Infrequent cyclonic or very intense rainfall events have the potential to exceed the design capacity of retention structures. This results in overtopping/breakout, which can cause considerable erosion in locations where access to undertake remedial work is often difficult. The stormwater design is to include an 'overflow' option, by directing peak storm flows off the crown and berm using the landform ramps, which channel this water to the open pit. In this way, very intense rainfall is shed off the landform and fully contained in the open pit. Any subsequent remedial/maintenance work on the ramps is easily implemented. The pulse of fresh water provided to the pit lake from these events has the additional benefit of reversing the gradual salinisation due to evaporative concentration.
- The PAF encapsulation cell floor is to be a minimum of 3 metres above natural ground level, to ensure no water ingress from underneath the waste landform.
- The encapsulation cell floor is to be 1 metre thick, sourced from AC or high ANC mine waste.
- Encapsulation cell walls are to be sourced from ANC or NAF mine waste.
- The encapsulation cell roof is to be 1 metre thick, sourced from AC or high ANC mine waste. The roof is to extend 3 metres past the walls of the encapsulation cell.
- Shape a convex surface on top of the encapsulation cell roof using NAF mine waste, to shed water away from this portion of the waste landform.
- Shape a concave surface on the remainder of the waste landform to promote water retention and infiltration rather than water shedding.
- Spread stockpiled vegetation on reshaped surfaces to provide erosion protection and fauna habitat.
- Spread available topsoil on reshaped surfaces to provide seed source and microbial inoculum.
- Deep rip surfaces on contour to assist with water infiltration and provide a seed bed (with the exception of the encapsulation cell).
- Apply seed and fertiliser to the newly ripped surfaces.

A conceptual design for the final waste landform is provided in Figure 1.

2.1.2 Sheeting

Emerson class analysis on the basic mine waste types that will make up the waste landform indicate almost all mine waste will slake but is non dispersive. This means the waste landform will not be highly susceptible to tunnelling erosion but has a low resistance of breakdown from rainfall impact. Armouring the final surface of the waste landform with a rocky / gravel material will provide significant resistance to this form of erosion. However, a sufficient quantity of laterite, gravel or similar rocky material is absent as an overburden layer in the mine waste profile. Some banded iron formation (BIF) waste is available. This will be stockpiled and used to sheet the final landform surface.

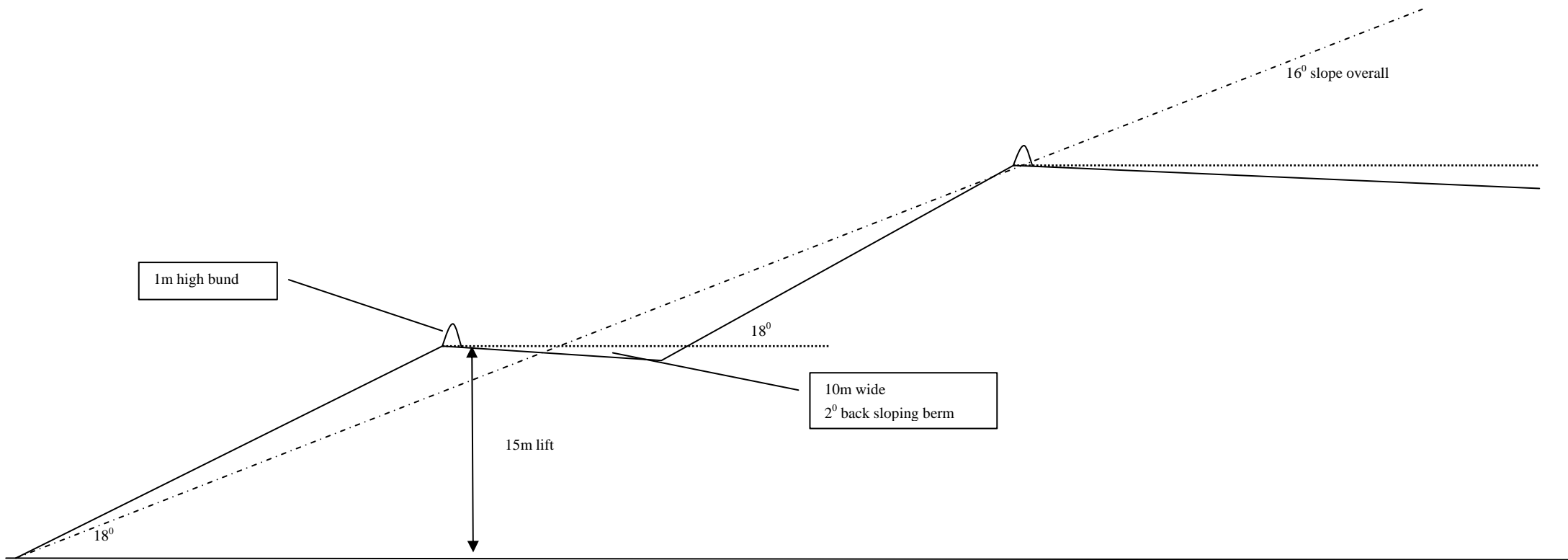
2.1.3 Topsoil and vegetation return

Once the primary earthworks on the waste landform are completed, available stockpiles of topsoil are to be respread over the waste landform to a depth of approximately 100 millimetres. Available stockpiles of vegetation are then to be pushed over the batters of the waste landform to provide seed, mulch and fauna habitat. In some locations, collections of timber, vegetation and large rocks may be pushed together in piles, to provide a diversity of habitat types.

2.1.4 Water management

Water management earthworks are a key component of waste landform rehabilitation. Infrequent cyclonic or very intense rainfall events have the potential to exceed design capacity of water retention structures. This results in overtopping/breakout, which can cause considerable erosion on waste landforms, in locations where access to undertake remedial work is often difficult. Stormwater design is to include an 'overflow' option, by directing peak storm flows off the crown and berm to the landform ramps, which then channel this water to the open pit. In this way, very intense rainfall is shed off the landform and fully contained in the open pit. Easy access to the ramps allows maintenance work as required. The pulse of fresh water provided to the pit lake from these events has the additional benefit of reversing gradual salinisation due to evaporative concentration.

Figure 1: Waste landform design



2.2 SPECIFIC AREAS

During operation, the mine waste landform is also used to bury domestic and industrial waste and encapsulate potentially acid forming mine waste. Allocating specific areas on the landform for each use, managing them through the operational phase of the mine and then ensuring rehabilitation works at the end of mining address these areas appropriately all require planning.

2.2.1 PAF encapsulation

The Acid Rock Management Procedure contains details of the PAF encapsulation cell design. The design is repeated in this document as Figure 2. The PAF encapsulation cell floor is to be a minimum of 3 metres above natural ground level, to ensure no water ingress from underneath the waste landform. It is to have a 1 metre thick floor, sourced from AC or high ANC mine waste. The cell walls are also to be sourced from AC mine waste if available, or (if not) ANC or NAF mine waste.

The encapsulation cell roof is to be 1 metre thick, sourced from AC or high ANC mine waste. The roof is to extend 3 metres past the walls of the encapsulation cell. Shape a convex surface on top of the encapsulation cell roof using NAF mine waste, to shed water away from this portion of the waste landform. Spread available topsoil on reshaped surfaces to provide seed source and microbial inoculum.

Cover over the encapsulation cell roof to be a minimum of 800mm, to ensure that even deep ripping does not penetrate the roof. However, only shallow scarifying, to 300 mm is required over the encapsulation cell to provide water control and a seed bed for shallow rooted species.

Special seed mix is to be applied over the scarified cell roof, consisting of shrub species only (eg Mariana, Ptilotus and Atriplex), to minimise root penetration through the cell roof. No deep rooted (Eucalypt) species.

2.2.2 Site landfill

The site landfill is to be located in the mine waste landform. Rubbish will be covered using mine waste at least weekly but usually on a daily basis. Final cover over the landfill is to be a minimum of 1 metre, to ensure that even deep ripping does not expose rubbish.

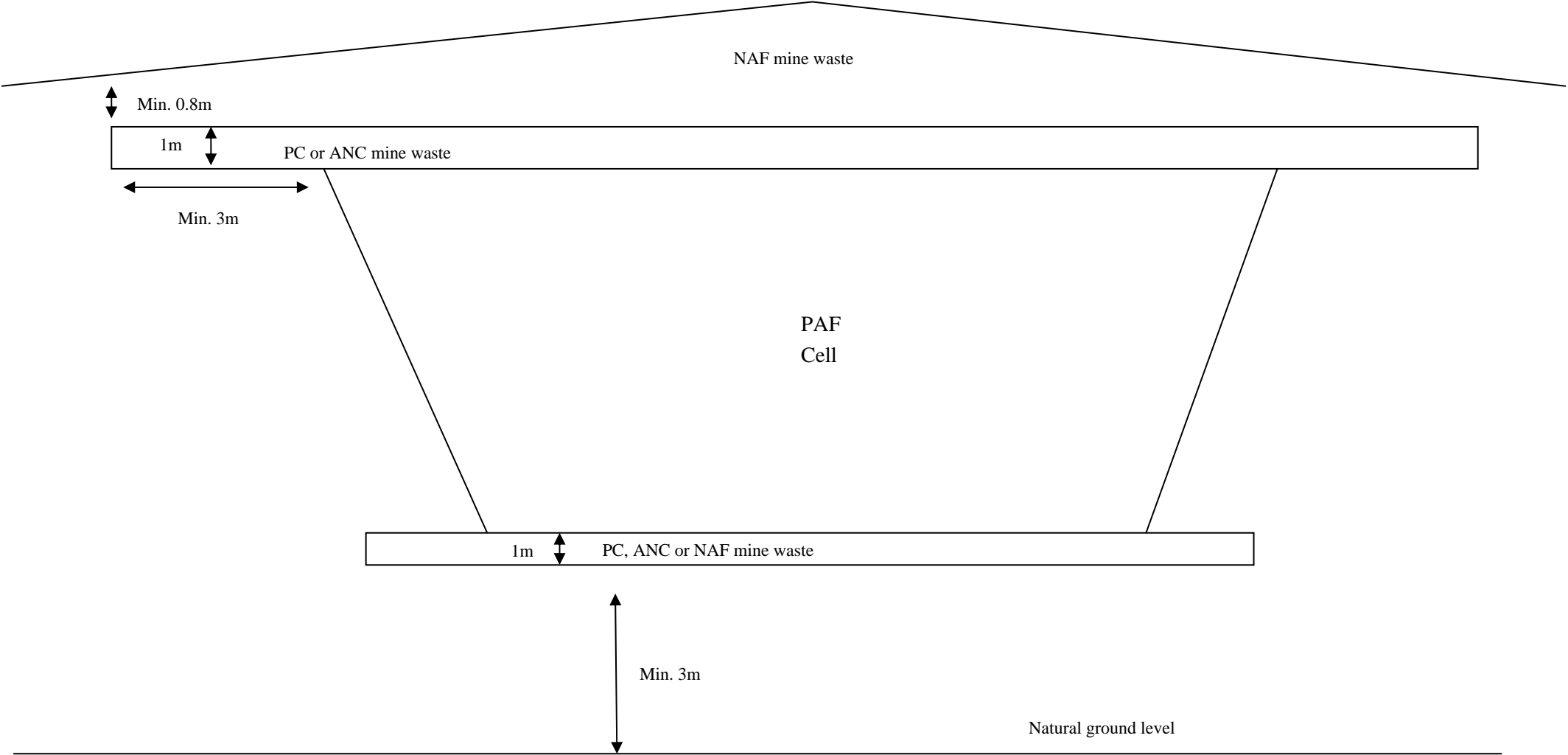
2.2.3 Abandonment bund

The abandonment bund is to be constructed using competent (rocky) mine waste. Trucks are to end tip loads of mine waste along the designated circumference from the open pit in a continuous barrier a minimum of 2 metres high.

Openings in the abandonment bund are to be left for access during the life of mine, providing haul road and access track entry to the open pit. A stockpile of mine waste is to be left at each opening, so that at mine closure, a front end loader can complete the abandonment bund.

In sections where the abandonment bund crosses natural drainage lines, the barrier is to be formed using large (1 metre diameter) rocks, rather than mine waste. This allows water to flow through the barrier while it prevents vehicle access to the open pit.

Figure 2: PAF encapsulation cell design



3. REVEGETATION

After primary earthworks have been completed to reshape the waste landform and construct major water management features, the revegetation process can be implemented. This is to be scheduled just prior to or at the onset of seasonal rains. At Carina, this is generally between May and June. Steps in the revegetation process are:

1. Ripping waste landforms on contour at approximately 3 metre spacing
2. Application of local native seed mix at rates between 5–10 kg/ha
3. Application of phosphorous and trace elements fertiliser at a rate of 100kg/ha
4. Supplementary planting of seedlings (optional)

3.1 RIPPING

The primary earthworks to reshape waste landforms effectively break any compaction from the placement phase, so ripping is not required to break compacted areas. The primary function of ripping waste landforms is to provide furrows on slopes to resist surface water flow, increase infiltration and provide a good seed bed.

To this end, wide furrows created by wide (winged) tines are preferable to narrow rip lines. The latter are created by conventional bulldozer tines, which are designed to rip rock or hard compacted surfaces rather than act as an agricultural plough. Figure 3 shows wings fitted to the shank of a bulldozer tine to expand the width of the furrow (Figure 4). This machine is also equipped with a trommel, which applies seed and fertilizer during ripping.

Figure 3: Winged tines on Cat D8



Figure 4: Winged tine furrows



3.2 SEED MIX

The vegetation survey data for exploration tenement E77/1115, provided in Matisse Sept 2008 – Appendix D, has been used to select an initial rehabilitation species list for seed collection (Appendix 1). *Acacia*, *Allocasuarina*, *Atriplex*, *Eucalyptus* and *Maireana* genera have been selected as the dominant components, due to their ease of collecting in significant quantities and their track record of successful establishment in mine site rehabilitation.

Many other species are listed in Matisse Sept 2008 – Appendix D. Research trials will be commenced to determine the practicality of collecting sufficient quantity of seed from these species, its viability if applied as direct seed or whether greater success is achieved by germinating seed in nurseries and planting out as tubestock.

Subsequent versions of this document will include additional species for direct seeding.

3.3 FERTILISER

Waste landforms created from excavated material are generally nutrient poor. Most topsoil used in the rehabilitation process has been stored, often for a number of years. The rehabilitation seed mix uses a number of nitrogen fixing species, so application of nitrogenous fertiliser is generally not required. High nitrogen fertilisers also have a disadvantage in promoting rapid weed growth, if these species are present. Nitrogen applied as nitrate or urea is also subject to loss by uptake from soil microorganisms or volatilisation, before plants are developed enough to access this resource.

Application of phosphorous, potassium and trace elements fertiliser to rehabilitated areas is proposed. These elements are rapidly fixed to clay minerals and iron in the soil, so remain on the waste landform to be used by developing vegetation.

3.4 PLANTING

A number of native species are difficult to establish in rehabilitated areas. This may be due to a number of reasons including:

- Seed is difficult to collect in any quantity, does not set on a regular basis, has low viability or cannot be easily germinated.
- Species naturally propagate from bulbs or rhizomes, rather than seed.
- Other factors (eg; mycorrhizal fungi, parasitic host) are absent in rehabilitated environment.

Successful return of these ‘recalcitrant’ species may be better achieved by propagating these plants in a nursery and planting seedlings on waste landforms.

4. GRAZING PROTECTION

The terrestrial fauna survey by Ninnox (2008) identified grazing by rabbits as a significant degradation process in the project area.

The project area is located in the former Jaurdi pastoral station, purchased by CALM (now DEC) in 1989. Stock have been removed from the station, however a small number of cattle remain. Other introduced grazing animals, such as camels have also been recorded, although also in low numbers.

The low numbers of large grazing animals are not anticipated to have such an significant impact to warrant fencing waste landforms. Fencing to exclude rabbits is problematic. The small mesh size required to exclude all rabbits is not robust and prone to damage by larger animals (kangaroos, cattle etc). Rabbits then enter through damaged sections. Rabbits can also burrow under fences, requiring skirts to be fitted. This substantially increases the cost and maintenance of fencing. The extent of grazing impact will be monitored in rehabilitation areas. If significant, advice will be sought from DEC and DAF on alternative control actions which may include baiting programs.

5. WEED CONTROL

Mattiske (Sept 2008) recorded only two weed species in the exploration tenement, *Erodium cicutarium* and *Erodium botrys*. These species are common on farmlands, pastures and along roadsides, especially in loamy soils. Surveys to date have not identified either of these weeds in the project area. The project’s PEMP includes procedures on washdown of earthmoving equipment coming to site and periodic site inspection for weed infestations.

6. RESEARCH TRIALS

Research trials will focus on the following areas:

- a) Species selection from local vegetation communities.
- b) Propagation methods.
- c) Sandalwood (*Santalum spicatum*) propagation.

Subsequent versions of this document will include additional detail on research trials.

7. MONITORING

Completion criteria are agreed standards to be achieved on particular aspects of the project. Progressive assessment against these criteria demonstrates the relative success of rehabilitation in achieving desired outcomes.

DoIR (2006) states that for each site a specific set of completion criteria needs to be developed, to determine whether the rehabilitation end point has been reached. Where possible, completion criteria should be developed from actual rehabilitation trials and site experience rather than arbitrary baseline studies conducted on analogue (local pristine) sites, which may have little edaphic or physical / chemical similarity to mine soils.

This is an extremely important principle in the development of the final mine closure plan. The significant earthworks and disturbance associated with most open cut mining projects often results in landforms with soil structure and properties significantly different to the pre-mining state. These differences may mean that return of pre-mining ecosystems is not readily achievable. It is crucial that closure planning is based on results of field evaluations and trials to ensure that rehabilitation methods are effective, durable and achievable. In most cases, appropriate methodologies may take years to develop and may be markedly different to initial concepts.

This view is also supported in ANZMEC/MCA (2000)(pg (x)), which states that “*completion criteria are specific to the mine being closed, and should reflect its unique set of environmental, social and economic circumstances*” and EPA (2006) (pg 12), which states “*There are situations where some of the standard aims of rehabilitation do not apply. These would include locations where the resulting landforms, soils and/or hydrology differ substantially from the pre-disturbance condition and cannot support the original vegetation types. In these cases, species from habitats that most closely resemble the new landforms should be used in rehabilitation.*”

Completion criteria should be flexible enough to adapt to changing circumstances without compromising the agreed end objective. There should be an agreed process for periodic review and modification of completion criteria in light of improved knowledge or changed circumstance.

Completion criteria should also establish time based (trend) targets, so rehabilitation development can be assessed on whether it is progressing well towards a defined end point or not. For example, it is unrealistic to set a completion target value for a specific factor, which may only be achievable after 20 or 30 years, without setting trend targets over realistic timeframes.

While the overall objective of the closure plan is to establish safe, stable final landforms, with a preference for self-sustaining vegetation, similar to that in the surrounding landscape, specific completion criteria will be developed to address aspects of the site including:

- Public safety.
- Geotechnical stability.
- Water quality
- Chemical stability.
- Revegetation.

Completion criteria will be developed in consultation with stakeholders, to define measurable goals for rehabilitation and closure. Agreed criteria and detailed actions necessary to satisfy the criteria will be described in subsequent versions of this document.

Agreed criteria will include progressive targets, to provide milestones on whether final criteria are likely to be achieved. Assessments over time plots development of rehabilitated areas against reference (analogue) sites and also the defined target score. Targets will be periodically reviewed in liaison with regulatory authorities, usually through the annual reporting mechanisms required in EPA and DMP approvals.

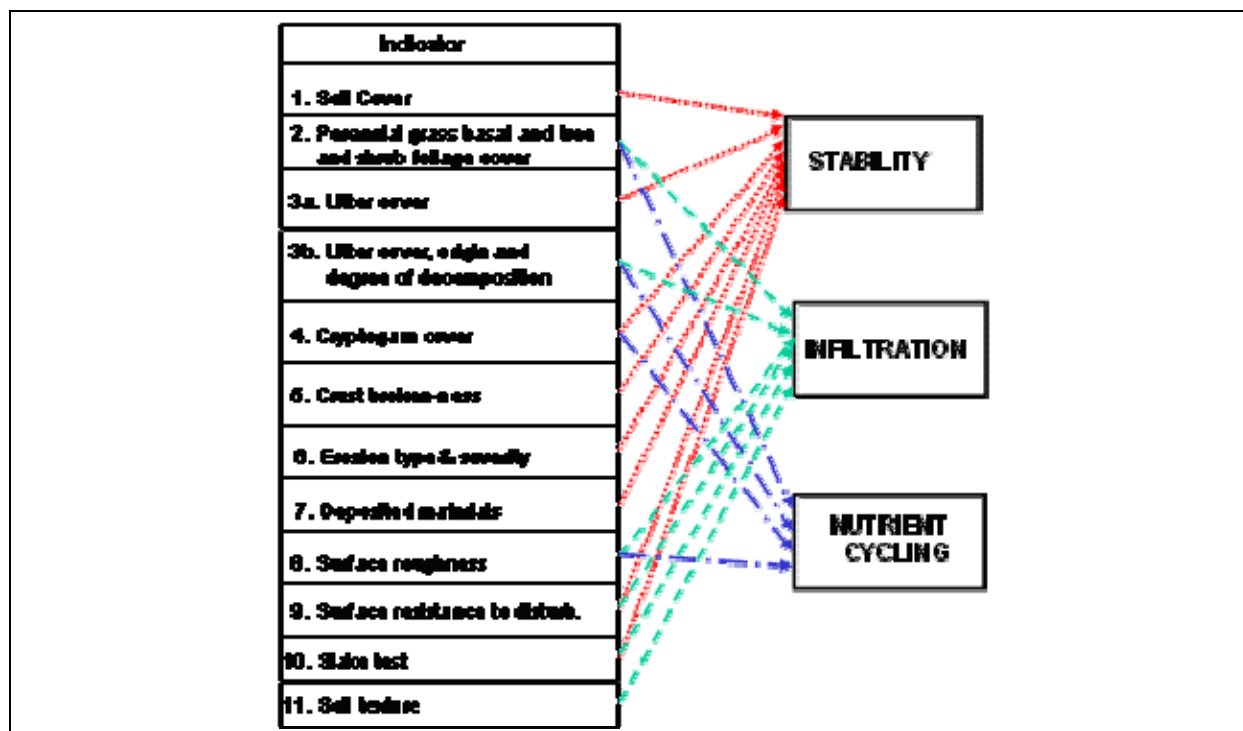
DoE (2006) requires that completion criteria must be sufficiently stringent to ensure that the overall objectives of rehabilitation have been met. These criteria must also be designed to allow effective reporting and auditing to define an endpoint for rehabilitation activities, to enable sites to be relinquished. Guidelines published by ANZMEC (2000) for completion criteria state they should be:

1. Specific enough to reflect the unique set of environmental, social and economic circumstances at the site.
2. Flexible enough to adapt to changing circumstances without compromising overall objectives.
3. Include indicators suitable for demonstrating that rehabilitation trends are heading in the right direction.
4. Undergo periodic review resulting in modification if required due to changed circumstances or improved knowledge.
5. Based on targeted research which results in more informed decisions.

The proposed mechanism for monitoring and assessing rehabilitation success and will be based on the Ecosystem Function Analysis (EFA) methodology. EFA will be undertaken on rehabilitated areas periodically through the life of mine.

Outcomes will be incorporated into subsequent reviews of the rehabilitation plan. The EFA is a multi factorial assessment method, conducted on both soil and vegetation criteria. For soil, various indices are derived from a list of assessment criteria. The indices include soil stability, infiltration/runoff and nutrient cycling status (Chart 1). Criteria used to assess habitat complexity are shown in Chart 2. Repeated assessments plot development of rehabilitated areas against analogue sites and also defined interim or final completion targets.

Figure 5: Soil Indices



Source: Tongway and Hindley (2004)

Figure 6 Habitat complexity data sheet

Site: _____ Date: _____
 Transect: _____ Observer: _____

Structure	Score				Assigned Score:
	0	1	2	3	
Tree Canopy Cover (%)	0	<30	30-70	>70	
Shrub Canopy Cover (%)	0	<30	30-70	>70	
Ground Herbage	Sparse <0.5m	Sparse >0.5m	Dense <0.5m	Dense >0.5m	
Logs, Rocks, Debris, etc (%)	0	<30	30-70	>70	
Soil Moisture	Dry	Moist	Permanent Water Adjacent	Water Logged	
TOTAL SCORE:					

EFA is a monitoring procedure that establishes how well an ecosystem works as a biophysical system. The conceptual framework was published in Ludwig et. al. (1997). It uses simple, visual, rapidly assessed indicators that focus on soil surface processes. As such it differs from conventional monitoring that typically records the presence and/or abundance of selected biota. It is made up of three modules:

- landscape function analysis (LFA)
- vegetation composition and dynamics
- habitat complexity.

EFA is designed for repeated use so that development, or degradation, of a site can be assessed over time. It includes an analytical process to examine trajectory of the ecosystem being monitored and to use this information to decide if the site is converging on a target level, or needs further work to ensure ultimate success.

8. TARGETS AND PERFORMANCE

Polaris proposes to use the EFA methodology in assessing rehabilitation success. Initial completion criteria, objectives and interim targets are proposed in Table 1. Further consultation with stakeholders will refine these targets through the life of mine. The interim targets will be reviewed against progressive rehabilitation results, to establish final closure targets in the final mine closure plan.

Table 1: Completion criteria and initial targets

Criteria	Objective	Initial Targets
Safety, stability, and sustainability	The overall health and safety of humans, stability of soils and landforms, long-term sustainability for agreed land uses.	Safety and abandonment structures in place.
Soils	Soil profiles and structures must ensure landform stability.	Rehabilitated waste landforms achieving defined scores/indices. Interim targets to be defined in subsequent reviews of the document.
Off-site impacts	Significant adverse off-site impacts must be avoided.	No off site impacts recorded
Pollution	Pollutants due to chemical spillage, excavation of substrates or changes to hydrology (e.g. acid drainage) avoided or managed within rehabilitated areas as required.	Monitoring showing that pollution levels are within parameters set by Regulatory agencies.
Hydrology	If there are major changes to hydrology as a result of mining operations, establish criteria that measure flows and availability of surface and groundwater to receiving environments.	Photographic record showing flow in all creek systems. Temporary creek diversions rehabilitated and original pathway restored.
Resilient and self-sustaining vegetation	This is a frequently used completion criteria that is linked to other criteria listed below:	
<ul style="list-style-type: none"> Species diversity 	Specified targets based on site data or analogue plots. Setting appropriate targets requires knowledge of the proportion of plant species that are unlikely to recruit or can be propagated from seed in the short term.	Rehabilitated waste landforms achieving defined scores/indices. First trend target of 30% reference site after 3 years is proposed. Further targets to be defined in subsequent reviews of the document.
<ul style="list-style-type: none"> Abundance and cover 	Sustainable rehabilitation requires vegetation cover to be sufficient to stabilise landforms and exclude weeds. In most cases, completion criteria are based on relative cover (% of area) occupied by native plants, in permanent plots or transects. Permanent photographic-monitoring points should also be established.	Rehabilitated waste landforms achieving defined scores/indices. First trend target of 30% plot cover after 3 years is proposed. Further targets to be defined in subsequent reviews of the document. Permanent photographic monitoring points installed.
<ul style="list-style-type: none"> Weed management 	Effective weed management requires demonstration that: (a) the relative cover of minor weeds is low (b) major weeds capable of becoming dominant at the expense of native plants are absent.	Monitoring and photographic records showing weed species on site limited to minor infestations (<5% cover).
Pest species	Control of introduced animal species that can have a major impact on native plants and animals. Animal grazing also requires effective management in rehabilitated areas.	Declared pest species controlled over rehabilitated areas. Installation of fencing around waste landforms if required.

9. CORRECTIVE ACTIONS

In the event that non compliance with elements of this procedure is identified, corrective actions will be developed based on the extent and severity of the exceedence. The two processes used on site to record, track and resolve non compliances are:

C3: Hazard Register- for minor incidents that can be quickly or easily rectified.

C6: Accident/Incident form- for more significant issues that require formal investigation and corrective actions.

The annual environmental report (AER) will include a summary of all environmental incidents recorded for the period and documented remedial actions.

10. BOND REVIEW

Rehabilitation bond will be established with the Department of Mines and Petroleum (DMP) through the Mining Proposal process, in accordance with the department's bond policy (DMP 2009). Table 2 from the bond policy shows the current minimum bond rates applicable to mine components and Table 3 shows progressive bond reduction as rehabilitation is undertaken. During the life of mine, as progressive rehabilitation is undertaken and reported in AER documents, progressive partial return of bonds will be requested as detailed in the policy.

Table 2: Minimum bond rates

Rate	Description	Rate/ha (Min)
1	Tailings Storage Facilities, including in pit disposal, Heap/Vat leach, Evaporation dams, Turkey Nest Dams, High risk waste dump (sulphides present, highly erodible pr >25m high)	\$12,000*
2	Low risk Waste dumps, ROM pads, low grade oxide stockpiles, plant sites, workshops and process water dams.	\$10,000*
3	Camp Sites, Strip Mining (backfilled mining voids), hyper saline pipelines (>15,000 TDS), causeways, haul roads, sewage ponds and landfill.	\$5,000
4	Roads and access tracks, "Fresh" water pipelines, laydown areas, borrow pits and airstrips.	\$3,000

* The Bond rate rise that was effective 1 July 2008 (Rate 1 and 2 were combined and increased from \$12,000/ha and \$10,000/ha to \$20,000/ha) will have a moratorium imposed from 1 January 2009 to the end of 2009 (i.e. the rates will now be \$12,000/ha for Rate 1 and \$10,000/ha for Rate 2).

Table 3: Progressive bond reduction

Stage	Action	Completion Criteria Met	Reduction Rates
1	Primary Earthworks - Reshaping - Drainage	Structure stable. Erosion controlled. Water run-off managed effectively.	50% total
2	Finishing Earthworks - Topsoil spread - Deep ripping	Appropriate topsoil cover. Adequate, contour ripping. Demonstrated stability and erosion control.	30% total
3	Revegetation - Seeding - Planting	Vegetation established but not demonstrated to be self-sustaining. Weed control program commenced. Grazing control commenced.	20% total
4	Relinquishment	All actions complete All criteria met.	Bond retired

11. RECORDS AND REPORTING

Reporting to regulatory agencies on compliance with this plan is undertaken through the Annual Environmental Report (AER) process.

12. REFERENCES

EPA (2006) Guidance for the Assessment of Environmental Factors No 6: Rehabilitation of Terrestrial Ecosystems

Australian and New Zealand Minerals and Energy Council (ANZMEC) / Minerals Council of Australia (MCA) (2000) Strategic Framework for Mine Closure

Ludwig, J., Tongway, D., Freudenberger, D., Noble, J and Hodgkinson, K. (eds) (1997). Landscape Ecology Function and Management: Principles from Australia's Rangelands

Tongway, D.J. and Hindley, N.L.,(2004). Landscape function analysis. Procedures for monitoring and assessing landscapes. CSIRO Sustainable Ecosystems, Canberra.

Department of Mines and Petroleum (January 2009) DMP Bond Policy.

APPENDICES

**APPENDIX 1:
SEED LIST**

Species list for seed collection

	S1	S2	S5	W1	W2	W4	W5	W7	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	W27	
<i>Acacia aneura</i> var. <i>aneura</i>	x				x																					
<i>Acacia burkittii</i>	x	x		x	x	x	x			x	x	x	x		x	x	x	x		x				x	x	
<i>Acacia colletioides</i>	x			x	x	x	x	x		x	x		x	x				x	x	x		x			x	
<i>Acacia crenulata</i> (P3)	x				x	x				x			x												x	
<i>Acacia erinacea</i>	x		x		x	x	x			x	x		x	x			x	x		x				x		
<i>Acacia ramulosa</i>	x																x								x	
<i>Allocasuarina campestris</i>	x	x	x		x							x	x							x		x	x			
<i>Atriplex nummularia</i>	x			x	x	x	x			x	x			x				x	x	x		x			x	
<i>Atriplex vesicaria</i>	x			x	x	x	x		x	x	x		x					x	x	x		x				
<i>Eucalyptus corrugata</i>	x	x		x	x	x	x			x	x	x	x	x			x	x	x	x	x	x			x	
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>	x				x			x		x			x	x	x	x	x	x		x	x	x	x	x		
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	x	x			x	x	x	x		x		x	x			x		x								
<i>Eucalyptus salmonophloia</i>	x			x	x	x			x	x								x							x	
<i>Eucalyptus transcontinentalis</i>	x			x	x			x		x	x									x						
<i>Eucalyptus yilgarnensis</i>	x			x	x	x		x		x										x		x			x	
<i>Eucalyptus longicornis</i>				x	x	x	x						x	x						x	x	x			x	
<i>Eucalyptus salubris</i>				x	x	x	x			x										x						
<i>Grevillea acuaria</i>	x			x	x	x	x			x	x		x							x					x	x
<i>Grevillea junceifolia</i>	x				x		x			x			x						x							
<i>Grevillea georgeana</i> (P3)		x											x							x	x			x		
<i>Maireana tomentosa</i>	x				x	x				x																
<i>Maireana trichoptera</i>	x				x	x	x			x																
<i>Maireana triptera</i>	x			x	x	x	x			x	x		x			x	x			x	x				x	
<i>Santalum acuminatum</i>	x	x		x	x	x	x		x	x			x	x						x						
<i>Santalum spicatum</i>	x	x			x		x			x	x	x	x	x						x					x	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	x	x		x	x	x	x			x	x		x	x	x	x	x	x	x	x					x	x
<i>Daviesia purpurascens</i> (P4)					x								x	x						x						

Note: Grey shade is vegetation types in the Carina mine envelope

APPENDIX 14:
ABORIGINAL HERITAGE PROCEDURE



Aboriginal heritage procedure
<p>Purpose This standard procedure details action required to comply with the Aboriginal Heritage Act, 1972 and protect places and objects of Aboriginal heritage value in the project area.</p>
<p>Background All staff and contractors will be made aware of cultural heritage issues in the site induction.</p>
<p>Risks The key risk is inadvertent damage to Aboriginal heritage sites located in or adjacent to active areas.</p>
<p>Procedure</p> <p><i>Prior to ground disturbance activities</i></p> <ul style="list-style-type: none"> • Conduct heritage surveys over project areas, to identify locations to be avoided and exclusion zones. • Implement control measures to protect identified heritage sites in or adjacent to project areas by signposts or fencing. • Where disturbance of known cultural heritage sites cannot be avoided, obtain Ministerial consent under Section 18 (Aboriginal Heritage Act, 1972). <p><i>During site activities</i></p> <ul style="list-style-type: none"> • Immediately stop work if any new cultural heritage sites are identified / uncovered and report the find to the site environmental officer. The environmental officer is to inform the Mine Manager, who is to inform the Department of Indigenous Affairs. <p><i>Monitoring</i></p> <ul style="list-style-type: none"> • The environmental officer is to annually inspect all control measures in place to protect cultural heritage sites, to ensure no inadvertent disturbance has occurred.
<p>Reporting</p> <ul style="list-style-type: none"> • Any non-compliance with this procedure will be reported immediately as an environmental incident.