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WELD RANGE IRON ORE PROJECT

ENVIRONMENTAL MANAGEMENT PLAN

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OVERVIEW

Sinosteel Midwest Corporation (SMC) is an incorporated entity set up to conduct mineral exploration, engineering, environmental and economic studies into the feasibility to mine at Weld Range.

The Weld Range Iron Ore Project (the Project) is a direct shipping iron ore project with high grade outcrops over a 60 km strike length. SMC is targeting to export 15 million tonnes per annum of iron ore over a 15 year period, however, this proposal addresses the first 11 years of planned operations.

There are a number of significant environmental impacts expected as a result of this Project, as described in Section 7 of the Public Environmental Review (PER) document. As a result, environmental management plans for the significant factors have been developed as a primary method of controlling, managing and monitoring these known and expected environmental impacts.

The purpose of this document is to summarise aspects of the various EMPs and provide an overview of the management approach for environmental impacts associated with the Project.

The management plans are elements of the Project's environmental management system (EMS) that will be used to achieve the environmental objectives, targets and commitments of the Project and the application of mitigation measures described in the PER.

Full management plans will be developed for impacts that represent the more significant aspects of the Project, and to meet with an EPA request, they will be developed in advance of Project approval. Key management actions identified to date are based on a risk assessment undertaken for each of the key elements of the Project in relation to significant environmental factors.

The Weld Range Iron Ore Project Environmental Management Plan (EMP) contains management plans for the following:

- threatened and conservation significant flora;
- vegetation clearance and weed management;
- topsoil;
- vertebrate fauna;
- SRE fauna species – in particular the Schedule 1 *Idiosoma nigrum* and *Cethegus* sp (not listed).
- air quality - dust ;
- air quality - greenhouse gas emissions;
- surface and groundwater management;
- evaporation pond management;
- acid mine drainage;
- rehabilitation;
- waste rock and tailings;
- waste management; and
- bushfire control.

These plans outline the actions that are currently proposed to be implemented to minimise any potential impacts on the environment associated with the construction and operation of the Project. Many of these plans are currently at an initial level of development given the present status of the Project; that is, the early engineering design and assessment phase. The plans will be developed in detail as more information becomes available.

It is a primary objective that all environmental impacts during operation of the Project are avoided or minimised as far as reasonably practicable; consistent with the principles of environmental protection. Environmental impacts will also be evident during construction of the Project infrastructure and the objectives and management practices within these plans will also apply to these construction activities.

It is the purpose of the EMP is to:

- Meet statutory environmental requirements for the Project.
- Identify actions to manage impacts on the environment that may occur as a result of operational activities.
- Demonstrate transparency and accountability to the community and government by identifying environmental management actions in advance of project implementation and making this EMP publicly available.

This EMP will be subject to regular review and revision in accordance with the Projects EMS. The EMP and the EMS are being submitted as appendices with the Weld Range Iron Ore Project PER (Assessment No. 1714).

Compliance with commitments outlined in this document will be internally audited by SMC and subject to external audits by the relevant regulatory agencies, including the Department of Environment and Conservation (DEC) and the Department of Mines and Petroleum (DMP).

This document is aligned with the requirements of Preparing Environmental Management Plans: A Guideline for Proponents, Draft (DoE, 2005).

1 INTRODUCTION

The Project is a direct shipping iron ore project with high grade outcrops over a 60 km strike length. SMC is targeting to export 15 million tonnes per annum of iron ore over a 15 year period, however, this proposal addresses the first 11 years of planned operations.

1.1 PURPOSE OF THIS DOCUMENT

This document is the environmental management plan (EMP) designed for the Project. This EMP provides the framework for managing environmental impacts from the construction and operation of the Project.

1.2 OBJECTIVE

The objective of the EMP is to minimise and, where possible, eliminate any adverse environmental impacts associated with construction and operation of the Project. Each management plan within the EMP describes the objectives for managing the individual environmental aspect.

1.3 IMPLEMENTATION

The EMP will be implemented prior to the commencement of detailed mine design through to rehabilitation.

1.4 RELEVANT LEGAL AND OTHER REQUIREMENTS

The legal requirements of the Project are provided within Table 1.1, with non-legislative requirements provided in Table 1.2.

Table 1.1 – Commonwealth and Western Australian Legislation Applicable to the Project

Legislation
Commonwealth Legislation
Environmental Protection & Biodiversity Conservation Act 1999 and Regulation 2000
Native Title Act 1993
Aboriginal and Torres Strait Islander Heritage Protection Act and Regulations 1984
Energy Efficiency Opportunities Act and Regulation 2006
National Greenhouse and Energy Reporting Act 2007 and regulations 2008
WA State Legislation
Aboriginal Heritage Act 1972
Agricultural and Related Resources Protection Act 1976
Bush Fires Act 1954 and Regulations
Conservation and Land Management Act 1984

Legislation
WA State Legislation cont.
Contaminated Sites Act 2003
Dangerous Goods Safety Act 2004 and Regulations
Environmental Protection Act 1986
Explosives and Dangerous Goods Act 1961
Health Act 1911
Heritage of Western Australia Act 1990
Land Administration Act 1997
Litter Act 1979
Local Government Act 1995
Mining Act 1978
Mines Safety and Inspection Act 1994
Rights in Water and Irrigation Act 1914
Soil and Land Conservation Act 1945
Water and Rivers Commission Act 1985
Waterways Conservation Act, 1976
Wildlife Conservation Act 1950

Table 1.2 – Non-legislative Requirements Applicable to the Project

Standards and Guidelines
Environmental Protection Authority
Guidance Statements
No. 6 – Rehabilitation of Terrestrial Ecosystems June 2006
No. 12 – Minimising Greenhouse Gas Emissions October 2002
No. 18 – Prevention of Air Quality Impacts from Land Development Sites March 2000
No. 19 – Environmental Offsets June 2007
No. 41 – Assessment of Aboriginal heritage April 2004
No. 48 – Draft Guidance on Groundwater Environmental Management Areas 1998b
No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA June 2004

Standards and Guidelines
Environmental Protection Authority
Guidance Statements cont.
No. 54 – Consideration of Subterranean Fauna in Groundwater and Caves During Environmental Impact Assessment in WA June 2004
No. 55 – Implementing Best Practice in Proposals Submitted to the Environmental Impact Assessment Process December 2003
No. 56 – Terrestrial Fauna Surveys for Environmental Impact Assessment in WA June 2004
Position Statements
No. 2 – Environmental Protection of Native Vegetation in WA December 2000
No. 3 – terrestrial Biological Surveys as an Element of Biodiversity Protection March 2002
No. 5 – Environmental Protection and Ecological Sustainability of the Rangelands in WA November 2004
No. 6 – Towards Sustainability August 2004g
No.7 – Principles of Environmental Protection August 2004
No. 8 – Environmental Protection in Natural Resource Management June 2004h
No. 9 – Environmental Offsets January 2006c
Department of Environment and Conservation (DEC)
Draft Code of Practice for Rural Landfill Management (DoE 2000)
Landfill Waste Classification and Waste Definitions (DoE 1996)
Department of Mines and Petroleum (DMP)
Council for Australia and New Zealand and Minerals Council of Australia (ANZECC/MCA) 2000, Strategic Framework for Mine Closure
Environmental Notes on Mining – Care and Maintenance September 2009
Guidelines for Mining in Arid Environments June 1996
Guidelines for the Protection of Surface and Groundwater Resources During Exploration Drilling November 2002
Guidelines to Help You Get Environmental Approval for Mining Projects in WA 1998
Mining Below the Water Table in the Pilbara August 1999
Environmental Notes on Waste Rock Dumps January 2001a
Environmental Notes on Firebreaks March 2001b

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2 RISK ASSESSMENT

A risk matrix (Table 2.1) determines the level of risk of an aspect from the point at which the consequence severity and likelihood / probability rankings intercept within the risk matrix.

The risk assessment conducted for the Project followed the framework outlined in the Australia and New Zealand Standard (AS/NZ) *4360: 2004 Risk Management Standard*. The qualitative approach to the risk assessment was used as an initial tool, focusing on the environmental hazards associated with project activities over the life of the mine.

This risk assessment identifies the aspects of the Project that require management (Aspects), and assign the level of risk associated with each. Specific management plans have been developed for those activities that have medium to high level of risk of impact.

The risk of impacts and potential impacts have been analysed by determining the consequence and severity and the likelihood that they will occur. The severity of the consequences was determined using a Consequence Severity Table (Appendix A - Table A.1). The likelihood of an impact resulting from a pathway was determined with a Likelihood Ranking Table (Appendix A - Table A.2). The level of risk was determined using a risk severity rating (Appendix A - Table A.3) which determines the level of risk by the point at which the consequence severity and likelihood rankings intercept within the matrix.

Table 2.1 – Risk Assessment of Project Activities and Impacts

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
Clearing Vegetation	Loss of P1 (6 species)	Loss of individuals or populations of P1 *Euphorbia sarcostemmoides* - 21% impact	Moderate	Likely	Medium
		Loss of individuals or populations of P1 *Goodenia lyrata* - less than 9% impact	Minor	Likely	Low
		Loss of individuals or populations of P1 - *Eremophila rhegos* less than 9% impact	Minor	Likely	Low
		Loss of individuals or populations of P1 *Sauropus sp. Woolgorong* (M. Officer s.n. 10/8/94) - less than 9% impact	Minor	Likely	Low
		Loss of individuals or populations of P1 *Stenanthemum patens* - less than 9% impact	Minor	Likely	Low
		Loss of individuals or populations of P1 *Beyeria lapidicola*- less than 9% impact	Minor	Likely	Low
	Loss of P3 (18 species)	Loss of Priority 3 species; *Acacia ?burrowsiana, Acacia speckii, Calytrix erosipetala, Dodonaea amplisemina, Eremophila arachnoides subsp. Arachnoides, Grevillea stenostachya, Hemigenia tysonii, Homalocalyx echinulatus, Indigofera gilesii subsp. gilesii Peter G.Wilson & Rowe, Micromyrtus placoides, Mirbelia ?stipitata, Phyllanthus baeckeoides, Prostanthera ferricola, Prostanthera petrophila, Ptilotus beardii, Ptilotus luteolus, Tecticornia cymbiformis, Verticordia jamiesonii*	Minor	Likely	Low
	Loss of P4 (3 species)	Loss of individuals or populations of P4 *Baeckea sp. Melita Station* (H. Pringle 2838), *Goodenia berringbinensis, Grevillea inconspicua.*	Minor	Likely	Low
	Loss of SOI	Loss of individuals or populations of SOI *Acacia sp. nov.* (aff. Kochii), Hemigenia sp. nov. (aff. Exilis) - 12% impact	Minor	Likely	Low
	Loss of vegetation of conservation significance	Loss of less than 10% of PEC	Minor	Likely	Low

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
	Loss of vegetation community	Loss of 77% of vegetation community 5b	Major	Likely	High
		Loss of 39% of vegetation community 7b	Moderate	Likely	Medium
		Loss of up to 34.2% of vegetation community 6a (P3 *Ptilotus beardii* commonly recorded in this community)	Moderate	Likely	Medium
		Loss of 13.8% of vegetation communities 1 and 2 (P3 *Prostanthera petrophila* and *Acacia sp. Weld Range* commonly recorded in these communities)	Minor	Likely	Low
	Introduction and/or spread of aggressive weed species	Competition with native species, irreversible loss of native species, long term loss of natural biodiversity, loss of integrity of vegetation community's	Moderate	Possible	Low
		Minor reduction in natural biodiversity	Minor	Unlikely	Very low
	Loss of topsoil	Reduction in quality of physical, chemical and/or biological characteristics of soils due to inappropriate handling and storage	Major	Unlikely	Low
	Increased erosion and sedimentation	Unsuccessful rehabilitation, impacts to surface water quality	Major	Unlikely	Low
	Increased generation of dust	Deposition on leaves and other plant structures reducing activity	Moderate	Possible	Low
	Loss of SRE species	Loss of Schedule 1 *Idiosoma nigrum* population (12%) - weighted as this is a Priority species	Major	Likely	High
		Loss of 26.3% of *Antichiropus sp. Weld Range* - not listed as conservation significant	Moderate	Likely	Medium
		Loss of 56.6% of Pleuroxia sp. - not listed as conservation significant	Moderate	Likely	Medium
		Loss of 11.1% of Cethegus 'fugax complex' - not listed as conservation significant	Moderate	Likely	Medium

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
		Loss of SRE habitat	Major	Likely	High
		Reduction of populations due to vibration	Major	Possible	Medium
		Loss of genetic diversity of Cethegus and Idiosoma	Major	Possible	Medium
	Fragmentation of habitat	Reduction of connectivity of habitats and thus preventing movement of species	Major	Possible	Medium
	Loss of fauna habitat	Habitat fragmentation	Minor	Possible	Low
		Alteration to fauna assemblages	Moderate	Possible	Low
	Loss of Rare and Priority fauna species	Loss of Conservation Significant species within the impact area (local impact only). Long-tailed Dunnart, Peregrine Falcon, Bush Stone-curlew, Slender-billed Thornbill and *Lerista eupoda*.	Moderate	Possible	Low
	Alteration of soil profile	Accelerated rates of erosion	Major	Unlikely	Low
		Siltation of natural drainage	Major	Unlikely	Low
	Disturbance to heritage site	Loss of heritage	Major	Unlikely	Low
	Sequestration of CO_2	Reduction in amount of sequestration of CO_2	Minor	Unlikely	Very low
	Alteration of fire frequency	Changes to vegetation community structure resulting in alterations of fire frequency	Moderate	Remote	Very low
Construction	Modification of surface water flows	Changes to local vegetation types	Moderate	Possible	Low
		Increased erosion and sedimentation	Major	Unlikely	Low
		Alterations to hydrological regime	Major	Unlikely	Low
		Changes to the flood regime	Major	Unlikely	Low

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
		Increase in water shadow affecting the vegetation	Major	Unlikely	Low
	Stockpiling of topsoil	Poor design leading to loss of topsoil from erosion and sedimentation and reduction in quality of physical, chemical and/or biological characteristics of soils due to inappropriate handling and storage	Major	Unlikely	Low
		Reduction in quality of physical, chemical and/or biological characteristics of soil due to inappropriate handling and storage	Major	Unlikely	Low
		Reduction in the quantity of topsoil available for rehabilitation	Major	Unlikely	Low
	Increased erosion of soil	Loss of land stability	Major	Unlikely	Low
		Generation of sediment loads in surface water runoff	Major	Unlikely	Low
	Increase in traffic movements/mobilisation of machinery	Loss of fauna due to road kill	Minor	Possible	Low
		Increase in ambient noise levels and vibration.	Minor	Possible	Low
		Increase in vibration levels - SRE impacts	Minor	Possible	Low
		Decline in individual flora species due to potential off road activities.	Negligible	Unlikely	Very low
		Increase in pest and disease species due to mobilisation of equipment	Minor	Unlikely	Very low
		Increased compaction of soil	Negligible	Possible	Very low
		Increased risk of fire	Moderate	Remote	Very low
		Increase in dust emissions resulting in vegetation smothering	Moderate	Possible	Low
	Increased dust suppression activities	Excess saline water may clog flora stomata	Moderate	Likely	Medium

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
	Running of generators	Increase in noise and vibration	Minor	Possible	Low
		increase in greenhouse gas (GHG) emissions	Minor	Unlikely	Very low
	Storage and handling of hazardous substances	Contamination of soil / surface and/or ground water	Minor	Possible	Low
	Inappropriate storage of waste (domestic and hydrocarbon)	Reduced visual amenity from litter	Negligible	Possible	Very low
		Increase in feral animal activity	Minor	Possible	Low
		Fauna death or injury	Negligible	Unlikely	Very low
		Contamination of soil / surface and/or ground water	Minor	Unlikely	Very low
	Increase in groundwater abstraction	Loss of stygofauna habitat	Moderate	Possible	Low
		Changes to humidity of troglofauna and stygofauna habitat	Moderate	Possible	Low
		Localised drawdown may impact groundwater dependent vegetation	Moderate	Likely	Medium
	Construction of infrastructure	Reduced visual amenity	Minor	Almost Certain	Medium
		Alteration of aquifer recharge patterns	Moderate	Possible	Low
		Reduction of fauna refuge sites and or food sources	Minor	Likely	Low
	Construction fabrication activities	Increased risk of fire	Moderate	Remote	Very low
Operation	Dewatering of the mine pits	Localised drawdown may impact groundwater dependent vegetation	Moderate	Likely	Medium
		Loss of subterranean fauna due to changes of soil humidity	Major	Possible	Medium
		Loss of stygofauna due to changes in quality and quantity of groundwater	Moderate	Possible	Low

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
		Oxidation of in-site potentially acid forming (PAF) material resulting in generation of acid mine drainage (AMD)	Moderate	Likely	Medium
		Disturbance of natural groundwater flow patterns form mine pits	Major	Possible	Medium
	Discharge of water to the evaporation pond	Fauna deaths from drowning	Negligible	Likely	Low
		Loss of flora assemblages and habitats	Moderate	Possible	Low
		Changes to surface water flows	Major	Unlikely	Low
		Possibility of leaching from failure in pond lining and walls resulting in contamination of soil and surface/ground water	Minor	Possible	Low
		Ineffective design resulting in inefficient storage capacity of evaporation pond	Minor	Unlikely	Very low
	Inappropriate disposal of evaporation residue	Contamination of soil and surface / ground water leading to loss of troglofauna and stygofauna habitat	Minor	Likely	Low
		Contamination of soil and surface / ground water	Minor	Unlikely	Very low
	Mining of ore	Loss of subterranean fauna habitat	Minor	Likely	Low
		Generation of AMD resulting in leaching of acid soluble heavy metals	Moderate	Almost Certain	High
		Contamination of downstream surface water and Groundwater	Moderate	Possible	Low
		Damage to soil and vegetation	Minor	Likely	Low
		Permanent landform modification	Minor	Almost Certain	Medium
	Processing of ore	Increase in dust leading to changes in soil chemistry and reduced visibility and visual amenity	Moderate	Possible	Low
		Increased noise emissions and vibration.	Minor	Possible	Low

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
		Energy and consumption of fuels, release of GHG	Minor	Unlikely	Very low
	Fines Reject Storage (TSF)	Short to medium changes to landscape due to construction of TSF	Negligible	Possible	Very low
		Increased erosion and sedimentation	Major	Unlikely	Low
	ROM stockpiling	Generation of AMD resulting in leaching of acid soluble heavy metals	Moderate	Almost Certain	High
		Changes to surface water flows	Major	Unlikely	Low
		Permanent landform modification	Minor	Almost Certain	Medium
		Increased erosion and sedimentation	Major	Unlikely	Low
	Blasting	Contamination of soil and surface/ground water by hydrocarbons and explosive chemicals	Minor	Unlikely	Very low
		Increase in noise and vibration	Negligible	Likely	Low
		Increase in dust leading to changes in soil chemistry and reduced visibility and visual amenity	Negligible	Likely	Low
	Storage of waste rock	Changes to surface water flows	Major	Unlikely	Low
		Generation of AMD resulting in leaching of acid soluble heavy metals	Moderate	Almost Certain	High
		Permanent landform modification	Minor	Almost Certain	Medium
		Increased erosion and sedimentation	Major	Unlikely	Low
	Hazardous chemical and hydrocarbon handling	Spills and contamination from mishandling of chemicals and hydrocarbons	Moderate	Likely	Medium
	Re-fuelling	Contamination of soil and surface/ground water by hydrocarbons	Minor	Possible	Low

Activity	Environmental Aspect	Environmental Impact of the Project	Current Consequence	Current Likelihood	Current Risk
	Airport	Increase in noise and vibration	Moderate	Possible	Low
	Camp facilities septic system	Contamination of flora and fauna habitat	Minor	Unlikely	Very low
Closure and rehabilitation	Rehabilitation of the mine site	Post closure land form inconsistent with the natural environment	Moderate	Unlikely	Low
		Contamination from pit lakes	Major	Possible	Medium
		Ineffective rehabilitation leading to increased erosion and sedimentation	Major	Unlikely	Low
		A safe and stable non-polluting landform is not established	Moderate	Unlikely	Low
		A self sustaining functioning ecosystem, comparable to pre-mining environment, is not created	Moderate	Unlikely	Low
		Reduced stock carrying capacity	Moderate	Unlikely	Low
		Not meeting closure criteria	Major	Unlikely	Low

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EMP 1 – ACID MINE DRAINAGE MANAGEMENT

Current Status

The soils of the project area vary from shallow, stony soils and loams on the rocky slopes of the hills and ridges, to deeper, red earths on the lower slopes and outwashes. These outwashes are derived from the weathering of the parent rock and include calcareous soils from mafic rock. They are characteristically infertile and acidic.

The development of the Project will require the stripping of soil from 3589.1 ha of land. Due to the acidity of the soil potential acid sulphate soils may be encountered.

As reported in the Weld Range PER the Project is expected to produce at least 273 Mt of waste rock from Madoonga Pit and at least 450 Mt from the Beebyn Pit. A small proportion of this waste rock will be potentially acid forming (PAF) with estimated tonnages of PAF material of 30 Mt at Madoonga (11%) and 4.5 Mt at Beebyn (1%).

Environmental Objectives

- Ensure that mine waste is contained and isolated so it does not result in long term impacts on the surrounding environment.

In the event that PAF soils are encountered the objectives for management are to:

- Identify potential acid generating material.
- Selectively handle potential acid generating material.
- Store potential acid generating material so that leachate is not generated.

Potential Impacts

Potential impacts arising from excavating high risk sites include spread of existing acidic material and creation of actual acid sulphate soil through exposing sulphidic material to oxidation. Inappropriate management of these soils and the acid generated may lead to contamination of surrounding groundwater, surface waters and ecosystems. Dewatering at the mine site will result in lowering of the water table, allowing oxidation of acid generating materials.

Disturbance of acid sulphate soils may potentially result in:

- Oxidation of in-site PAF material resulting in generation of AMD.
- Contamination of downstream surface water and groundwater.
- Damage to soil and vegetation.
- Contamination of the environment by release of acid water and mineral leachate.

Management Strategies

Management of any acid sulphate soils will comply with the relevant legislation.

SMC's approach to managing acid mine drainage is, in order of priority, to:

- Define the location and maximum amount of potential and existing acidity.

- Avoid disturbance to the PAF where possible.
- Store excavated PAF materials in an environment that minimises exposure to air and water.
- Mitigate impacts where PAF disturbance in unavoidable.

This approach will be applied on a risk basis to protect areas of environmental significance from acid drainage impacts. Factors influencing the risk associated with disturbance of PAF include the quantity of sulphidic material, depth of excavation and proximity to sensitive sites.

Stockpiling PAF will be minimised where possible as significant quantities of acid can build up, especially in porous sandy stockpiles if left in oxidising conditions for even short periods.

Neutralisation of PAF is the least preferred management option due to the difficulty and cost of mixing lime with PAF, the low reactivity of lime and reduced neutralising capacity over time as iron, aluminium and gypsum coat the neutralising agent. Neutralisation will be conducted in consultation with relevant authorities if required.

The risk associated with PAF material is the production of AMD. This risk is lower in the case of NAF material, although it should be noted that some metals can be mobile under neutral pH conditions.

To manage the waste materials appropriately, waste rock dumps will be designed with two objectives:

- To limit contact between PAF material and percolating water.
- To minimise the likelihood that seepages will exert a detrimental effect on local surface and ground water quality, for example, by capturing and managing waste dump drainage appropriately, and if practicable, locating the PAF material away from existing water courses and flood prone areas.

Waste Rock

To meet the objectives the following management strategy has been proposed:

The base layer of the dump (A) will be constructed of NAF material (Figure 2.1). The purpose of this layer will be to raise any PAF material above the original ground and prevent direct contact of PAF material with any water flowing at the interface of the original ground and the dump.

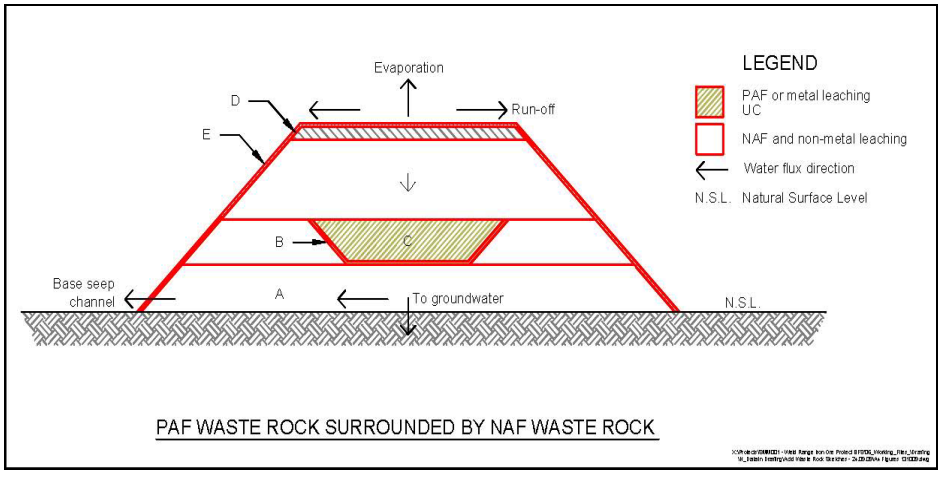

Figure 2.1 – PAF Waste Rock Surrounded by NAF Waste Rock

The minimum thickness of the base layer will be determined based on information such as the saturated and unsaturated hydraulic properties of the base layer, estimates of rates of infiltration into the waste from rainfall, natural seeps and flood levels.

During construction there will be areas of PAF rock that are uncovered and potentially exposed to rain. These exposure times will be minimised as far as possible through scheduling mining or dumping and planning the location of the PAF material in the dump. In order to reduce the load of oxidation products that could be released from PAF material during construction, a layer of low permeability NAF material (B) will be placed over the NAF base layer and under the PAF rock (C). The purpose of layer B will be to limit the rate of downward movement of water and therefore reduce the rate of release of any AMD produced. It is likely that a small portion of water moving downward through the dump will exit the dump at the base and continue to move downward towards the groundwater table.

The waste rock dump will be constructed in several lifts. The number of lifts will be based on geotechnical stability and mine scheduling requirements. Truck and dozer movement on the top surface of the lifts will compact the material and reduce the permeability to water. This will have the benefit of reducing the permeability of the top surface of each lift, potentially reducing water infiltration and promoting runoff. These benefits will be maximised through dump design aspects such as surface contouring and drain construction. Construction design of the dump drainage management system will be focused on shedding all storm runoff as quickly as possible to avoid any temporary pond of rain water on the dump surface.

PAF material will be covered on both of the side slopes (batters) and top surface with NAF material. A cover (D) designed to limit the infiltration of rain will be constructed on the top surface of the dump as shown in Figure 2.1. It will extend laterally beyond the PAF material. The final design of the cover will be determined based on the annual rainfall, rainfall intensity distribution and potential evapotranspiration. The design would likely include features to promote water shedding of excessive storm runoff while promoting retention of normal rain water to infiltrate into the upper cover units to sustain vegetation and subsequent evapotranspiration.

Engineered features will include appropriate slopes, berms and drains. The top surface of the cover (E) will be suitable for supporting vegetation. The design of the cover has not yet been finalised but is likely to include topsoil and subsoil stripped from the pit surface and waste rock dump footprints prior to starting construction of the pit and dump

Batters of the dumps will be constructed of materials resistant to erosion. Batter slopes will be chosen to reduce rates of erosion and thereby maintain the NAF cover. Any PAF material will be encapsulated well away from the dump edge (at least 20 metres) to not only restrict air and water ingression but also allow for later re-profiling of outer batters if so required.

Cut off drains and diversion channels will be constructed to prevent runoff from undisturbed lands contacting the dumps and to separate dump runoff from water running off undisturbed land. Dump runoff will be channelled to settling ponds to detain sediment.

Water drainage lines passing under the dumps that may transport seepage from the dumps will be managed separately.

As studies of the deposit, geochemistry of the waste and other aspects of the project provide further data related to waste rock management the options for alternative strategies will be considered. It is possible that the proposed strategy will be modified in the future during operations to better manage waste material and the potential for AMD.

Monitoring

As a minimum, chemical indicators monitored will include, but not be limited to:

- Sulphate / chloride mg/L ratio;
- Alkalinity / sulphate mg/L ratio;
- pH; and
- soluble aluminium concentration.

To ensure acid forming materials are not present on site, the following will be undertaken:

- Regularly survey for PAF waste rock in the mine pits to improve planning for waste rock dumping and mine scheduling.
- Regularly monitor groundwater and surface water for acidity and heavy metals.

Performance Indicators / Criteria

No environmental impacts from AMD including acidic water runoff from waste dumps and ore stockpiles during construction and operation activities.

Contingencies

Where acidic levels have been triggered in the above monitoring program the following will be employed:

- Selectively handle potential acid generating material.
- Store potential acid generating material so that leachate is not generated.

Auditing

Monitoring of soil and surface and groundwater to identify any potential ADML will be undertaken on an annual basis.

Review and Revision

The management plan will be reviewed as known or suspected PAF material is located. The management plan will also be updated to incorporate any changes to existing legislation and guidelines for management of PAF materials and AMD.

Reporting

Project issues relevant to PAF material and ADML will be reported annually to the DEC.

Environmental Management Commitment

Commitment 3

An Acid Mine Drainage Management Plan will be developed and implemented, during construction and operation. The plan will set our procedures to minimise the creation of PAF and acid mine drainage, monitor the effectiveness of control measures, detail further need for kinetic testing of waste materials, and ensure that effective rehabilitation can be achieved.

EMP 2– GROUNDWATER

Current Status

The Weld Range area is within the East Murchison Groundwater Management Unit. Groundwater occurs at depths, typically 5 – 50 m bgl, beneath the quaternary alluvial plain around Weld Range, and also occurs within the bedrock sequence that forms Weld Range. Recharge to the system occurs from rainfall infiltration mainly through creek beds and to a lesser extent on floodplains. Some groundwater recharge can be expected through the creek beds between the ridges that form Weld Range.

The Beebyn and Madoonga pits will be mined to depths of around 200 m beneath the ambient water table, therefore dewatering will be required to maintain a dry working floor. The dewatering will cause an elliptical cone of depression to develop with drawdown, preferentially propagating along the ridges. Generally the quality of groundwater in the areas appears to be quite good, with TDS concentrations < 5000 mg/L.

Environmental Objectives

- Control and contain contaminated water on site to prevent entry into the natural drainage system.
- Maintain groundwater quality so that existing and potential environmental, social and cultural values – including ecosystem protection – are protected
- Minimise impacts to groundwater resources during mining.
- Manage groundwater abstraction so as to limit the risk of adverse impacts on groundwater resources and environmental values

Potential Impacts

Potential impacts to groundwater as a result of the construction and operation of the Project could include:

- Disturbance to natural groundwater flow patterns from the mine pit.
- Localised drawdown of groundwater may impact groundwater dependent vegetation (“phreatophytic vegetation”) and/or subterranean fauna.
- Localised drawdown may impact groundwater dependent vegetation (phreatophytic vegetation), stygofauna and stock watering bores.
- Degradation and contamination of groundwater sources from hydrocarbon or chemical spills.
- Degradation and contamination of groundwater sources from inappropriately constructed and managed TSF and waste rock stockpiles.
- Degradation and contamination of groundwater sources from contaminated re-injected dewatered water.
- Contamination of groundwater as a result of seepage from pit lakes;
- Contamination from inappropriate disposal of evaporation salt waste.

Management Strategies

Quantity

- DoW Groundwater Licences will be complied with.
- Groundwater will be used for construction and operation activities and disposed of in an approved manner.
- Saline groundwater will be discharged to an evaporation pond.

Quality

To maintain the quality of the groundwater resource SMC will ensure the following:

- Groundwater management will be undertaken consistent with the DoW approved operating and monitoring strategy.
- The mine will be designed to ensure the safe storage and handling of hazardous materials to prevent contamination.

Evaporation Pond

- During operations waste salt evaporate will be removed from the evaporation pond when required. Salt evaporate will be transported from site by an approved contractor to an appropriate licensed facility or disposal method.
- The frequency of removal from site will be determined by visual inspections. Inspections will be carried out weekly.
- Final decommissioning of the pond will include:
    - The removal of waste salt evaporate;
    - Compacted surfaces will be ripped or scarified and where practicable, natural drainage patterns will be reinstated.
    - Disturbed areas to be recovered with topsoil or rock to match adjacent undisturbed areas to a depth of approximately 100 mm.
    - Stockpiled vegetative matter will be distributed over the rehabilitation area.
    - Where required only the use of local provenance seed and plants will be utilised.

Monitoring

The groundwater monitoring plan will require the installation of groundwater monitoring boreholes upstream and downstream of each pit and downstream of the evaporation pond. This monitoring will:

- Measure and record, on a Groundwater Monitoring Register, groundwater levels in the monitoring boreholes on a monthly basis.
- Collect samples from the monitoring boreholes on a quarterly basis and measure field parameters in these samples (pH, TDS, EC and temperature).
- Collect water samples from monitoring boreholes annually and submit these samples to a laboratory for full chemical analysis.

- Extraction quantities will be recorded throughout life of mine by the Environmental Manager. Results will be updated monthly in a Groundwater Monitoring Register.
- Water quality sampling will be undertaken by the Environmental Manager as part of any investigation into suspected contamination.

This monitoring program will be reviewed annually when the data from the program is also reviewed.

Monitoring of the evaporation pond will be carried out weekly to assess the level of evaporate salt and the stability of the evaporation pond walls.

Performance Indicators/Criteria

- Compliance with all relevant DoW licences and monitoring guidelines.
- Detailed project design incorporates effective groundwater management measures.
- Groundwater monitoring shows that impacts are not significantly different to those predicted in the impact assessment and documented in the PER.

Reporting

- SMC will maintain a Groundwater Monitoring Register.
- Reporting will be performed annually and in accordance with prescribed groundwater/environmental licence requirements.

Environmental Management Commitment

Commitment 4

Prior to dewatering activities, a Groundwater Management Plan will be developed and implemented in consultation with the DEC and DoW. The plan will:

- model the short and long term hydrogeological impacts of dewatering;
- complete further studies on the hydrology of the palaeochannel (gap);
- detail a groundwater monitoring program, including monitoring of pit lakes; and
- set out procedures to minimise the impact to the groundwater aquifer.

Commitment 5

Prior to approval of the PER, SMC will conduct vertebrate and invertebrate fauna and vegetation and flora surveys to assess the proposed impact area and to determine the potential impact to fauna and flora as a result of discharging dewatered saline water to an evaporation pond. This information will influence design parameters and management measures for this proposed work.

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EMP 3 – SURFACE WATER

Current Status

The Weld Range has several clearly delineated drainage channels; however, the land to the north of the range has only minimal well defined drainage channels and is characterised by numerous mud flats and salt pans. There is a significant salt pan in a depression immediately north of the Madoonga tenement.

Weld Range rises above the centre of a drainage basin that is surrounded in the north by topographically higher flat-topped breakaways. The main drainage lines converge at the south-eastern part of the basin on its western path to form the Sanford River, a tributary of the Murchison River. The major named drainage line, Berhing Creek, drains through the Weld Range at The Gap, in the vicinity of Madoonga Station Homestead.

The Beebyn and Madoonga deposits and associated infrastructure are located immediately south of and adjacent to two significant ephemeral watercourses (Beebyn and Madoonga Creeks). The catchment areas providing flow to Beebyn and Madoonga creeks are 222 km^2 and 524 km^2 respectively

The watercourses are generally deep and narrow (deeply incised) in the upper sections of the Beebyn and Madoonga catchments along the Weld Range. These watercourses become wide and shallow in the lower sections of the catchment where the topography is relatively flat.

There are a number of minor drainage lines which currently run through the proposed waste dumps. The flood risk to mine access and haulage is considered potentially significant. Catchment analysis has yielded 54 significant waterway crossings along the proposed mine access and haulage road routes.

Environmental Objectives

- Control and contain contaminated water on site to prevent entry into the natural drainage system and surrounding vegetation.
- Maintain the quality and quantity of surface water so that existing and potential environmental values, including ecosystem maintenance, are protected.
- Maintain the integrity, ecological functions and environmental values of wetlands.
- Minimise impacts to surface resources during mining.
- Prevent or minimise impacts from flooding.
- Ensure emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

Potential Impacts

- Alteration of the hydrological regime, leading to increased erosion and sedimentation.
- Erosion of exposed surfaces by wind, water and construction activities generating sediment loads in surface runoff flows.
- Contamination of surface water.
- Changes to the flood regime.
- Changes to local vegetation types.
- Increase in water shadow effect.
- Potential for a groundwater cone of depression due to extraction.

Management Strategies

Hydrology / Watercourses

- Design of Project construction and operational activities and infrastructure will be completed in a manner to minimise interference to natural drainage.
- The establishment and construction of drainage structures and sedimentation ponds will be monitored to ensure compliance with the design specifications.
- Where practicable, construction of watercourse crossings will be scheduled during dry periods.
- Project pit infrastructure will be located outside the estimated 100-year ARI design flood extents of the main creeks.
- Where practicable, clearing of slopes leading to watercourses will be delayed until construction is imminent, this minimise erosion and sedimentation risk.
- Washing vehicles and equipment will only occur in appropriate and designated wash-down bays.
- Cleared vegetation and topsoil will be stockpiled away from watercourses.
- Where required a permit to obstruct or interfere with Bed and Banks issued under Section 17 of the *Rights in Water and Irrigation Act* will be obtained.
- Concept design calculations, design specifications and recommended locations (co-ordinates) have been prepared for the proposed flood mitigation and surface water management measures, within The Conceptual Closure Plan – Section 8.2. Summaries of the design calculations are provided in the Conceptual Closure Plan. A summary of the proposed flood mitigation and surface water management measures is provided in the Conceptual Closure Plan – Section 8.2 with design drawings.

Water Quality

- Stormwater runoff from workshop pavements, fuel unloading and storage areas and from vehicle washdown areas will be directed to grit and oil interceptors to remove pollutants prior to discharge of the water.
- Accidental spills outside controlled areas will be remediated to avoid contamination of groundwater or surface waters.
- Water quality samples will be taken if potential contaminants are believed to have reached natural drainage channels.
- All chemicals stored on site will be stored in accordance with dangerous goods regulations.

Flood Mitigation

- The Beebyn and Madoonga mine site infrastructure will be located outside the estimated 100-year ARI design flood extents of the main creeks. Flood protection measures will be required to protect the site infrastructure, waste dumps and mine pits from inundation caused by sheet flow and localised flooding of minor waterways.
- Diversion drains will be designed to divert runoff from undisturbed areas around or through the mining operations where possible, with an allowance for 0.5 m freeboard. Diversion drains around the mine site infrastructure and waste dump drainage will be designed to capture and divert the 10 year ARI design flood event, while mine pit diversions will capture and divert the 100-year ARI design flood event. Portions of the Madoonga waste dump drainage are located within the 100-year ARI flood risk area.
- Surface water runoff from waste dumps will be managed to reduce suspended sediment loads prior to discharge to existing ephemeral watercourses.
- Stormwater runoff from waste dump areas will be directed to sedimentation ponds using diversion drains, bunds and existing natural drainage lines. To ensure all runoff from these areas is captured, sedimentation ponds will be located in natural drainage lines on the ultimate boundary of the waste dump layout
- Culvert crossings and floodways have been designed to accommodate the 10-year ARI design flood event at location where creeks and drainage lines cross the hail road alignment.

Monitoring

- Inspections of sumps, sedimentation ponds, drainage structures and erosion control measures will be carried out as soon as possible after periods of heavy rainfall to assess structural integrity.
- Major erosion events will be reported immediately by submitting a hazard and incident report to the Environmental Manager and repair works commenced as soon as possible.

Performance Indicators / Criteria

- A maintenance program will be implemented to ensure all drainage structures and erosion control measures are maintained to working condition.
- Compliance with all relevant legislation and sampling guidelines.

- All water samples tested for potential contaminants will be submitted to NATA certified laboratories for analysis.

Reporting

Reporting will be performed annually and in accordance with prescribed legislative requirements.

Environmental Management Commitments

Commitment 6

A Surface Water Management Plan will be developed and implemented in consultation with the DEC. The plan will set out procedures to:

- minimise the impacts of mining and processing to surface water quality, and
- monitor the effectiveness of management procedures.

EMP 4– THREATENED FLORA AND CONSERVATION MANAGEMENT PLAN

Current Status

One species listed under the *Environment Protection and Biodiversity Act* 1999 (EPBC Act) as Endangered, *Conospermum toddii* (Approved Conservation Advice for *Conospermum toddii*, 2008), is known from two collections in the Murchison region. However, *Conospermum toddii* was not recorded during the *ecologia* survey.

Currently, two DRF taxa are protected by the *Wildlife Conservation Act* 1950 (WC Act) and listed as occurring in the Murchison, *Conospermum toddii* (Approved Conservation Advice for *Conospermum toddii*, 2008) and *Eremophila rostrata* subsp. *rostrata* (Wildlife Conservation (Rare Flora) Notice 2008(2)). However, *Eremophila rostrata* subsp. *rostrata* and *Conospermum toddii* were not recorded during the *ecologia* survey.

To date, 27 flora taxa of conservation significance have been recorded during surveys carried out at the Weld Range. Twenty-five priority flora taxa were recorded during the surveys by *ecologia* – six Priority 1, 18 Priority 3 and three Priority 4 species.

One Priority 1 PEC is recorded as occurring in the area "Weld Range vegetation complexes (Banded Ironstone Formation) (BIF)", and the survey area lies within the current PEC boundaries (*ecologia*, 2009d). PECs are classified into one of five possible Priority ratings based on frequency of ecological community occurrence and known threatening processes. The Banded Ironstone Formation, recorded as a Priority 1 PEC at the Weld Range presents a rare vegetation complex and is considered currently under threat of mining (*ecologia*, 2009d).

Environmental Objectives

- Maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement of knowledge.
- Minimise the loss of and adverse impacts to native vegetation and plant habitats.
- Protect Rare and Priority Flora Species that occur within the proposed area.

Potential Impacts

Direct impacts to the vegetation and flora of the project area will result from vegetation clearing.

Approximately 3589.1 ha of land will be cleared for project activities.

The main impacts that will result from vegetation clearing include:

- Loss of Priority 1 species; *Beyeria lapidicola*, *Sauropus sp.* Woolgorong and *Stenanthemum patens.*
- Loss of Priority 3 species; *Goodenia lyrata Acacia ?burrowsiana, Eremophila arachnoides subsp. Arachnoides, Hemigenia tysonii, Homalocalyx echinulatus, Micromyrtus placoides, Mirbelia ?stipitata, Phyllanthus baeckeoides, Prostanthera ferricola, Prostanthera petrophila, Ptilotus beardii, Ptilotus luteolus, Tecticornia cymbiformis, Verticordia jamiesonii*

- Loss of Priority 4 species; *Goodenia berringbinensis, Grevillea inconspicua, Acacia speckii, Dodonaea amplisemina.*
- Loss of individuals or populations of the species of interest *Acacia* sp. Wilgie Mia (formerly described as *Acacia* sp. nov. (aff. *kochii*))
- Loss of <10% of the PEC.
- Loss of vegetation communities.
- Increased presence of weed/pest species.
- Loss of topsoil.
- Introduction of feral animals (i.e. insects).
- Increased erosion.
- Increased generation of dust coating of vegetation.
- Loss of SRE habitat.
- Alterations to fire frequency and associated changes in community structure
- Habitat fragmentation and reduced connectivity
- Alteration of soil profile.
- Reduction in the amount of sequestration of CO_2.

Management Strategies

- Vegetation clearing and earth works will be carried out at an appropriate time of year to minimise deterioration in surface water flow and/or, appropriate soil stabilisation methods will be used in areas where increased sedimentation could be expected. Drains and culverts will be incorporated into infrastructure crossing minor and major drainage lines to maintain seasonal flow regimes.
- The preferred mine infrastructure footprint option has been selected to minimise impact to conservation significant vegetation and flora species of the project area as well as areas of heritage significance.
- Access tracks leading to the project areas have not been surveyed for conservation significant flora. Targeted flora surveys will be undertaken and every effort shall be made to ensure that final alignments minimise impacts to the priority flora of the area.
- Vegetation clearing shall be minimised and kept to that which is absolutely necessary. Whenever possible, areas with large populations of multiple priority flora species shall be avoided. Environmental personnel shall be present when vegetation is cleared in areas where priority flora species are known to occur, especially Priority 1 and 2 species, to ensure that impacts to priority flora are minimised.
- The height of stockpiles of soil and cleared vegetation shall be minimised. Multiple smaller stockpiles, dispersed at regular intervals along the edges of cleared areas, are preferable to a single, large stockpile. Lower stockpiles allow greater retention of biological activity within

the soil (bacteria, fungi and lichens), which improves seed germination rates when the soil is reused.

- Disturbance to vegetation associated with drainage lines and seasonally inundated low lying areas shall be avoided or minimised whenever possible. Removing vegetation associated with drainage lines can lead to accelerated soil erosion or the alteration of surface water flow. Impacts to the vegetation of the halophytic shrubland (Community 7) to the west of Madoonga homestead shall be avoided. This community has a restricted distribution within SMC's lease at Weld Range and is potentially a significant habitat for migratory fauna of the area.
- Groundwater dependent ecosystems have been identified in the project area, vegetation units 7a and 7b. A baseline and long-term monitoring programme shall be initiated to document any effects on groundwater dependent ecosystems resulting from groundwater extraction in the project area. Pumping of water for the proposed works will need to be managed appropriately so that any phreatophytic vegetation in the project area is not irreversibly affected by changes in groundwater levels.
- Existing environmental procedures shall be implemented for staff and contractors. These shall include, but not be limited to, managing the risk of fire, the spread of weeds, and encouraging general environmental impact awareness.
- A handbook containing photographs of conservation significant and weed species of Weld Range will be provided to all staff involved in vegetation clearing, prior to clearing. This will reduce the likelihood that these species are inadvertently cleared, or in the case of weed species, spread as a result of ground disturbance.
- Topsoil stockpiles and areas of rehabilitation will be monitored periodically. Particular attention will be paid to weed species. If population densities or distribution of any weed species is seen to be increasing, eradication procedures will be implemented.
- The minimum amount of topsoil possible will be removed when clearing vegetation for short-term structures. Minimal topsoil disturbance will encourage natural regeneration due to retention of the seed store and microbiological activity, which is largely confined to the topsoil. Achieving minimum disturbance will also discourage weeds and other species which proliferate following disturbance.
- Areas that have been impacted by earthworks but are not needed for long-term infrastructure will be rehabilitated as soon as practicable after completion of works. This will promote soil stabilisation by plant roots and help to discourage weed proliferation in these areas. Stockpiled topsoil will be used in rehabilitation works as soon after removal as possible as the seed stored in the soil will be viable.
- Off road driving will be limited to reduce impact to vegetation in general and conservation significant flora, in particular, and also to reduce areas of soil compaction.
- SMC, as part of their annual review of their EMS and legislative requirements, will review the DEC Priority Flora listings to ensure that rankings of Priority species identified during this survey are updated. Management measures, such as provision of the priority flora handbook and identification of Priority flora during clearing activities, will be updated to reflect any changes in Priority rankings.

Monitoring

In order to ensure progress toward achieving the objectives described above, ongoing flora and vegetation monitoring will be undertaken. Monitoring methods may include, as appropriate, visual observation and photographic inspections of vegetation and quantitative quadrat or transect based surveys.

Vegetation monitoring will be designed to target the presence or absence of species of conservation significance and to ensure that the impact assessment accurately assessed the risk of potential indirect impacts to flora and vegetation. The methods for these monitoring programs, including survey method, survey timing, site selection, reporting and trigger criteria for further action, will be developed prior to the commencement of construction.

SMC also commits to undertake the following additional surveys:

- To determine the population extent, distribution and taxonomy of the two taxa of interest – *Acacia* sp. nov. (aff. *kochii)* and *Hemigenia sp.*sp. nov.(aff. *exilis*).
- A targeted flora survey is undertaken for all access tracks once the preferred infrastructure option has been chosen. SMC will ensure that the final alignment of the infrastructure minimises impacts to priority flora of the area.

Performance Indicators

- Area of disturbance minimised.
- A significant flora and weed identification guide available for all employees and contractors.
- Compliance with contractual requirements.
- Abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels maintained.
- Loss of and adverse impacts to native vegetation and plant habitats.
- Rare and Priority Flora Species that occur within the proposed area protected.

Reporting

- The Annual Environmental Report will provide a summary of monitoring and audit results and the status of conservation significant fauna species at Weld Range. The report will be provided to the DEC and DMP.
- New occurrences of Declared Rare Flora will be reported to the DEC.

Environmental Management Commitment

Commitment 7

A Threatened Flora and Conservation Management Plan will be developed and implemented in consultation with DEC prior to mine construction works. The plan will set out procedures to maintain the abundance, diversity, and distribution and conservation status of threatened flora species. This plan will be implemented throughout the life of the mine.

Commitment 8

Following WA Museum taxonomic identification of two taxa of interest - *Acacia sp. nov*. (aff. kochii) and *Hemigenia sp. nov*. (aff. exilis), SMC, if required, will undertake further surveys to determine the population extent and distribution of these species.

Commitment 9

SMC will identify potentially groundwater dependent ecosystems in the project area. SMC will also ensure a baseline and long-term monitoring programme is initiated in order to document any effects on groundwater dependant ecosystems resulting from groundwater extraction at Weld Range.

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EMP 5 – VEGETATION CLEARANCE AND SOIL MANAGEMENT

Current Status

The project area is situated in the Murchison botanical district within the Eremaean botanical province. The region is well known for the dominance of mulga (*Acacia aneura)* woodlands, and the extensive flats and plains provide optimum conditions for the occurrence of these woodlands.

Vegetation clearance will be required for the following:

Weld Range Project	Approximate Area (ha)
Beebyn Pit and Waste Dumps	1098
Madoonga Pit and Waste Dumps	625.5
Madoonga Pit Infrastructure	72.6
Central Processing Facility – Plant and Infrastructure	450
Evaporation Pond	330
Accommodation Village	161.3
Airstrip	55
Access Tracks and Haul Roads	756.4
ANFO	40.3
Undisturbed Land	18,910.9
TOTAL	**3589.1 (35.89 km^2)**
TENEMENT AREA	**22500 (225 km^2)**

Environmental Objectives

- Conserve and optimise reuse of vegetation and topsoil which contains seeds, nutrients, organic matter and micro-organisms required for establishing vegetation on rehabilitated areas.
- Minimise soil disturbance and maintain the integrity of the disturbed surrounding soils as much as practical.

Potential Impacts

Direct impacts include the clearance of approximately 3589.1 ha for various project components.

Indirect impacts of clearing include:

- Impacts on significant flora species.
- Potential loss of biodiversity.
- Invasion of weeds (and associated health issues with pesticide management).

- Dust emissions.
- Loss of habitat.

Management Strategy

General

- Vegetation and soil clearance will be undertaken progressively and be restricted to the minimum area needed at the time to facilitate ongoing production.
- All ground disturbances must be authorised through a procedure and permitting process, which will be developed and implemented prior to construction.
- Best efforts will be made to direct return topsoil. That is, where possible, topsoil removed from one area will be immediately placed in another area that has already been prepared for rehabilitation.
- Where direct return of topsoil is not practicable, topsoil stockpiles will be managed to prevent deterioration of seed, nutrients, microbes and soil structure.
- Before clearing activities commence in previously undisturbed areas, a Site Disturbance Permit will be completed and work will be carried out in accordance with EMP 6 - Vegetation Clearing Demarcation Standards.
- Vehicles and machinery will only use designated tracks/roads. Off-road / track traversing will be prohibited.
- All employees/contractors will be inducted on the importance of minimising vegetation clearing and disturbance, and in the avoidance of weed infested areas (EMP 7 - Weed Management).
- Clearing of mature trees will be avoided where practicable.
- Any significant flora identified during botanical surveys will be clearly demarcated and avoided. Ministerial approval will be sought prior to the disturbance of any Declared Rare Flora (DRF). SMC will consult with DEC regarding any threatened/significant flora which may be impacted.
- Clearing of slopes near/leading to watercourses will be delayed until construction is imminent – minimising erosions and sedimentations risks.
- Cleared vegetation will be stockpiled away from streams/creeks.
- Erosions and sedimentation will be minimised by the construction of erosion control berms.
- Where large areas of vegetation are disturbed resulting in exposed soil, soil stabilising techniques, such as the application of water, will be employed to minimise dust, where this is required and practicable.
- Topsoil will be stripped and stockpiled, and vegetation debris, logs and leaf litter will be retained for reuse during rehabilitation.
- Topsoils and vegetation will be stored separately.

- All clearing activities will be scheduled to minimise the time between initial clearing and rehabilitation.
- No burning of vegetation spoil will be allowed.
- Work will be carried out in accordance to EMP 14 - Bushfire Control.

Monitoring

The Environmental Manager, or delegate, will regularly inspect construction and operational areas to ensure:

- Only authorised clearing is undertaken.
- Vegetation and topsoil is directly returned to its place of origin or stockpiled in suitable locations.

Areas of rehabilitation will be checked to assess the progress of rehabilitation.

Performance Indicators/Criteria

- Topsoil and vegetation correctly stockpiled for later use.
- A significant flora and weed identification guide made available for all persons.
- Employees trained in fire safety procedures.
- Environmental induction program implemented, including vegetation clearance procedures.
- No unauthorised clearing is undertaken.

Reporting

- Clearing plans will be submitted to the Environmental Manager for approval before the works begin.
- SMC will maintain a register of site disturbance permits.

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EMP 6 – VEGETATION CLEARING DEMARCATION STANDARDS

Environmental Objectives

Ensure vegetation clearance demarcation standards clearly and unambiguously define clearing boundaries for site works.

Potential Impacts

- Clearance of vegetation outside of the proposed clearance area.

Management Strategy

SMC's approach to managing vegetation clearance is as follows:

- The access tracks will be clearly pegged or flagged **PINK** and **YELLOW** to identify allowable access routes.
- Priority flora not to be cleared will be flagged **BLUE**.
- Pegs or flagging will be positioned at intervals not exceeding 25 m.

Clearing will be kept to a minimum where possible; however, tracks will provide sufficient access for equipment needing to traverse the track. In places this may be up to 5 m in width due to terrain and size of the equipment.

Monitoring

- Periodic checks of areas approved for clearing will be undertaken.

Performance Indicators

- Site Disturbance Permit approved.
- Clearing boundaries consistent with approved permit.

Contingencies

Clearing will take place within demarcated areas only. If clearing beyond approved limits takes place, a non-conformance will be reported using a hazard/incident report.

Reporting

Clearing beyond approval limits will be reported to the appropriate authority using a hazard/incident report.

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EMP 7 – WEED MANAGEMENT

Current Status

No Declared Plants (weeds) were recorded during the Weld Range survey.

Currently, 106 weed species are known to occur in the Murchison region of Western Australia (Western Australian Herbarium, October 2009). Six general/environmental weed species were recorded during the Weld Range survey:

- **Anagallis arvensis;*
- **Cenchrus ciliaris;*
- **Cuscuta epithymum;*
- **Portulaca oleracea;*
- **Solanum nigrum;* and
- **Sonchus oleraceus.*

The locations of these general/environmental weeds are provided in Table 4.11 of PER Technical Appendix 13 (*ecologia*, 2009d).

Environmental Objectives

- Prevent the transfer of weed species within the project area.
- Prevent the introduction of weed species by SMC (or their contractors) activities.
- Control and/or reduce any existing infestation of target weed species in the project area.

Relevant Legislation

- *Agriculture and Related Resources Protection Act* 1976
- *Environmental Protection Act* 1986
- *Conservation and Land Management Act* 1984

Potential Impacts

Potential impacts from mining activities include:

- Transport and spread of identified alien (weed) species in the Weld Range area from vegetation clearing, earthmoving activities, disturbance to native vegetation and increased vehicle traffic; and
- Competition of weeds with native species for space, nutrients and water.

Management Strategy

- Known populations of weeds within all project areas will be demarcated on a site map and data kept electronically in the project geographic information system.
- Approval will be required before entering or leaving known weed infested quarantine areas.
- Vegetation and topsoil removed from weed risk areas with known infestations of weeds will be stripped and stockpiled separately. Topsoil and vegetation from these areas will not be used for rehabilitation unless it has been treated appropriately.
- SMC employees and contractors will undergo awareness training that includes:
    - an induction prior to commencement of work on the Project;
    - environmental risks and management; and
    - ground disturbance procedures and permit requirements.
- A weed identification guide will be produced and will be made available to all personnel prior to construction.
- Ground disturbance will be minimised and controlled through a procedure and permitting process to minimise the opportunity for weed invasion.
- All vehicles, earthmoving/mobile plant and construction equipment will be washed down and cleaned of all vegetative, soil and rock material, prior to arrival on site.
- A Vehicle/Rig Audit will be completed and documented by the Environmental Manager after inspection on arrival at site.
- A washdown facility will be established to facilitate the cleaning of vehicles and equipment. This will include provisions for capturing all water and filtering water from solids (including seeds).
- Weed seeds, soil and other material collected from the washdown facility will be disposed of in a manner that does not allow viable seeds to enter the environment.
- During construction and drilling activities, any location of weed outbreaks will be reported to the Environmental Manager.
- No plants or animals will be brought onto the mine site.
- A Flora Register will be maintained by the Environmental Manager throughout the life of mine. Information such as distribution, abundance, relevant biological information and effective control methods will be recorded in the register.

Weed Control

- A weed control program will be implemented if target species are found to be present in SMC work areas. For all listed Declared Weed, the weed control program will be compliant with the Department of Agriculture's management actions for that weed.
- The standing crop of target species will be reduced by appropriate methods within the vicinity of areas to be affected by exploration activities.

- Quarantine areas encompassing known infestation will be established and demarcated by the Environmental Manager to prohibit vehicular access. The location will be noted, advised to all employees and access prohibited until appropriate action for control/prevention is implemented.
- Spot spraying on emergent weed species within project areas will be carried out to gradually deplete seed stocks and reduce or eliminate any new colonies generated by work activities.

Monitoring and Reporting

- At completion of the construction phase, weed infestation status surveys will be commissioned by SMC using suitable qualified external consultants.
- SMC will monitor weed hygiene compliance using the Vehicle/Rig Audit Register.
- New infestations of weeds or pests will be reported as an environmental incident to the Environmental Manager.
- SMC will monitor weed hygiene compliance using a Mobilisation Hygiene Register.
- Work sites will be inspected regularly.

Performance Indicators / Criteria

- Area of disturbance minimised.
- A significant flora and weed identification guide available for all persons.
- Weed hygiene procedures adopted.
- Completed Vehicle/Rig Audits documented in the Vehicle/Rig Audit Register.
- Compliance with contractual requirements.
- No persistent new introductions or spread of weeds or pests.
- Audits completed at required intervals.

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EMP 8 – FAUNA

Current Status

A review of all fauna records from the project area and its surroundings was undertaken. The review was based on Western Australian Museum, DEC records, and surveys previously undertaken in the area. The review provided a list of 29 native and eight introduced mammal species, 156 birds, 88 reptiles and five amphibian species which may potentially occur in the project area.

During the two Level 2 and Level 1 *ecologia* fauna surveys, 17 native and six introduced species of mammal, 80 bird species, 44 reptile species and one amphibian species were recorded in the project area (*ecologia*, 2009e).

Of these, five species of conservation significance were recorded on site:

- Long-tailed Dunnart (*Sminthopsis longicaudata*) (DEC Priority 3);
- Peregrine Falcon (*Falco peregrinus*) (WCA Schedule 4);
- Bush Stone-curlew (*Burhinus grallarius*) (DEC Priority 4);
- Slender-billed Thornbill (*Acanthiza iredalei*) (EPBC Act Vulnerable); and
- A fossorial skink (*Lerista eupoda*) (DEC Priority 1).

A further two conservation significant species, the Rainbow Bee-eater and the Australian Bustard, were not recorded but were considered highly likely to utilise the project area on occasion.

Environmental Objectives

- Maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.
- Protect Specially Protected (Threatened) fauna consistent with the provisions of the *Wildlife Conservation Act* 1950.
- Protect other fauna species of particular conservation significance (e.g. range extensions).

Relevant Legislation

- *Wildlife Conservation Act* 1950;
- *Environment Protection and Biodiversity Conservation Act* 1999;
- EPA Guidance Statement No. 56. Terrestrial Fauna Surveys for Environmental Impact Assessment in WA (EPA, 2004); and
- EPA Position Statement No. 3. Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002).

Potential Impacts

Potential direct impacts to fauna include:

- Habitat disturbance and fragmentation as a result of construction.
- Disturbance resulting in behavioural responses.
- Inadvertent injury or death as a result of increased vehicle strikes from increased traffic.
- Impacts on significant fauna species.
- Increase in ambient noise and vibration.
- Waste management.

Potential indirect impacts include:

- Human presence and activity which is associated with a change in fire regimes leading to degradation of natural ecosystems.
- Contamination of habitat from mining activities.
- Injury to fauna from mining infrastructure such as uncapped drill holes.
- Introduced flora species may alter habitat
- Introduced fauna may compete aggressively for habitat and resources.
- Increase risk of fire.

Management Strategy

- Site personnel will be familiarised, through inductions and training, with potential species of conservation significance.
- All sightings of potential species of conservation significance will be reported to environmental personnel.
- Remnant vegetation will be retained where possible within the mine site.
- Rehabilitation will comprise the distribution of mulched vegetation across rehabilitation areas, the planting of native vegetation used by local fauna, and the placement of hollow logs on the ground as refuge for fauna.
- Drill holes will be capped to prevent fauna entrapment and fatalities. Operational control procedures and employee training programs will be implemented to protect native fauna from intentional harm and to appropriately manage injured fauna if found.
- Employees and contractors will be familiarised of the potential for Rainbow Bee-eaters to breed in sandy embankments and should avoid nest hollows if present.
- Long-tailed Dunnart (*Sminthopsis longicaudata*) will be trapped and relocated outside of the mine footprint in consultation with DEC.
- Vehicles will only use designated tracks.
- Wild fire from accidental ignition will be avoided where possible.

- Native fauna will not be captured or intentionally harmed.
- Introduction of feral/domesticated animals will be prohibited.
- Where needed a feral animal trapping program will be undertaken, in consultation with the DEC, to target introduced mice, goats and cats where required.
- Areas found to contain Rare or Endangered species will be avoided and advice sought upon immediate notification of DEC.
- Disturbed areas will be rehabilitated as soon as practicable to facilitate fauna habitat restoration.
- Waste will be managed according to best practice principles in order to not provide a source of harm to fauna.
- Employees will be required to comply with management actions of vegetation clearance to minimise habitat disturbance as outlined in EMP 5 – Vegetation Clearance and Soil Management.
- Drill holes will be capped to prevent fauna entrapment and fatalities.
- Wherever possible, mature trees containing hollows will be retained as they provide habitat for a large number of mammal and bird species present in the area.

Monitoring and Reporting

- Areas that have been disturbed will be checked for rehabilitation progress on a regular and ongoing basis.
- Where required, a report detailing the status of any specially protected (threatened) fauna will be prepared and provided to the DEC.
- Unauthorised clearing of areas and any native animal injures/deaths will be reported as soon as possible and investigated by the Environmental Manager.
- Any death of fauna of conservation significance will be reported to the DEC.

Performance Indicators

- Environmental induction implemented and fauna management measures included.
- No fauna deaths occur.
- Disturbance on site has been limited to the approved footprint.
- Feral animal management measures are in place and implemented.

Reporting

The Annual Environmental Review will provide a detailed summary of monitoring, audit and status of conservation significant fauna species at Weld Range. The report will be provided to the appropriate regulatory bodies.

A Fauna Mortality Register will be established and maintained to record all fauna deaths resulting from the Project and this information will be included in the Annual Environmental Review.

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EMP 9 – SHORT RANGE ENDEMIC INVERTEBRATE FAUNA

Current Status

Forty five invertebrate species of interest were collected from the Weld Range SRE survey. These included:

- 15 species of mygalomorph spiders;
- 10 species of centipedes;
- 8 species of scorpions;
- 6 species of pseudoscorpions;
- 4 species of isopods;
- 1 species of millipede; and
- 1 species of land snail.

Environmental Objectives

- Maintain the abundance, diversity, geographic distribution and productivity of SRE fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.
- Protect Specially Protected (Threatened) fauna consistent with the provisions of the *Wildlife Conservation Act* 1950.

Potential Impacts

Four risk issues were identified in the course of conducting the risk assessment for the Weld Range Project:

- Stock grazing.
- Habitat alteration.
- Vegetation clearing.
- Fire.
- Dust.

Potential impacts from these risks include:

- Decline or loss of species.
- Loss of habitat.
- Alterations to community assemblages,
- Loss of genetic diversity of Cethegus and Idiosoma.

Management Strategy

The following management items are recommended to mitigate impacts of the development at Weld Range on the SRE species that were identified during the survey:

- Clearing will be restricted to only that which is necessary. Clearing boundaries will be defined in the field.
- Areas that are likely to contain SRE species such as drainage lines, south facing slopes and other areas with high moisture retention will not be cleared where possible.
- Cleared areas will be rehabilitated as soon as practical.
- De-stocking and goat removal at Madoonga and Beebyn stations is highly recommended.
- Dust suppression measures will be implemented, including management of road speed on unsealed roads.
- A fire prevention strategy will be implemented.
- Vibration management (i.e. reducing the level of vibration in areas containing vibration sensitive invertebrates) will be implemented to reduce impact to this.

Environmental Management Commitment

Commitment 10

A Bushfire Management Plan will be developed and implemented prior to mine construction works and implemented throughout the life of the mine. This will ensure that risks of bushfire are identified and managed to minimise potential impacts to fauna and flora.

Commitment 11

A dedicated *Idiosoma nigrum* Conservation Management Plan will be developed and implemented prior to clearing and construction, to reduce impact on the population at Weld Range during construction, development and active mining.

Commitment 12

Develop and implement a dedicated *Cethegus* sp. *'fugax complex'* Conservation Management Plan to reduce impact on the population at Weld Range during construction, development and active mining.

Performance Indicators

Performance will be demonstrated by conformance with the prescribed management tasks.

EMP 10 – *IDIOSOMA NIGRUM*

Current Status

A total area of 76 hectares was surveyed for *I. nigrum* at Weld Range. On all occasions, *I. nigrum* burrows were found within the boundaries of drainage lines and underneath *Acacia* vegetation. With the exception of the Weld Range North, which has north-south orientation, all burrows were found on the southern side of the range

The spider was present in each of the five sections of the range (Hampton Hill, Madoonga, Wilgie Mia, Beebyn and Weld Range North); however there were differences in total population numbers between these sections. In addition, the population of Beebyn was found in flat drainage lines south of the Beebyn BIF ridge rather than on the BIF ridge itself. Weld Range North had the highest number of burrows surveyed (658), followed by Beebyn southern flats (393), Wilgie Mia (295), Madoonga (192) and Hampton Hill (170).

Environmental Objectives

- Maintain the abundance, diversity, geographic distribution and productivity of species at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.
- Protect Specially Protected (Threatened) fauna consistent with the provisions of the *Wildlife Conservation Act* 1950.

Potential Impacts

The current mining proposal impacts directly on six sub-populations of *I. nigrum*, representing 9% of the total population recorded at Weld Range. It is expected that the loss of these populations will result the extirpation of the Madoonga population due to inbreeding depression, which will result in a further 3% loss to the overall population. The effect of the Beebyn pit development on hydrology and thus the populations in drainage lines on the Beebyn flats south of the proposed pit is currently unknown. The impact could range from 0% (no loss) to 34% (complete loss of the Beebyn flats population). The total expected loss from known direct and indirect impacts of the proposed mining development equals 12% of the overall population of *I. nigrum* at Weld Range.

The extirpation of the Madoonga (and potentially Beebyn) population is expected to create a distance of more than 500 m between the remaining populations of Wilgie Mia, Hampton Hill and Weld Range North, effectively presenting a barrier to the limited male-facilitated dispersal (B. Y. Main, pers. comm.). As a result, the populations at Hampton Hill, Wilgie Mia and Weld Range North will become isolated, with no genetic exchange between the populations. This highlights the need to ensure that each of these populations have adequate numbers to allow them to become self- sustainable long term.

An indirect impact is also expected to occur on a sub-population of *I. nigrum* in the immediate proximity to the eastern edge of the Madoonga pit as a result of potential additional vegetation clearance, dust pollution and vibration), and also on the populations that are located further away from the mining development as higher grazing pressure from stock that will likely withdraw from the developed areas.

Management Strategy

- Areas with *I. nigrum* burrows will be identified and excluded from clearing.
- Clearing will be restricted to that which is necessary and clearing boundaries will be defined in the field.
- Dust suppression measures will be implemented, including the management of road speed on unsealed roads.
- A fire prevention strategy will be implemented.
- Relevant site staff shall be educated about the conservation issue of *I. nigrum* and trained in recognising the spider's burrows and overall habitats.
- The Project Area will be de-stocked and goats removed.

Performance Indicators / Criteria

Performance will be demonstrated by conformance with the prescribed management task.

Monitoring and Reporting

A specific monitoring program for individual factors which may significantly impact the species will be developed and undertaken. This program will be developed to allow assessment of:

- Changes in the abundance and distribution of the species.
- Changes in the spider behaviour associated to the vibration and dust pollution.

Opportunistic observational records of *I. nigrum* burrows will be recorded by SMC employees and contractors.

Environmental Management Commitment

Commitment 11

A dedicated *Idiosoma nigrum* Conservation Management Plan will be developed and implemented prior to clearing and construction, to reduce impact on the population at Weld Range during construction, development and active mining.

EMP 11 – *CETHEGUS SP. MUR*

Current Status

Both morphological and genetic studies confirmed that Cethegus sp obtained at Weld Range belong to a new, undescribed species (*ecologia*, 2009i).

At Weld Range, *Cethegus fugax* displayed several characteristics associated with relictual species. It was found predominantly in shaded microhabitats, mostly associated with vegetated areas on southern slopes. Several nests were also found on the plain below the range, however their density was sparse and their total numbers too low to be considered as a viable population. Thus it was assumed that a local flood or an unusually strong wind transported the spiders from their source populations on the range to the plain during their aerially-dispersed emergent stage.

In total, five subspecies were identified in the Murchison region – two at Weld Range, two at Jack Hills and one at Robinson Range. Although *Cethegus* spiderlings are known to use limited aerial dispersal, the pattern of the genetic structure shows that such dispersal is clearly limited. The fact that the spiders were not able to disperse across the 1 km wide natural gap between Hampton Hill and Madoonga presents evidence that aerial dispersal may possibly enable *Cethegus* to escape disturbance on a very local scale (i.e. < 1km) but it does not function as a long-distance vector (*ecologia*, 2009i).

The subspecies at Weld Range were different from each other and each was also different from the subspecies obtained at Jack Hills and Robinson Range and therefore each will require separate conservation management.

Environmental Objectives

- Maintain the abundance, diversity, geographic distribution and productivity of species at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.
- Protect Specially Protected (Threatened) fauna consistent with the provisions of the *Wildlife Conservation Act* 1950.

Potential Impacts

Cethegus spiderlings are known to use limited aerial dispersal, the pattern of the genetic structure shows that such dispersal is clearly limited (*ecologia* 2009). The fact that the spiders were not able to disperse across the 1 km wide natural gap between Hampton Hill and Madoonga presents evidence that aerial dispersal may possibly enable *Cethegus* to escape disturbance on a very local scale (i.e. < 1km) but it does not function as a long-distance vector.

The two *Cethegus fugax* subspecies at Weld Range were different to each other and different to the subspecies obtained at Jack Hills and Robinson Range, therefore they will require separate conservation management. Establishing two conservation zones (one at Hampton Hill along the ridge) and one at Madoonga or Beebyn will ensure the long term survival of both subspecies at Weld Range.

Management Strategy

The following management items will be implemented to mitigate impacts of the development on the curtain-web spider *Cethegus fugax* at Weld Range:

- Dust suppression measures will be implemented, including the management of road speed on unsealed roads.
- A fire prevention strategy will be implemented.
- In order to maintain both of the subspecies, *Cethegus* sp. 'Weld Range Hampton Hill' and *Cethegus* sp. 'Weld Range Madoonga & Beebyn', it is recommended that exclusion zones are established at Hampton Hill, Madoonga and/or Beebyn.
- Clearing will be restricted to that which is necessary and clearing boundaries will be defined in the field.
- The Project Area will be de-stocked and goats removed.

Performance Indicators / Criteria

Performance will be demonstrated by conformance with the prescribed management task.

Monitoring and Reporting

A specific monitoring program for individual factors which may significantly impact the species will be develop and undertaken. This program will be developed to allow assessment of:

- Changes in the abundance and distribution of the species; and
- Changes in the spider behaviour associated to the vibration and dust pollution.

Opportunistic observational records of *Cethegus* sp. *'fugax complex'* burrows will be recorded by SMC employees and contractors.

Environmental Management Commitment

Commitment 12

Develop and implement a dedicated *Cethegus* sp. *'fugax complex'* Conservation Management Plan to reduce impact on the population at Weld Range during construction, development and active mining.

EMP 12 –DUST

Current Status

A dust impact assessment was conducted by Sinclair Knight Merz (SKM) 2009 for the Project. The key pollutants investigated were PM_{10} and TSP, as particles larger than $PM_{2.5}$ are the primary constituent of the dust generated from the mining activities performed in this proposed Project.

It was determined that the main contributions of ground-level concentrations (GLCs) of dust across the modelled region were from blasting events, wind erosion from waste material stockpiles and from vehicle movement.

Control measures were applied to particulate emissions, including dust suppression via watering of all haul roads and waste/ore stockpiles, restricting blasting times based on wind direction, hooding with fabric filtering over all processing operations (ore crushing and screening) and water sprays on ore conveying operations.

Modelling demonstrated that although the assessment criteria are not exceeded, the maximum PM_{10} and TSP ground-level concentrations have potential to exceed 80% of the assessment criteria.

Environmental Objectives

- Ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land users by meeting statutory requirements and acceptable standards.
- Minimise dust associated with the construction and operation of the mines.
- Minimise exposed surfaces through clearing minimisation, staged clearing and progressive rehabilitation.

Potential Impacts

Air emissions within the project area have the potential to:

- Reduce visibility.

  Reduce visual amenity.
- Affect employee work conditions and general health.
- Create dust loads which devalue social amenity within the Shire of Cue.
- Create dust loads which may result in the loss of flora and potentially fauna.

Management Strategy

- Minimisation of vegetation clearing.
- Staged clearing and progressive rehabilitation to minimise exposed areas.
- Regular inspections to visually assess dust generation.
- Stockpile watering on all waste and ore stockpiles to reduce wind erosion emissions as required.

- Crushing and screening machinery fitted with dust hooding and an extraction system.
- Water sprays fitted on all ore conveying operations, including reclaimers when operational.

Monitoring

- At sensitive receptors, electronic dust sampling units will be implemented.
- Sampling records will be retained and frequently analysed by the Environmental Manager or delegate.
- Regular inspections to visually assess dust generation.
- Regular inspection of sewage facilities in regard to odour emissions.
- Sites inspections to be conducted.

Performance Indicators / Criteria

Dust concentration does not exceed NEPM criteria at potentially sensitive receptors.

Environmental Management Commitment

Commitment 16

The Dust Management Plan will be developed, in consultation with the DEC and DMP, and implemented prior to construction and will include procedures for dust monitoring at sensitive receptors.

EMP 13 –GREENHOUSE GAS EMISSIONS

Current Status

Excluding the emissions from vegetation clearing at the beginning of the Project, the Project is expected to generate annual emissions of 263,570 tonnes Co_2-e Scope 1 (KB, 2010). The majority of these emissions are associated with diesel consumption by the mining fleet (51% of emissions) and the diesel-fired power generators (36% of emissions). When compared against Western Australia's total emissions for 2006, the Project will exceed the State's emissions by 0.37%.

The Project is expected to consume approximately 3,718 terajoules of energy per annum. The scale of the Project is likely to trigger participation in a number of government programmes that require collection and reporting of energy and greenhouse gas information such as the National Greenhouse and Energy Reporting System (KB, 2008).

Environmental Objectives

- Ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.
- Minimise emissions to levels as low as practicable on an on-going basis and consider offsets to further reduce cumulative emissions.

Potential Impacts

Greenhouse Gas Emissions

The proposal will release greenhouse gases, predominantly carbon dioxide, either directly or indirectly from fossil fuel consumption and biomass decomposition. Direct contributions include:

- Combustion of diesel fuel used in vessels, heavy and light vehicles.
- Detonation of explosives used in blasting.
- Decomposition of cleared vegetation and release of carbon dioxide from the soil.

Indirect contributions to greenhouse gas emissions include the combustion of fuel at the relevant generator stations to meet the proposal's power requirements.

Direct Fossil Fuel Consumption:

The majority of the mobile equipment used during the construction and operational phases will be diesel-powered. This includes light vehicles, haul trucks, face shovels, dozers, and other equipment. Estimates were made on the quantity of diesel to be consumed each year by the anticipated number of pieces of equipment, their respective duties and approximate fuel efficiency. Annual diesel consumption for the proposal during full operation is estimated to be 75,624 kL.

Annual Scope 1 emissions from the Project are estimated to be 263,570 tonnes CO_2-e. The majority of these emissions are associated with diesel consumption by the mining fleet (62% of emissions) and the diesel-fired power generators (22% of emissions) (KB, 2008).

Indirect Fossil Fuel Consumption:

During full operation, the proposal is expected to consume approximately3,718 terajoules (TJ) (3 PJ) of energy per annum. The base load power will be generated via 12 x 1MW diesel engine gensets (KB, 2008).

Biomass Decomposition:

The Project requires the clearing of approximately 3589.1 ha of native vegetation. The decomposition of this vegetative matter results in emissions of CO_2. Greenhouse gas emissions associated with land clearing were calculated using the National Carbon Accounting Toolbox (Australian Greenhouse Office, 2005). Emissions associated with land clearing are estimated at 62,383 t CO_2-e per annum in year 1. Although some carbon dioxide will be sequestered from the atmosphere through the re-vegetation of disturbed areas, this process will take many years (KB, 2008).

Total Greenhouse Gas Emissions:

Under full production, the Project is expected to generate approximately 1,350,123 tonnes of CO_2-e per annum. The majority of emissions during the Project's production phase are associated with the mining fleet contributing 62% of total emissions. Electricity generation contributes 22%, while land clearing contributes 4% and road train haulage and ancillary fleet both contribute less than 6% respectively (KB, 2008).

Management Strategy

Greenhouse gas emission minimisation measures will include:

- Construction and operation phases of the proposal will be designed to minimise vehicle movements and duplication of activities to reduce cost, greenhouse gas emissions and increase efficiency.
- The construction and permanent camp will be located on site to reduce the number of vehicles used in association with the Project.
- Selection of the most energy efficient technology available where practicable.
- Use of renewable energy, including wind turbines.
- Energy consumption will be set as criterion in equipment selection.
- Vegetation clearing will be minimised where practicable during selection of the waste dumps. Vegetation to be cleared at the mine site (a total of 3589.1 ha) will be cleared progressively and stockpiled for use in rehabilitation. Progressive rehabilitation of open areas will result in partial offsets of emissions over the life of the Project.
- Other carbon sequestration options include purchase and conservation of existing remnant bushland in the south-west and forestry or other revegetation methods.

Monitoring

- SMC will apply to participate in the Greenhouse Challenge Plus programme.
- Once operational, SMC will also report energy efficiency and greenhouse gas emissions annually to the Australian Greenhouse Office as required under the Greenhouse Challenge Plus programme and WA Strategy.
- Regular (e.g. triennial) energy efficiency audits will also be conducted for the Project as required under the Energy Efficiency Opportunities programme and WA Strategy.
- Atmospheric emissions will also be reported to the National Pollutant Inventory if they meet the reporting threshold values.

Performance Indicators / Criteria

Greenhouse gas emissions are reduced on an on-going basis.

Environmental Management Commitments

Commitment 14

SMC will apply to participate in the Greenhouse Challenge Plus programme and WA Strategy.

Commitment 15

SMC will comply with National Pollution Inventory reporting requirements for emissions that trigger reporting thresholds.

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EMP 14 – REHABILITATION

Current Status

The BIF ranges of the Midwest are of very significant biodiversity value as a consequence of their unique geology, soils and relative isolation. The values of the ranges are related to the presence of endemic plant species, rare and restricted plant species and highly restricted and distinct plant communities and ecological communities. The ranges are also very distinct features in their regional landscape and in many cases possess outstanding landscape values. They also have fauna conservation values although these are previously less well documented than for flora.

Environmental Objectives

- To meet tenement conditions with respect to the rehabilitation of mine site areas.
- To meet commitments to best practice environmental management.
- To encourage the re-establishment of self-sustaining ecosystems compatible with surrounding undisturbed areas.

Potential Impacts

- Visual impact to landform from pit areas.
- Visual impacts as a result of cleared vegetation.

Management Strategy

- Disturbed areas will be rehabilitated within 6 months of completion unless otherwise approved in writing by the designated departmental officer, and will adhere to all programmes of work (PoW) and tenement conditions.
- Where practicable, project areas will be progressively rehabilitated to ensure that the rate of rehabilitation is similar to the rate of clearing.
- Compacted surfaces will be ripped or scarified to a depth of approximately 300 mm should ground condition and hydrology allow.
- Where practicable, natural drainage patterns will be reinstated.
- Disturbed areas to be recovered with topsoil or rock to match adjacent undisturbed areas to a depth of approximately 100 mm.
- Stockpiled vegetative matter will be distributed over the rehabilitation area.
- Where required only the use of local provenance seed and plants will be utilised.
- Management of noxious or environmental weeds in rehabilitated areas will be in accordance with EMP 7 - Weed Management.
- SMC will monitor and manage rehabilitated areas until such time as criteria for relinquishment are met, in accordance with relevant agencies.

- SMC will restore the surface profile and prepare the surface to a condition of roughness to resist erosion and accelerate natural revegetation by containing runoff, ensuring infiltration and seed trap.
- Rehabilitation methods for ripping will be looked at implemented on a case by case basis. It may be appropriate to: deep rip, shallow rip, multi-tyne rip, scarify, harrow, mini moonscape reshape, seed, leave as is, or any combination of these.
- As tracks are particularly susceptible to erosion on steep slopes, mini moonscaping will be used where appropriate.
- Disturbance to vegetation and soils will be minimised, through minimising clearing and employing appropriate clearing techniques, and there will be a requirement to rehabilitate disturbances, where the area is no longer required.
- SMC will avoid long continuous rip lines along racks, especially on slopes, and will rip off the track frequently.
- Rehabilitated areas will be signed and vehicles will be excluded from these areas.

Decommissioning

- Equipment including vehicles, equipment and drill rigs will be removed from the lease.
- Infrastructure, including camp and storage facilities, will be dismantled and removed from the lease.
- Waste will be removed and disposed of in appropriate licensed facilities – there will be no burial of waste on-site.
- Rehabilitation of impacted areas will be undertaken in accordance with Rehabilitation procedures detailed above.

Monitoring and Reporting

Monitoring programs will include the following:

- Flora and fauna (species abundance and diversity).
- Invasive species (weeds, pests, grazing stock).
- Groundwater quality (heavy metals and AMD).
- Surface water quality (turbidity, heavy metals and AMD).
- Contaminated sites assessment.

Results of the post-closure monitoring program will be reported to regulatory authorities on a regular basis until agreed closure criteria have been met and tenement relinquishment is achieved.

- Routine inspections of rehabilitation areas will be carried out and a Site Disturbance and Rehabilitation Register will be maintained.
- Rehabilitation will be addresses in an Annual Environmental Report as required.

Performance Indicators

- Rehabilitation implemented in adherence to the principles for the rehabilitation of exploration sites.
- Progressive rehabilitation of disturbed areas.
- All drill holes plugged and rehabilitated within 6 months of drilling, except where permission for DMP is gained.
- Demobilisation and removal of all equipment, supplies, vehicles, waste and infrastructure associated with the project from the lease.
- Monitoring of rehabilitated areas at set intervals using standard sampling techniques.

Completion Criteria

- There should be no access tracks apparent which are left to be used by others and develop into permanent features.
- There should be no actual or potential erosion sites.
- There should be no permanent markers, spoil or litter.
- There should be no open holes, sumps or unstable or visible drill hole collars remaining.
- All disturbed areas should be re-contoured to pre-disturbance conditions and prepared for natural plant regeneration when weather permits. Re-contouring should be such that natural water flow is retained or re-established or that it encourages microtopographical water harvesting.
- There should be no disturbances likely to remain visible from the air where these could be removed by immediate remedial action.
- Weeds and exotic plant and animal species should neither be introduced nor spread. Treatment must be undertaken, as required, in consultation with DEC.

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EMP 15 – BUSHFIRE CONTROL

Environmental Objective

To prevent mining and exploration related bushfires.

Potential Impacts

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

Management Strategy

- No fires will be allowed on the mine site.
- Vehicles will carry fire fighting equipment complying with the relevant standards and staff will be trained in the use of this equipment.
- Fire fighting equipment will be located at campsite, worksites, and at powered equipment such as generators and pumps.
- Fire safety inspections will be periodically undertaken.
- An adequate firebreak will be constructed and maintained around the accommodation village.
- Diesel powered vehicles will be used on site, unleaded fuel vehicles fitted with catalytic converters will be avoided in order to reduce the chance of fire.

Monitoring

- Housekeeping inspections and routine maintenance of fire fighting equipment will be undertaken.
- All equipment that may cause fires will be inspected and potential fire hazards addressed. Pre-start checks will be recorded on the appropriate daily inspection form.

Performance Indicators / Criteria

- House keeping inspections are undertaken.
- Fire fighting equipment present at stipulated locations on site.
- Details of bushfire frequency and previous bushfire details kept as a current record on site.

Reporting

Bushfire frequency and details will be recorded and maintained on site on a Hazard and Incident Register.

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EMP 16 – HAZARDOUS MATERIALS AND CHEMICALS

Environmental Objective

- To ensure that hazardous materials are stored correctly.
- To ensure that hazardous wastes are collected, treated, transported and disposed of in an environmentally sound manner.
- To prevent hazardous spills.

Potential Impacts

SMC will be storing the following materials on site:

- Diesel Fuel;
- Lube oil;
- ANFO;
- Emulsion; and
- High explosives.

The potential impacts that may arise from the incorrect storage, handling or transport of hazardous materials include, but are not limited to:

- contamination of the environment from spills;
- non adherence to management procedures and work instructions;
- complaints due to poor work practices;
- loss of reputation due to poor work practices; and
- environmental incidents due to poor work practices.

Management Strategy

Storage

- Handling, storage and disposal will be in accordance with the *Dangerous Goods Act 2004* and associated Regulations.
- Hydrocarbons will be stored in compliance with the Australian Standards for the Storage and Handling of Flammable and Combustible Liquids (AS 1940-2004), Guidance Note S301, Storage of Dangerous Goods Licensing and Exemptions (DMP, 2004), *Dangerous Goods Safety Act 2004* and associated regulations and Australian Dangerous Goods Code (Road and Rail) 7th Ed, (Australian Government, 2008).
- Storage of the materials will be as specified in Table 2.2.

- Storage facilities will be equipped with adequate fire control equipment and spill response kits.
- Material Safety Data Sheets (MSDS) will be available for all chemicals used within work practices within reach of the storage areas and also in administration. MSDS of the hazardous materials utilised by SMC will be maintained in a site office file and within chemical storage areas.
- All hazardous materials are to be stored within above ground, weatherproof and spill proof containers, which are appropriately labelled. All containers to be stored upright with the lids on.
- All hazardous materials are to be stored in impermeable double skinned tanks within bunding with the capacity to hold 110% of the stored volume.

Transport

- Hazardous materials will be transported to site in accordance with the standards below and as specified in Table 2.2;
    - Australian Standard 1940-2004: The storage and handling of flammable and combustible liquids;
    - *Dangerous Goods Safety Act* 2004 and associated regulations; and
    - Australian Dangerous Goods Code (Road and Rail) 7th Ed, (Australian Government, 2008).

Spills

- Specific site personnel will be trained in spill management. Records of these personnel will be maintained on site.
- Hazardous materials spills will be managed in accordance with the manufactures MSDS, as outlined in Table 2.2.
- Spill response will be handled as per WIN-001- Emergency Spill Response (major and minor).
- Monitoring
- All spill response training will be recorded within the training register.
- All incidents will be recorded in the incident register.
- Monthly Inspections of hazardous materials storage will be carried out as part of the SMC monthly audit.
- Hazardous materials storage areas will be inspected weekly.

Performance Indicators / Criteria

- House keeping inspections are undertaken.
- Spill response and fire prevention equipment present at stipulated locations on site.

Reporting

- Spills will be recorded as environmental incidents.
- Spill, where required, will be reported to the relevant Government Departments.

Table 2.2 – Storage of Hazardous Materials and Chemicals.

	Storage	Transport	Spill
Diesel Fuel	CPF – 2 X 1.5 Ml bulk fuel tanks Madoonga – 1.5 Ml bulk storage tank Beebyn - 1.5 Ml bulk storage tank Power station at Village – 100 Kl fuel tank Power station at the Airstrip – 20 Kl fuel tank Dewatering Bores – fuel for one weeks operations	DG class: 3-flammable Packing Group: III UN Number: 1202 Hazchem Code: none	See WIN-001, below.
Lube Oil	Heavy and light vehicle workshops	DG class: none Packing Group: none UN Number: none Hazchem Code: none	See WIN-001, below.
ANFO, emulsion and high explosives	Stored at the CPF in three distinct areas. : **ANFO**: within the magazine area. Store in clean, well ventilated and dry magazine licensed for Class 1 Explosives. Segregate from all other reagents including sunlight, specific incompatibilities, combustibles (including wooden pallets) and foodstuffs. Ensure magazines are adequately labelled and protected from physical damage/shock or friction. **Emulsion:** four liquid tanks with diaphragm pumps. **High Explosives**: converted sea container for detonator storage with a second container for high explosives. These will be separated by an earth bund. The area will be fenced, lit and monitored by CCTV, back to SCADA surveillance.	**ANFO**: DG class: 1.1D Packing Group: None UN Number: 0082 Hazchem Code: EEPG **Emulsion**: DG class: 1.1, 1.5 Packing Group: None UN Number: 0084 Hazchem Code: EEPG **High Explosives:** DG class: 1.5D Explosive Packing Group: UN Number: 0331 Hazchem Code: Explosive type E	If spilt (bulk), evacuate area and contact emergency services immediately. Eliminate all ignition sources. Contain spillage, then cover / absorb spill with non-combustible absorbant material (vermiculite, sand, or similar), collect and place in suitable containers for disposal. Prevent spill entering drains or waterways. CAUTION: Heating, impact or static charge may cause explosion.

WIN-001- EMERGENCY SPILL RESPONSE (MAJOR AND MINOR) WORK INSTRUCTION

Roles and Responsibility

All	• Clean up and remove of the spill. • Report all incidents to the Manager or delegate.
Manager	• Coordinate the spill clean up, where required. • Ensure that all clean up complete and waste disposed of appropriately. • Ensure that spill kits are maintained. • Ensure all incidents are recorded on the Incident Register.

Procedure

Spill Response kits shall be provided at set locations on site. These will be placed in areas that are convenient to access and in close proximity to hazardous areas.

The flowing procedure should only be undertaken if safe to do so. It should not endanger the personal safety of yourself or others.

- Spill response of both major and minor spill will follow the 3C's principal: Control, Contain and Clean up.
    - Control:
        - Identify the source and the product involved in the spill.
        - Get help if required.
        - Be aware of fumes.
        - Is safe, control the spill at the source by:

          Shut off valves.

          Stop the pump or process.

          Turn container upright.
        - Clear the area of people not involved in the clean up.
        - Contact the Manager to report the spill as an incident. Report the volume of spill, substance and location.
    - Contain:
        - Where appropriate wear correct PPE (gloves, goggles or mask).

- Block any flow towards drains. Either using spill kit materials or earth bunds.
- Place appropriate spill kit material over the body of the spill.

o Clean up:

- Spills on concrete or in bunded areas that have been contained can be absorbed by using the appropriate material.
- Spills on soils shall be contained and the contaminated soils excavated and removed to a licensed facility.
- Clean up all materials and dispose of appropriately.
- Inform the Manager of a list of products that need to be reordered for the spill kits.

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APPENDIX A RISK ASSESSEMENT

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Table A.1 – Consequence Severity Table

Consequence Severity	Environmental Definition
Catastrophic	Loss of ecosystem function across a wide area Extinction of a species regionally
Massive	Significant loss of plant communities, significant species at a regional level Extinction of a species locally
Major	Significant loss of significant species at the local level Habitat of significant fauna is significantly affected Vegetation communities significantly affected at regional level > 50% of individuals in the local population affected
Moderate	Significant deterioration/loss of vegetation communities at a local level A significant species is affected but not significantly 15% to 49% of individuals in the local population affected
Minor	Small number (<15%) of individuals in the local population of non-significant species or plant communities may be affected
Negligible	Very small number of individuals (<1.0%) in local population of non-significant species or plant communities may be affected. No significant addition to background level, No detectable change.

Table A.2 – Likelihood Ranking Table

Likelihood Category	Definition
7 – Almost Certain	Common repeating occurrence, ongoing Will occur most often Planned occurrence / action
6 - Likely	Will probably occur in most circumstances There is at least 50% chance that it may happen
5 - Possible	Might occur at some time Could occur but not often 5% chance it could happen
4 - Unlikely	Unusual occurrence Unexpected
3 – Rare / Improbable	May occur in exceptional circumstances Unheard of

Table A.3 – Risk Matrix

Likelihood Category		Consequence Category					
		3	4	5	6	8	9
		Negligible	Minor	Moderate	Major	Massive	Catastrophic
7	Almost certain	21	28	35	42	56	63
6	Likely	18	24	30	36	48	54
5	Possible	15	20	25	30	40	45
4	Unlikely	12	16	20	24	32	36
3	Remote	9	12	15	18	24	27

VERY LOW	9 – 16
LOW	18 – 25
MEDIUM	27 – 32
HIGH	35 – 40
EXTREME	42 - 63