International Minerals
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Balmoral South Iron Ore Project Environmental Impact Assessment and Management Programme

International Minerals Pty Ltd

May 2007

Environmental Impact Assessment and Management Programme

Prepared by

International Minerals Pty Ltd

In association with

Maunsell's Aecom Australia, SMEC and Aquaterra

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Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	13/10/2006			
B	06/12/2006	Incorporated comments from IM		
C	18/04/2007	Revised to incorporate comments from Consultation and updated base line studies.		
D	20/04/2007	For Submission of Referral to DEC		

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Executive Summary

International Minerals Pty. Ltd. (IM), a wholly owned subsidiary of Australasian Resources Limited 'ARH' (ASX Code: ARH), is developing a magnetite iron ore mine, processing facility and associated infrastructure in the Cape Preston Region of Western Australia, 80km south of Karratha ("the Balmoral South Project).

IM is the Proponent ("the Proponent") for this referral of the Balmoral South Project proposal under Part IV of the *Environmental Protection Act, 1986 ("the Act").*

The Proponent has entered into a series of agreements with Mineralogy Pty Ltd which provides for the rights and tenure to all Mineralogy tenements necessary to carry out the project. These agreements have been agreed by the Minister Resources Development and set out in First Schedule of the Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002 which was passed by the Parliament of Western Australia in 2002.

Mineralogy's tenements are divided into the Northern, Central and Southern Blocks. Mineralogy has undertaken extensive environmental assessment of the iron ore mining, processing and exporting operation in the local area over the past 7 years for the Mineralogy Central Block Project. During this time there has been thorough consultation with government departments, indigenous, conservation and local community groups.

The Mineralogy Central Block Project has formally assessed the environmental impacts of the development via Public Environmental Review (Austeel, 2000); and a Supplementary Environmental Review (Austeel, 2002). There has been an extensive environmental assessment of the overall site and more specifically a suite of Environmental Management Plans, Ministerial Conditions (Ministerial Statement 000634) and Proponent Commitments for the Mineralogy Central Block Project, which applies to and can be adapted or adopted to suit the Balmoral South project.

The Balmoral South Project has built on this previous work undertaken for the Mineralogy Central Block Project by completing, in consultation with all key stakeholders, environmental assessment of the impact of the Balmoral South Project, including the cumulative assessment of the impact of both projects within the Cape Preston Region.

This environmental assessment of the Balmoral South Project has highlighted that the issues which require management are consistent with those identified for the Mineralogy Central Block Project.

Given the high level of understanding of the impacts of this type of development in the local area and the understanding of how these impacts can be readily managed, including the cumulative impacts of the two projects, the Proponent believes that the Balmoral South Project can be adequately assessed through the Environmental Protection Statement or Assessed on Referral Information level of assessment.

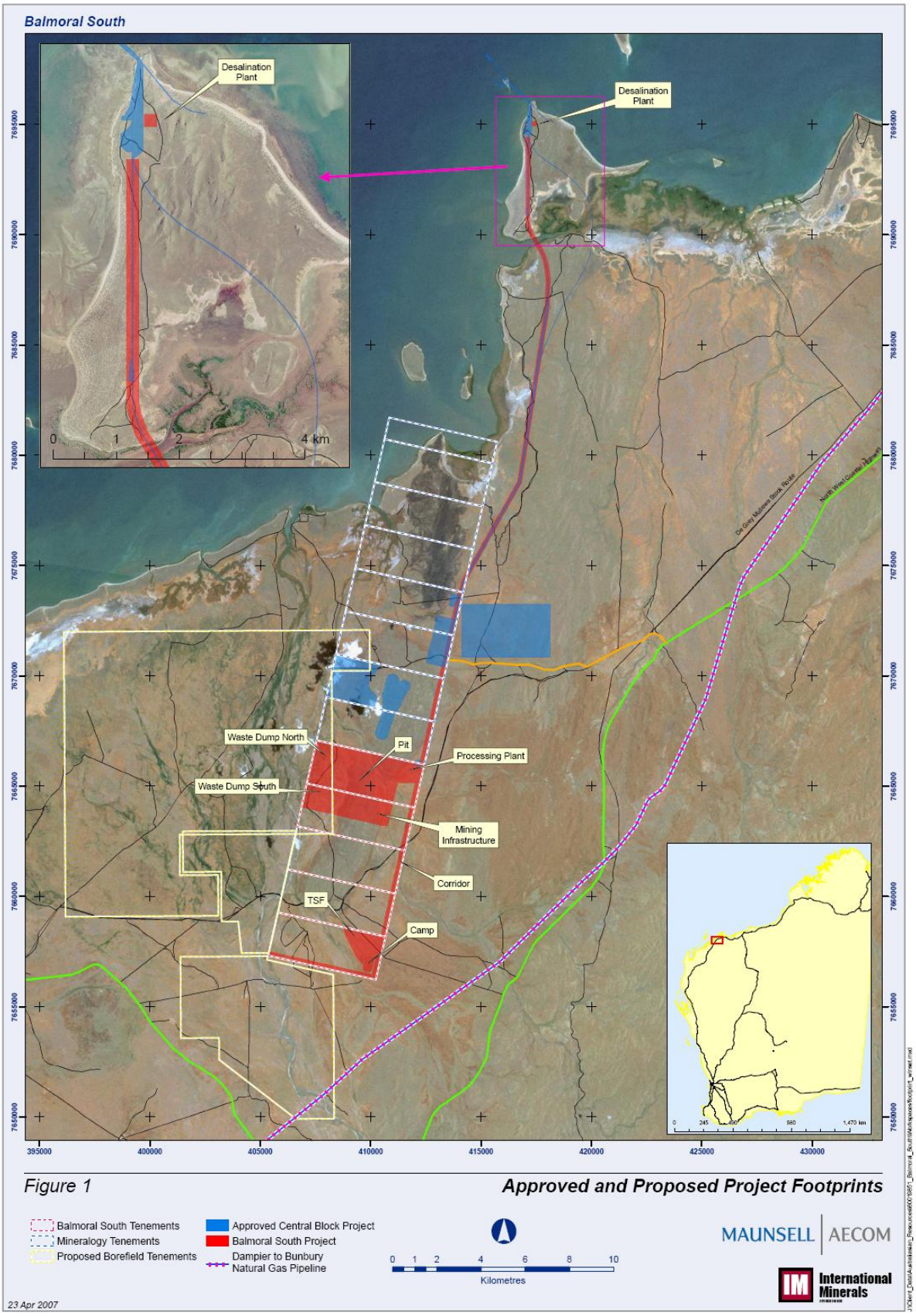

Figure 0.1: Balmoral South Block Project and Mineralogy Central Block Project Footprints

The Balmoral South Project has a number of significant strategic advantages which include: an estimated 1 billion tonne high quality magnetite deposit; its close proximity and access infrastructure including port facilities and related infrastructure near Cape Preston; a superior coastal location which is close to Asian markets; and finally, close proximity to one of the world's renowned gas fields, thus enabling access to a long-term energy resource.

The Proponent are currently finalising the development of the Balmoral South Project and the projected time for commencement of production is in 2010.

The following tables summarise project background, impacts and management of the site.

Table 0.1. Summary of the Key Components of the Balmoral South Iron Ore Project

Component	Element	Characteristic
Mining Operations		
Project Life	Approximately 20 years	Long life mine
Estimated Resource	1 billion tonnes	Balmoral ore reserve
Iron Ore Mining Rate	85 million tonnes per annum (Mtpa)	Open-pit ore extraction
Waste Volume	Tailings: 38 Mtpa Waste: 38 Mtpa	Tailings dam located within M08/130 Waste generated in mining process will be moved to waste dumps within the mining lease.
Size of Final Pit	3km x 1.5km x 300m	Open-pit
Final Pit Depth	300m	Open-pit
Dewatering Requirements	Less than 1 Giga litre per annum (GLpa)	Estimated interception of 4 – 8% of estimated groundwater in the Fortescue River alluvium and interception of most of the groundwater throughflow in basement rock aquifers within the vicinity of the pit - *(obtained from Pit Dewatering and Vegetation monitoring Plan)*
Required Water Resources	20 GLpa desalination plant	Desalination located at Cape Preston
Stripping Ratio	0.8 waste:ore	Ratio of waste to ore
Proportion of Waste to be Backfilled	nil	Waste will consist of shale, dolerite and oxidised Banded Iron Formation (BIF).
Estimated Total Area of Disturbance	2,400ha	Area of disturbance including pit, plant site, waste, tailings dam, desalination plants and other project infrastructure
Processing Requirements	Processing or beneficiation of metallic or non-metallic ore.	Iron ore will be processed through a crushing plant, concentration plant, pelletising plant and hot briquetted iron (HBI) plant.
Transportation	Extension of Mineralogy Central Block services corridor to 200m	Extension of services corridor width from Sino Iron's plant Site to Port to 200m for: product transportation, pipelines, roads, other services and infrastructure.

Component	Element	Characteristic
	A 200m wide infrastructure and services corridor.	Inside the eastern boundary of the mining leases (M08/126 to M08/130) and southern boundary of mining lease M08/130.
	A 200m wide infrastructure and services corridor.	Connecting the Balmoral South Project plant to the Mineralogy Central Block services and infrastructure corridor.
	Construction of roads.	To enable general traffic, haulage, mine, accommodation and infrastructure maintenance access.
General		
Power Generation	Up to 350 MW gas fired power station within the processing plant site;	Gas consumption for power station and processing plant up to approximately 65,000 Tera Joules per annum (TJpa);
Accommodation Village	Temporary construction camp for up to 4000 construction personnel; Temporary construction facilities such as offices and batch plant.	The initial camp will be 4000 beds and when the capacity is no longer required it will be downsized to 1000 beds.
Waste Water Management	A package sewage treatment plant will treat sewage water from on-site accommodation facilities.	The treatment plant will be sized for 4000 personnel. (Section 5.11.3)
Solid Waste Management	A landfill will be located and maintained in the project area for inert waste and putrescibles.	Location is yet to be determined, but will be situated to meet all safety, health and environmental requirements. (Section 5.11.2 and 5.11.3)

The Balmoral South iron ore project will bring significant long term benefits, over an extended mine life expectancy, to the people of Western Australia as summarised in Table 0.2.

Table 0.2. Project contributions to the benefit of Western Australia.

Project Benefit	Description
Employment	• up to 4000 construction jobs will be created. • up to 1000 permanent and direct employment during operation • up to 2000 indirect jobs through services;
Export Market Establishment	• creation of a new iron ore area which has potential for ultimate extraction of up to 100 billion tonnes of resources;
Innovation and Technological Improvement	• export of pellets from WA and resuming the export of HBI processed using a proven technology
State and Federal Government Revenue	• provision to the state of some $900 million of royalties over the current life of the project with the likelihood of increased royalties with further expansion.
Boosted Local Economy	• the expected workforce will be accommodated on-site. Some of the workforce is expected to commute from Perth on a fly in fly out basis with the remainder domiciled in Karratha.

As preparation for this document a Project Briefing Paper was issued to stakeholders. A number of issues were raised during the process that reconfirmed the environmental impacts that need to be appropriately assessed and managed. The Proponent considers the expected environmental impacts can be readily avoided, minimised and/or managed to ensure the development of the Project. Table 0.3 provides a description of the key environmental impact, the approach to assessing the impact, details of how these impacts will be managed and references to where additional information can be found.

Table 0.3. Summary of Environmental Impacts

Impact	Description	Approach	Management	Reference
Flora and Vegetation				
Vegetation Clearing	Approximately 2,400 ha of vegetation is expected to be cleared for the pit and associated infrastructure.	Three detailed flora and vegetation surveys have been conducted within the project area to date. An initial vegetation and flora survey was undertaken between the 15th and 28th of April 2000 in preparation of the Mineralogy Central Block Project's Public Environmental Review process (Halpern Glick Maunsell, 2001). Additional, surveys were undertaken in 2003 and 2006 by Maunsell Australia to assess the impact of the Balmoral South Project on the local vegetation, specifically addressing the impact of the development on Priority Flora, Mangroves, phreatophytic vegetation and Cracking Clay Grasslands. The flora communities to be impacted are consistent with those identified for the Mineralogy Central Block Project. As such Management and Monitoring Programmes have been adopted from those produced for the Mineralogy Central Block project.	Detailed design will give consideration to the locations of priority flora species as appropriate. Minimise clearing as much as practicable commensurate with the requirements of mining and progressive rehabilitation.	**Vegetation Management and Monitoring** *(Section 5.1.3)* **Preliminary Decommissioning and Closure Plan** *(Section 5.16)* (*adapted from the approved Central Block Project Preliminary Decommissioning and Closure Plan*)
Priority Flora	Three Priority Three listed species of flora have been identified within the project area.		To ensure compliance with all statutory requirements relating to all flora species within the project area. Where possible, any disturbance of populations of Priority or listed flora will be avoided. The level of unavoidable disturbance will be monitored and appropriately managed.	**Vegetation Management and Monitoring** *(Section 5.1.3)*
Cracking Clay Grasslands	Cracking clay grasslands are recognised as regionally significant vegetation communities.		Where possible, the Proponent will endeavour to minimise any clearing of these grasslands within its project area. Pastoral lease boundary rationalisation planned for 2015 will ensure that substantial areas of these grasslands are preserved within the conservation estate.	**Vegetation Management and Monitoring** *(Section 5.1.3)*
Phreatophytic Vegetation	Some unavoidable loss of phreatophytic vegetation (groundwater dependent vegetation) will occur as a result of groundwater drawdown.		The Proponent will manage the rate of drawdown as much as is practicable to assist vegetation to adapt to the change in groundwater levels. Rehabilitation will also focus on encouraging the return of phreatophytic vegetation wherever possible. A monitoring and assessment program will be established which will assess the	**Ground Water Impacts and Management** *(Section 5.5)*

Impact	Description	Approach	Management	Reference
			impact of groundwater drawdown on vegetation.	
Mangrove Communities	Infrastructure corridor crossing of Mangrove Creek Tidal changes reducing viability of local Mangrove community		• Monitor Mangrove community for change in viability • Undertake remedial actions if decline detected • Construction techniques adopted to minimise impact on mangrove communities.	**Vegetation Management and Monitoring** *(Section 5.1.3)*

Impact	Description	Approach	Management	Reference
Fauna				
Fauna Habitat	The vegetation that will be impacted constitutes a variety of fauna habitats.	The fauna field assessment of the South Balmoral study area was conducted in accordance with the EPA Guidance Statement No. 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA, 2003) for Level 2 Surveys, encompassing: • desktop studies; • field survey, encompassing: - opportunistic sightings and sampling; and - a targeted trapping program. The fauna field survey was conducted during October in accordance with advice from DEC that this timing would record optimum fauna records. This was predicted as animals feeding on abundant annuals and a range of flowering plants will be most active at this time, following rains and the onset of warmer weather, typical of what occurred during October. In addition, temperatures in the Pilbara region are	None of these habitats have been determined as regionally or locally significant by several previous fauna surveys conducted over the Balmoral leases. Detailed design will be undertaken to minimise as much as practical the extent of clearing (fauna habitat) for construction and operational activities. Any relocation program will be done with consultation of the DEC and other stakeholders to ensure suitable protocols and permits are in place. Presence of suitably qualified environmental staff during operations.	**Fauna Management and Monitoring** *(Section 5.2.3)*
Priority Fauna	A search of the Department of Environment and Conservation's Threatened Fauna Database revealed seven priority fauna species that		Only two of these species (White Bellied Sea Eagle and Rainbow Bee eater) was observed during detailed ground survey work, however the White Bellied Sea Eagle was a single observation and as no habitat was located, the observation was considered to be an opportunistic	**Fauna Management and Monitoring** *(Section 5.2.3)*

Impact	Description	Approach	Management	Reference
	may occur within the project area (Priority 1 to Priority 4). In addition two species listed as migratory species under the *Environment Protection and Biodiversity Act 1999* (EPBC act) were observed.	increasing at this time, and reptiles and other cold blooded animals are regarded as far more active. The field survey took place between the dates of 21st and 29th of October 2006.	visitation. The Rainbow Bee Eater was observed on numerous occasions particularly along the river and creek lines. The Bee Eaters are widespread in distribution and have been described as common. Specifically, the Proponent aim to maintain the abundance, diversity, distribution and functionality of fauna to be impacted by the project at a species and ecosystem level through minimising or avoiding impacts on target species.	
Subterranean Fauna	Groundwater extraction has the potential to affect resident subterranean fauna.	The aquifers involved are unconfined and accordingly any resident subterranean fauna are able to migrate away from the cone of depression.	The Proponent commit to the preparation and implementation of a stygofauna survey and monitoring programme prior to the commencement of pit dewatering.	**Ground Water Impacts and Management** *(Section 5.5)*

Impact	Description	Approach	Management	Reference
Water				
Surface Water	Location of mine site infrastructure, waste dump, plant, tailing storage facility (TSF) and camp site will impact the surface water	Hydraulic modelling was performed on surface water flows. The modelling took into consideration the cumulative impacts of the Balmoral South and Mineralogy Central Block Projects. The following potential impacts from the mine site were identified: • Water levels will rise upstream of the waste dump by 0.37m (with the cumulative impacts Central Block waste dump included); • Plant site bunds will increase water levels in Du Boulay Creek by up to 1.0m; • All other infrastructure is generally located out of the Fortescue River and Du Boulay floodplains. Infrastructure may be located on minor streams but no major watercourses are interrupted and no impact on water levels is expected from the infrastructure; and • Localised increases in velocities around infrastructure.	Detailed design will be undertaken to minimise as much as practical the impacts to surface water. These measures include: Diversion bunding to redirect surface water around mine structures and into adjacent or downstream flow pathways to minimise changes in volume and peak flows. Riprap/armouring to slow and redistribute runoff, particularly in ecosystem sensitive sheet flow zones. Culverts to ensure major flow paths intercepted by roads and other infrastructure are not disrupted. Locate mine site infrastructure so as to minimise encroachment into the 100yr ARI floodplain.	**Surface Water Impacts and Management** *(Section 5.4)*
River Floods	Flood of Fortescue River	The surface water impacts of a 100 year ARI flood event in the Fortescue River include: The cumulative flood assessment demonstrated that the Balmoral South Project will have no additional impacts on flood levels than those shown for the Mineralogy Central Block Project except that the 0.37m increase in flood level will extend further upstream. Increased loss of flow from the	To minimise the impacts on surface water of the Fortescue River flood: Local diversion channels will be constructed around the waste dump to redirect surface water into adjacent or downstream flow pathways to minimise changes in volume and peak flows. Bunds and drainage diversion works will be constructed around the waste dump to maintain separation between the river water and water internal to the waste	**Surface Water Impacts and Management** (*Section 5.4)*

Impact	Description	Approach	Management	Reference
Water				
		Fortescue River main channel through break-out channels. Increased sedimentation and erosion if flow velocities around mine infrastructure increase. The peak flood event on the Fortescue River will not coincide with the peak flood event on the Du Boulay Creek.	dump.	
Creek Floods	Flood of Du Boulay Creek	The surface water impacts of a 100 year ARI flood event in the Du Boulay Creek include: • Increased water levels in the Du Boulay Creek due to bunding around the plant site with a maximum water level increase of about 1m adjacent to the conveyor system; • An increase in downstream velocities as flow exits the confinement between two hills, and a decrease in upstream velocities adjacent to the plant site; • Accentuated meandering of the flow path after bund construction, increasing the potential for locally higher velocities and scouring; and • Contamination of local waterways from plant site. The peak flood event on the Du Boulay Creek will not coincide with the peak flood event on the Fortescue River.	To minimise the impacts on surface water of Du Boulay Creek flood: • Construct bunding to contain contaminated runoff as well as divert flows around plant site; and • Locate mine site infrastructure such as to minimise encroachment of bunds on the 100 year ARI Du Boulay Creek floodplain.	**Surface Water Impacts and Management** *(Section 5.4)*
Water Quality	Surface water quality	There is potential for the water quality of flows downstream of the proposed infrastructure to deteriorate. The risk of erosion and sedimentation due to surface runoff is high,	To minimise erosion and contaminant discharge to the external environment: Construction phase of the mine site will be planned for the dry season where practicable, and stabilisation measures	**Surface Water Impacts and Management** (*Section 5.4)*

Impact	Description	Approach	Management	Reference
Water				
		particularly on disturbed or degraded land. Sediment deposition can reduce the capacity of water courses and impact water course ecology. Discharge of various chemicals, including hydrocarbons can originate from the construction camp and accommodation village, sewage treatment plant, mine workshop, waste dump and Tailings Storage Facility (TSF).	will be used in high erosion risk zones. Surface water runoff from disturbed areas such as the waste dumps and stockpiles will be bunded and treated in sediment traps prior to discharge. The waste dump area may be dished in the centre to be internally draining, thus reducing contaminated runoff and the potential for erosion down the dump face. Bunds and drainage diversion works will be constructed around the perimeter of all infrastructure areas to divert and prevent natural runoff waters originating outside the development sites from mixing with possibly contaminated internal site runoff.	
Surface Water Run-off Contamination of the Fortescue River Alluvial Aquifer	Potential for contamination of the adjacent aquifer from contaminated surface water run-off.	There is potential for interaction between surface water and the underlying aquifer Contaminated runoff could recharge into the groundwater	To minimise the undesirable interactions between surface and ground water: • Contaminated runoff should be contained and treated	**Surface Water Impacts and Management** (*Section 5.4)*
Groundwater Levels	Development of the mine pit will require dewatering which will cause a cone of depression in the local water table.	The cumulative cone of depression from the Central and Southern Block Projects has been modelled and impacts on groundwater levels determined. Flow on effects to other users, phreatophytic flora and subterranean fauna have been predicted.	Groundwater monitoring programmes will be implemented to monitor water level drawdown. Trigger levels have been established at which point mitigation measures will be implemented following consultation with DEC and DoW.	**Groundwater Impacts and Management** *(Section 5.5)*
Ground Water Contamination of the Fortescue River Alluvial	Interaction between the basement rock aquifer around the mine site and Fortescue River Alluvial	The groundwater drawdown cone of depression is predicated to extend only to the margin of the Fortescue River Aquifer. This is due to the low	Groundwater monitoring programmes will be implemented to monitor water quality of the Fortescue River Alluvium to ensure: • The pit dewatering is not lowering the	**Groundwater Impacts and Management** *(Section 5.5)*

Impact	Description	Approach	Management	Reference
Water				
Aquifer	could potentially lead to the following impacts on the Fortescue River Alluvial Aquifer:: • excessive lowering of the water table; and • contamination from spillages in the mine area	porosity/permeability in the rock separating the two structures. Modelling has demonstrated that the potential for these impacts is negligible.	Fortescue River Alluvium Aquifer water table; and • The water quality of the Fortescue River Alluvium Aquifer is not impacted.	
	Other groundwater users	The watertable may fall below pump inlets or the base of some local bores causing them to dry up.	Should local water bores dry up then it is proposed to ensure continuation of water supply by either supplying water or installing deeper replacement wells.	**Groundwater Impacts and Management** *(Section 5.5)*
Flora	Phreatophytic vegetation	The watertable may drop below the root zone of some groundwater dependent vegetation resulting in their death.	There will be some unavoidable loss of phreatophytic vegetation but it will be minimised by reducing water level drawdown rates where possible, monitoring vegetation and vegetation stress and implementing offset measures at identified trigger levels.	**Groundwater Impacts and Management** *(Section 5.5)*
Subterranean Fauna	Groundwater extraction has the potential to affect resident subterranean fauna.	The aquifers involved are unconfined and accordingly any resident subterranean fauna are able to migrate away from the cone of depression.	The Proponent commit to the preparation and implementation of a stygofauna survey and monitoring programme prior to the commencement of pit dewatering.	**Ground Water Impacts and Management** *(Section 5.5)*
Groundwater Quality/hyper salinity	Development of the mine pit will produce a pit void which will fill with water on cessation of mining/ dewatering which will act as a groundwater sink.	There is the potential for long term build up of salinity in the pit lake due to evaporative concentration which could locally impact groundwater quality.	Groundwater investigation has demonstrated that the pit will become a groundwater sink and that saline water will largely remain confined to the immediate pit area. Any flow of hyper saline water out of the bottom of the pit will be well below regional water tables and there will be no impact on useable groundwater resources. The management of the pit	**Preliminary Decommissioning and Closure Plan** *(Appendix L)* **Ground Water Impacts and Management** *(Section 5.5)*

Impact	Description	Approach	Management	Reference
Water				
			void is addressed in the Preliminary Decommissioning and Closure Plan.	
Du Boulay Creek	Development of the mine pit will intersect Du Boulay Creek alluvium.	The proposed mine pit will intersect the Du Boulay Creek alluvium which may lead to excessive groundwater inflows into the mine pit and dewatering of the alluvium which may impact phreatophytic vegetation and stygofauna habitat in the Du Boulay Creek area.	Where practicable, design engineering will ensure groundwater flow from the Du Boulay Creek alluvium into the mine pit will be minimised.	**Ground Water Impacts and Management** *(Section 5.5)*
Water Supply	A 20 GLpa desalination plant will be located at Cape Preston which includes the provision for a sea water intake and waste water outfall.	Brine dispersion modelling indicates that the waste water outfall will not significantly affect water quality at the outfall location, and will meet all requirements within the moderate protection zone approved for the Mineralogy Central Block Project (4ha surrounding wastewater discharge location).	Management will be in accordance with the conditions imposed on the Central Block Project by Ministerial Statement 000635.	**Water Supply Impacts and Management** *(Section 5.6)*
Wastewater	Sewage treatment plants will be constructed at appropriate locations.	In order to reduce demand on potable water, treated sewage effluent will be recycled for the irrigation of established vegetation surrounding the project area.	Treated waste water will be applied in accordance with appropriate guidelines and legislation.	**Water Supply Impacts and Management** *(Section 5.6)*
Air Quality				
Dust Emissions	The mining process; ore processing and ore handling will produce dust emissions.	Dust issues identified for the Balmoral South Project are consistent with the Central Block Project. The Proponent commit to complying with the Central Block Dust Management Plan.	These will be managed using standard dust suppression techniques where appropriate such as water sprays, chemical suppressants and dust collection systems. IM will ensure that salinity levels of water used for dust suppression will be suitable for use on vegetation.	**Dust Management** *(Section 5.7) (adopted from Central Block Project Dust Management Plan – approval pending)*

Impact	Description	Approach	Management	Reference
Water				
Aerial Emissions	Greenhouse gas emissions	Air emission modelling has demonstrated that the cumulative emissions from both the Central and Southern Block Projects will be within the criteria approved under Ministerial Statement 000635 for the Central Block Project.	Greenhouse gas issues identified for the Balmoral South Project are consistent with the Central Block Project. The Proponent commit to complying with the Central Block Greenhouse Gas Management Plan.	**Greenhouse Gas Management Plan** *(Section 5.8) (adopted from Central Block Project Greenhouse Gas Management Plan – approved)*
	Other gaseous emissions	Oxides of Nitrogen (NOx) and Sulphur Dioxide (SO_2) will arise from operation of the pellet plant, power station and HBI plant. Modelling, including the cumulative effect of the Central and Southern Block projects, has been completed and indicates that emissions arising from both projects are within acceptable criteria of EPA Guidance Statements 15 and 55.	The Proponent commit to ensure that gaseous emission are within criteria defined within Section 5.8.3, Table 5.15 Strategies to control and minimise aerial emissions will be employed in accordance with the National Environment Protection (Ambient Air Quality) Measure.	**Gaseous Emission Management** *(Section 5.7.4)*
Noise Emissions	The mining process; ore processing and ore handling will produce some noise emissions.	Noise modelling has demonstrated that the cumulative effects from both the Central and Southern Block Projects will comply with relevant EPA noise regulations (1997).	In the event that noise emissions exceed regulatory target levels at sensitive receptors industry best practice measures will be used to further minimise noise emissions.	**Noise Emissions Management** *(Section 5.9)*
Social				
Aboriginal Heritage	Archaeological and Ethnographic values	Archaeological and ethnographic studies in the project area have revealed previously identified Aboriginal Heritage sites.	Management of potential impacts will be pursuant to the *Aboriginal Heritage Act, 1972* and in accordance with the requirements of Mineralogy's approved Aboriginal Heritage Management Plan. The Proponent commit to complying with this plan.	**Aboriginal Heritage Management Plan** *(Section 5.1.3)* (*Mineralogy Central Block Project's EMP applies*).
Recreational Use	Anthropogenic impacts on the area of Cape Preston.	Set performance targets to minimise the impacts from project related	Recreational use issues identified for the Balmoral South Project are consistent with the Central Block Project. The Proponent	**Recreational Use Management Plan** *(Section 5.3) (Central Block Project's Recreational Use*

Impact	Description	Approach	Management	Reference
Water				
		recreational activities.	commit to complying with the Central Block Recreational Use Management Plan.	*Management Plan applies – approved)*

Impact	Description	Approach	Management	Reference
Port				
Port	Product will be conveyed to the port facilities which will be established by the Mineralogy Central Block Project and Balmoral will where necessary carry out such works to expand the facilities where required. The Proponent will utilise the same technology and mythology as Mineralogy Central Block when loading and exporting its additional 12Mtpa products which inter alia may include additional loading and materials handling facilities.	The impact of the port and loading facilities has been assessed for the Mineralogy Central Block Project. IM commits to all conditions set out in Ministerial 0635.	The Proponent commit to comply with the requirements of these conditions including the adoption of management plans as appropriate.	***(Section 1.0)*** **Marine Environmental Management Plan** *(Central Block Project's Marine Environmental Management Plan applies – approval pending)* **Port Environmental Management Plan** *(Mineralogy Central Block Project 's Port Environmental Management Plan applies – approval pending)* **Oil Spills Contingency Management Plan** *(Mineralogy Central Block Project's Oil Spills Contingency Management Plan applies – approval pending)* **Ballast Water Management Plan** *(Mineralogy Central Block Project's Ballast Water Management Plan applies – approval pending*)

Table 0.4. Proponent's commitments

Topic	Objective	Commitments	Timing	Advice From
Environmental Management System *(Appendix K)*	Manage environmental impacts of the project and promote environmental excellence	Prepare and implement and Environmental Management System that is consistent with the ISO 14001 Standard.	Prior to Commissioning	DEC
Flora and Vegetation	Compliance with Statutory requirements Minimal negative impact to the health of flora and vegetation within the project area	Manage impacts on Flora and Vegetation through a process of avoidance, minimising disturbance, monitoring and rehabilitation • minimise clearing wherever possible • avoid all threatened species unless absolutely unavoidable • monitor the impact of dewatering, dust and weed infestations • procedures as outlined in progressive re Monitor Mangrove community for change in viability • Undertake remedial actions if decline detected • Construction techniques adopted to minimise impact on mangrove communities. rehabilitation plans In addition the Proponent commits to implementing a minimum clearing policy and responsible traffic management.	Prior to construction and ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Fauna Flora	Compliance with Statutory requirements Minimal negative impact on fauna within the mining lease Maintenance and protection of key fauna habitats, populations and linkage corridors	Manage impacts on fauna through a process of avoidance, minimising disturbance, monitoring and rehabilitation; • minimise or avoid impacts on target species and habitats. • undertake various monitoring programs to detect project impacts on local fauna • detailed design will consider habitat values and where possible will avoid destruction of Cracking Clay Grasslands and drainage lines. • procedures as outlines in progressive rehabilitation plans. • workforce education, minimal fencing and waste management.	Prior to construction and ongoing during operation	DEC
Recreational Use areas	Limit the impact on the surrounding environment of all recreational activities Modify and address any activities that have adverse impact on the surrounding environment	• Implement Mineralogy Central Block Project's *Recreational Use Management Plan*. • Review performance measures in accordance with project environmental management system	Prior to construction and ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Surface Water	Minimise the potential for contaminated runoff to recharge into the aquifer. Minimise adverse impacts on surface water quality within the project area and downstream of infrastructure. Minimise surface water impacts of a 100 year ARI flood event in the Du Boulay Creek and Fortescue River. Reduce the risk of erosion and sedimentation deposition impacts on water course ecology.	Detailed design will be undertaken to minimise as much as practical the impacts to surface water. These measures include: • Diversion bunding; to redirect surface water around mine structures and into adjacent or downstream flow pathways (minimising changes in volume and peak flows); to contain contaminated runoff as well as divert flows around plant site; to maintain separation between the river water and water internal to the waste dump. • Riprap/armouring to slow and redistribute runoff, particularly in ecosystem sensitive sheet flow zones. • Culverts to ensure major flow paths intercepted by roads and other infrastructure are not disrupted. • Locating mine site infrastructure so as to minimise encroachment into the 100yr ARI floodplain. • Construction phase of the mine site will be planned for the dry season where practicable, and stabilisation measures will be used in high erosion risk zones. • Surface water runoff from disturbed areas such as the waste dumps and stockpiles will be bunded and treated in sediment traps prior to discharge. • The waste dump area may be dished in the centre to be internally draining, thus reducing contaminated runoff and the potential for erosion down the dump face. • Minimising undesirable interactions between surface and ground water by containing and treating contaminated runoff.	Prior to construction and ongoing during operation	DEC/DoW

Topic	Objective	Commitments	Timing	Advice From
Ground Water	Minimise adverse impacts on groundwater levels and quality. Limit the impact on phreatophytic vegetation and stygofauna habitat. Minimise the potential for salinity build up in the pit lake that may impact the groundwater quality. Minimise groundwater inflows into the mine pit.	Detailed design will be undertaken to minimise as much as practical the impacts to groundwater. These measures include: • Groundwater monitoring programmes to monitor water level drawdown. This will ensure pit dewatering is not lowering the Fortescue River Alluvium Aquifer water table, and water quality is not impacted; • Reducing water level drawdown rates where possible to avoid the loss of phreatophytic vegetation, implement monitoring and offset measures at identified trigger levels. • Monitor groundwater quality in bores following pit closure. • Engineering design to minimise groundwater flow from the Du Boulay Creek alluvium into the mine pit; and • Implementing a stygofauna survey and monitoring programme prior to the commencement of pit dewatering.	Prior to construction and ongoing during operation	DEC/DoW
Water Supply	Minimise adverse impacts to the health of the ecosystem in the vicinity of the wastewater outfall from the desalinisation plant.	The Proponent commits to managing water supply operations in accordance with the conditions imposed on the Mineralogy Central Block Project by Ministerial Statement 000635.	Prior to construction and ongoing during operation	DEC/DoW

Topic	Objective	Commitments	Timing	Advice From
Dust	Dust emissions comply with criteria as defined in National Environmental Protection Measure - Air Quality Standards and Goals -Dust	• Implement the *Central Block Dust Management Plan.* • The Proponent commits to implementing best practice dust management procedures and monitoring program in both construction and operation phases to monitor performance against predefined criteria. • Adherence to National Environmental Protection Measure - Air Quality Standards and Goals - Target Limits	Ongoing during construction and operation	DEC
Gaseous Emissions	Gaseous emissions comply with criteria as defined in National Environmental Protection Measure - Air Quality Standards and Goals - Gaseous Emissions	Implement best practice emissions management to ensure emissions are contained within acceptable criteria. Establish a meteorological station to collect ambient air quality data. Implement monitoring program.	Detailed design 12 months prior to DRI or power station construction Ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Greenhouse Gas Emissions	Consistent with the National Greenhouse Strategy	The Proponent commits to implementing the *Mineralogy Central Block Projects Greenhouse Gas Management Plan.* Employ the most energy efficient and best available construction and operational technology to minimise greenhouse gas emission, including • increased furnace utilisation; • increased in-situ reforming; • higher reducing gas temperatures; • increased reducing gas quality; • decreased reformer size; and • greater heat recovery.	Ongoing during construction and operation	DEC
Noise Emissions	Compliance with required noise emission levels pursuant to the Environmental Protection (Noise) Regulations (1997)	*Implement Noise Management Program* that complies with EP Noise Regulations. Conduct blasting operations monitoring and management.	Prior to construction and ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Waste Storage, Treatment or Disposal	Compliance with Statutory requirements Waste minimisation consistent with the strategic direction for waste management in WA	Implement *Waste Management Plan* (adopted from Mineralogy Central Block Project) Use both onsite and off-site facilities to ensure appropriate disposal of all waste • collect and dispose inert waste and putrescibles in an on-site landfill; • transport all industrial waste and hazardous waste off-site for appropriate disposal by certified contractor; • establish a bioremediation landfarm if hydrocarbon spills occur; • treat and dispose sewage waste through a sewage treatment system • minimise waste through waste separation and off-site recycling • Implement monitoring program	Ongoing during operation	DEC
Soils	Compliance with Statutory requirements	• Manage acid mine drainage, asbestiform materials and soil contamination in accordance with statutory requirements if encountered. • Asbestiform materials and soil contamination in accordance with statutory requirements if encountered. • Any contaminated soils will be treated and disposed of in an approved manner.	Ongoing during construction and operation	DEC DoIR
Risk and Safety	Compliance with Statutory requirements	Formulate a suitable *Safety Management System*. Incorporate appropriate safety precautions into the design of the transfer pipeline and power station.	Prior to construction	DoIR

Topic	Objective	Commitments	Timing	Advice From
Indigenous Heritage	Compliance with the *Aboriginal Heritage Act, 1972* requirements	Conduct all operations in accordance with Mineralogy's *Aboriginal Heritage Management Plan.* Reference to DIMA Section 18 clearances and requirements (being processed).	Ongoing during construction and operation	DIA
Public Health	Minimise mosquito breeding areas	Use best practises and comply with relevant standards in designs of sewage/waste water treatment system and landfill.	Prior to construction and ongoing during operation	DEC
Sustainability	The project need to consider impacts on community and environment	The Proponent commit to sustainability and long-term economic health.	Prior to construction and ongoing during operation	DEC, DoIR
Closure Planning / Decommissioning	Ensure, as far as practical, that rehabilitation achieves stable and functioning landform consistent with surrounding landscape	Prepare and implement a *Preliminary Decommissioning and Closure Plan*.	Prior to construction	DoIR DEC

1.0 Description of proposal

1.1 Background

International Minerals Pty. Ltd. (IM), a wholly owned subsidiary of Australasian Resources Limited 'ARH' (ASX Code: ARH), is developing a magnetite iron ore mine, processing facility and associated infrastructure in the Cape Preston Region of Western Australia, 80km south of Karratha ("the Balmoral South Project).

IM is the Proponent ("the Proponent") for this referral of the Balmoral South Project under Part IV of the *Environmental Protection Act, 1986 ("the Act").*

The Proponent has entered into a series of agreements with Mineralogy Pty Ltd which provides for the rights and tenure to all Mineralogy tenements necessary to carry out the project. These agreements have been agreed by the Minister for Resource Development and set out in First Schedule of the Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002 which was passed by the Parliament of Western Australia in 2002

The Balmoral South Project is adjacent to the Mineralogy Central Block Project ("Mineralogy Central Block Project") as shown in Figure 1.1. The Mineralogy Central Block Project has current approvals for the development of a mine, processing plant, stockyards, ports, dredging and associated infrastructure under the conditions set out in Ministerial Statement 0634.

The Balmoral South Project entails establishment of a new mine, processing facilities and infrastructure. IM has access to additional infrastructure that is the subject of separate approvals applications including:

- Korean Steel Pty Ltd is currently finalising approval for additional stockyard facilities at Cape Preston and once approved will allocate the rights for the Proponent to utilise 1 Mtpa capacity of this facility.
- From the stockpile product will be conveyed to the port facilities which will be established by the Mineralogy Central Block Project and the Balmoral South Project will, where necessary, carry out such works to expand the facilities where required. The Proponent will utilise the same technology and mythology as Mineralogy Central Block when loading and exporting its additional 12Mtpa products which inter alia may include additional loading and materials handling facilities.
- A borefield located on the west side of the Fortescue River, which is currently the subject of a separate water allocation application being prepared by Mineralogy. Whilst the borefield is the preferred option the sustainable capacity of the aquifer is as yet unproven. The referral is based on alternative water supply from a desalination plant.

Figure 1.2 indicates those areas that are the subject of previously assessed proposals (blue) and the areas currently included in this proposal (red).

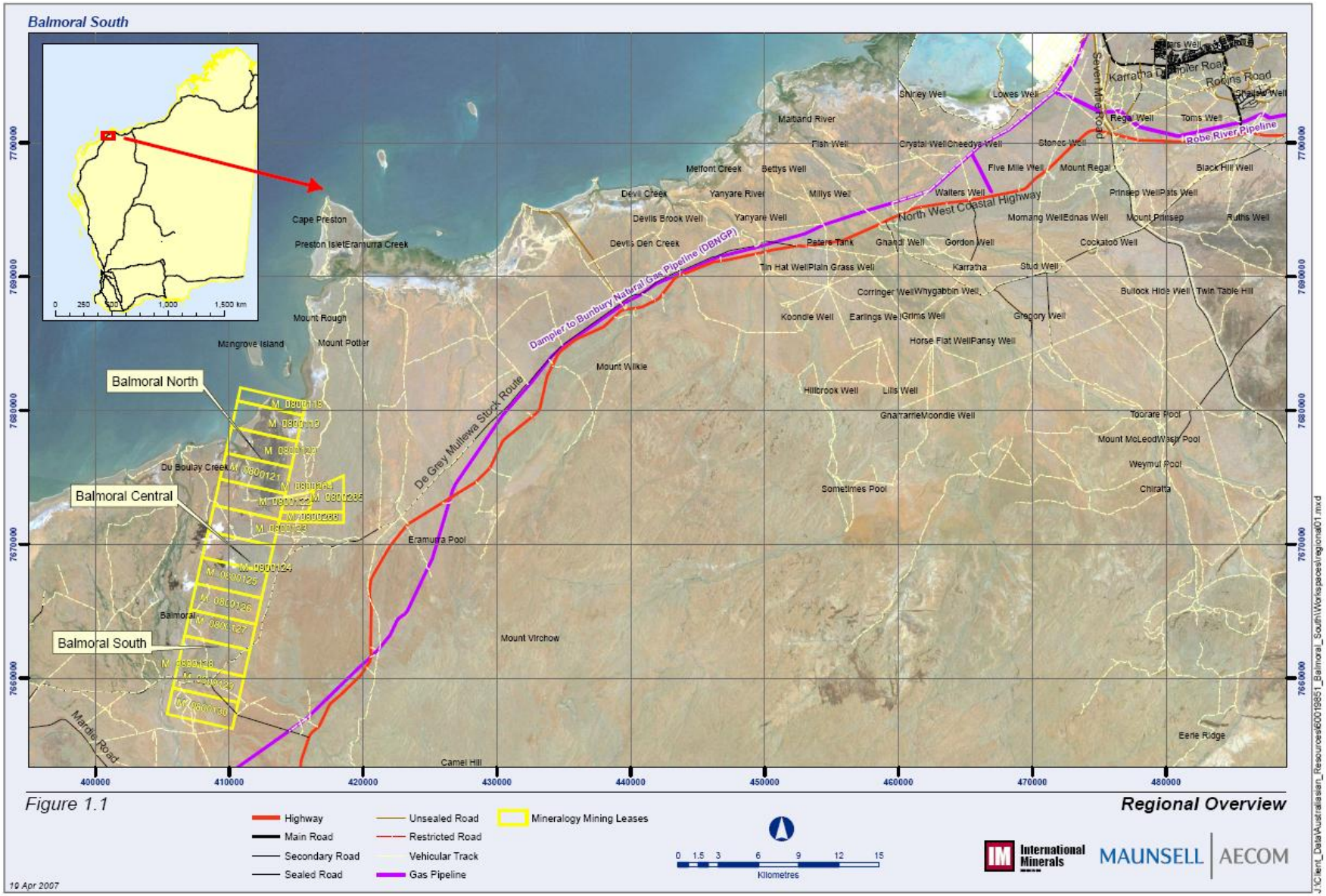

Figure 1.1. Project Locality Plan

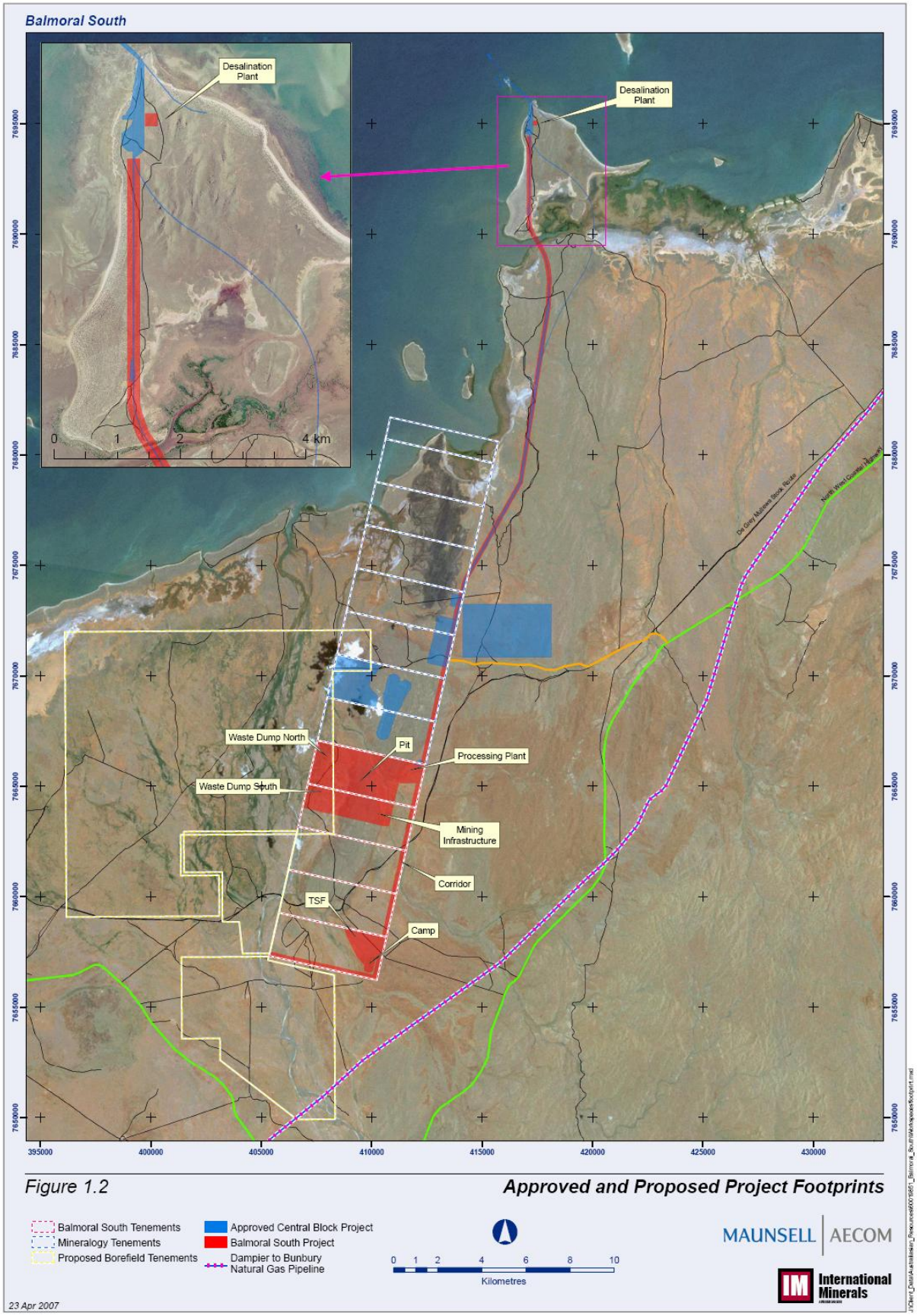

Figure 1.2. Approved and proposed footprints

1.2 Ore Processing

The mining process will involve open-pit ore extraction. It is expected that most of the material will be blasted before loading and drills will be employed to drill the full depth of each mining bench. Once blasted, the ore and waste will be mined separately. The material will then be delivered to the crusher via trucks and / or conveyors. Crushing will occur before transport by conveyor to the concentration plant. In-pit crushing is being examined as an alternative option. The mining rate is expected to be up to 85 Mtpa comprising 47 Mtpa of ore and 38 Mtpa of waste for a minimum of 20 years. The amount of ore and waste mined annually will vary according to the pit configuration at the time, ore quality and market requirements.

Waste will be generated in the mining process and moved to the waste dumps to be located west of the pit, within the mining lease. This waste dump will move along the pit as it develops and a number of haul roads are expected to be constructed on the western side of the pit to accommodate waste transport. The dump will be designed with 30m lifts with a 5m separating berm. Waste is expected to consist of shale, dolerite and oxidised BIF that is considered uneconomic for processing. Coarse tailings material from the magnetic separation process in the plant may also be incorporated into the waste dump. The height of the waste dump is expected to be up to 100 m.

The plant area will be equipped with stockpiles to hold material. Stockpiles are intended for inter plant use and for batching products on the overland conveyor to the port. The size of stockpiles will be dependant on the surge studies to be carried out during detailed design. Performance requirements will be established as the project progresses. Dust suppression will be undertaken.

The concentrator plant will use high pressure grinding rolls that will reduce the ore size. This will help to reduce both power and water requirements. The crushed ore will be slurried and further concentrated with magnetic separation. Waste slurry will be transported to a tailings dam. Water from the coarse tailings produced in the concentrator may be recovered in a dewatering process to minimise water usage (under investigation). The dewatered tailings will be transported out and stored as part of the mine waste dump.

The fine tailings will be transported, using single point discharge techniques, from a ridge area on the eastern boundary of the tailings storage facility site to form a tailings stack. The tailings may initially be thickened through a water removal process.

In the pellet plant, the concentrate will be balled with an organic binder, and dolomite or limestone will be added to the pellets to meet reduction and physical specifications. The pellets will then be dried and cooled through a Travelling Grate or Grate-Kiln pelletising process. The recovery of fines, pellet chips, spillage and other dust laden water will be directed to the concentrator thickener for re-processing.

In the HBI plant, iron ore pellets will be reduced in a shaft furnace using natural gas and then briquetted to enable safe transportation.

The products will be moved to the export facility by up to three conveyors. The overland conveyors will have a capacity of up to 12,000 tonnes per hour (tph).

1.3 Utilities

Water will be required for ore processing and filtered, potable water will be required for the mine, plant and camp areas. The Proponent's preferred option is to draw water from a proposed bore field, to be established on the Fortescue Aquifer. Investigations into the sustainable yield of water from this source are currently underway. As a contingency in the event that the borefield cannot provide all of the project's water requirements, a 20GLpa Desalination plant has been proposed and forms part of this assessment.

A package sewage treatment plant will treat sewage effluent from on-site accommodation facilities. Water from this process is expected to be recycled for vegetation surrounding the camp area, in accordance with appropriate guidelines. Waste water treatment plants will also be located at the plants and stockyard areas.

A power station operating adjacent to the concentrator / pellet plant complex will supply power. This will utilise a high efficiency gas turbine power generation system that is expected to supply up to 250 MW of power for mining, camp, bore field and delivery of product to the port facilities. With standby capacity the size of the installed power station will be up to 350 (Mega Watt) MW.

Gas supplied to the power plant will be transported via a lateral spur line connecting to the Mineralogy Central Block gas lateral.

1.4 Other Infrastructure

The expected workforce up to 1000 permanent employees will be accommodated on-site. This will be a camp-style facility offering amenities such as full food service and recreational services. During the construction period, a larger workforce of up to 4,000 people will be housed in camp style units on the periphery of the core accommodation site. Once no longer required, the camps will be downsized to approximately 1000 beds with the affected areas fully rehabilitated. Other temporary facilities such as construction roads, offices and batch plant will also be removed and the affected areas either rehabilitated or maintained for future lay-down as appropriate.

A services corridor will be constructed connecting the processing plant to the approved services corridor for the Mineralogy Central Block Project. This corridor will be 200m in width and will be located along the eastern edge of the mining leases (M08/126 to M08/123). The Proponent will construct conveyors, access roads, utilities/services and other infrastructure within this corridor.

A 200m wide services corridor will be located within the eastern edge of mining leases M08/126 to M08/130 and within the southern edge of M08/130. This corridor will provide access for conveyors, access roads, utilities/services and other infrastructure including the connection to the proposed borefield.

Extension of services corridor width from Sino Iron's plant Site to Port to 200m. This corridor will provide access for conveyors, access roads, utilities/services and other infrastructure.

Other infrastructure associated with the Project Area includes:

- on-site roads, power transmission lines and water piping, appropriately placed throughout the site in order to transport required utilities.
- main mobile equipment workshops (service and maintenance)

- specialist workshops (electrical, boilermaker, crusher)
- medical and emergency response facilities
- wash bay / tyre bay / fuel bay for mining and support vehicle fleets
- laboratory
- explosives magazines and storage and distribution depot
- offices (administration, mine planning, process plant, maintenance)
- crib room facilities (mine planning, production, maintenance)
- warehousing
- all other ancillary requirements necessary for the project.

A landfill will be located and maintained for inert waste and putrescibles. The location of this landfill is yet to be determined, but it will be situated so as to meet all safety, health and environmental requirements.

1.5 Technical Specifications

The following ranges for inputs, outputs and discharges have been identified for the Project. Whilst best endeavours will be used to develop plant designs that conform to these specifications, accurate quantities will not be known until detailed design is developed during later phases of the project. For the purposes of this document, however and considering the engineering expertise used in developing these estimates they are considered appropriate and within acceptable ranges.

Table 1.1. Project Technical Specifications

Infrastructure	Inputs	Outputs	Comments
Mining and Crushing			
Primary Crushing	Run of mine (ROM) ore: up to 47 Mtpa	Primary crushed ore: up to 47 Mtpa	The primary crushing facility will be located close to the final mine outline; in pit crushing is amongst options under consideration. Gyratory crushing will be used. The primary crushed ore will be conveyed over a creek crossing to the plant site.
Secondary Crushing	Primary Crushed Ore: up to 47 Mtpa	Secondary crushed ore: up to 47 Mtpa	Secondary crushing, in the form of cone crushers.
Process Plants			
Magnetic Concentrator	Secondary crushed ore: up to 47 Mtpa Depressant, Frother, Amine and pH modifier: as required for reverse flotation Flocculant: as required for concentrate thickening	Concentrate slurry: 12 Mtpa BF and DR grade for dewatering in the pellet plant Tailings: flow to be determined from detailed testwork. The density of the fine (dewatered) tailings is expected to be 55% w/w (weight ratio). The fine tailings include silica from flotation process. Both coarse and fine tailings are expected to be up to 38 Mtpa.	

Infrastructure	Inputs	Outputs	Comments
Pellet Plant	Concentrate Slurry: BF and DR grade at up to 12 Mtpa. Flux: as required per design. Binder: as required per design. Other: any reagents required for emission control.	Concentrate Filter Cake: 5.2 – 12 Mtpa BF and DR grade Pellets: up to 7Mtpa BF and DR grade.	
HBI Plant	Pellet: Screened DR Grade Pellets 2-3 Mtpa. Hydrated Lime: as required per design. Oxygen: to be produced within the process. Other: any reagents required for emission control.	Briquettes: 1-2 Mtpa	
Support facilities			
Power Plant	Cooling Water: minor losses expected.	Power: as required to meet the load.	
Desalination Plant	Sea Water: 45GLpa	Potable Water: 20GLpa Waste Water Discharge (Brine): 25GLpa	

1.6 Key Project Characteristics

Table 1.2. Key Project Characteristics

Element	Characteristics
General	
Construction period	Approximately 3 years
Project life	Minimum 20 years
Mining	
Ore reserves	1billion tonnes
Ore mining rate	Around 47Mtpa
Pit depth (ultimate)	300m
Overburden and waste	Around 38Mtpa
Stripping ratio	0.8 waste:ore
Materials handling	Conventional drill, blast, load and haul.
Dewatering rate	Less than 1 GLpa

Dewatering disposal	To process water stream and dust suppression
Concentrator	
Production	Ore concentration: 12Mtpa
Waste	Tailings: up to 38Mtpa
Pelletising	
Production	Pellets: 7Mtpa
DRI / HBI	
Production	Briquettes: 1-2Mtpa
Infrastructure	
Power	Up to 350MW installed capacity gas fired open cycle power station
Conveyor	~ 30km in length between HBI plant and Korean Steel stockyard at Cape Preston
Gas supply	Up to 65,000 Tjpa
Water	20GLpa desalination plant
Roads	General traffic, haulage, mine, accommodation and access, infrastructure maintenance access
Buildings	Administration, maintenance workshops, storage, accommodation village and powerstation
Sewage	Package sewage treatment plant
Disturbance Areas	
Area of pit	266ha
Processing Infrastructure	166ha
Waste dumps	433ha
Tailings dam	151ha
Desalination plant	4.ha
Mining infrastructure	452ha
Accommodation camp	27ha
Infrastructure corridors	900 ha
Total area disturbed	2,400ha
Area rehabilitated (assuming open void)	2134ha
Workforce	
Construction	Up to 4,000
Permanent	Up to 1000
Accommodation	Entire workforce

1.7 Project Time Line

The project is expected to operate for at least 20 years, although extensions beyond this will depend only on continued contracts for ore supply and economic analysis. Project construction is expected to commence in the second half of 2008. Active construction is expected to continue for approximately 35 months until the first products are produced.

1.8 Workforce Considerations

The project is expected to employ up to 1000 personnel comprised of both direct and contractor employees. A smaller group of employees will be based in Perth to provide logistical support, purchasing and employment services.

It is expected that approximately 12% of the workforce will be graduates in a variety of technical and accounting disciplines. Another 10% are likely to be people with extensive experience and skills required to run the operations, and 15% will be trades people with a variety of mechanical and electrical skills, supplemented by local contractors from the Karratha and Perth areas, as required.

The workforce will be accommodated on site in suitable camp accommodation. Due to the distance from Dampier and Karratha it is expected this will be a fly in fly out operation. The majority of personnel are expected to be domiciled in Perth, although the proportion domiciled in Karratha is expected to increase over time. It is not anticipated that personnel will commute to and from Karratha on a daily basis; rather they will be accommodated in camp whilst rostered on. On-site emergency services will provide first-aid services, while those with more serious medical circumstances will use local services in Karratha.

1.9 Project Benefits

The project will bring significant benefits to the state including:

- up to 4000 construction jobs;
- up to 1000 permanent and direct employment during operation with up to 2000 indirect jobs through services;
- pioneering the creation of a new iron ore area which has potential for ultimate extraction of up
- provision to the state of some $900 million of royalties over the current life of the project with the likelihood of increased royalties with further expansion.

It presents many domestic employment opportunities and wider regional opportunities. For example, Western Australian expertise will be used for geological drilling, mine planning and scheduling, project management and mine operations management. In addition, Western Australian companies may construct many of the miscellaneous infrastructures, including the road and utilities infrastructure and the workforce accommodation.

This project represents a long term, economically viable opportunity for Western Australia, promising sustainable employment growth in the Pilbara region. Market projections indicate that the products proposed for export from the facility will be in increasing demand for world steel production, particularly for China, India and South East Asia.

The Proponent commitment to the local community (see section 6.2.1) translates into benefits that will boost the regional and local economy with long-term, intergenerational project benefits. This project will achieve net social benefit.

1.10 Planning and Approvals

Before construction can commence on the proposed mine and processing facility, a number of approvals and licenses must be obtained from several Western Australian Government Authorities. A summary of required approvals is provided below, while a more detailed table of legislation, policies,

agency guidelines, standards and codes of practice relevant to this proposal is provided in Section 3.0.

1.10.1 Section 38 Referral – Environmental Protection Act, 1986

Section 38 of the *Environmental Protection Act, 1986* (EP Act) requires that any proposal likely to have a significant impact on the environment be referred to the Environmental Protection Authority (EPA) for Environmental Impact Assessment (EIA). This proposal has been referred to the EPA by the proponent under Section 38 (1) of the EP Act. The EPA Referral Form is provided in Appendix A.

The Balmoral South Project has built on this previous work undertaken for the Mineralogy Central Block Project by completing, in consultation with all key stakeholders, environmental assessment of the impact of the Balmoral South Project, including the cumulative assessment of the impact of both projects within the Cape Preston Region.

This environmental assessment of the Balmoral South Project has highlighted that the issues that require managing are consistent the issues that where identified for Mineralogy Central Block Project.

Given the high level of understanding of the impacts of this type of development in the local area and the understanding of how these impacts can be readily managed, including the cumulative impacts of the two projects, the Proponent believe that the Balmoral South Project can be adequately assessed through the Environmental Protection Statement or Assessed on Referral Information level of assessment.

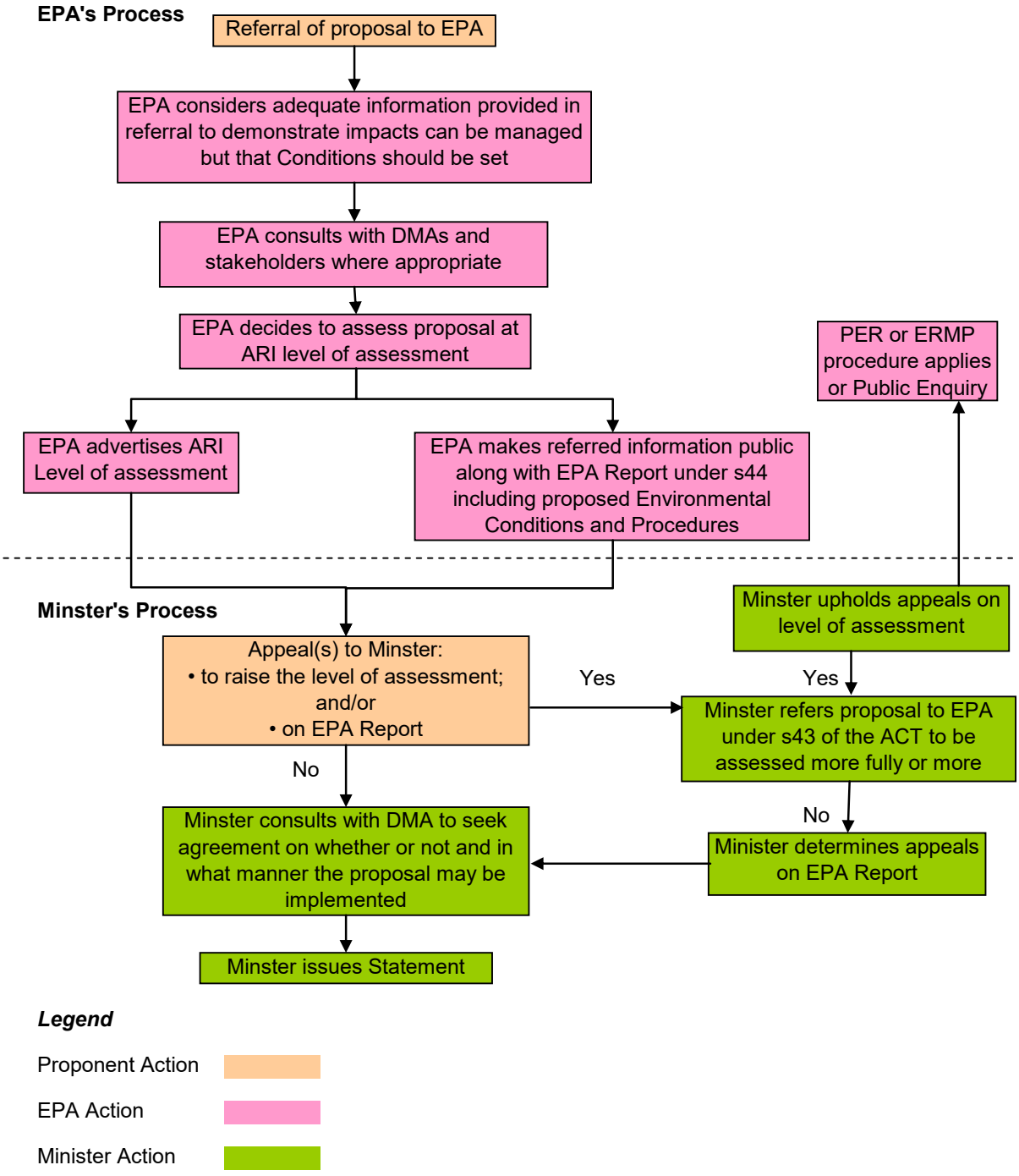

Figure 1.3. Process for Assessment on Referral information

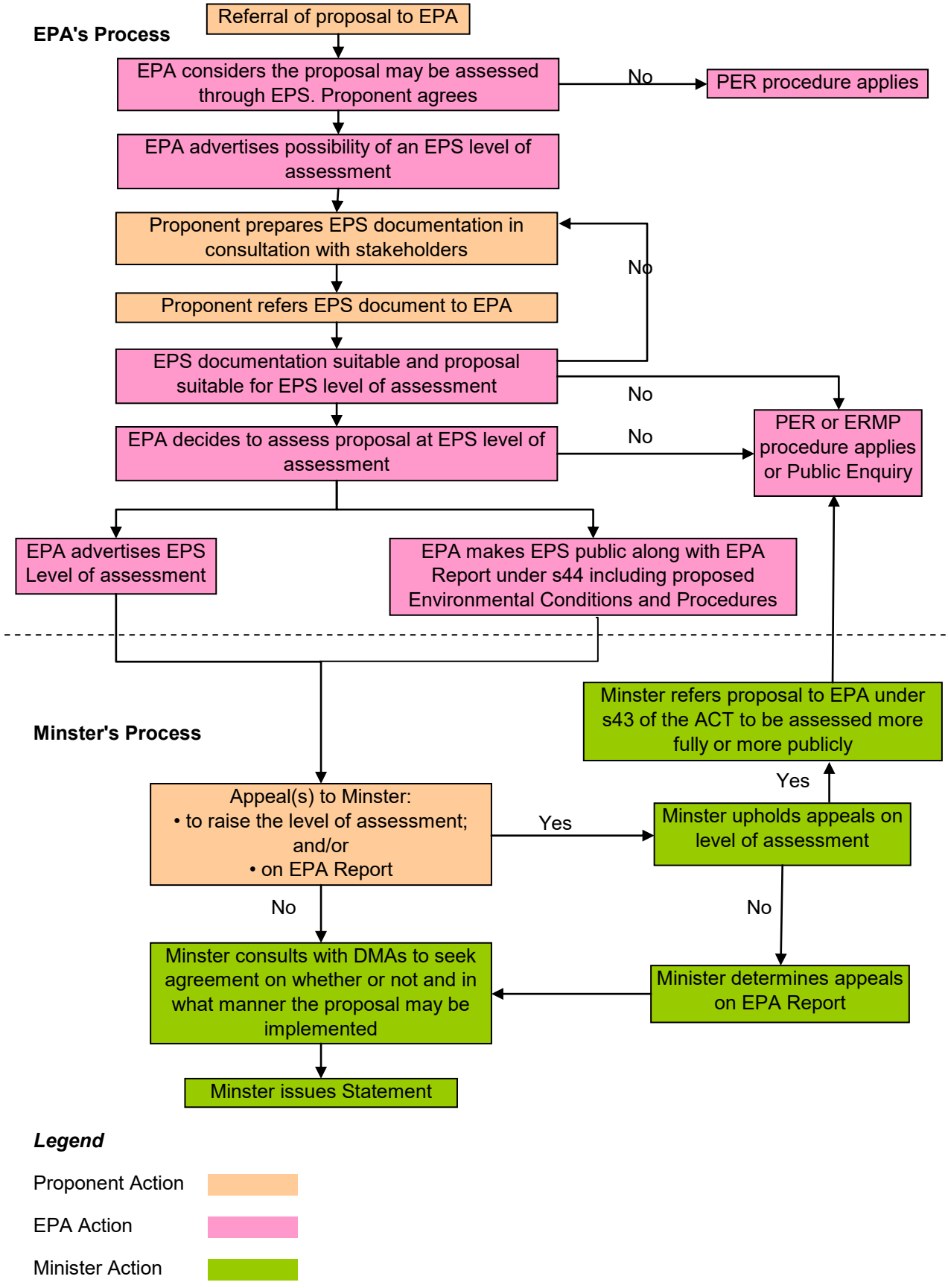

Figure 1.4. Process for Environmental Protection Statement

1.10.2 Works Approvals and Licensing

The proposed mine and associated infrastructure will constitute a number of prescribed premises under Schedule 1 of the Environmental Protection Regulations 1987 (EP Regulations). The proposed infrastructure will fall under the following categories:

Table 1.3. Works Approvals and Licensing Proposed Infrastructure

Category Number	Description of Category	Production or Design Capacity
5	**Processing or beneficiation of metallic or non-metallic ore**: premises on which a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; b) tailings from metallic or non-metallic ore are reprocessed; or c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	50 000 tonnes or more per year
6	**Mine dewatering**: premises on which water is extracted and discharged into the environment to allow mining of ore.	50 000 tonnes or more per year
44	**Metal smelting or refining**: premises on which metal ore, metal ore concentrate or metal waste is smelted, fused, roasted, refined or processed.	1000 tonnes or more per year
52	**Electric power generation**: premises (other than premises within category 53 or an emergency or standby power generating plant) on which electrical power is generated using a fuel.	20 megawatts or more in aggregate (using natural gas) 10 megawatts or more in aggregate (using a fuel other than natural gas)
54	**Sewage facility:** premises - a) on which sewage is treated (excluding septic tanks); or b) from which treated sewage is discharged onto land or into waters.	100 cubic metres or more per day
57	**Used tyre storage (general):** premises (other than premises within category 56) on which used tyres are stored.	100 tyres or more
58	**Bulk material loading or unloading:** premises on which clinker, coal, ore, ore concentrate or any other bulk granular material is loaded onto or unloaded from vessels by an open materials loading system.	100 tonnes or more per day
62	**Solid waste depot**: premises on which waste is stored, or sorted, pending final disposal or re-use.	500 tonnes or more per year
64	**Class II or III putrescible landfill site**: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996", published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	20 tonnes or more per year

1.10.3 Other Approvals

The project is also likely to require the following permits and licenses:

- Heritage Disturbance Application (*Aboriginal Heritage Act 1972* s.18, DIA),
- Commonwealth Referral and Approvals (*Environment Protection and Biodiversity Conservation Act 1999*),

- Utility Approvals,
- Department of Water permits (e.g., 11/17/21A permit to modify bed and banks),
- State Mining Engineer's approval, and
- Shire Building Licenses.

1.11 Document Structure

This document has been prepared to address the requirements of the EPA pursuant to Part IV of the EP Act. The document has been prepared with consideration for consultation with the various Decision Making Authorities and key stakeholders.

The Executive Summary provides a brief overview of the proposal, key environmental assessment results and an outline of key environmental management measures to be implemented as a part of the proposal.

Section 1.0 provides a description of the proposal. It consists of an description of the mining process, the key components of the project, an outline of the approvals process and an overview of the document structure.

Section 2.0 provides an overview of the stakeholder consultation process that has been undertaken to date. It presents the issues raised and comments on the proponent's approach to managing those issues.

Section 3.0 outlines the various legislation, policies, guidelines, codes of practice and standards that are relevant to this proposal.

Section 4.0 provides a description of the current land use, zoning and ownership at the project site.

Section 5.0 contains a description of the existing environment and detailed analysis of the potential environmental impacts of the proposal.

Section 6.0 addresses sustainability issues and presents International Minerals' strategies for managing the project in a sustainable way.

Section 7.0 provides a tabulated version of the proponent's commitments with regard to environmental management of the proposal.

Section 8.0 provides details of the implementation plan that will be used to manage and monitor the environmental impacts highlighted throughout this referral.

Sections 9.0 and 10.0 contain reference information and a glossary of terms used throughout this document.

2.0 Proponent Consultation Summary

The Proponent conducted initial stakeholder consultation during October 2006. Through DoIR, the Office of Development Approvals Coordination (ODAC) provided the Proponent with a list of potential key stakeholders, to whom a project overview document was distributed, which described the project. Written responses were requested and meetings with all respondents were held in early November 2006.

2.1 Summary of Stakeholder Consultation to Date

Consultation has been undertaken with the following preliminary list of stakeholders:

- Department of Environment and Conservation (DEC) including the Environmental Protection Authority (EPA);
- Department of Consumer and Employment Protection (DoCEP);
- Department of Health (DoH);
- Office of Development Approvals Coordination (ODAC);
- Department of Indigenous Affairs (DIA);
- Department of Water (DoW);
- Department for Planning and Infrastructure (DPI);
- Department of Industry and Resources (DoIR);
- Department of Agriculture and Food (DAF);
- Chamber of Commerce and Industry (CCI);
- Karratha Visitor Centre;
- Shire of Roebourne;
- Pilbara Development Commission; and
- Pastoral Lease Holders.

2.2 Key Issues Identified in Relation to the Proposal

Table 2.1 summarises the issues and recommendations identified in the first stage of stakeholder consultations.

Table 2.1. Issues and Recommendations arising from Stakeholder Consultations

Issue Identified	Stakeholder(s)	Proposed Actions
Declared Plants issues need to be considered in consultation with Department of Agriculture and Food (e.g., *Mesquite* spp.)	DEC, DAF	Weed extent identified in flora surveys. Will require management planning. Flora and vegetation management will include consideration for control of Declared Plants.
Need to consider conservation status of regionally significant native vegetation.	DEC	Considered in comprehensive flora survey. See Appendix C

Issue Identified	Stakeholder(s)	Proposed Actions
Need to consider Conservation Estate (e.g., Great Sandy Island Nature reserve, parts of Mardie and Karratha Stations to be relinquished, proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area)	DEC	The Proponent has committed to adopting the marine based Environmental Management Plans for the Mineralogy Central Block Project.
Need to consider local and regional significance of impacting groundwater dependent vegetation	DEC	Please refer to Section 5.5
Need to undertake risk based assessment considering species occurrence, range, distribution and significance of stygofauna. Also consider hydro-geological conditions such as connectivity between aquifers. Consult experts on stygofauna	DEC	The Proponent has committed to the preparation and implementation of a stygofauna assessment programme. Connectivity between aquifer has been assessed in Section 5.5.
Develop sustainability policy and relate responses to environmental issues to the policy. Consider the State Sustainability Strategy and the EPA's Principles of Environmental Protection	DEC	Developed and presented in Appendix B
Resolve any Aboriginal Heritage issues	DEC, DIA	Will be managed in accordance with the approved Mineralogy Aboriginal Heritage Management Plan.
Project needs to consider impacts on local services	DoH, CCI	Commitment to sustainability and long-term economic health (Section 6.2.1)
Consider workforce planning such as transport between Karratha and the mine site and potential local involvement	DoH, DPI, CCI	Bus transport under consideration for fly in fly out workforce.
Location of the wastewater treatment plant should consider environmental and public health requirements	DoH	Design and planning of wastewater treatment plant will comply with public and environmental health and safety guidelines. Wastewater treatment plants will be located at the camp, plant site and stockyard. Best practices will be used for all treatment systems
Consider insect issues through a Mosquito Management Plan. Consider sand flies and termites since they are a significant nuisance	DoH	Mosquito management planning is under consideration
Be aware of the combined water demands from different projects and ecological water requirements in the area. Allocations are likely to reflect seasonal variations. The project needs to look at alternative water supplies and develop contingency planning	DoW	Seasonally adjusted water allocations would be untenable for the project. Bore field development remains the preferred option for water supply. The proposal includes the construction of a Desalination plant as a contingency should aquifer investigations determine insufficient sustainable yield for the project.
Referral should address operational management and physical infrastructure phasing.	DPI	Detailed management planning is in process.
Referral should address local government consultation and community consultation.	DPI	Local government and community consultation has commenced and is ongoing.

Issue Identified	Stakeholder(s)	Proposed Actions
Referral should address phasing, decommissioning, milestones, and indicators.	DPI	Preliminary project time line is considered in Section 1.7 and decommissioning is considered in Section 5.15.
Referral should address security and project airstrip.	DPI	No project airstrip is envisaged. Fly in fly out workforce will use Karratha airport. Project security measures will be investigated during detailed design.
Project should address discontinuity between tenements.	DoIR	Mineralogy as tenement holder will be responsible for addressing this discontinuity.
Project requires resolution of Native Title for gas lateral and tailings dam.	DoIR, DPI	There are no Native Title issues as all tenements are granted associated with the this referral
Project should ensure that public access is maintained to the Fortescue River mouth camping area.	Shire of Roebourne, DPI	Public access will be maintained.
Project should address Conservation Recreation and Natural Landscapes Reserve over Mangrove Creek and coastal zone adjacent to James Point.	Shire of Roebourne	Assessed in Section 5.1 and 5.2
Concerns for impacts on grazing lands and Pastoral Lease, including: devaluation of Lease, jeopardising sale of Lease, direct loss of grazing land, loss of tourism potential, contamination affecting grazing land, loss of water supplies, road kills, dust impacts and loss of access.	Pastoral Lease Holder	The Proponent has been in regular contact with the Pastoralist and relevant issues raised have been addressed in this referral.
Project should offer additional community service (e.g., boat ramp at Fortescue River mouth)	Karratha Visitor Centre	Under consideration.

3.0 Relevant Legislation, Policies and Guidelines

3.1 Commonwealth Legislation

Table 3.1. Commonwealth Legislation

Legislation	Relevance / Application
Environment Protection and Biodiversity Conservation Act, 1999	Protection for matters of national environmental significance from development impacts
Native Title Act, 1993	Affords certain rights to Indigenous land owners
National Occupational Health and Safety Commission Act, 1985	Healthy and Safety in the workplace

3.2 State Legislation

Table 3.2. Stage Legislation

Legislation	Relevance / Application
Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act, 2002	Act under which the project is developed and to which International Minerals is a co-signatory
Aboriginal Heritage Act 1972	Protection of Aboriginal heritage sites
Agriculture Related Resources Protection Act, 1976	Addresses the obligations for management, control, destruction, and notification of gazetted noxious plants and animals
Conservation and Land Management Act 1984	Protection and management of land vested for conservation purposes
Environmental Protection Act, 1986	Mechanism that provides for formal assessment of the proposal and assigns impact management responsibilities to the proponent
Explosives and Dangerous Goods Act 1961	Correct procedures for transporting handling and storing explosive and dangerous goods such as explosives, hydrocarbons and chemicals
Health Act 1911 – Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste Regulations) 1974	Correct procedures for the treatment and disposal of effluent waste
Maritime Archaeology Act 1973	Governs human interaction with shipwrecks
Mines Safety and Inspection Act 1994	Correct protocol for waste disposal
Occupational Health, Safety and Welfare Act, 1984	Sets workplace limits for air quality
Rights in Water and Irrigation Act, 1914	Governs water resource management and allocation in Western Australia ensuring water resources are comprehensively and appropriately managed. Regulation of draw on groundwater
Wildlife Conservation Act, 1950 (WA)	Provides for the conservation and protection of wildlife (flora and fauna). Special provisions and schedules cover protection and management of gazetted rare flora and fauna

3.3 Policies, Guidelines and Standards

Table 3.3. Policies, Guidelines and Standards

Best Environmental Practice in Mining
Community Consultation and Involvement
Tailings Containment
Rehabilitation and Revegetation
Planning a Workforce Environmental Awareness Training Programme
Managing Sulphidic Mine Wastes and Acid Drainage
Environmental management Systems
Water Management
Decommissioning and Planning for Mine Closure
Noise, Vibration, and Airblast Control
Dust Control
Environmental Monitoring and Performance
National Environmental Protection Council Guidelines
National Environmental Protection (Ambient Air Quality) Measure for Particles as $PM_{2.5}$
National Environment Protection (Ambient Air Quality) Measure. Technical Paper on Monitoring for Particles as $PM_{2.5}$

Table 3.4. State Guidelines

Environmental Protection Authority Position Statements	
2	Environmental Protection of native Vegetation in Western Australia
3	Terrestrial biological Surveys as an Element of Biodiversity Protection
5	Environmental Protection and Ecological Sustainability of the Rangelands in Western Australia
6	Towards Sustainability
7	Principles of Environmental Protection
9	Environmental Offsets
Environmental Protection Authority Guidance Statements	
1	*Protection of Tropical Arid Zone Mangroves Along the Pilbara Coastline*
12	*Minimising Greenhouse Gas Emissions*
15	*Emissions of Oxides of Nitrogen from Gas Turbines*
18	*Prevention of Air Quality Impacts from Land Development Sites*
51	*Terrestrial Flora and Vegetation Survey for Environmental Impact Assessment in Western Australia*
54	*Sampling of subterranean fauna in groundwater and caves*
55	*Implementing best practice in proposals submitted to the environment impact assessment process*
56	*Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia*

Table 3.5. Other Guidelines

Other	
Recreational Fishing Guidelines – Pilbara and South Coast Regions 2003/04	Provides guidance to recreational fishers in coastal waters of WA
Recreational Net Fishing Guidelines for WA 2004	Controls use of fish nets in coastal waters of WA
Environmental Protection (Noise) Regulations 1997	Control of construction and operational noise
Environmental Protection (Controlled Waste) Regulations 2001	Management of Contaminated Soil Bioremediation landfarm.
Draft Code of Practice for Rural Landfills	Correct protocol for design and management of putrescible waste landfill.
Landfill Waste Classification and Waste Definitions	Classification of site waste.
Guidelines for Direct Land Application of Biosolids and Biosolids Products	Method for disposal of sludge
Bioremediation of hydrocarbon-contaminated soils in Western Australia	Methods for Contaminated Soil Bioremediation
Management of Asbestos in Mining Operations	Provides guidance for the appropriate handling and disposal of asbestiform minerals
Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000	Provides criteria for marine water quality

4.0 Land Details

4.1 Site Description

The project area includes the proposed mine, waste dumps, tailings dam, processing plant, infrastructure and services corridors, other project infrastructure and workforce camp. In addition, a Desalination plant will be located at Cape Preston. All other components of the project will be provided by other parties and are the subject of separate approvals applications.

4.2 Ownership

International Minerals Pty. Ltd. (IM), a wholly owned subsidiary of Australasian Resources Limited 'ARH' (ASX Code: ARH), is developing a magnetite iron ore mine, processing facility and associated infrastructure in the Cape Preston Region of Western Australia, 80km south of Karratha ("the Balmoral South Project).

IM is the Proponent ("the Proponent") for this referral of the Balmoral South Project under Part IV of the *Environmental Protection Act, 1986 ("the Act").*

4.3 Tenure

The Proponent has entered into a series of agreements with Mineralogy Pty Ltd which provides for the rights and tenure to all Mineralogy tenements necessary to carry out the project. These agreements have been agreed by the Minister Resources Development and set out in First Schedule of the Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002 which was passed by the Parliament of Western Australia in 2002.

4.4 Land Zoning

The proposal falls within a Zoned Rural area pursuant to the Shire of Roebourne Town Planning Scheme 8. The planning scheme includes a Reserve for Infrastructure. This area is also subject to a Pastoral Lease – Mardie Station.

The *Iron Ore Processing (Mineralogy Pty. Ltd.) Agreement Act, 2002* requires that the designated land use at the site is compatible with mining project proposal (Clause 24).

4.5 Adjacent Land Use

The proposed mine is located a considerable distance from existing residential areas. Recreational areas are present around the mouth of the Fortescue River, some 15km from the mine site – impact from operations is expected to be minimal. Noise, dust and other emissions generated by the project are expected to have the greatest impact on the immediate project area, although some emissions may have a larger scale effect (such as greenhouse gas emissions). Appropriate management strategies will be implemented to minimise the extent of these impacts and ensure they are within established criteria.

The adjacent Mineralogy Central Block Project will increase the extent of impact due to cumulative effects of matters such as noise, groundwater drawdown, dust and aerial emissions. Again,

management strategies will be implemented to ensure that these impacts are considered and minimised in a regional context.

The Balmoral South project lies adjacent to the Coastal Margin Cape Preston to Cape Keraudren National Estate (identification number 17917) to the east and the Coastal Margin Exmouth Gulf to Cape Preston natural area (identification number 17918), located to the south-west of the mouth of the Fortescue River is adjacent to the project area. Both National Estates are Indicative Places that have yet to receive official status. These areas are noted as significant mangrove and tidal communities. All import and export activities undertaken for the Balmoral South project will be performed under the control of the requirements imposed on the formally assessed Mineralogy Central Block Project's Port infrastructure.

5.0 Existing Environment and Impact Assessment

The Proponent has undertaken numerous investigations to quantify the extent of impacts that its project will have on the receiving environment. In addition, the Proponents has access to the vast amount of information that has been gathered and compiled for the assessed Mineralogy Central Block Project, based on the Central Block of the Balmoral Deposit. Where applicable, assessment has been made of the cumulative affect that this project has in conjunction with the Mineralogy Central Block Project.

The following sections outline the environmental values and issues that will be affected by the project, and quantifies and or qualifies the impacts. Management strategies are proposed, and will be implemented throughout the life of the project.

5.1 Flora and vegetation

5.1.1 Background

Three detailed flora and vegetation surveys have been conducted within the mining lease to date. An initial vegetation and flora survey was undertaken between the 15th and 28th of April 2000 in preparation of the Central Block Project Public Environmental Review process (Halpern Glick Maunsell, 2001). Additional, supplementary surveys were undertaken in 2003 and 2006 by Maunsell Australia. Details of these surveys can be found in Appendix C.

In general terms, the vegetation of the project area comprises various *Acacia* Shrublands over *Triodia* Hummock Grasslands on the more rugged, shallow soiled habitats and *Eragrostis xerophila* Tussock Grasslands dominating the heavy clay soils. Drainage lines are dominated by *Eucalyptus* species over *Melaleuca* and *Acacia* Shrublands. These areas also tend to be heavily infested with **Cenchrus ciliaris* (Buffel Grass), a highly invasive weed introduced by pastoralists for its high grazing value.

Approximately 2400 ha of vegetation are expected to be cleared for the proposed mine and associated infrastructure. This infrastructure includes the proposed mine site, two waste dump areas, the tailings dam, plant site (including expansion areas), infrastructure corridors and the accommodation camp. Table 5.1 presents the extent of each vegetation unit that will be cleared.

Table 5.1. Vegetation Communities Affected by Project Infrastructure

Land System	Vegetation Type	Pit	Mining Infrastructure	Processing Infrastructure	Infrastructure Corridor	Waste Dump	Desalination Plant	Tailings Storage Facility	Village	Total Area (ha)
Boolgeeda	Bx1	41.76	52.46							94.22
Horseflats	Hp			48.16	196.29			143.13	25.04	404.47
Littoral	Ld2				48.45					48.45
	Ld3				9.06					9.06
	Ld4				0.72					0.72
	Lm				2.69					2.69
	Lp1				5.49					5.49
	Ls1				16.58					16.58
	Ls2				3.39					3.39
Newman	Nc	22.67	13.23	3.65	12.00					50.99
	Nh	129.10	48.71	43.36	21.49					242.66
	Nh2	15.37	24.69		6.88					46.42
	Nh3				25.05					25.05
	Nr3	0.16								0.16
Paraburdoo	Pc	3.02	21.34	4.11	5.91					34.38
	Pc2				5.21					5.21
	Pc3				1.73					1.73
	Pf1				0.41					0.41
	Pp1				55.23					55.23
	Pp2				38.64					38.64
	Px1	43.90	143.64	9.95	120.59	165.34				483.42
	Px2		46.96	42.81	153.49			8.44	2.29	207.87
Rocklea	Rc1					8.77				8.77
	Rc2		0.14							0.14

Land System	Vegetation Type	Pit	Mining Infrastructure	Processing Infrastructure	Infrastructure Corridor	Waste Dump	Desalination Plant	Tailings Storage Facility	Village	Total Area (ha)
	Rc3					10.79				10.79
	Rc4	0.50	8.33		3.08	5.94				17.85
	ROc2				8.69					
	ROc3				0.44					
	ROc5				0.32					
	ROpl				5.96					
Riverland	Rf1	9.90	92.89	14.29	48.12	98.4				258.86
	Rf2					144.64				144.64
	ROh1b				42.48		3.33			3.33
	ROh2				43.13		0.57			0.57
	ROr						0.10			0.1
	Total	**266.38**	**452.39**	**166.33**	**881.5**	**433.88**	**4.00**	**151.57**	**27.33**	**2383.4**

As this project is the subject of a formal EIA approval process, there is no requirement for a Native Vegetation Clearing Permit. Flora and vegetation surveys conducted by HGM (2001) and Maunsell (2006) indicate that the vegetation communities likely to be affected by clearing are not regionally or locally significant, and are well represented throughout the region. However, the cracking clay grasslands and phreatophytic vegetation communities occurring within the mining lease are recognised as regionally significant. Pastoral lease boundary rationalisation planned for 2015 will ensure that substantial areas of these grasslands are preserved within the conservation estate. Additionally, where possible, the Proponents will endeavour to minimise any clearing of these grasslands within its project area.

Investigations have recorded 14 Priority Species within the Cape Preston Region (Table 5.2). Of these 14 species, six species were recorded within the mining lease during the field surveys and an additional eight species were identified as occurring in the region through interrogation of the DEC Declared Rare and Priority Species Database (2007). None of the identified priority species with specific location information are reported to occur in the project area.

Table 5.2. Priority flora recorded within and surrounding the project area.

		Source		
Scientific Name	**Status**	**2001**	**2006**	**DEC Database**
Goodenia omearana	P1	+		
Gunniopsis sp. Fortescue (M.E. Trudgen 11019)	P1			+
Ischaemum albovillosum	P2			+
Abutilon trudgenii	P3	+		+
Acacia glaucocaesia	P3			+
Eriachne tenuiculmis	P3	+		
Goodenia nuda	P3			+
Goodenia pascua	P3			+
Hibiscus brachysiphonius	P3	+	+	
Owenia acidula	P3			+
Phyllanthus aridus	P3	+	+	
Sida sp. Wittenoom (WR Barker 1962)	P3	+		+
Tephrosia sp. Cathedral Gorge (FH Mollemans 2420)	P3			+
Themeda sp. Hamersley Station (ME Trudgen 11431)	P3			+

No species listed as Declared Rare Flora (DRF) or listed Threatened Ecological Community by the Department of Environment and Conservation (DEC), under the *Wildlife Conservation Act, 1950*, or as Threatened under the *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999* have been recorded within the survey area.

Where the infrastructure corridor crosses Mangrove Creek it will have a direct impact on Mangrove Communities. The 2000 field survey (Halpern Glick Maunsell, 2001) recorded and mapped twelve Mangrove units along the wider project area coastal zone. These were principally stands of variable cover dominated by *Avicennia marina* and/or *Rhizophora stylosa.* Other units included shrublands of *Aegiceras corniculatum* or *Ceriops tagal.* The mangrove assemblages were generally in very good to excellent condition and are classified as a Type 'A' conservation areas. The 2001 survey estimated

the mangal area mapped within the project area as approximately 40ha. The area of mangal that will be directly impacted (ie: cleared) by the construction of the infrastructure corridor over mangrove Creek will be up to a maximum of only 6%.

The Balmoral project area supports populations of the Declared Plant species **Prosopis pallida* (Mesquite) and **Datura leichhardtii* (Native Thornapple) (Department of Agriculture, 2006). Under the Act, landholders are obliged to carry out recommended control measures, each specific to the species. Of particular note Mesquite can have a significant impact on the availability of groundwater resources where it exists in dense populations such as on the Fortescue Floodplain. The rapid growth of mesquite north of the Mardie- Balmoral Road between 1945 and 1953 is reported to have lowered water levels in local station wells by about 2m. Water levels subsequently recovered as the mesquite was removed (Commander, 1994).

Hydrological processes are likely to be affected by pit dewatering activities and bore water extraction. Further details relating to dewatering and groundwater dependent ecosystems are discussed in Section 5.5 and Appendix D of this document.

5.1.2 Impacts

Impacts on flora and vegetation communities will be managed through a process of avoidance, minimising disturbance, monitoring impacts and rehabilitation.

Detailed design will take account of the results of previous flora and vegetation surveys and, wherever possible, will ensure that significant species are avoided. Similarly, design will be undertaken so as to minimise as much as practicably possible the extent of clearing required for construction and operational activities. Ongoing monitoring throughout the life of the mine will enable unacceptable impacts to be identified early, such that alternative procedures can be investigated and implemented as appropriate. Predicted general impacts of the project on flora and vegetation are presented in Table 5.3.

Table 5.3. Predicted impacts on local flora and vegetation from construction and operational activities.

Activity	Impact
Vegetation Clearing	• Reduction in species abundance • Local disturbance to vegetation communities
Pit dewatering	• Ground water drawdown affecting groundwater dependent ecosystems
Dust from roads etc	• Possible reduction in vegetation health
Contamination of surface & groundwater	• Decline in groundwater dependent vegetation • Decline in riparian vegetation
Vehicle movement	• Possible introduction and/or spread of weeds

Maunsell (2006) determined that the EPA's desired management outcomes to achieve Mangrove conservation in the Cape Preston area have the potential to be compromised by the construction and operation of the infrastructure corridor at Cape Preston, which is likely to:

- require clearing of Mangroves for construction;
- alter tidal processes; and
- generate significant quantities of dust.

As impacts associated with the proposal are likely to be similar in nature to those arising from the Central Block Project proposal, the Proponents have adapted those plans to its current proposal.

5.1.3 Management

The key objective of flora and vegetation management and monitoring is to comply with all statutory requirements relating to flora and vegetation within the project area. The following objectives and targets (Table 5.4) will be used to assess the impact that various activities associated with all mining operations may have on local native vegetation.

The areas of mangroves at Cape Preston are subject to conservation measures outlined in the Environmental Protection Authority (EPA) Guidance Statement No. 1 – *Guidance Statement for the protection of tropical arid zone mangroves along the Pilbara coastline* (2001), which includes the Cape Preston mangroves as one of several populations that occur within areas that have been 'designated for industrial development, associated ports or related uses. Within this context, the Cape Preston populations are considered to be "Mangrove areas of very high conservation value (designated *regionally significant*)" and are classified under Guideline 3 as outlined in the Guidance Statement. The EPA's operational objective for Guideline 3 areas is that no development should take place that would significantly reduce the mangrove habitat or ecological function of the mangroves in these areas.

With regard to management of impacts on mangrove communities, as outlined above, the EPA's objectives are to:

- minimise any clearing of Mangroves during construction;
- limit the extent to which tidal processes are altered; and
- minimise dust emissions.

Management and monitoring of mangrove impacts at the creek crossing has been adapted from the Central Block Project's approved Vegetation Monitoring Plan and are outlined in Table 5.5, 5.6 and 5.7 below. Any required remediation of impacts will be considered in consultation with the EPA.

Table 5.4. Key Objectives and Targets Related to Flora and Vegetation

Objective	KPI's	Data Source	Target
Compliance with Statutory requirements	100% Compliance	Compliance auditing	100%
No negative impact to the health of flora and vegetation within the mining lease	Maintenance of species diversity	Flora and Vegetation Monitoring	No negative impacts or plant deaths

All employees shall receive suitable instruction on environmental issues as part of the mine site induction process, to ensure they are aware of their environmental responsibilities and are competent to carry out their work in an environmentally responsible manner.

International Minerals will engage in stakeholder consultation with relevant government agencies such as the Department of Environment and Conservation, where appropriate.

Details of management strategies for predicted impacts are outlined in Table 5.5.

Table 5.5. Proposed flora and vegetation impact management strategies

Activity	Impact	Management	Performance Target	Responsibility

Vegetation clearing	Loss of native vegetation	• International Minerals will implement a minimum clearing policy on site that incorporates the following::
		  ○ as feasible, any clearing for temporary activities will be scheduled to minimise the time between initial clearing and rehabilitation;
		  ○ areas will be cleared only when required and necessary; and the accommodation camp and utility infrastructure will be designed so as to enhance final site rehabilitation.
		• Progressive rehabilitation will occur, where possible. Rehabilitation will commence as soon as cleared areas are no longer required
			Minimal loss of vegetation
			
			Disturbed areas will be rehabilitated to vegetation types that reflect the region's natural occurring ecosystem.
				Construction Manager
				Environmental Officer

Vegetation clearing outside footprint	Loss of native vegetation	• Areas to be cleared will be delineated on project drawings and pegged/flagged in the field. Pegged clearing limits will be inspected and approved by the Construction Manager, or a nominated representative, to ensure they comply with design specifications. • Rehabilitation of cleared area	Stay within defined clearing envelope	Construction Manager. Environmental Officer
Vehicle movement	Spread or introduction of weed species	• Where practicable, vehicles and machinery will only use designated tracks and roads, and will be parked only in designated parking locations. • Management and control of Declared weed species particularly Mesquite (**Prosopis pallida*) will be undertaken according to guidelines specified in the Agriculture and Related Resources Act 1976, to reduce the drawdown pressures on the aquifers and reduce loss of water through evapotranspiration	No net increase in area infested by weeds	Environmental officer Construction Manager Weed Contractors
Infrastructure corridor crossing of Mangrove Creek	Tidal changes reducing viability of local Mangrove community	• Monitor Mangrove community for change in viability • Undertake remedial actions if decline detected	No net loss of Mangroves	Environmental Officer Construction Manager

Monitoring Programme

International Minerals will undertake various monitoring programs to detect impacts that the project is having on local fauna. These surveys will be pursuant to the EPA's Guidance Statement No. 51 on Terrestrial Flora and Vegetation Surveys (EPA 2004).

Monitoring of the health and function of flora and vegetation will include:

- sampling target vegetation communities for species of interest;
- groundwater drawdown from pit dewatering on vegetation (refer to section 5.5 and Appendix D); and
- permanent quadrat assessment of vegetation condition.

In order to assess the impacts of the project on local flora and vegetation sites will be established across the project area to monitor; erosion, weed invasion, extent of stock disturbance and pathogen attack. The following parameters can be measured as part of the monitoring program to assess vegetation health:

- Visual health - to be assessed via established photo points.
- Health ranking - to be derived from visual assessment, ranging from healthy to dead with various degrees of stress as intermediates.
- Alive canopy foliage cover (%) - to be used as a visual measure of tree stress.
- Height (m) - to be used as a measure of growth.
- Diameter at Breast Height (DBH) - to be used as a measure of growth.
- Percentage weed species

To assess the impacts on vegetation during construction and operation of the project, monitoring sites will be established at locations to assess:

- riparian vegetation condition (to monitor impacts from dewatering – See section 5.5);
- vegetation adjacent to ground disturbing activities (to monitor impacts from dust);
- general assessment of weeds across the project area (to monitor the spread and control of weed species);
- mangrove community condition (to monitor impacts associated with the infrastructure corridor crossing, dust and other disturbances); and
- controls of all of the above.

Whilst conveyance and stockpiling of International Minerals' products has the potential to cause impacts to mangrove communities at Cape Preston, The Central Block Project has already committed to monitoring of these impacts, and has prepared a monitoring program to this effect. Accordingly, International Minerals does not propose to monitor impacts on mangrove communities resulting from its operations. However, should it become necessary for International Minerals to take on this responsibility, it will adopt the approved Vegetation Monitoring Plan developed for the Central Block Project (Maunsell, 2006).

Details of proposed monitoring programs are presented in Table 5.6.

Table 5.6. MONITORING METHODOLOGY

Impact	Vegetation/ Area	Monitoring Program	Plot dimensions	Parameters to be monitored
Mangrove clearing/ changes to tidal regime at infrastructure corridor crossing	Surrounding Mangroves	Quadrats at sites surrounding the infrastructure corridor crossing	10m x 10m quadrats	• no. mature trees (ea sp.) • no. saplings (ea sp.) • no. seedlings (ea sp.) • no. each health factor (H, SS, S, VS, D) of each of the above • no. alive leaves on selected branch of selected mangroves • site conditions including; site photograph, soil conditions, erosion, visible dust deposits, cattle degradation and weed presence (if significant)
Accretion and Erosion vs Mangrove Recruitment and Mortality	Creek banks within mangrove communities	Transects parallel to creek banks	10m x 2m	• distance from outer edge of transect to bank edge (established at 2m) • no. mature mangroves (ea sp.) • no. saplings (ea sp.) • no. seedlings (ea sp.) • no. alive and dead of each of the above • site conditions including; site photograph, visible dust deposits, cattle degradation and weed presence (if significant)
Dust from roads, etc.	Surrounding Mangroves	Quadrats at sites surrounding the roads and other ground disturbances	10m x 10m quadrats	• no. mature trees (ea sp.) • no. saplings (ea sp.) • no. seedlings (ea sp.) • no. each health factor (H, SS, S, VS, DR, DO) of each of the above • no. alive leaves on selected branch of selected mangroves • site conditions including; site photograph, erosion, visible dust deposits, cattle degradation and weed presence (if significant)

Impact	Vegetation/ Area	Monitoring Program	Plot dimensions	Parameters to be monitored
Dust from roads, etc.	Various vegetation adjacent to roads and other ground disturbances	Quadrats at a range of sites in close proximity to ground disturbances	10m x 10m	• species (including weeds) • height • no. alive plants (ea sp.) • no. dead plants (ea sp.) • % cover alive plants (ea sp.) • % cover dead plants (ea sp.) • site conditions including; site photograph, erosion, visible dust deposits, cattle degradation and weed presence (if significant)
Weed Infestations	Various vegetation adjacent to, haul roads, roads, waste dumps and other disturbances	Quadrats at a range of sites selected for their vegetation type and proximity to disturbances	10m x 10m	• species of weeds • % cover alive weeds (ea sp.) • % cover dead weeds (ea sp.) • site conditions including; site photograph, erosion, visible dust deposits and cattle degradation
Weed Infestations	Over entire site	Opportunistic visual assessment	NA	• location • species of weeds • % cover alive weeds (ea sp.) • % cover dead weeds (ea sp.) • site conditions including; erosion, visible dust deposits and cattle degradation

Table 5.7. Predicted Impacts and Associated Monitoring Programs to be implemented to Assess Vegetation Health Decline, Cape Preston Development

Activity	Performance Indicator	Corrective Action	Frequency	Responsibility	Records
Vegetation Clearing	No long-term decline in diversity and distribution	• Undertake remedial actions such as site rehabilitation • Collection and seed banking of key species for long-term storage of propagation for site rehabilitation • Avoid or minimise clearing of significant vegetation types	Annual or seasonal depending on target species/vegetation types	The Proponents and Environmental Consultant	Species abundance and distribution data. Reports to DEC for DRF.
Dust from roads etc	• No reduction in distribution or diversity of flora species or vegetation types • No decline in health of vegetation	• Implement dust suppression protocols such as hydro-mulch or watering • Reduce vehicle speeds	As required if indicated from monitoring	The Proponents and Environmental Consultant	Diversity and abundance data. Vegetation health information
Vehicle movement etc resulting in the spread or introduction of weeds	• No increase in weed distribution • No introduction of new weed species	• Implement targeted weed control programs • Quarantine specific areas • Wash-down facilities if required	Annual control of targeted species and areas as indicated from monitoring	The Proponents and Environmental Consultant	Species and abundance data Department of Agriculture and DEC
Alteration to Mangrove habitat	Maintain balance between accretion and Erosion vs Mangrove Recruitment and Mortality	• Implement remedial actions to maintain mangrove diversity and distribution	As required if indicated from monitoring	The Proponents and Environmental Consultant	Species and abundance data. Data on altered erosion or accretion

5.2 Fauna

5.2.1 Background

Fauna values of the project area have been developed from field surveys and desktop studies. Previous fauna surveys for the general project area were conducted for the Central Block Project including the mine, plant, tailings and waste dump sites, as well as the conveyor corridor and port facilities (Halpern Glick Maunsell, 2000). These surveys are considered to be indicative of the fauna diversity of this adjacent site. Details of fauna studies are provided in Appendix C of this document.

Fauna species of conservation significance recorded in the project area and their key habitat requirements are presented in Table 5.8.

Table 5.8. Key aspects of biology and habitat requirements of Priority Fauna Species.

Fauna Species	Conservation Code	Requirements
Pezoporus occidentalis (Night Parrot)	P1	Nesting sites are scrapes in Spinifex or samphire bush. This specie is a nomad in Spinifex, samphire and bluebush plains in rocky hillsides. Rarely seen as a result of nocturnal activity.
Mormopterus loriae cobourgiana (Little North-western Mastiff Bat)	P1	This species' wider distribution encompasses the West Australian coastal areas from Derby to Exmouth Gulf. This species has been recorded as roosting in small sports and crevices in dead upper branches of the mangrove *Avicennia marina*. They are restricted to mangrove forests and adjacent areas. *M. loriae* preys on insects above and beside the forest canopy. They give birth to single young, which are born in the wet season (summer) (Churchill 1998).
Lagorchestes conspicillatus leichardti (Spectacled Hare-wallaby)	P3	Requires large Spinifex hummocks for shelter. In the Pilbara region frequent fires have resulted in a decline of mature Spinifex grasslands and as a result numbers of the Spectacled Hare-wallaby have declined. It is common (subspecies *conspicillatus*) on Barrow Island.
Leggadina lakedownensis (Lakeland Downs Mouse)	P4	Little is known about this species. It is likely to survive on a diet of small seeds of both native and introduced species, especially grasses. Under favourable conditions population numbers are likely to increase significantly and similarly crashing during unfavourable conditions.
Pseudomys chapmani (Western Pebble-mound Mouse)	P4	This species inhabits hummock grassland areas of *Triodia basedowii, Cassia, Acacia* and *Ptilotus* on skeletal soils containing an abundance of pebbles. Distinctive pebble mounds are usually formed on the lower slopes of spurs and ridges due to the abundance of building material. Little is known about their breeding biology.
Ardeotis australis (Australian Bustard)	P4	Breeding generally takes place when grass growth at its peak. No nests. This nomadic species prefers habitat types including open grassland, light scrub and open woodland. Appears to avoid settled areas. Maintenance of grassland habitats important to its survival. Threats from grazing pressures from sheep and rabbits and predation from foxes. Bustards roost in trees or high points in treeless country and fly out to the plains to feed during the day. They forage on grasses, seeds, fruits, grasshoppers, other insects and small mammals.

Fauna Species	Conservation Code	Requirements
Burhinus grallarius (Bush Stonecurlew)	P4	The Bush Stone-curlew is a wader-like bird that can be difficult to see in its lightly timbered, open forest or woodland habitat (Pizzey 1991; Marchant & Higgins 1993). Preferred habitat is often associated with eucalyptus and acacia. Dry, open grassland and cropland, with cover nearby, may also provid habitat for the species. (Leach & Hembrow 1988 in Marchant & Higgins 1993). The Bush Stone-curlew nests on the ground, near dead timber, usually under trees within open woodlands that have an understory of short grass or among brushwood (Wilson 1989). Threats include predation from foxes and cats.
Numenius madagascariensis (Eastern Curlew)	P4	A migratory species that is present in Australia between August and April spending most of their time on the coast. Most are located on the east coast with small flocks found on the west coast. In Australia they prefer estuaries, mud flats and soft sandy beaches. Breeding occurs in the Northern Hemisphere.

Two species listed as migratory species under the *Environment Protection and Biodiversity Act 1999* (EPBC act) were observed:

- *Merops ornatus* (Bee Eater) - recorded regularly throughout the survey area, and
- *Haliaeetus leucogaster* (White - bellied sea eagle) – one sighting recorded.

In general, it has been determined over the course of the 2000 and 2006 field surveys that the fauna habitats within the project area are all regarded as well represented in the region and none are regraded as regionally significant or unique. However, of the habitats sampled, creek lines and cracking clays dominated by *Triodia spp* yielded the highest number of species.

No mammal species of conservation significance were recorded during the field survey. A targeted search of low stony rises failed to identify any signs of the priority species or *Pseudomys chapmani* (Western Pebble Mound Mouse) and targeted trapping of cracking clays failed to record *Leggadina lakedownensis* (Lakeland Downs Mouse).

Stygofauna

Stygofauna are aquatic subterranean animals found in a variety of groundwater systems. Recently, the Western Australian Museum has demonstrated that the Pilbara and Yilgarn regions contain stygofaunal communities in calcrete and alluvial aquifers (Scanlon et al. 2006).

Mining can potentially impact stygofauna populations through inherent manipulations of groundwater. Mine dewatering often produces a cone of dewatered sediment that can remove stygofauna habitat (Eberhard et al. 2004).

A stygofauna survey was conducted between 26 and 31 March, 2001 for the George Palmer Orebody, located immediately north of the Balmoral South Project. A total of 46 bores were inspected from the Orebody, the proposed concentrator / HBI plant site and the alluvials of Mardie Station. All of the bores in the ore body were located within the steeply dipping Joffre Member of the Brockman Iron Formation. No karst or calcrete formations were intersected by the drill holes. Most of these bores were over 100m deep and unslotted. By contrast, the plant site and Mardie Station bores were relatively shallow and located in the Maddina Volcanics and Fortescue River Alluvium, respectively.

Sampling was performed using standard techniques developed by the Western Australian Museum. Haul nets with 100µm mesh and of varying diameters (which corresponded to the borehole diameters) were used. At each borehole, where water quality was adequate, three separate haul samples were taken from the entire column. In the ore body, bores were sampled to an average depth of 65.6m. In the plant site and Mardie Station, sampling depths were 14.4m and 15.6m, respectively. Average water depths at the three sites were 27.1m for the ore body, 6.5m for the plant site and 6.5m for Mardie Station.

Samples were examined under a stereo microscope after preservation in a 70% ethanol solution. Samples were submitted to Dr. Brenton Knott at the University of Western Australia for identification. Specimens were identified based on their morphological attributes.

Further fieldwork was conducted on 2nd to 8th October, 2001 in order to gather more information on the distribution of the isopod species in the orebody. All bores previously sampled in March were re-sampled using the same methodology.

Of the 46 bores sampled, only 27 contained specimens. The majority of the collected specimens were stygofauna. They were dominated by crustaceans including amphipods, a thermosbaenacean, isopods, copepods (cyclopoid and harpacticoid) and ostracods. The other aquatic fauna consisted of turbellarian and oligochaete worms, and an acarine. The two remaining non-stygofaunal specimens were a beetle and a Diplura (insect relative).

Stygofauna diversity collected included:

- Amphipoda (4 species, 39 individuals);
- Isopoda (1 species, 19 individuals);
- Thermosbaenacea (1 species, 78 individuals);
- Copepoda (2 species, >400 individuals);
- Ostracoda (2 species, 13 individuals);
- Acarina (1 species, 2 individuals);
- Oligochaeta (3 species, 9 specimens); and
- Turbellaria (2 specimens).

Stygofauna in the orebody was dominated by Copepoda. Nineteen individuals in the Isopoda group and three individuals in the Oligochaeta group were also recorded. The Isopoda were found exclusively in the A10 bore hole and specimens were also collected from the A34 and A6 bores during the October surveys. The isopod was identified as an Oniscid (Peter Seroy, pers. comm.), and it is believed to be the first subterranean Oniscid ever recorded.

The most notable specimen found outside of the orebody was a significant species of Thermosbenacea, which have predominantly been recorded from the Mediterranean coast and the Caribbean.

The Balmoral South Project could potentially impact stygofauna through dewatering activities. To carry out proposed mining operations, the open pit is to extend 250 m to 300 m below natural surface, or 220 m to 270 m below the local and regional groundwater table. Associated pit dewatering is expected to result in creation of a steep “cone of depression” around the pit area.

Additional surveys of stygofauna species richness and distribution in the orebody and ongoing monitoring will indicate the effects of mining on these subterranean organisms. These surveys will be pursuant to the EPA’s Guidance Statement on subterranean fauna (EPA 2003).

5.2.2 Impacts

Impacts on fauna in the project area will largely occur due to habitat loss or modification. Minimal impacts on fauna are likely to result from operational activities such as dust and noise. The primary areas where fauna will be affected include the orebody, plant sites, waste dump, tailings dam and access roads. However, the majority of potential faunal impacts identified are likely to have no adverse long term impact on the environment and can be managed through the implementation of routine management procedures and safeguards. Impacts that may have a potential to result in decline of fauna around the project area are indicated in Table 5.9.

Table 5.9. Impacts on fauna

Activity	Impact
Vegetation Clearing	• Loss of breeding sites • Loss of habitat • Loss of linkage corridors such as De Boulay Creek
Vehicle Movements	• Fauna deaths and injury
Trenching and other holes	• Fauna deaths from exposure and predation
Fencing	• Fauna deaths or injury
Disposal of waste products such as plastics, Chemicals & food scraps	• Fauna deaths from entrapment or poisoning • Increased predation of native fauna by foxes and cats as a result of increased feral animal numbers
Noise generation	• Deter fauna from surrounding area and possible breeding sites
Pit dewatering	• Decline in subterranean fauna
Contamination of surface & groundwater	• Decline in subterranean fauna • Decline in subterranean habitats

With the implementation of appropriate management measures and safeguards, risk to fauna will be maintained at a level where the project activities are unlikely to result in long term negative impacts on the local fauna. Short-term loss of fauna species is likely to occur in and adjacent to the project area during the construction phase due to increased noise levels, creation of dust, and generally high levels of disturbance for the period during which construction will take place. High levels of vehicle traffic during the construction phase will also result in increased numbers of fauna road casualties. Management actions and procedures will minimise this impact.

Pit dewatering is also likely to have an impact on fauna that is dependant on phreatophytic vegetation. Impacts associated with groundwater drawdown and there management are discussed in Appendix D.

The impact of the project on the two migratory species is discussed below:

- The Rainbow Bee Eater was observed on numerous occasions particularly along the river and creek lines. The Bee Eaters are widespread in distribution preferring to excavate burrows for the purpose of breeding, often utilising the banks of rivers and streams. They are described as quite common in Flegg (2002). As the project does not directly impact on rivers and streams, the potential for impacts on this species is considered minimal.
- Simpson and Day (1999) describe the habitat of the White Bellied Sea Eagle as being large rivers, lakes, coastal seas and islands. This species is considered widespread but erratic in distribution and rarely common (Flegg 2002). The individual sighted was making opportunistic use of standing water within the Fortescue River. Accordingly, it is unlikely that the project will have any impact on this species.

5.2.3 Management

Impacts on fauna species will be managed through a process of avoidance, minimising disturbance, monitoring impacts and relocations. The key objective of fauna management and monitoring is to ensure compliance with all statutory requirements relating to all fauna species within the project area. Specifically, International Minerals aims to maintain the abundance, diversity, distribution and functionality of fauna to be impacted by the project at a species and ecosystem level through minimising or avoiding impacts on target species and habitats. As with management of flora impacts, detailed design will be undertaken with consideration for habitat values and where possible, will avoid destruction of more important areas such as cracking clay grasslands and drainage lines. Rehabilitation programmes post construction, during operation and for mine closure will be aimed at ensuring suitable habitat is returned as practicable.

Mechanisms for managing impacts on stygofauna are outlined in the Groundwater Management Plan (Appendix D).

Objectives

The following objectives and targets will be used to assess the impact that various activities associated with all mining operations may have on local fauna populations.

Table 5.10. Key Objectives and Targets Related to Fauna

Objective	KPI's	Data Source	Target
Compliance with Statutory requirements	100% Compliance	Compliance auditing	100%
No negative impact to fauna within the mining lease	Maintenance of fauna abundance	Fauna monitoring	Minimal decline in species diversity
Maintenance and protection of key fauna habitats and populations	Maintenance of fauna abundance	Fauna monitoring	Minimal reduction in fauna species numbers
Maintenance and protection of key fauna linkage corridors	No significant loss of Habitat	Fauna and Vegetation monitoring	Minimal reduction or removal of key fauna corridors
Manage impacts on the subterranean fauna and their habitats	Maintain current diversity and habitat quality	Fauna and water monitoring	Minimal long-term impact on species survival and diversity

Actions

To achieve these objectives the Proponents will ensure that:

- the necessary resources are provided to implement, monitor and review operations and management actions to minimise impacts that project operations may have on subterranean fauna;
- all employees and contractors comply with Management guidelines while carrying out their work activities; and
- where necessary, specialists are engaged to undertake detailed surveys and accurately identify specimens.

Table 5.11. Proposed fauna impact management strategies

Activity	Impact	Management	Performance Target	Responsibility
Vegetation Clearing	Loss of breeding sites	• Develop and implement system for reporting nest sites • Evaluate significance of nest sites • Avoid clearing significant nest sites where possible • Offset unavoidable loss of nest sites through the use of nesting boxes	Minimal net loss of known nest sites	The Proponents Environmental Manager
Vegetation Clearing	Loss of habitat	• Obtain appropriate permits and licenses for fauna handling • Implement catch and release relocation program prior to any ground disturbing activity • Minimise clearing as much as practicable commensurate with the requirements of mining	Minimal loss of significant habitat	The Proponents Environmental Manager Construction Manager
Vegetation Clearing	Loss of linkage corridors such as De Boulay Creek	• Divert creek line to maintain existing flows downstream • Rehabilitation of diversion. • Create alternative linkages if feasible.	Reinstatement of corridor as soon as practicable	The Proponents Environmental Manager
Vehicle Movements	Fauna deaths and injury	• Erect signage to warn operators of fauna 'hotspots' • Impose speed restrictions • Where possible, reduce vehicle movements during peak fauna movement periods as determined through a log of fauna deaths (species, location and time), • Highlight risks during workforce inductions	Minimal fauna deaths	The Proponents Environmental Manager Construction Manager
Trenching and other holes	Fauna deaths from exposure and predation	• Minimise the time that the trench or hole is open. • If it is necessary for a trench to remain open for extended periods, suitable escape ramps to be installed at regular intervals. • Frequent inspections of open excavations will be undertaken by suitably qualified environmental staff and a release strategy developed. • All fauna removed from the excavations will be documented prior to being released. • In those cases where dead animals are encountered the specimen will be preserved for lodging with the Western Australian Museum	Minimal fauna deaths	The Proponents Environmental Manager Construction Manager
Entrapment in fencing	Fauna deaths or injury	• Minimise fencing in areas where fauna is known to move, • Use fauna friendly fencing such as reduced mesh size and no top wires	Minimal fauna deaths and injury	The Proponents Environmental Manager Construction Manager

Activity	Impact	Management	Performance Target	Responsibility
Waste products such as plastics & Chemicals	Fauna deaths from entrapment or poisoning	• Ensure correct disposal of wastes • Development and implementation of cleanup protocols for chemicals in accordance with safety data sheets. • Ensure all Material Safety Data Sheets are on record. • Workforce education	Minimal fauna deaths and injury	The Proponents Environmental Manager Construction Manager
Noise	Deter fauna from surrounding area and possible breeding sites	• Monitor noise levels and ensure they are within acceptable levels.	Noise remains within an acceptable limit resulting in minimal displacement of fauna	The Proponents Environmental Manager Construction Manager
Increased numbers of feral animals	Increased predation of native fauna by foxes and cats	• Ensure correct disposal of wastes, especially food materials • Implement monitoring and control programs targeting foxes and cats.	No increase in numbers of foxes and cats	The Proponents Environmental Manager
Fencing	Entanglement of fauna in fencing	• Minimise fencing in areas where fauna is known to move, • Use fauna friendly fencing such as reduced mesh size and no top wires.	Minimal fauna killed in fencing	The Proponents Environmental Manager Construction Manager

Monitoring
International Minerals will undertake various monitoring programs to detect impacts that the project is having on local fauna. These surveys will be pursuant to the EPA's Guidance Statement No. 56 on Terrestrial Fauna Surveys (EPA 2004).

Monitoring will include:

- sampling target habitats for species of interest;
- sampling at opportunistic times, such as following exceptional seasons when populations of species like *Pseudomys chapmani* (Western Pebble Mound Mouse) and *Leggadina lakedownensis* (Lakeland Downs Mouse) are likely to increase in response to increased availability of feed, thus increasing the chance of detection;
- specific sampling for bat species likely to occur in the area and the identification to species level of all individuals captured;
- specific sampling for *Ctenotus* aff*. Robustus* to increase the understanding of it's distribution within the project area; and
- specific sampling for subterranean fauna.

Table 5.12. **Proposed fauna monitoring program**

Activity	Performance Indicator	Corrective Action	Frequency*	Responsibility	Records
Target rare or threatened species surveys	No long term decline in abundance and distribution	• Undertake remedial actions such as habitat rehabilitation and feral animal control if required as detected through monitoring program	Annual or seasonal depending on target species	The Proponent and Environmental Consultant	Species abundance and distribution data. Reports to DEC.
General fauna surveys	Within acceptable bounds of baseline survey data taking into account seasonal variation	• Site rehabilitation • Feral animal control	Annual or seasonal	The Proponent and Environmental Consultant	Diversity and abundance data. Reports to DEC
Feral animal surveys	Abundance data	• Implement control programs	Annually	The Proponent and Environmental Consultant	Population estimates. Reports to DEC
Logging of road kills	Number of fauna deaths	• Reduce speed limit in key sections of road. • Signage and education	On going	The Proponent	Log of species and abundance. Reports to DEC
Monitoring of open trenches/holes	Number of deaths vs rescued fauna	• Increase monitoring program • Installation of escape rams	Twice daily while trench is open	The Proponent	Log of species recorded and deaths.
Monitoring breeding sites	Number of available breeding sites	• Installation of artificial nesting boxes	Pre and post construction	The Proponent and Environmental Consultant	Number of nesting sites. DEC

* Review monitoring program after two years to determine the extent of monitoring required

5.3 Recreational Use

5.3.1 Background

There is the potential for indirect impacts to occur outside the project area. Accordingly, International Minerals has considered the environmental values of the areas that surround the project area. Values that occur within these areas include the public camping area at the mouth of the Fortescue River and the various conservation reserves, including the Great Sandy Island Nature Reserve, the Cape Preston Marine Management Area and the proposed Dampier Archipelago-Cape Preston Marine Conservation Reserve.

5.3.2 Impacts

The cumulative effects of increased mining activity will increase anthropogenic impacts in the area of Cape Preston. Off the coast, to the west, the Great Sandy Island Nature Reserve (GSINR) incorporates 26 islands as a 'B' Class Reserve for the 'Conservation of Flora and Fauna' (HGM, 2004). The reserve does not affect the activities that can be undertaken in the marine environment around the islands. To the east, DEC proposes the creation of the Dampier Archipelago Marine Park and Cape Preston Marine Management Area (CPMMA). Many of the islands in the Dampier Archipelago are already classed as nature reserves. The formation of the CPMMA will have implications for future utilisation of the marine environment, in particular with the formation of no-take zones. No take zones are considered important tools for managing fisheries, with ample evidence suggesting that the establishment of no-take zones has direct effects on the levels of fish stocks within them and in adjacent waters (Colman & Simpson, 1999).

Recreational activities are likely to include:

- fishing (open water, river and beach)
- boating
- camping / picnics
- nature watching
- swimming

Not only will these activities impact the natural environment, they will also result in increased competition for recreational 'space' with the annual flux of tourists to the Fortescue River mouth camping area.

5.3.3 Management Strategies

The Proponent commit to implementing the Mineralogy Central Block Projects' approved Recreational Use Management Plan (Appendix N).

5.4 Surface Water Impact and Management

5.4.1 Background

Existing Fortescue River Hydrology
The mine site is located adjacent to the lower reaches of the Fortescue River and about 15km from the river mouth in the Indian Ocean. The project area has an effective catchment area of approximately 20,000km^2 and an estimated 100 year ARI peak flow of 9,570m^3/s. The Fortescue River has a well defined main flow channel, typically 4-6m deep and around 100m wide adjacent to the project area. The main channel has a gravelly bed and typically gum trees along both banks. Vegetation over the floodplains varies from wide open grass areas to dense scrub. There appears to be a significant "break-out" area to the south of Coolangara Hill that redirects high level flood water north-west, away from the main Fortescue River system (Appendix F).

Existing Du Boulay Creek Hydrology
Du Boulay Creek flows in a north-westerly direction through the general project area, and joins the Fortescue River approximately 6km from the coast. The creek has a catchment area of about 200km^2, with an estimated 100 year ARI peak flow of 1,400m^3/s. Du Boulay Creek typically has main flow channels with 5-10m width gravel beds and trees along the banks. Floodplains adjacent to the creeks typically comprise open grassed areas with scattered trees.

5.4.2 Impacts

Waste Dump
The Balmoral South waste dump occupies the western extent of Leases MO8/126 & 127. It is located in the Fortescue River floodplain, west of the pit with the north end of the dump near Du Boulay Creek. It is currently sized at 3.1km long x 1.4km wide.

The proposed Balmoral South waste dump encroaches into the Fortescue River eastern floodplain, and a number of creeks and intertwining tributaries flow through the proposed dump area. Hydraulic modeling predicts that the construction of the Balmoral South waste dump in the Fortescue River floodway will locally increase 100 year ARI flood levels within about 3km upstream of the dump.

The hydraulic modelling for the Central Block waste dump predicted that the MAXIMUM local water level would be about 0.4m, with the increase tapering off in an upstream direction. The construction of the Balmoral South waste dump, upstream of the central block waste dump, therefore has no further impact on the MAXIMUM flood level increase (approx 0.37m), but rather the impact of the Balmoral South waste dump is to extend the increase in Fortescue River flood levels over a longer reach of the river, in an upstream direction from the Central Block waste dump.

This rise in flood level could potentially cause more water to escape from the Fortescue River main channel through the break-out channels. At its north end, flood levels are predicted to be unaffected by the development of the Balmoral South waste dump once the Central Block dump is in place.

The waste dump also has the potential to discharge sediment laden water to the environment.

Plant Site
The process and power station site is set around Du Boulay Creek. The proposed stockpile area, conveyor system, ROM pad and primary crushing area encroaches into the 100 year ARI floodplain but will be protected by bunding.

The bunds will restrict flow through the Du Boulay Creek in large flood events and cause water levels to rise. The most significant impact on water levels will occur around the conveyor system where water levels are predicted to increase by about 1.0m after construction of the bunds around the plant site. However, velocities in this area should decrease due to the increased flow depths causing flow areas to increase. Additionally, the location of the bunds creates a meandering flow path and an increased potential for locally higher velocities and scouring.

Tailings Storage Facility

The tailings storage facility (TSF) occupies the eastern extent of Lease MO8/130, north of the mine camp site. Most of the TSF occupies ground gently sloping towards the Fortescue River and no major watercourses are interrupted. However, the facility has the potential to discharge various chemicals, reagents and unrecovered metals to the environment, thus increasing the risk of surface water contamination.

Camp Site

The proposed village site is located 8km south of the plant site in the south-east corner of Lease Area MO8/130. The village site gently slopes to the west towards the river and there are no significant water courses through the area. Hydraulic modelling shows the proposed village area has a 100 year ARI flood level of approximately RL30.8m and the ground level in the area of the village is about RL29.5m-32.5m. Therefore, the 100 year ARI flood level in the Fortescue River has the potential to inundate parts of the site nearer to the river.

Borefield

The project water supply borefield is proposed to be located on the western flank of the Fortescue River, upstream from the project area. Some of this borefield area would be susceptible to inundation during a 100 year ARI flood event. Inundation could be up to 2m depth during the 100 year ARI event, though peak flow velocities would typically be low at less than 1m/s.

5.4.3 Management of Surface Water Impacts

Waste Dump

The risk of erosion and sedimentation from the waste dumps is high. Waste dump areas will be bunded to contain internal surface water runoff for treatment prior to discharge to the external environment, and to protect the dump from external river and wave attack. Around the perimeter bunding, vegetation would provide the best long term protection. The waste dump area may also be dished in the centre, to dissipate runoff by evaporation and seepage, and to reduce runoff and erosion down the face.

Riprap (or rock armour) can be used to protect against scouring and erosion. Appropriate armouring would be particularly required at the corners of the dump where eddies form or local velocities are high, to mitigate against erosion and scour holes.

A diversion channel will be required at the southern upstream edge of the waste dump to transport trapped water back towards the main river channel, although it is envisaged that some ponding would be acceptable.

Plant Site

Appropriate bunding around the plant infrastructure will prevent runoff from large flood events inundating the site. The proposed stockpile area, ROM pads and crusher encroaches into the Du Boulay Creek and will require: bunding; raising above the flood level on a pad; or relocation out of the flood plain. The final plant layout will ensure all plant site facilities minimize encroachment into the floodplain. The conveyor system crosses the Du Boulay Creek floodplain and would also need to

withstand 100 year ARI floodwater depths and velocities. Runoff from the plant areas will be controlled to ensure it does not cause undue erosion and to guard against potential contamination of watercourses.

TSF
The north-east corner of the TSF will approach Du Boulay Creek, and will remain a suitable distance away and bunded off from the creek with a 1000mm freeboard above the 100 year ARI 72 hour water level. An emergency spillway is also proposed that would allow rainfall from long return period events to be discharged from the TSF into the Fortescue River. The spillway and bunding will minimise contaminant and silt loading to the external environment. The TSF site requires no significant flood diversion works but armouring may be required if diversion channels run alongside the facility.

Camp Site
The proposed village site is at risk from flooding in the Fortescue River, and as such will require bunding to protect against large flood events. Drainage off the developed village site will also be self contained and controlled to ensure no undue erosion, and to guard against potential contamination to adjacent creeks and the Fortescue River.

5.5 Groundwater Impact and Management

5.5.1 Background

Dewatering of the ore-body will be required with average dewatering rates in the order of 1,300 to 1,800 kL/day (15 to 21 L/s) over the life of the mine with peak dewatering requirements in the order of 2,500 kL/d (30 L/s). This equates to a total estimated dewatering volume of approximately 15 GL over the 24 year mining period.

Process water requirements are estimated to be approximately 20 GLpa. The preferred water supply option is the development of a borefield to be installed in the Fortescue River alluvial aquifers adjacent to the Project, supplemented by dewatering discharge. An investigation programme is currently under way to determine the sustainable yield of the aquifer system, the results of which will be known later this year. It is currently planned to make any shortfall in supply (between Project demand and sustainable borefield/aquifer yield) by seawater desalination. However, prior to the development of a fallback seawater desalination system, other sources of water supply and water supply augmentation (wet season surface water harvesting, enhanced aquifer recharge etc) will also be assessed.

5.5.2 Impacts

Dewatering
The main pit will be excavated to around –280 mRL. Dewatering and depressurisation will be a critical component of mining. Dewatering is likely to be achieved via sump pumping and possible opportunistic construction of dewatering bores. Horizontal drain holes may be required to reduce pit wall pressures.

Dewatering of Balmoral South will induce drawdowns in groundwater levels around the pit. The lateral and vertical extent of the a “cone of depression” in groundwater levels will be dependent on the nature of local and regional aquifers, the depth of the pit and the “interference” effects of dewatering at the nearby Central Block. The results of groundwater modelling indicate that the cumulative impacts of both dewatering operations will result in one large elongate cone of depression.

Groundwater level drawdowns in close proximity to the mine be at, or close to the deepest section of the pit (approx 300 mbgl). Predicted drawdowns extend 21 km northwards to the coast, 12 km

southwards to the intersection with the Fortescue River and the upper reaches of the Fortescue River alluvial aquifer, 3.5 km to the west to the margin of the Fortescue River alluvial aquifers and 7 km to the east within the basement rock aquifers. Predicted drawdowns within the adjacent Fortescue River alluvial aquifers are minimal.

It should be noted that the model used predicts drawdowns within the basement rock aquifers around the mine sites and within the main Fortescue River alluvial aquifers, There are also minor (and largely seasonally intermittent) aquifers associated with shallow alluvium within several creeks that drain westwards through the mine areas towards the Fortescue River. While the drawdowns in the basement rock aquifers will induce some leakage from these shallow alluvial aquifers (depending on local aquifer properties), these aquifers will be recharged seasonally and will maintain some perched groundwater levels.

The dewatering induced drawdowns in groundwater levels will have some potential impacts on nearby groundwater users, predominantly pastoral wells as well as impacts on phreatophytic vegetation and other groundwater dependant ecosystems as follows:

- Other groundwater users: Bores and wells which tap the basement rock aquifers will experience interference drawdowns and some shallow wells close to the pit may dry up.
- Phreatophytic vegetation: There is the potential for the loss of vegetation within the cone of depression of groundwater level drawdowns. The vegetation risk assessments have been based on the predicted drawdowns in the basement rock aquifers and take no account of seasonal creek flows and perched water tables within the main creeks which support much of the vegetation at risk. Actual impacts on phreatophytic vegetation are expected to be significantly less than predicted.
- Subterranean Fauna: There is the potential for the localised impact on stygofauna, through the loss of habitat due to groundwater level drawdowns in both the basement rock aquifers and in the creek alluvium. However, as outlined above (phreatophytic vegetation), the actual groundwater level drawdowns in some areas are expected to be less than predicted. As a result, the loss of stygofauna habitat during mining is also expected to be less than predicted.

Pit Void

The final pit void will act as a groundwater sink in the long term with a pit lake level at around -230mRL (some 240m below the premining water table, and some 40m above the pit base). The potential impacts on groundwater levels will therefore be slightly less than during active dewatering. There will be some long term salinity build-up within the pit lake as a result of evaporative concentration. However, as the pit will remain a groundwater sink, this saline water will largely remain confined to the immediate pit area. There is the possibility of some very long-term density driven flow of hypersaline water at very low rates downwards out of the bottom of the pit. However, any such flow will be well below regional water tables and the major aquifer in the area (Fortescue River alluvium) and there will be no impact on useable groundwater resources.

TSF

It is not expected that the TSF will have any adverse impact on local or regional groundwater. In fact seepage from the TSF will likely result in the development of a local groundwater mound which would have the effect of reducing the potential drawdown impacts of pit dewatering on the two nearby station wells. TSF seepage is also likely to be of similar or better quality than local groundwater in the vicinity of the TSF.

5.5.3 Management of Groundwater Impacts

Groundwater Level Monitoring
Comprehensive groundwater monitoring programmes will be implemented to measure the extent of drawdowns and to provide input to the assessment of impacts on other groundwater users, phreatophytic vegetation and stygofauna. Appropriate trigger levels have been developed for more detailed monitoring and analysis.

Maintenance of Supply
In the case of pastoral wells affected by dewatering it is proposed to ensure continuation of water supply to running small diameter feed line to water troughs at effected wells. In cases where water levels drawdowns are not too great the installation of deeper replacement wells may be an option.

Phreatophytic Vegetation
There will likely be some unavoidable loss of vegetation within the cone of depression in groundwater levels. Management strategies have been developed to minimise drawdown impacts including:

- Minimising the rates of drawdowns by the adoption of a steady vertical (ie depth) development progression in the mine plan.
- Monitoring vegetation and vegetation stress to assess actual versus predicted impacts in high drawdown areas.
- Establishment of trigger levels (in consultation with DEC) to identify and quantify impacts.
- Determining (in consultation with DEC and others) appropriate offset strategies to compensate for losses in phreatophytic vegetation.

Stygofauna
There is the potential for localised impact on stygofauna through the loss of habitat due to groundwater level drawdowns in both the basement rock aquifers and in the local creek alluvium. However, as outlined above (phreatophytic vegetation), the actual groundwater level drawdowns in some areas are expected to be less than predicted. As a result, the loss of stygofauna habitat during mining is also expected to be less than predicted.

5.6 Water supply

5.6.1 Background

The Proponent intend to install a desalination plant with capacity to produce 20Glpa of water for mine operation and ore processing, as potable water and as a water supply for fire prevention and dust suppression. The preferred source for this water is a borefield based on the Fortescue Alluvium. Borefield development is currently the subject of separate investigations and applications and is therefore not addressed in this document. Details of the methodology behind this investigation are provided in Appendix E.

The assessed Mineralogy project includes provision for a 45Glpa desalination plant. The key requirements of the Ministerial Statement issued for that project required that Mineralogy:

- *Ensure that the salinity variation resulting from the discharge is no greater than five percent above the ambient level for more than one percent of the time anywhere around Cape Preston (except within the proposed Moderate Protection Mixing Zone); and*
- *Ensure that toxicant concentrations do not exceed the ninety percent species protection levels at the end of the outfall pipe for more than five percent of the time, nor exceed the ninety percent species protection levels at the edge of the Moderate Protection Zone.*

(Minister for the Environment, 2003)

In addressing the conditions set by the Minister, the Mineralogy Central Block Project has prepared a Wastewater Outfall Environmental Management Plan, which includes modelling to demonstrate that it can adequately achieve the objectives and targets defined in the Ministerial Statement. The plan also comprehensively defines the receiving environment, the impacts associated with brine discharge and the management and monitoring methods it intends to implement in order to ensure that the Minister's conditions are met.

International Minerals' desalination plant will be located adjacent to the assessed Mineralogy Central Block's Project's desalination plant at Cape Preston (Figure 1.3). It is proposed that the plant will have the capacity to provide 20Glpa. Wastewater will be discharged immediately adjacent to the wastewater outfall proposed for the Mineralogy Central Block Project at a rate of approximately 25Glpa. This is in addition to the assessed discharge of 57.8Glpa proposed for the Mineralogy Central Block Project. A total of 4ha of vegetation will be cleared for the construction of the plant at Cape Preston.

5.6.2 Impacts

The most significant impact associated with desalination arises from the requirement to dispose of brine. As outlined above, brine dispersion modelling was initially undertaken for the Mineralogy Central Block Project. Additional brine dispersion modelling has been undertaken in order to quantify the cumulative affect of increased wastewater discharge at the port. The outcomes of this modelling are presented in Appendix G. Brine, due to its high density and concentration of sodium, has the potential to cause harm to marine biota, in particular benthic primary producers (BPP). Some important ecosystem services provided by BPP include the provision of food (primary production), substrate and shelter, and physical stability of the seafloor and coastline.

Modelling of the cumulative effects of waste water outfall indicates that salinity concentrations would decrease rapidly (to within 43ppt of ambient within 5m) on initial mixing of the total release volume with the receiving waters. Further, based on the present planned discharge characteristics, the salinity concentration is predicted to dilute to within 1ppt above ambient (35.4ppt) approximately 40m from the release site. However, the saline water from the discharge is expected to continue mixing with receiving waters and reduce to within 0.3ppt (approximately 1%) above ambient, 55m from the discharge site. Hence, the salinity variation should be no greater than 5% above the ambient level for more than 1% of the time anywhere around Cape Preston (except within the central parts of the designated Moderate Protection Mixing Zone).

Accordingly, the additional volume of brine being discharged from the proposed International Minerals desalination plant will not significantly increase the extent of environmental impact that has already been approved for the Mineralogy Central Block Project.

5.6.3 Management

International Minerals commit to adopting the conditions outlined in Ministerial Statement 000635 (Minister for the Environment, 2003).

Water supply management will also focus on minimising water usage and waste wherever possible. The majority of water loss associated with the project will be through disposal of tailings. A number of strategies including dewatering of coarse magnetic separation tailings and tailings thickening are being considered to recover as much water as practicably possible during the process and to minimise water losses.

Fire control will be through in-situ fire ring mains included in all plant. The fire ring mains will be connected to the process water stream, and will source water from the processing facilities in the event of fire.

Water from the package sewage plant at the accommodation camp will be used on trees and vegetation surrounding the camp. Accommodation camp lawn areas will be watered using bore water to minimise the risk of health issues.

Monitoring Programme

The main potential impact of the project operations on water quality and receiving waters habitat will be in relation to hyper-saline releases from the proposed desalination plant. The wastewater outlet from the desalination plant will be located off the jetty in approximately 11m of water. It is proposed that water quality monitoring of the health of the ecosystem, in the vicinity of the outlet, take a number of forms. Management will be in accordance with the conditions imposed on the Central Block Project by Ministerial Statement 000635.

5.7 Dust

5.7.1 Background

Dust is considered to be any particle suspended within the atmosphere. Particles can range in size from as small as a few nanometres to 100 microns (µm) and can become airborne through the action of wind turbulence, mechanical disturbance of fine materials or through the release of particulate rich gaseous emissions. Most mine originated dust is chemically inert; however, there is the potential for more harmful and persistent particulate contamination to occur from mining ore containing or associated with certain products, such as asbestos, radioactive materials or heavy metals. Emissions from operating machinery not included as greenhouse gasses can also be classed as dust particulates.

Dust is measured using a variety of methods, the most common being Total Suspended Particulates (TSP), which nominally measures up to 50µm, and PM_{10} or $PM_{2.5}$ (particulate matter less than 10µm or 2.5µm in size, respectively). Deposited matter measures the mass of any particulate falling out of suspension expressed in mass per area per time and is the least commonly used in determining dust concentrations (Department of Environment 1998).

Dust production will occur during construction and during normal operation and will be cumulative with the neighbouring CP Mining project based on the George Palmer orebody. During the construction phase, dust will be generated through:

- vegetation clearing;
- light and heavy vehicle movements;
- haul roads, track and access road construction; and
- general earth moving.

During operations, dust will be generated through:

- additional vegetation clearing;
- mining related earth moving;
- drilling and blasting;
- light / heavy vehicle movements;
- crushing, both external and internal to the processing plant;
- screening;

- stockpiling;
- ore handling and transport (conveyors);
- ore beneficiation (e.g. DRI)

5.7.2 Impacts

Dust can affect the environment by impacting flora and fauna health and by reducing visual amenity. In the immediate vicinity of the source, dust can stress vegetation through blocking stomata and reducing light availability. Overall, the potential impacts of dust in the project area include:

- reduced visual amenity;
- smothering of surrounding vegetation;
- adverse impact and disturbance to fauna;
- risk to human health; and
- nuisance.

Human health risks arise from fine particles which can enter into the respiratory tract and possibly cause respiratory problems. Dust may also irritate the eyes and mucus membranes. Some mining dust can also contain toxic particles such as asbestos which has an elevated human health concern.

Dust derived from DRI production is potentially reactive in nature, particularly in the presence of moisture. The EPA Bulletin prepared for the Mineralogy Central Block Project (EPA, 2002) stated DRI *"has caused safety problems in confined spaces with high moisture levels, such as during ocean transport. This reactivity can be reduced by stabilisation via hot briquetting (which reduces the surface area) or via passivation, where part of the DRI is oxidised (to create an insulation effect). However, there is still potential for process areas and materials handling to produce reactive DRI dust. DRI dust is known to cause health problems (eye damage) and damage to property (paint coatings). Because of this, the EPA believes that DRI dust needs to be treated more cautiously than iron ore dust and emissions must be required to meet best practice"*.

5.7.3 Management

Management of issues and impacts arising from dust emissions will be managed in accordance with Mineralogy Central Block Project's Dust Management Plan (approval pending). This plan is provided in Appendix I.

5.7.4 Gaseous Emissions

5.7.5 Background

Atmospheric emissions will arise from the operation of the pellet plant, power station and HBI plant, producing oxides of nitrogen (NO_x) and sulphur dioxide (SO_2). Modelling of gaseous emissions arising from the project has been undertaken, taking into account the cumulative affect of this proposal combined with the assessed Mineralogy Central Block Project proposal. Appendix H provides this report in full.

Sources of gaseous emissions include:

- The power station consisting of open-cycle gas turbines. Modelling was based on the worst case configuration of anywhere between two and nine turbines. The combustion of natural gas in the power station for supplying electricity to the mine site, processing plant, conveyor, desalination plant and ship loading operations at the port will emit oxides of nitrogen and carbon dioxide.
- The pellet plant emitting oxides of nitrogen from a main stack.
- The DRI plant producing process gases for the reduction of iron oxides to iron metal in the reformer and carbon dioxide. The three DRI modules emit combustion products (oxides of nitrogen and sulphur dioxide) via main stacks.

5.7.6 Impacts

Nitrogen oxide, or NOx, is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colourless and odourless. NOx emissions can contribute to:

- the creation of ground-level ozone, which can trigger serious respiratory problems;
- the formation of nitrate particles, acid aerosols, as well as NO_2, which also cause respiratory problems;
- the formation of acid rain;
- nutrient overloads that deteriorate water quality;
- an increase in atmospheric particles;
- the creation of toxic chemicals; and
- global warming.

NOx and the pollutants formed from NOx can be transported over long distances, following the pattern of prevailing winds. Accordingly, impacts associated with NOx must be considered cumulatively with other sources of emissions throughout the region.

Sulphur dioxide, or SO_2, belongs to the family of sulphur oxide gases (SOx). These gases dissolve easily in water. Sulphur is prevalent in all raw materials, including crude oil, coal, and ore that contains common metals like aluminium, copper, zinc, lead, and iron. SOx gases are formed when fuel containing sulphur, such as coal and oil, is burned, and when gasoline is extracted from oil or metals are extracted from ore. SO_2 dissolves in water vapour to form acid, and interacts with other gases and particles in the air to form sulphates and other products that can be harmful to people and their environment. SO_2 contributes to:

- respiratory illness, particularly in children and the elderly, and aggravates existing heart and lung diseases;
- the formation of acid rain; and
- formation of atmospheric particles.

5.7.7 Management

The EPA's position on acceptable emissions and ambient concentrations are contained in the guidance statement *"Implementing Best Practice in proposals submitted to the Environmental Impact*

Assessment process" (EPA, 2003). This statement provides guidance on what the EPA means by "best practice in the EIA process" with the thrust of the statement being that new proposals are "required" to demonstrate that:

- "All relevant environmental quality standards must be met;
- Common pollutants should be controlled by Proponent adopting Best Practicable Measures (BPM);
- Hazardous pollutants (like dioxins) should be controlled to the Maximum Extent Achievable (MEA), which involves the most stringent measures available. For a small number of very hazardous and toxic pollutants, costs are not taken into account.
- There is a responsibility for Proponent not only to minimise adverse impacts, but also to consider improving the environment through rehabilitation and offsets where practicable" (EPA, 2003).

The statement defines Best Practicable Measures as those that: "*incorporate technology and environmental management procedures which are practicable, having regard to, among other things, local conditions and circumstances, including costs, and to the current state of technical knowledge, including the availability of reliable, proven technology.*"

Through appropriate design, the Proponent will ensure that gaseous emissions are within the following criteria.

Table 5.13. National Environmental Protection Measure - Air Quality Standards and Goals – Gaseous Emissions

Pollutant	Averaging Period	Maximum Concentration		Goal
		(ppm)	(µg/m^3)	Maximum allowable exceedances within 10 years
Carbon Monoxide	8-hour	9.0	11,240	1 day a year
Nitrogen Dioxide	1-hour	0.12	246	1 day a year
	1-year	0.03	62	none
Photochemical Oxidants (as ozone)	1-hour	0.10	214	1 day a year
	4-hours	0.08	171	1 day a year
Sulphur Dioxide	1-hour	0.20	572	1 day a year
	1-day	0.08	228	1 day a year
	1-year	0.02	57	none
Lead	1-year	-	0.5	none

Notes:

Concentrations of gaseous pollutants in italics have been converted from the NEPM standard quoted at 0 deg C and 101.3kPa.

Stack testing will be conducted at three sites to measure the following emissions:

Power Station – CO_2 & NO_x

Pellet Plan – NO_x

DRI Plant – CO_2, SO_2 & NO_x

Ambient air quality data will be collected for a period of 12 months prior to commencement of construction. International minerals will install a meteorological station to gather site-specific data,

which will allow the calculation of atmospheric stability and more accurate modelling of air emissions. The meteorological station will be established 12 months prior to completion of the DRI plant or power station.

Monitoring equipment and sampling methods will conform to Australian Standards and will be determined prior to commencement of the dust and air quality monitoring programme. A gas analyser located in the gas stream vent will be used to monitor CO_2 and NOx emissions released from the stacks. The specific instruments used to monitor emissions will be determined through further liaison with the relevant regulatory authorities. Ambient air quality will be monitored continuously using automated data loggers downloading to a computerised data base to facilitate reporting of the data collected. Carbon dioxide and oxides of nitrogen emissions will be measured and logged twice a week using the gas analyser located in the various gas stream vents. Additional quarterly compliance stack testing will also be incorporated to obtain accurate measurements of the emissions released from the facility. Detailed monitoring methodologies will be developed in consultation with the relevant regulatory authorities.

5.8 Greenhouse Gas Emissions

5.8.1 Background

Gaseous emissions that contribute to the greenhouse effect can be given a global warming potential factor, which enables each gas to be expressed as a carbon dioxide equivalent ($CO_{2\text{-}e}$). This allows each gas that the Balmoral South project emits to be quantified, establishing their overall greenhouse effect.

The Balmoral South project will produce the following greenhouse gases:

- carbon dioxide (CO_2);
- methane (CH_4);
- sulphur dioxide (SO_2); and
- oxides of nitrogen (NO_X).

The sources of these emissions include:

- pellet plant;
- DRI plant;
- gas turbines at the power station;
- combustion of diesel fuel in mobile plant and equipment used for construction and mining;
- decomposition of cleared vegetation;
- explosives used in blasting; and
- decomposition of domestic wastewater.

Table 5.14 summarise the total estimated carbon dioxide equivalent ($CO_{2\text{-}e}$) emissions from the project.

Table 5.14. Emissions Per Year of Operation

Source	Year (emissions in 10^3 tonnes)					
	1	2	3	4-6	7-14	15+
Process gas and electricity generation	0	0	1,159	4,637	4,637	4,637
Upstream Natural Gas Production and Delivery	0	0	194	774	774	774
Natural Gas Full Fuel Cycle	0	0	1,353	5,411	5,411	5,411
Mobile plant equipment	214.5	241.5	336	241.5	207	193
Vegetation clearing	3	4.5	7.5	9	10.5	7.5
Blasting	0	0	2	3	3	3
Wastewater	0.15	0.15	0.15	0.03	0.03	0.03
Total (rounded)	**217.5**	**219**	**1,583**	**5,634**	**5,631**	**5,615**

5.8.2 Impacts

The impacts associated with greenhouse gas emissions are well documented. Greenhouse gasses lead to global warming because they absorb the longer wavelength energy that is reflected by the earth back into space more efficiently than they do the shorter wavelengths originating from the sun. The absorption of this longwave radiant energy warms the atmosphere. Because the atmosphere then radiates most of this energy back to the Earth's surface, our planet is warmer than it would be if the atmosphere did not contain these gases. Without this natural greenhouse effect, temperatures would be about 15ºC lower than they are now.

5.8.3 Management

The Proponent commit to implementing the Mineralogy Central Block Projects approved Greenhouse Gas Management Plan (Appendix M).

5.9 Noise Emissions

5.9.1 Background

During the project, various activities will produce noise emissions. The project area is within the boundaries of the Mardie pastoral lease, and is isolated from any substantial human development. The only sensitive noise receiving locations that will be affected by the project are the public camp at the mouth of the Fortescue River and the two proposed mining camps associated with the local iron ore mining projects.

The Western Australian *Environmental Protection (Noise) Regulations (1997)* specifies allowable noise emissions. These allowable emissions depend on the type of receiving premise and time of day. Airblast recommended levels are also specified in the guidelines.

The noise criteria will be applicable to the following locations:

- miner's camp located to the east of the proposed mine (associated with the Mineralogy Central Block Project),
- miner's camp located to the south of the proposed mine (associated with this project), and

- the public camping area located at the mouth of the Fortescue River.

The Regulations require that a noise emission must not significantly contribute to a level of noise that exceeds the assigned level appropriate for the receiving premises. A significant contribution to a level of noise at the receiving premises is considered to be a level that is greater than 5dB below the assigned level at the point of reception. To ensure that the project complies with the regulations, design targets are 5dB below the assigned noise level for each combination of receiving area and time of day in order to not significantly contribute to the overall noise environment.

The Regulations also provide guidance for construction noise; however, there are no specific criteria. The guidelines for construction work specify management practices that should be followed, and it requires general adherence to the Regulations.

Although the guidelines do not provide specific criteria for construction noise, best practices should ensure that:

- The construction work complies with section six of Australian Standard 2436-1981 (*Guide to Noise Control on Construction, Maintenance and Demolition Sites*), and
- Equipment used for the construction work must be the quietest reasonably available.

5.9.2 Impacts

To ensure the project's compliance with the Regulations, an environmental noise assessment was conducted by Bassett Acoustics (2006, Appendix J) to model the expected noise emissions at the three noise receiving locations. Construction, operation and blasting noise emissions were predicted using CONCAWE algorithms in the SoundPLAN noise propagation software. Noise modelling was based on the mine operating 24 hours per day, seven days per week. Three operational scenarios were considered for the assessment of the mining noise: initial, future and final. The scenarios differed in the operational capacity and activity locations. In addition, noise emissions arising from the adjacent Mineralogy Central Block Project were included in the modelling to ensure adequate consideration of cumulative affects.

To ensure that project noise emissions do not make a significant contribution to a noise receiving location, the design target noise levels were chosen to be 5dB(A) below the lowest noise level at each noise sensitive location, which is the assigned night time noise level. Therefore, based on the categorisation of each noise receiving premise, the design target noise level for the miners camps was set at L_{A10} 60dB(A) and the design target for the public camping area was set at 30dB(A).

Blasting noise at the receiving locations will vary depending on the stage of the project, the blast configuration and the site-specific condition. Blasting noise is expected to be higher during construction and the initial stages of mining.

The noise assessment predicted that the noise emissions criteria will be met at all noise sensitive receivers (Table 5.15).

Table 5.15. Predicted Operational Environmental Noise Levels

Receiver Location	Predicted Night Time Operational Noise Emissions – L_{A10} dB(A)			Criteria – L_{A10} dB(A)
	Initial	Future	Final	
Miners camp (east)	36	36	36	60
Miners camp (south)	26	24	24	60
Public camping area (Fortescue River)	24	24	24	30

Construction noise emissions are also expected to be minimal at the receiving locations (Table 5.16).

Table 5.16. Predicted Construction Environmental Noise Levels

Receiver Location	Predicted Night Time Construction Noise Emission – L_{A10} dB(A)	Criteria – L_{A10} dB(A)
Miners camp (east)	28	N/A
Miners camp (south)	23	N/A
Public camping area (Fortescue River)	17	N/A

At the assumed levels of activity for the construction and operational phases of the Balmoral South Iron Ore Project, environmental noise levels are expected to be well below the criteria levels at all the noise sensitive locations, as required in the *Environmental Protection (Noise) Regulation 1997*.

5.9.3 Management

Project noise levels shall be kept to a minimum to satisfy workplace health and safety requirements and to reduce the disturbance on the surrounding fauna. Particular attention will be given to the noise associated with the overland conveyor and port materials handling facilities. Containing noise from blasting operations to within permissible limits is not anticipated to be problematic. Noise will be monitored during the initial blasts to determine the typical maximum permissible charge size per delay interval.

The Noise emission levels from the equipment supplied will be better than the criteria defined in the *Environmental Protection (Noise) Regulations of 1997*. The maximum sound pressure for all equipment at 1m from its boundary is 85dB(A) with no tonality to its noise spectrum. Equipment that exceeds this will have baffles fitted. The layout of the Project Area shall be designed in such a way to reduce the operators' exposure to its noise. Personnel will not be exposed to a Daily Noise Dose in excess of 1.0.

The Proponent will ensure that all realistic, good practice noise management measures will be implemented for the duration of the project, and the effectiveness of the Noise Management Programme will be reviewed against the following indicators:

- compliance with the Regulation 13 *Environmental Protection (Noise) Regulations 1997* (general construction noise);
- compliance with the Regulation 7 *Environmental Protection (Noise) Regulations 1997* (operational noise levels)

- compliance with the Regulation 11 *Environmental Protection (Noise) Regulations 1997* (blasting noise); and
- the level of complaints received and registered.

Table 5.17. Acceptable noise criteria

Receiver Location	Noise Criteria L_{A10} dB(A)	
	Construction	Operation
Miners camp (east)	60	N/A
Miners camp (south)	60	N/A
Public camping area (Fortescue River)	30	N/A

The project is expected to comply with required noise emission levels pursuant to the Regulations. Adherence to the following management practices will further minimise environmental noise emissions:

- all construction work will be carried out in accordance with control of environmental noise practices set out in Section 6 of AS 2436-1981 (Guide to Noise Control on Construction, Maintenance and Demolition Sites);
- all equipment, machines and vehicles to be used on site during construction and operation will be the quietest reasonably available consistent with operational requirements, and will be routinely maintained to ensure the effectiveness of noise suppression systems and equipment;
- in the event that any blasting is required to facilitate construction, initial blasts will be limited to a mass of 60kg and measurements will be undertaken near both the river mouth camps and the accommodation camp site as a basis for determining the actual allowable charge mass to ensure compliance with Regulation 11 of the *Environmental Protection (Noise) Regulations 1997*;
- the layout of the Project Area shall be designed in such a way to reduce the operators' exposure to noise;
- through site induction programmes, all personnel (including contractors) will be informed of their responsibilities and the importance of managing noise levels; and
- any noise-related complaints received will be registered and will trigger a review of the relevant operational / management procedure/s by the site Environmental Officer as a basis for development and implementation of appropriate modified practices.

A monitoring program will be implemented in order to ensure that the project remains within compliance of the Regulations. Annual noise monitoring will be conducted at the noise sensitive Fortescue River mouth camping area. Airblast monitoring will also be conducted during each blast for the first month of the project to ensure that this activity is in compliance with the Regulations. All monitoring activities will be included in the annual environmental reporting.

5.10 Waste Storage, Treatment or Disposal

5.10.1 Background

Project activities will generate waste that can be broadly categorised into the seven types (Table 5.18).

Table 5.18. Waste Streams

Waste Stream	Activity	Disposal site
Bulk earthen waste (sub-surface soil)	Clearing	Waste rock dump
Dry tailings	Ore concentration and processing	Tailings dam or waste dump
Inert waste and putrescibles	General domestic waste	On-site landfill
Industrial (oil filters, hydraulic hose, workshop waste, waste oil, tyres, etc.)	Industrial works	Off-site for disposal or recycling, as appropriate to the specific waste type
Recyclables (aluminium, glass, paper, etc.)	General domestic waste and industrial works	Off-site recycling facility
Sewage, grey water and washdown water	Domestic and industrial activities	On-site package sewage treatment plant
Hazardous waste	Industrial activities including blasting	Off-site

5.10.2 Impacts

Although management activities will be designed to avoid any environmental contamination, there is risk that accidental contamination will occur. In general, potential impacts of waste generation and disposal from the project may include:

- Fauna: through loss of habitat, mortality, reduced species diversity, disturbance to activity patterns and movement, habitat fragmentation and habitat contamination;
- Flora: loss of vegetation through clearing, weed introduction or spread and dust generation;
- Surface water and/or ground water quality: contamination through accidental spills and contamination; and
- Air quality: volatile emissions and odours from the operation.

The proponent will use a both on-site and off-site facilities to ensure appropriate disposal of all waste streams (Table 5.18). Inert waste and putrescibles will be collected and disposed in a landfill site that complies with the Draft Code of Practice for Rural Landfills. All industrial waste will be removed from the project site to a registered landfill or recycling facility, using the appropriate certified contractors. Hazardous waste will be transported off-site for appropriate disposal. If accidental hydrocarbon spills do occur then a bioremediation landfarm will be established. Sewage waste will be treated through a package sewage treatment system and appropriately disposed to meet health regulations. Additional wastewater treatment will occur at the plant site and stockyard.

5.10.3 Management

Performance Targets

Performance targets will focus on appropriate waste disposal based on the legislation, regulation and guidelines specified above. Waste collection and disposal will comply with all relevant legislation and follow all appropriate guidelines. The project will target 100% compliance with all relevant legislation, regulation and guidelines. Additionally, the project will target waste minimisation consistent with the strategic direction for waste management in Western Australia. The waste management program will endeavour to implement annual targets in waste minimisation and/or staff awareness and education.

Landfill

The location for the on-site landfill will be carefully chosen and it will consider potential environmental impacts including the type of vegetation to be cleared and visual impact. The landfill location will be chosen to avoid any sites of Aboriginal heritage. Additionally, geotechnical investigations will ensure appropriate soils and local drainage.

The landfill site will be designed and located in accordance with the Draft Code of Practice for Rural Landfills (DoE 2000), including:

- excavated cell (trench) method of operation, using a working tip face up to 100m in length, 2-5m in depth and 3-5m in width;
- a 10m firebreak around the landfill site;
- safe access to the working face of the cell, (trench) directions to the tip face demarcated with bunding;
- a 1.8m (minimum) high cyclone mesh litter control fence with gates around the perimeter of the landfill site;
- drainage control measures;
- progressive rehabilitation of each completed cell (trench) section; and
- the cells (trench) will be ramped at one end to allow fauna egress.

Management of the landfill will continue throughout active use of the facility. The filling method for the landfill will be the trench method. This design is appropriate for areas where a sufficient groundwater clearance level can be maintained and where adequate cover material is available. The excavated material from the cell will be stockpiled and then used as cover material.

Contamination Avoidance

Waste management activities will focus on the prevention of any environmental contamination, including the following management practices to ensure minimal leachate from the waste disposal operation:

- Surface runoff will be diverted around the active waste disposal cell.
- The cell base will be contoured to create a low point into which incidental rainfall will collect within the trench. Waste will initially be deposited within the low point to absorb incidental rainfall.
- Once the low point has been filled, waste will be progressively placed over the entire cell base to create a 2m deep layer of absorbent material throughout the cell and minimise the occurrence of any exposed water therein.

- Water infiltration into waste will be minimised through the final configuration of the emplaced waste, a low ridge will be created to promote surface runoff, and placement of a capping layer of cover material.

Groundwater contamination will be prevented by ensuring that the landfill is designed with an adequate distance between the base of the landfill and the water table. This will ensure that the undisturbed soil beneath the landfill will act as a medium to filter pollutants through physical, chemical and biological processes.

A number of other management activities will be implemented to minimise environmental impacts from the waste operations:

- the use of wind breaks, such as earth bunds or portable windbreaks where prevailing wind direction is consistent to reduce the incidence of windblown litter dispersal;
- the use of mobile litter screens where prevailing wind direction is inconsistent; and
- dust minimisation through the establishment of vegetation cover and mulch placement as an alternative surface treatment.

Waste Transfer and Recycling

A waste transfer and recycling area will be established on-site to appropriately store waste destined for off-site disposal. Waste for off-site transfer will include recyclable materials and hazardous goods.

Recyclable materials storage on-site will include:

- high grade metals to be stored in skip bins
- low grade metals to be stored in drums
- batteries on bunded pallets
- waste oil and fuel and other oily materials such as rags, filters, etc to be stored in bunded tanks
- aluminium cans
- recyclable plastics

Hazardous waste such as hydrocarbons, solvent paints, and other chemicals will be appropriately stored in bunded areas for off-site disposal by a licensed contractor. Management of hazardous wastes will minimise the risk of contamination through appropriate storage, handling and off-site disposal.

- Where practicable, refuelling will be undertaken in designated areas fitted with internal drainage systems and oil/water interceptors.
- Transport of hydrocarbons and chemicals by road or rail will be in accordance with the *Dangerous Goods (Transport) (Road & Rail) Regulations 1999*.
- The storage of chemicals will adhere to the DoIR Dangerous Goods requirements.
- Regular inspections of the storage and handling of hydrocarbons and chemicals, including inspecting storage areas for leaking bunds, drums or containers.
- Vehicle and machinery maintenance will be restricted to designated areas.
- Above ground pipework for chemicals and hydrocarbons will be used where practicable to facilitate leak detection.
- Used hydrocarbon drums and storage containers will be appropriately labelled and stored for future use or removal.

- Implementation of Minor Hydrocarbon and Chemical Spills procedures, and Emergency Response and Preparedness Plan to ensure a swift and effective clean up in the event of contamination of surface and groundwater.
- In the event of a significant hydrocarbon or contaminant spill, monitoring of groundwater quality in locations near the spill to identify any changes to physical and chemical parameters will be undertaken.
- Disposal of waste chemicals, hydrocarbons or contaminated materials (soil and containers) in an approved manner, including treatment of any contaminated soil at a landfarm facility.
- Staff will be educated on appropriate hazardous material handling and storage as well as full induction into the MSDS system.

Sewage Treatment Plant

Human sewage will be generated at the accommodation village, administration buildings and workshops. The wastewater from on-site ablution facilities will be treated via a package plant prior to discharge to contained evaporative lagoons. The proponent will ensure that the sewage treatment process will conform to the following requirements:

- compliance with DEC *Environmental Protection Act 1986* license conditions;
- exclusion of uncontaminated runoff from the treatment plant;
- minimisation of seepage from the treatment plant;
- exclusion of vegetation within the systems; and
- disposal of resultant sludge in accordance with Western Australian Guidelines for Direct Land Application of Biosolids and Biosolids Products (DEC) or by methods approved by the Minister for the Environment.

Waste Minimisation

The project will ensure that waste from all streams is minimised. Waste minimisation will largely occur through the waste separation practices and off-site recycling. Additionally, waste minimisation on-site and at the mining camp will be emphasised through an environmental induction program for employees, contractors and sub-contractors. Education and training of all project personnel, including contractors and subcontractors will take place on or prior to arrival at site and prior to undertaking any activities within the project area.

The ore concentration process will be designed to minimise the volume of tailings materials entering the tailings dam. Water recovery from the tailings may be conducted via a tailings thickening process. Minimisation of water in the tailings dam will also reduced the potential for surface water contamination.

The project's waste management procedures are likely to evolve with relevant changes in technology, waste management approach and availability of recycling services. The proponent will maintain an awareness of developments in waste management and will ensure that all site personnel are aware of all applicable requirements relating to waste management.

Monitoring Programme

Periodic inspections will be conducted to ensure waste management procedures are being maintained. Regular monitoring will ensure compliance with all legal requirements and waste minimisation practices (including recycling). Visual and compliance monitoring will be conducted

regularly on a review and inspection schedule (Table 5.19). The waste management facilities will be regularly inspected, including the onsite accommodation village, the landfill, waste transfer station and recycling area. The Site Environmental Manager or representative will carry out monitoring. The adequacy of all waste procedures will be reviewed on an annual basis.

The following Waste Disposal Registers will be maintained to monitor and record the quantity and location of wastes:

- Recycled Material Register;
- Waste Disposal Register;
- Landfarm Register;
- Wastewater Register; and
- Hazardous Disposal Register

Table 5.19. Monitoring and Inspection Schedule

Project area	Inspection Item	Responsibility	Timing
Landfill	Collection of waste disposal records	International Minerals Environmental Manager	Monthly
	Segregation of recyclable materials	International Minerals Environmental Manager	Weekly
	Visual inspection of surrounding environment for evidence of accumulated wastes	International Minerals Environmental Manager	Weekly
Waste transfer station	Collection of hazardous waste disposal register	International Minerals Environmental Manager	Weekly
	Visual inspection of hydrocarbon and chemical storage bunded areas	International Minerals Environmental Manager	Weekly
	Visual inspection of waste oil traps	International Minerals Environmental Manager	Weekly and after heavy rainfall events
Wastewater	Visual Inspection of sewage treatment plant	International Minerals Environmental Manager	Weekly and after heavy rainfall events
	Visual inspection of site runoff treatment facilities	International Minerals Environmental Manager	Weekly and after heavy rainfall events
Landfarm	Visual inspection of bunded areas	International Minerals Environmental Manager	Weekly
	Collection of landfarm soil disposal records	International Minerals Environmental Manager	Monthly

Groundwater monitoring will be undertaken every six months in locations around the landfill site to determine whether there is any movement of leachate into the surrounding environment as per the requirements outlined in the Groundwater Management Plan, provided as Appendix D.

Incidents involving waste management including contamination through spills, leaks and inappropriate disposal will be reported using the Procedure for Emergency Preparedness and Response in the Environmental Management System. Information from the incident report will be collected and collated in the Register for Corrective and Preventative Action to provide for review and modification of waste management procedures.

Appropriate precautions will be implemented to minimise hydrocarbon spills. However, if hydrocarbon spills occur and they must be treated on site, a landfarm (Class III) for the bioremediation of hydrocarbon contaminated soils will be established. A landfarm functions as a biological remediation process whereby micro-organisms (bacteria and fungi), which occur naturally in the soil, break down contaminants (i.e. hydrocarbons and chemicals) into non-hazardous by products.

The landfarm will be located at a site with appropriate separation from surface drainage features, water bodies, the water table, any drainage infrastructure or any other sensitive receptors. The landfarm will be licensed under the *Environmental Protection Act 1986* and its operation will include regular maintenance and inspection.

5.11 Soils

5.11.1 Acid Mine Drainage

Pyritic black shales, which give rise to acid mine drainage have the potential to contaminate soils. Pyritic black shales have not been encountered during extensive drilling on the Mineralogy Central Block Projects site. Furthermore, pyritic shales are not evident in historic or current drilling of the Brockman Iron Formation. In the event that acid forming materials are encountered during normal mining operations, appropriate management activities pursuant to Best Practice Environmental Management In Mining (Environment Australia, 1997) Managing Sulphidic Mine Wastes and Acid Drainage, and with the procedures outlined in Section 5.12.3 will be applied.

5.11.2 Asbestiform Materials

Asbestiform minerals are a common component of BIFs, and the Cape Preston area is considered to be a medium risk of asbestiform exposure (DoIR 2001). Routine geological investigations of the mine site during operations will test the favourable conditions for the formation of asbestiform minerals. Detection of significant asbestiform minerals will evoke appropriate management activities pursuant to the guidelines for asbestos in mining operations (DoIR 2001). Appropriate dust suppression activities and environment management plans will also help to minimise asbestos exposures.

To date, in excess of 12,000 metres has been drilled. Suspected asbestiform materials were encountered during the geological logging of two separate intervals in two different drill holes during the drilling of the Balmoral South ore body in 2006. This material was quarantined in a sealed steel drum for further analysis in the future. Accordingly, the occurrence of asbestiform minerals to date is considered to be rare. However it should be noted that other iron Miners in the Pilbara have encountered this mineral and have established appropriate HSE procedures to manage this issue. If necessary the Proponent will adopt industry best practise procedures.

5.11.3 Soil Contamination

Mining and processing activities have the potential to contaminate soils with hydrocarbons. Chemical storage, handling and transport are expected to comply with rigorous safety standards that minimise the risk of spills. Furthermore, any contaminated soils will be treated and disposed of in an approved manner. In addition, all surface drainage will be contained within the project area and directed through separators designed to remove sediment and contaminated wastes.

5.12 Risk and Safety

Mining activities pose some hazards and risks. However, these are regularly managed and addressed by the individual mining operation. The Proponent will formulate a suitable Safety Management System

to provide governance over operational safety. The mining proposal is unlikely to generate any off-site risks as all activities are to occur in the project leases. The Project does not involve storage of hazardous materials in excess of schedule 1 of NOHSC:1014(2002) “Control of Major Hazard Facilities” and is not expected to be deemed a Materials Hazard Facility.

Gas from the Dampier-Bunbury high pressure gas line will be transported via The Sino Iron Gas lateral and then via a Balmoral South spur line The pipe will first pass through a let-down station near the power station to achieve operating pressure. A third party will operate the supply in accordance with the relevant industry standards. All appropriate safety precautions will be incorporated into the design of the transfer pipeline and power station.

5.13 Indigenous Heritage

Archaeological and ethnographic studies (O’Connor 2001, Quartermaine Consultants 2001) were conducted for the greater Balmoral project area for the previously assessed Mineralogy Central Block Project. The resulting reports indicate that Aboriginal Heritage values occur within the project area. All activities undertaken for the Balmoral South project will be pursuant to the requirements of the *Aboriginal Heritage Act, 1972*. In this regard, Section 18 clearances to disturb known sites are currently in preparation by Mineralogy Central Block Project. All of the Proponent’s operations will be conducted in accordance with the approved procedures outlined in the Aboriginal Heritage Management Plan prepared for the Mineralogy Central Block Project.

5.14 Public Health

Mosquitoes are a concern for the general Project Area. Project activities will be managed to minimise mosquito breeding areas created by the project. Any on-site human health risks will be minimised and are not expected to affect population centres outside of the project area. For example, the sewage treatment plant and wastewater treatment plants will be in compliance with health and safety standards and use best practices; the landfill will comply with rural landfill standards; and any hazardous wastes will be controlled and will be appropriately disposed off-site. Due to the hot conditions, pools of site water that may attract mosquitoes are not expected to form for any significant period of time.

5.15 Closure Planning / Decommissioning

Planning for closure will continue throughout the life of the mine since it largely depends on the extraction rate. A preliminary decommissioning and closure plan has been prepared and is presented as Appendix L.

6.0 Sustainability

6.1 Environmental and Sustainability Policies

The Proponent' Environmental and Sustainability Policies are included as Appendix B. The policy objective is for simultaneous net economic, social and environmental improvement. This reflects the notion of sustainability upon which the State Sustainability Strategy is premised and it responds to the Principles of Sustainability incorporated in the Strategy and the related Environmental Protection Principles.

Economic, social and environmental improvement underpins the management commitments provided in relation to potential impacts associated with the Balmoral South Project. The following sections specify the integration of sustainability into the proposed project activities.

6.2 Principles of Sustainability and Related Environmental Protection Principles

6.2.1 Sustainability Principles

Long-term economic health:
Sustainability recognises the needs of current and future generations for long-term economic health, innovation, diversity and productivity of the earth.

The Proponent' commitment to the project will directly boost the regional economy, while project royalty payments will contribute to the State's economic development and the export income generated by the project will enhance the national balance of payments. Additionally, because of the 20 plus year life of the project, the economic benefits arising from it will be long-term.

Equity and human rights:
Sustainability recognises that an environment needs to be created where all people can express their full potential and lead productive lives and that significant gaps in sufficiency, safety and opportunity endanger the earth.

As indicated above, the contribution of the Balmoral South project to the State's economic and social development is significant. The project will be implemented with the highest possible regard for employee and public safety, and will ensure that opportunities are available to everyone. This will assist in creating conditions that will enable people to express their full potential and lead productive lives, thereby achieving this foundation principle.

Biodiversity and ecological integrity:
Sustainability recognises that all life has intrinsic value and is interconnected and that biodiversity and ecological integrity are part of the irreplaceable life support systems upon which the earth depends.

The Proponent' Sustainability Policy specifically recognises the interdependencies between economic, social and ecological factors and the need to address the effects of the Balmoral South project both within and beyond the project area in order to achieve the policy objective of simultaneous economic, social and environmental improvement. An essential part of this process is recognition of the ecological values of the receiving environment, the inevitability of some impacts arising from the development and the commitment to minimising, mitigating and offsetting these impacts. The Proponent' commitment to impact management includes development and implementation of an ISO

14001 compliant Environmental Management System for both the construction and operational phases of the project.

Settlement efficiency and quality of life:
Sustainability recognises that settlements need to reduce their ecological footprint (i.e. less material and energy demands and reduction in waste) while they simultaneously improve their quality of life.

In accordance with the Proponent' Sustainability Policy, the Balmoral South project will deliver net environmental benefit. Minimising the project ecological footprint is a priority in this regard, and whilst some impacts are inevitable, the approach to environmental management as outlined above will assist in achieving this outcome. Additionally, the Proponent' commitment to the delivery of net economic and social benefit will ensure that the project will also contribute to quality of life objectives.

Community, regions, 'sense of place' and heritage:
Sustainability recognises the significance and diversity of community and regions for the management of the earth and the critical importance of 'sense of place' and heritage (buildings, townscapes, landscapes and culture) in any plans for the future.

The Balmoral South project area is known to contain sites of Aboriginal Heritage significance. Aboriginal Heritage issues will be managed in accordance with the approved Aboriginal heritage Management Plan submitted in association with the Mineralogy Central Block Project. The project area does not contain any sites of heritage significance to the non-indigenous community. Impacts on the local visual amenity will be considered for site planning.

Net benefit from development:
Sustainability means that all development, and particularly development involving extraction of non-renewable resources, should strive to provide net environmental, social and economic benefit for future generations.

In accordance with its Sustainability Policy, the Proponent are committed to the delivery of simultaneous net economic, social and environmental benefit as a result of the Balmoral South project. This will be achieved through the implementation of best practicable operational management practices and continuous improvement of its operational performance.

Common good from planning:
Sustainability recognises that planning for the common good requires equitable distribution of public resources (like air, water and open space) so that ecosystem functions are maintained and a shared resource is available to all.

As a result of its policy commitment to sustainability, the Proponent' Balmoral South project will deliver a "common good" package of economic, social and environmental benefits. While the Proponent' Sustainability Policy acknowledges that some project impacts will necessitate an off-site response, the ultimate effect will be a net improvement in economic, social and environmental conditions.

6.2.2 Environmental Protection Principles (from the *Environmental Protection Act*)

The precautionary principle:
Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The precautionary principle is premised on risk-based assessment of alternatives, contingency planning and an iterative implementation, monitoring and adaptive response process. Contingency planning and an iterative monitoring and adaptive response process are also fundamental to the risk-based approach to project implementation and on-going management that will underpin the Proponent' ISO 14001 compliant project construction and operational phase EMS and issue specific Environmental Management Plans.

The Proponent also recognises that the Balmoral South project will pose a number of environmental risks, including the following unavoidable impacts:

- direct loss of native vegetation and consequent fauna habitat;
- alteration of surface water hydrology, including encroachment on existing watercourses and flow lines;
- groundwater drawdown from pit dewatering and borefield abstraction, including consequent loss of phreatophytic vegetation and impacts on stygofauna.

Studies addressing these impacts have already been completed. For example, recent field flora and vegetation and fauna surveys have been undertaken to supplement results from earlier surveys done for the Mineralogy Central Block Project.

Outcomes from the surveys will be used to determine the extent of habitat loss. The Proponent' objective in this regard is to minimise direct loss and potential indirect impacts as practicable through planning and design and operational management. For example, alternative locations for the processing plant have been investigated and the selected site as indicated in Figure 1.2X has been adopted because it minimises encroachment on Du Boulay Creek.

A firm commitment to further studies demonstrates the Proponent' dedication to increasing understanding of potential environmental impacts. Further information will inform decision making within the planning and design stages.

The principle of intergenerational equity:
The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

The Balmoral South project represents a generational commitment (20 + years) from the Proponent to achieving net environmental benefit through implementation of best practicable operational management practice combined with continuous improvement in environmental performance. While it is necessary to recognise that there will be unavoidable environmental impacts within the project area, the ultimate environmental outcome (combining management, mitigation and offsetting initiatives within and beyond the project area) will be positive over the life of the project. This ensures that the next generation will inherit an improved environment as a result of the project.

The principle of the conservation of biological diversity and ecological integrity:
Conservation of biological diversity and ecological integrity should be a fundamental consideration.

The Proponent have committed to delivering simultaneous net economic, social and environmental improvement over the life of the Balmoral South project. In this context, although there will be unavoidable environmental impacts within the project area, the ultimate environmental outcome (combining management, mitigation and offsetting initiatives within and beyond the project area) will be positive over the life of the project.

Principles relating to improved valuation, pricing and incentive mechanisms:
Environmental factors should be included in the valuation of assets and services.

- *Those who generate pollution and waste should bear the cost of containment, avoidance or abatement.*
- *The users of goods and services should pay prices based on the full life cycle costs of providing the goods and services.*
- *Established environmental goals should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*

The Proponent' commitment to sustainability is premised on, inter alia, implementation of best operational practice, continuous improvement of environmental performance, and offsetting of unavoidable environmental impacts (including the provision of off-site offsets for unavoidable on-site impacts). This commitment reflects acceptance by the Proponent of a holistic approach to the discharge of its environmental obligations. Additionally, its purchasing and subcontractor engagement procedures that will be included in the project ISO 14001 compliant EMS, the Proponent will require similar commitments from its materials, equipment and service providers.

The principle of waste minimisation:
All reasonable and practical measures should be taken to minimise waste generation and its discharge to the environment.

The Proponent commit to preparation and implementation of construction and operational phase Waste Management Plans for the Balmoral South project which reflect the hierarchical approach to waste management. Materials, equipment and service providers will also be required to commit to this approach through contractual arrangements while at the individual level, obligations on project personnel will be conveyed through initial induction and ongoing environmental training programmes.

7.0 Table of Proponent Commitments

Throughout the preceding document, numerous references have been made to the Proponent commitment to minimising its impact on the environment, and where necessary to implementing appropriate management strategies to offset and mitigate unavoidable impacts. Table 7.0 consolidates these commitments for the sake of convenience.

Table 7.0: Table of Proponent' Commitments

Topic	Objective	Commitments	Timing	Advice From
Environmental Management System *(Appendix K)*	Manage environmental impacts of the project and promote environmental excellence	Prepare and implement and Environmental Management System that is consistent with the ISO 14001 Standard.	Prior to Commissioning	DEC
Flora and Vegetation	Compliance with Statutory requirements Minimal negative impact to the health of flora and vegetation within the project area	Manage impacts on Flora and Vegetation through a process of avoidance, minimising disturbance, monitoring and rehabilitation • minimise clearing wherever possible • avoid all threatened species unless absolutely unavoidable • monitor the impact of dewatering, dust and weed infestations • procedures as outlined in progressive re Monitor Mangrove community for change in viability • Undertake remedial actions if decline detected • Construction techniques adopted to minimise impact on mangrove communities. rehabilitation plans In addition the Proponent commit to implementing a minimum clearing policy and responsible traffic management.	Prior to construction and ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Fauna Flora	Compliance with Statutory requirements Minimal negative impact on fauna within the mining lease Maintenance and protection of key fauna habitats, populations and linkage corridors	Manage impacts on fauna through a process of avoidance, minimising disturbance, monitoring and rehabilitation; • minimise or avoid impacts on target species and habitats. • undertake various monitoring programs to detect project impacts on local fauna • detailed design will consider habitat values and where possible will avoid destruction of Cracking Clay Grasslands and drainage lines. • procedures as outlines in progressive rehabilitation plans. • workforce education, minimal fencing and waste management.	Prior to construction and ongoing during operation	DEC
Recreational Use areas	Limit the impact on the surrounding environment of all recreational activities Modify and address any activities that have adverse impact on the surrounding environment	• Implement Mineralogy Central Block Project's *Recreational Use Management Plan*. • Review performance measures in accordance with project environmental management system	Prior to construction and ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Surface Water	Minimise the potential for contaminated runoff to recharge into the aquifer. Minimise adverse impacts on surface water quality within the project area and downstream of infrastructure. Minimise surface water impacts of a 100 year ARI flood event in the Du Boulay Creek and Fortescue River. Reduce the risk of erosion and sedimentation deposition impacts on water course ecology.	Detailed design will be undertaken to minimise as much as practical the impacts to surface water. These measures include: • Diversion bunding; to redirect surface water around mine structures and into adjacent or downstream flow pathways (minimising changes in volume and peak flows); to contain contaminated runoff as well as divert flows around plant site; to maintain separation between the river water and water internal to the waste dump. • Riprap/armouring to slow and redistribute runoff, particularly in ecosystem sensitive sheet flow zones. • Culverts to ensure major flow paths intercepted by roads and other infrastructure are not disrupted. • Locating mine site infrastructure so as to minimise encroachment into the 100yr ARI floodplain. • Construction phase of the mine site will be planned for the dry season where practicable, and stabilisation measures will be used in high erosion risk zones. • Surface water runoff from disturbed areas such as the waste dumps and stockpiles will be bunded and treated in sediment traps prior to discharge. • The waste dump area may be dished in the centre to be internally draining, thus reducing contaminated runoff and the potential for erosion down the dump face. • Minimising undesirable interactions between surface and ground water by containing and treating contaminated runoff.	Prior to construction and ongoing during operation	DEC/DoW

Topic	Objective	Commitments	Timing	Advice From
Ground Water	Minimise adverse impacts on groundwater levels and quality. Limit the impact on phreatophytic vegetation and stygofauna habitat. Minimise the potential for salinity build up in the pit lake that may impact the groundwater quality. Minimise groundwater inflows into the mine pit.	Detailed design will be undertaken to minimise as much as practical the impacts to groundwater. These measures include: • Groundwater monitoring programmes to monitor water level drawdown. This will ensure pit dewatering is not lowering the Fortescue River Alluvium Aquifer water table, and water quality is not impacted; • Reducing water level drawdown rates where possible to avoid the loss of phreatophytic vegetation, implement monitoring and offset measures at identified trigger levels. • Monitor groundwater quality in bores following pit closure. • Engineering design to minimise groundwater flow from the Du Boulay Creek alluvium into the mine pit; and • Implementing a stygofauna survey and monitoring programme prior to the commencement of pit dewatering.	Prior to construction and ongoing during operation	DEC/DoW
Water Supply	Minimise adverse impacts to the health of the ecosystem in the vicinity of the wastewater outfall from the desalinisation plant.	The Proponent's commit to managing water supply operations in accordance with the conditions imposed on the Mineralogy Central Block Project by Ministerial Statement 000635.	Prior to construction and ongoing during operation	DEC/DoW

Topic	Objective	Commitments	Timing	Advice From
Dust	Dust emissions comply with criteria as defined in National Environmental Protection Measure - Air Quality Standards and Goals -Dust	• Implement the *Central Block Dust Management Plan.* • The Proponent's commit to implementing best practice dust management procedures and monitoring program in both construction and operation phases to monitor performance against predefined criteria. • Adherence to National Environmental Protection Measure - Air Quality Standards and Goals - Target Limits	Ongoing during construction and operation	DEC
Gaseous Emissions	Gaseous emissions comply with criteria as defined in National Environmental Protection Measure - Air Quality Standards and Goals - Gaseous Emissions	Implement best practice emissions management to ensure emissions are contained within acceptable criteria. Establish a meteorological station to collect ambient air quality data. Implement monitoring program.	Detailed design 12 months prior to DRI or power station construction Ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Greenhouse Gas Emissions	Consistent with the National Greenhouse Strategy	The Proponent commit to implementing the *Mineralogy Central Block Projects Greenhouse Gas Management Plan.* Employ the most energy efficient and best available construction and operational technology to minimise greenhouse gas emission, including • increased furnace utilisation; • increased in-situ reforming; • higher reducing gas temperatures; • increased reducing gas quality; • decreased reformer size; and • greater heat recovery.	Ongoing during construction and operation	DEC
Noise Emissions	Compliance with required noise emission levels pursuant to the Environmental Protection (Noise) Regulations (1997)	*Implement Noise Management Program* that complies with EP Noise Regulations. Conduct blasting operations monitoring and management.	Prior to construction and ongoing during operation	DEC

Topic	Objective	Commitments	Timing	Advice From
Waste Storage, Treatment or Disposal	Compliance with Statutory requirements Waste minimisation consistent with the strategic direction for waste management in WA	Implement *Waste Management Plan* (adopted from Mineralogy Central Block Project) Use both onsite and off-site facilities to ensure appropriate disposal of all waste • collect and dispose inert waste and putrescibles in an on-site landfill; • transport all industrial waste and hazardous waste off-site for appropriate disposal by certified contractor; • establish a bioremediation landfarm if hydrocarbon spills occur; • treat and dispose sewage waste through a sewage treatment system • minimise waste through waste separation and off-site recycling • Implement monitoring program	Ongoing during operation	DEC
Soils	Compliance with Statutory requirements	• Manage acid mine drainage, asbestiform materials and soil contamination in accordance with statutory requirements if encountered. • Asbestiform materials and soil contamination in accordance with statutory requirements if encountered. • Any contaminated soils will be treated and disposed of in an approved manner.	Ongoing during construction and operation	DEC DoIR
Risk and Safety	Compliance with Statutory requirements	Formulate a suitable *Safety Management System.* Incorporate appropriate safety precautions into the design of the transfer pipeline and power station.	Prior to construction	DoIR

Topic	Objective	Commitments	Timing	Advice From
Indigenous Heritage	Compliance with the *Aboriginal Heritage Act, 1972* requirements	Conduct all operations in accordance with Mineralogy's *Aboriginal Heritage Management Plan.* Reference to DIMA Section 18 clearances and requirements (being processed).	Ongoing during construction and operation	DIA
Public Health	Minimise mosquito breeding areas	Use best practises and comply with relevant standards in designs of sewage/waste water treatment system and landfill.	Prior to construction and ongoing during operation	DEC
Sustainability	The project need to consider impacts on community and environment	The Proponent commit to sustainability and long-term economic health.	Prior to construction and ongoing during operation	DEC, DoIR
Closure Planning / Decommissioning	Ensure, as far as practical, that rehabilitation achieves stable and functioning landform consistent with surrounding landscape	Prepare and implement a *Preliminary Decommissioning and Closure Plan*.	Prior to construction	DoIR DEC

8.0 Implementation

8.1 Introduction

The responsibilities for management and reporting associated with the commitments outlined in this referral document will be implemented as per this implementation plan.

8.2 Roles and Responsibilities

8.2.1 Construction and Operational Phases

A tiered approach has been used to set out the responsibilities of personnel on the Balmoral South Block Project with regards to environmental issues as shown in Figure 8.1 below.

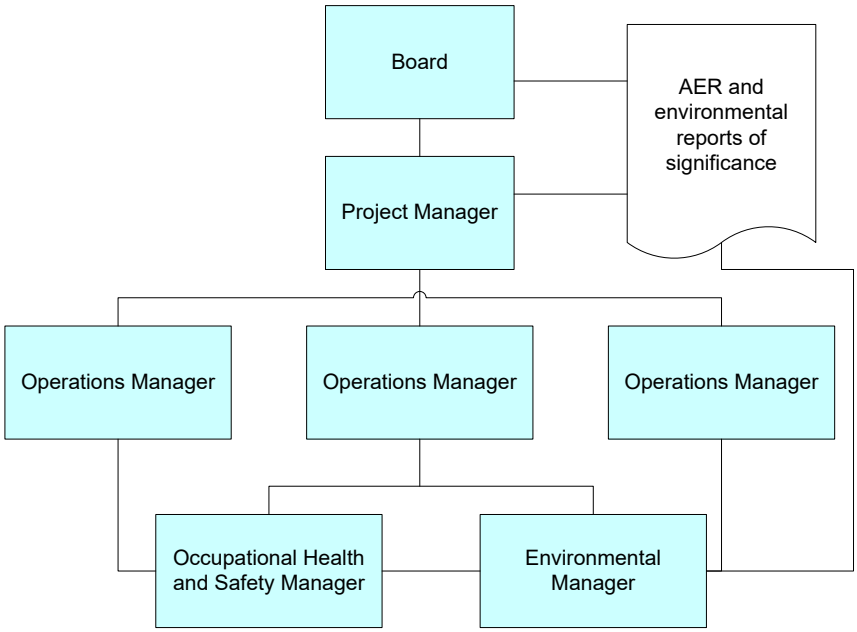

Figure 8.1 Tiered Management Approach

Ultimate responsibility for ensuring that site environmental management requirements are met will rest with the proponent's Environmental Manager.

The main responsibilities of the Environmental Manager will include:

- ensuring that all personnel, including both the proponent's workforce and contract personnel, conform with the requirements outlined in this referral ;
- ensuring that contractor staff are fully inducted and aware of their environmental responsibilities and obligations; and
- ensuring that monitoring requirements are being met.

In the case of emergency environmental situations, both the Environmental Manager and the appropriate Operational Manager will be informed. The problem will then be dealt with by the two Managers and, if necessary, reported to the Board by the Environmental Manager.

The Annual Environmental Review/Report (AER) will be produced and presented by the Environmental Manager to the board.

Contracting companies employed at the site will be required to appoint an environmental representative. The key responsibilities of this representative will be to:

- maintain routine contact with the proponent's Environmental Manager to ensure that environmental objectives of the commitments are being met;
- provide monthly reports to the proponent's Environmental Manager on environmental issues and conduct regular audits; and
- ensure that all management aims and monitoring requirements of the Proponent Commitments are being met.

8.3 Training, Inductions & Awareness:

All employees shall receive environmental awareness training, to ensure they are aware of their responsibilities and are competent to conduct work in an environmentally acceptable manner.

Site inductions will outline to all employees the project's environmental requirements. Regular tool box meetings will be conducted to ensure on-going training is provided. All inductions and on-going training will be recorded within a register.

All employees (including sub-contractors) will receive environmental awareness training in the following areas:

- environmental policies;
- Project EMS and other related documents;
- site environmental objectives;
- understanding authorities and their responsibilities;
- significant project aspects, impacts and controls
- potential consequences of departure from procedures;
- emergency procedures and responses, including procedures to follow in the event of a bushfire; and
- identification of their legal obligations.

Personnel performing tasks that may cause significant environmental impacts shall be competent on the basis of appropriate education, training and/or experience.

8.4 Communication

Internal and external communication mechanisms, such as discussed in Sections 8.4.1 and 8.4.2 below, will be established to ensure that all employees, senior management and other interested parties are appropriately informed on project related environmental issues.

8.4.1 Internal Communication

Internal communication methods may include the following, as applicable:

- meetings;
- project reports;
- performance assessment reports;
- notice boards;
- employees inductions, training and toolbox sessions (as required); and
- subcontractor co-ordination meetings.

8.4.2 External Communication

External communication methods may include the following, as applicable:

- meetings and correspondence with appropriate regulatory authorities;
- discussions and consultation with adjoining landowners; and
- handling of and responding to complaints.

8.5 Reporting and Recording

Performance reporting is required to provide systematic, comprehensive and informative documentation of the environmental performance, management and monitoring during the Project. The following reports will be provided to the Environmental Manager, for action as appropriate, and to relevant regulatory authorities, as appropriate:

- reports in support of annual licences and permit renewal applications;
- all significant records and reports in the form of AERs submitted to the EPA;
- records maintained in accordance with the Project EMS;
- results of EMS audits, including any environmental monitoring results and compliance with Conditions of Approval;
- Monthly Incident Reports summarising any incidents occurring during the relevant period, including comments on response procedures and preventative actions; and
- Monthly Complaint Reports summarising any complaints received by the contractor, Environmental Manager or Construction Manager in the reporting period, including comments on the course of action taken and any responses to that action.

A register of preventative and corrective actions implemented will be maintained in accordance with the project EMS.

8.6 Auditing and Compliance

Auditing of the Condition of Approval and the environmental management commitments will be undertaken as follows:

- annual system audits of the EMS, including Conditions of Approval and compliance procedures;
- quarterly on-site environmental compliance audits;
- regular audits of contractor performance; and

- on-going work area inspections and audits.

Persons responsible for environmental auditing will be suitably qualified, to comply with ISO 14012:1996 Guidelines for Environmental Auditing: Qualifications Criteria for Environmental Auditors.

8.7 EMP Review & Revision

The auditing and annual environmental reporting will be used to assess whether environmental objectives have been met.

9.0 Glossary and Definitions

Adapt	Change other details, including quantums in managment commitments or « non-significant » changes to implementation
Adopt	Change the proponent name and project description specific to the project. No material changes to managemnt commitments.
BIF	Banded Iron Formation
dB (A)	decibel
DWT	Dead Weight Tonne
ºC	Degrees Celsius
ha	hectare
kg/m^3	kilograms/cubic metre
km	kilometre
kV	kilovolt
GL	Gigalitre (1,000 megalitres, 1x 10^6 litres)
GLpa	Gigalitres per annum
HBI	hot briquetted iron
m	metres
Mm^3	million cubic metres
m/s	metres per second
m^3/s	cubic metres per second
Mt	Megatonnne, one million tonnes
Mtpa	Megatonnes per annum
MW	Mega Watts
Mya	million years ago
NSF	National Sanitation Foundation
pa	per annum
%	percent
ppt	parts per thousand
ppm	parts per million
t	tonne
Tj	terajoules (1 x 10^{12} Joules)
Tjpa	Tera Joules per annum
Tph	tonnes per hour

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Appendix A – EPA Referral Form

Appendix B - International Minerals Environmental and Sustainability Policies

Appendix C – Flora and Fauna Survey Report, 2006

Appendix D – Groundwater Management Plan

Appendix E – Groundwater Supply Development Plan

Appendix F – Surface Water Management Plan

Appendix G – Brine Discharge Modelling at Cape Preston, Western Australia

Appendix H - Balmoral South Air Quality Assessment

Appendix I - Balmoral South Dust Management Plan

Appendix J – Environmental Noise Assessment

Appendix K – Environmental Management System

Appendix L – Preliminary Decommissioning and Closure plan

Appendix M– Greenhouse Gas Management Plan

Appendix N – Recreational Use Management Plan