Wheelarra Hill Iron Ore Mine Extension

BHP Billiton Iron Ore P/L

Report and recommendations
of the Environmental Protection Authority

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Summary

The Wheelarra Hill mine was started by Hancock Mining Ltd and has been operating since 1989 under the *Iron Ore (McCamey's Monster) Agreement Authorisation Act 1972*. In 1992 BHP Minerals Ltd acquired the mine, which is located 40km east of the town of Newman, in the Opthalmia Range. Subsequent exploration east and west of the original mine has boosted the known ore reserves and the proposal is to extend the existing pit, create new ones and expand production from the currently approved 8 million tonnes per annum (mtpa) to 12mtpa of Marra Mamba iron ore, over the envisaged mine life of about 50 years. The ore will be transported to Newman by train for blending with product from other mines in the area before being railed to Port Hedland, as is currently the case.

The proponent has consulted extensively with government agencies and stakeholders during the preparation of its EPS.

The main issues identified in this proposal are as follows:

- loss of fauna, flora and habitat from clearing;
- the conservation of significant species;
- weed control;
- water management and the potential for impacts on stygofauna from the use of groundwater;
- potential for impact on Aboriginal heritage sites; and
- visual amenity, final landforms, rehabilitation and mine closure strategies.

The EPA has recommended conditions which address these issues. Furthermore, it considers that dust, noise and vibration; and greenhouse gas emissions are secondary factors in relation to this proposal which can be acceptably managed and do not require specific conditions under Part IV of the *Environmental Protection Act 1986*.

The EPA considers that the proposal could be carried out in an environmentally acceptable manner provided that the recommended conditions, which address all the main issues, together with the proponent's commitments, are implemented.

Contents

1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to a proposal by BHP Billiton Iron Ore P/L (BHPB) to extend mining operations and increase production at its Wheelarra Hill iron ore mine.

The EPA was advised of the proposal in July 2004. Based on the information provided, the EPA considered that, while the proposal had the potential to have a significant effect on the environment, it could be managed to meet the EPA's environmental objectives. Consequently it was notified in *The West Australian* newspaper on 20 September that, subject to preparation of a suitable Environmental Protection Statement (EPS) document, the EPA intended to set the level of assessment at EPS.

The proponent prepared the EPS which accompanies this report (BHPB, 2005). It sets out the details of the proposal and the potential environmental impacts, with appropriate environmental management, monitoring and commitments to manage those impacts. The EPA considers that the proposal described can be managed in an acceptable manner subject to the relevant commitments and the EPA's recommended conditions being made legally binding.

The EPA therefore has determined under Section 40 (1) that the level of assessment for the proposal is EPS, and this report provides the EPA advice and recommendations in accordance with Section 44 (1).

2. The proposal

The mine, first known as McCamey's Monster, became the Jimblebar Iron Ore Mine and subsequently Wheelarra Hill. It is located west of Jimblebar Creek (***Fig 1***) on Mining Lease 266SA. The proposal is for the remaining life of the mine (50+ years) and is described in detail in Section 2 of BHPB's "Wheelarra Hill Extension Project" EPS (BHPB, 2005). It entails increasing the iron ore production rate at the mine from 8 million tonnes per annum (Mtpa) to approximately 12Mtpa, and the mining of the currently undeveloped deposits on either side of the existing operation, including both in-situ hard rock and detrital ores. Approximately 600 million tonnes of Marra Mamba iron ore have been identified within the mining envelope. Because all of the ore in this proposal is above the water table the proposed mining will not require pit dewatering. Several pits are to be developed and mined at the same time to allow for blending of ores to suit customer requirements.

A tabled summary of the key characteristics of the proposal follows.

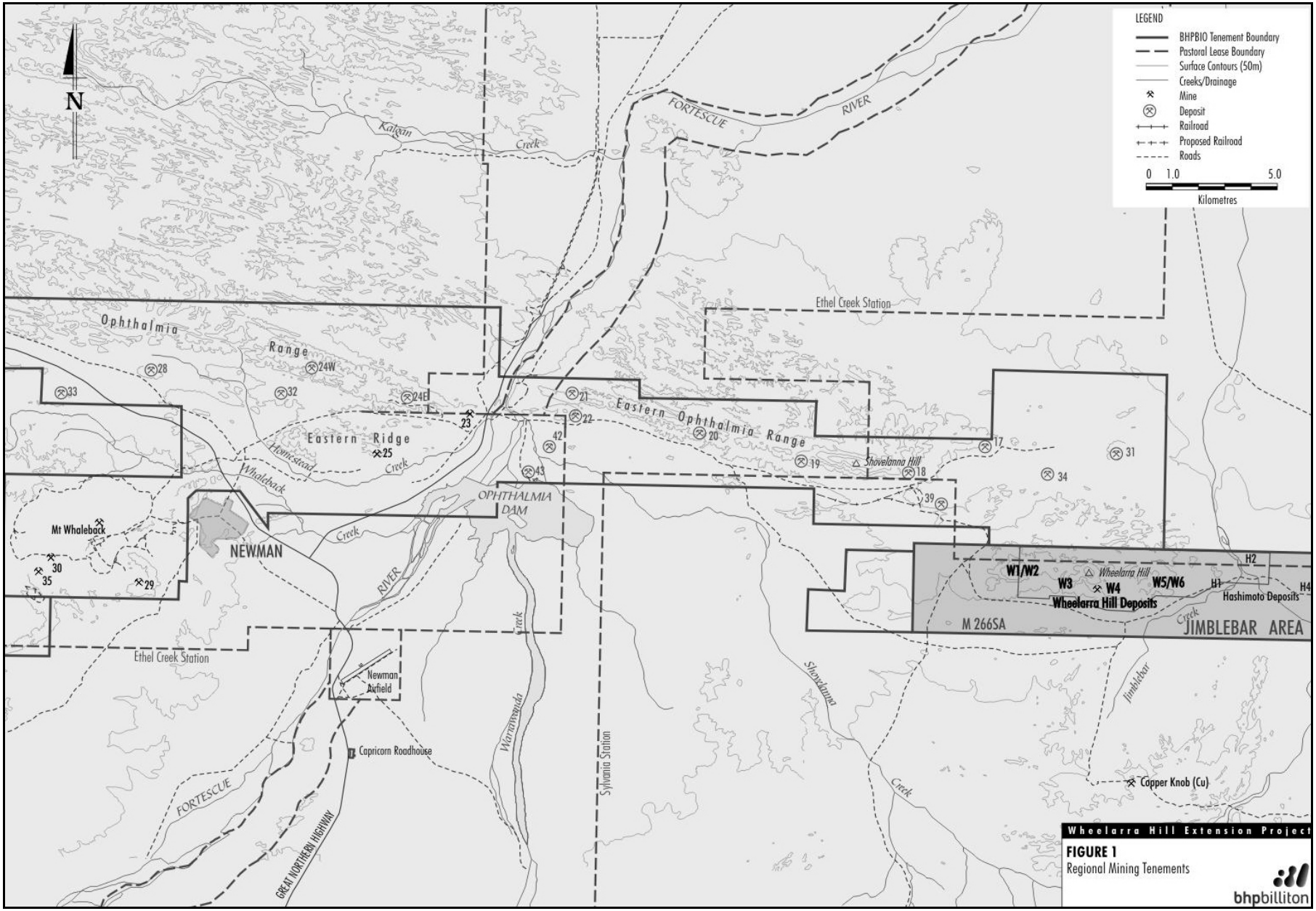


Figure 1: Project location

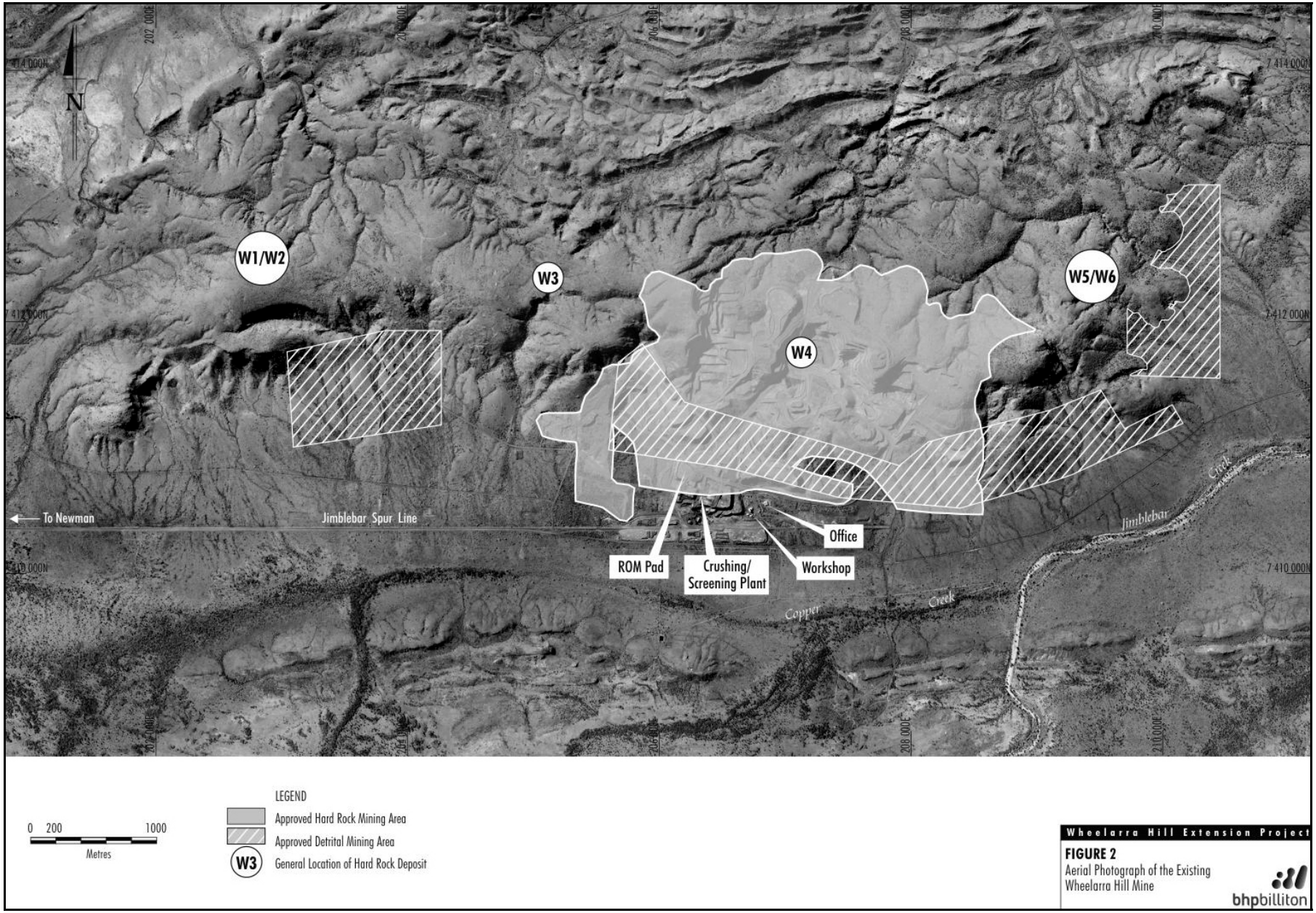
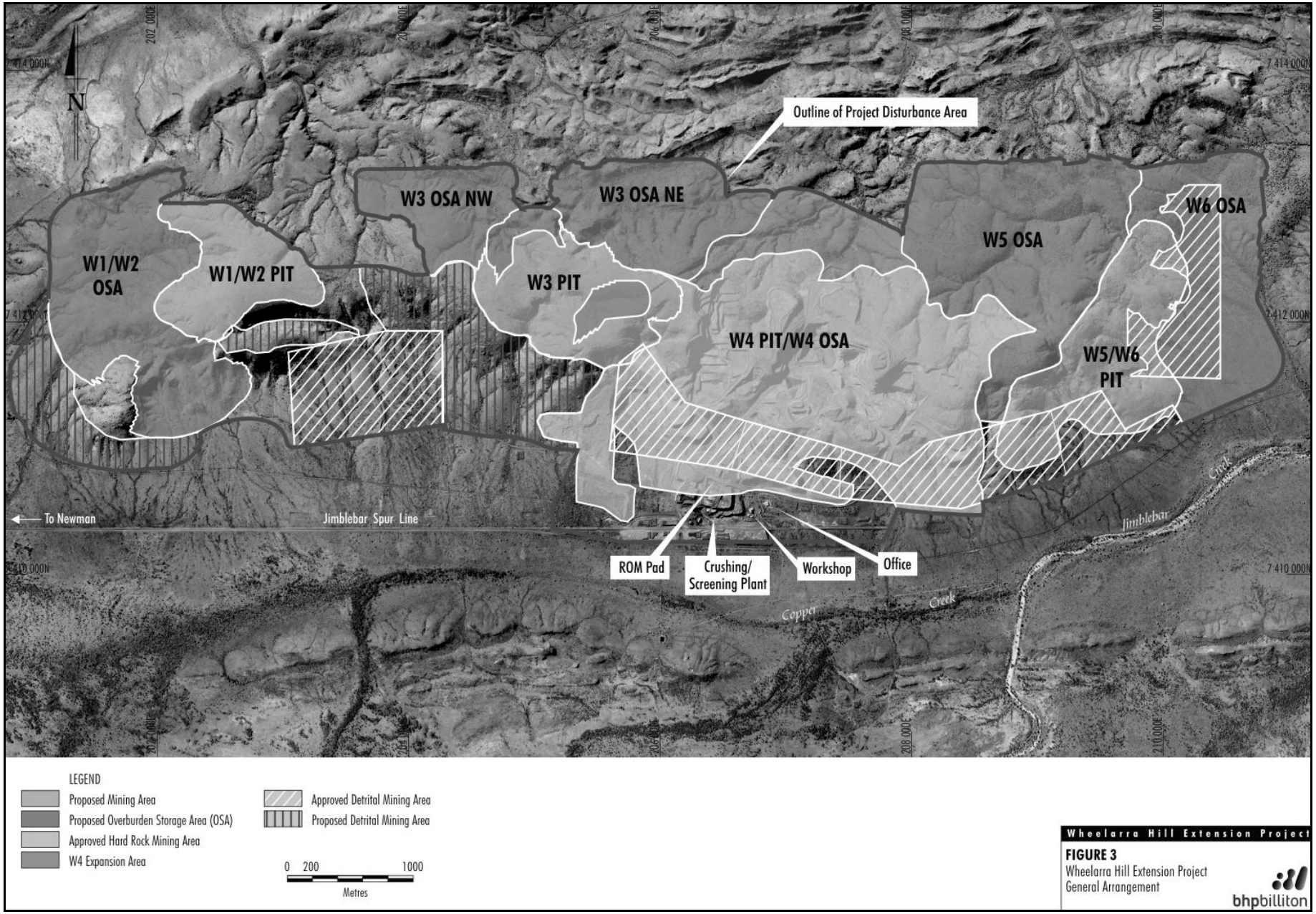


Figure 2: Existing project



Wheelarra Hill Extension Project

FIGURE 3
Wheelarra Hill Extension Project
General Arrangement

bhpbilliton

Figure 3: Proposed Wheelarra Hill Extension project

Table 1 Summary of key proposal characteristics-see also *Figures 2 and 3*

Proponent	BHP Billiton Pty Ltd (BHPB)
Location	Jimblebar, 40km east of Newman, on Sylvania Station, East Pilbara Region
Main activity	Continue mining of the currently approved W4 deposit; extend the pit beyond the currently approved area
	Progressively develop other hard-rock mining areas designated W1, W2, W3, W5 and W6 over the life of the mine, as well as new, detrital (or scree) deposits
	Increase production from 8Mtpa to approx. 12Mtpa iron ore
Contingent activities	Extend existing, and create new, overburden dumps adjacent to new pits. Some overburden material will be placed in mined-out pits
	Progressively construct access and haul roads to proposed mine areas, overburden dumps and other infrastructure
	Rehabilitate mined-out areas, completed dumps and redundant roads
	Replace the existing ore-processing facility (crushing and screening)
	Upgrade the ore-train loading facilities
	Increase ore train movements to Newman from 14 to 40 a week
	Increase water uptake from the Jimblebar Wellfield, from the current 1500kL/day to approx. 3750kL/day
	Periodically relocate the administration and workshop facilities to remain close to active mining areas
	Bituminise the access road from Newman
Area disturbed	From current 440ha approved to 1960ha
Power supply	50% increase from 500kVA to 750kVA, from Newman Power Station
Duration	Approximately 50 years
Employment	From current approx. 90 personnel to approx. 110

3. Consultation

The proponent advised that consultations have been held with the following government agencies and stakeholders in the course of preparing the EPS:

- representatives from the Nyiyaparli Aboriginal Group;
- Pilbara Native Title service;
- Sylvania Station Managers;
- Newman Community Consultative Interaction Forum;
- Shire of East Pilbara;
- Department of Conservation and Land Management (CALM)- Perth, Karratha;
- Department of Industry and Resources (DoIR);
- Department of Environment (DoE)- Karratha, Perth; and
- EPA and the EPA Service Unit.

The issues raised and a summary of the proponent's responses are included in Table 1-2 of the EPS (BHPB, 2005) with links to the text. Most agencies and stakeholders have had follow-up meetings.

EPA Service Unit officers raised the matter of consultations between BHPB and representatives from the Wildflower Society and the Conservation Council of Western

Australia. The EPA has subsequently received written confirmation from BHPB that meetings with these organisations have taken place. No specific issues were raised. The company has committed to providing both groups with the current version of the EPS for their records.

4. Relevant environmental factors

The proponent's summary of the relevant environmental factors and their management is outlined in Table S-2 in the Executive Summary of the EPS (BHPB, 2005).

In the EPA's opinion the environmental factors relevant to the proposal are:

- loss of fauna, flora and habitat from clearing;
- the conservation of significant species;
- weed control;
- water management and the potential for impacts on stygofauna from the use of groundwater;
- potential for impact on Aboriginal heritage sites; and
- visual amenity, final landforms, rehabilitation and mine closure strategies.

It is considered appropriate to group the factors above as shown because they are closely linked. Whilst the abovementioned are considered to be the key factors, dust, noise and vibration and greenhouse gas emissions were factors which were regarded as being of lesser significance in the case of this proposal. The mine is remote from other population centres and, in the case of greenhouse gas emissions, the power supply will be provided from Newman Power Station which has in-built capacity to provide the additional requirements.

Details on each of these factors follow.

4.1 Flora and fauna

Description

Within the general region, flora studies at the Opthalmia Dam site (27km west of the proposed mine) were conducted by Murdoch University (1980, 1981, 1982, 1983); in 1995 at the Orebody 25 deposit 33km west of Wheelarra Hill (*ecologia*, 1995a); and 8km north west of Wheelarra Hill at Orebody 18 (*ecologia*, 1995b). The *ecologia* studies covered the ridges, hill and scree slopes, outwash plains, gorges and gullies in the orebody areas. The Pilbara Biological Survey, a five year regional biological survey of the flora, fauna, aquatic life and ecosystems of the Pilbara by CALM and the WA Museum, with assistance from the mining industry, will be supplemented with survey data from Wheelarra Hill to provide comprehensive, long-term baseline data. In its EPS document, BHPB has included a comparison of results from nearby areas with similar landform characteristics and vegetation associations in its assessment of this proposal.

On the mining lease at Wheelarra Hill, flora and vertebrate fauna surveys to determine the specific characteristics of the project area were carried out with specific attention to the W3 area by Biota Environmental Sciences in August 2003. *ecologia* in February-March 2004 surveyed the specific flora characteristics of the wider project area to be encompassed by the mine extensions (deposits W1, W2, W5 and W6). These reports comprise Appendix A of BHPB's EPS (BHPB, 2005). This work mapped vegetation associations where project

activities are likely to occur, so as to assess the impact of these activities on flora, especially those of conservation significance.

The surveys supplement earlier work on the central portion of Wheelarra Hill (orebody, crest, ranges and scree slopes) in the vicinity of the W4 deposit by Endersby in 1994 and *ecologia* in 1998. *ecologia* described nine vegetation associations:

- **range crests**:-low open woodland of *Eucalyptus leucophloia* and *E. kingsmilli* in association with *Corymbia deserticola* and *Acacia pruinocarpa* with Spinifex groundcover;
- **rocky range slopes**:-low open woodland and shrublands with *E. leucophloia* and *Acacia* species and a dense Spinifex ground cover;
- **range slopes**:-dominated by Spinifex species *Triodia basedowii* and *T. pungens*;
- **gorges and gullies**:-low stunted woodland of mixed *Eucalyptus* in association with mixed *Corymbia* species. A mixed shrub mid-storey over a ground storey of mixed hummock and bunch grasses;
- **lower slopes and foothills**:-scattered *Corymbia deserticola* and *Eucalyptus gamophylla* and shrubs over Spinifex;
- **woodland**:-*Acacia aneura* (Mulga);
- **valley plains**:-mixed *Acacia* shrubland with sparse woodland species over mixed Spinifex ground cover and other common bunch grasses;
- **minor drainage channels**:-mixed low open woodland with diverse shrub understorey and ground storey of mixed hummock and bunched grasses; and
- **minor creekline**:-*E. victrix* over mixed *Acacia* and *Corymbia hamersleyana*.

There are no threatened ecological communities known in the project area.

Forty four sites were selected for systematic flora identification. The EPS states that 365 flora species have been recorded within the project area and that special attention was given to assessing the occurrence of flora of conservation significance. The landforms, vegetation associations and floristic communities within the project area are considered by *ecologia* to be widespread throughout the area and therefore not of regional conservation or ecological significance.

No Declared Rare Flora species has been reported within the project area, but two Priority flora species have been found within the mining lease: *Goodenia hartiana* (Priority 2) and *Sida?* Sp Wittenoom (Priority 3).

Goodenia hartiana was recorded at several sites within the project area, generally in open mixed shrubland with moderately dense Spinifex. Several of these sites coincide with areas of proposed disturbance. Figure 3-7 in the EPS shows where it has been mapped within the surveyed area with respect to proposed mining areas and that it is recorded from a number of different vegetation associations. It has also previously been recorded at many other locations elsewhere within the State.

One possible occurrence of *Sida*? Sp Wittenoom was recorded. This is outside of the planned areas of disturbance (see Fig 3-7 in the EPS). This species has also been recorded from several other sites in the Pilbara.

Seven plant collections from the 2004 survey could not be identified beyond genus level. This is a small proportion of the total of over 600 collected and is generally a result of

insufficient plant material being available to enable identification. The EPS describes these plants individually (section 3.7.1). In one case an unknown *Euphorbia* species was considered unlikely to be a priority species by consultant *ecologia* because a total of nine *Euphorbia* species have been collected in the Jimblebar area and nearby from similar landforms and vegetation associations, none of which has included the known priority species found in the region. One collection, designated *Ptilotus* sp nov., was considered by *ecologia* to possibly be an undescribed species, however the specimens collected were of poor quality and identification was inconclusive. Prior to undertaking any land clearing in the vicinity of the *Ptilotus* specimen collected BHPB will collect more specimens for the WA Herbarium to confirm the plants' identity and, if necessary, implement any necessary protective control measures for this plant.

With the exception of the *Ptilotus* sp. the potential for any of the above taxa being species of conservation significance was considered to be very low. BHPB has committed to implement a management strategy for flora of conservation significance. The EPA has endorsed this Significant Species Management Plan and recommends it be formalised as a condition.

Weeds

Six weed species have been mapped in the project area. Many become active following land disturbance and can dominate groundcover to the exclusion of annuals and eventually larger perennials. BHPB's weed management strategy targets all six species with particular emphasis on Ruby Dock and Kapok, which are the most significant weeds species. Key features of the company's weed management strategy are as follows:

- known areas of infestation would be shown on mine plans and marked on the ground to reduce inadvertent access and hence the spread of weeds by vehicles;
- vehicles would be cleaned regularly, especially those that operate in known areas of weed infestation;
- topsoil from weed-infested areas would be isolated, time would be allowed for weeds to germinate and then treated with glyphosate. The soil would then be inspected for further signs of weed growth and given follow up treatment before use;
- regular inspections for weeds would be carried out in disturbed areas;
- treatments for weeds would be implemented in consultation with CALM staff;
- weeds would be sprayed with glyphosate during April-June; Kapok to be treated by hand;
- larger specimens of Kapok would have their seed heads removed with secateurs and are appropriately disposed of. The stem of the plant would then be cut to above ground level and painted with glyphosate.

Fauna

The fauna survey by *ecologia* defined five habitat types / vegetation associations within the surveyed area:

- mesa top;
- rocky gully;
- riverine;
- alluvial plain; and
- scree.

A total of 105 species (seven mammals, 62 birds, 31 reptiles and five amphibians) was identified. Several surveys have been carried out in the project area over the years. The above habitat types / vegetation associations are considered to be well represented in the Pilbara region. The surveys have not recorded any fauna species listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*; neither was any Scheduled species listed under the *Wildlife Conservation Act 1950* identified within the project area. During the 2004 *ecologia* survey, one Priority 4 species (Western Pebble-mound Mouse) was recorded, as well as the JAMBA-listed (ie. migratory) Rainbow Bee-eater and the IUCN-listed Desert Mouse.

BHPB implemented in the mid to late 1990s a Pebble-mound Mouse translocation programme in consultation with CALM and continues to monitor and avoid active mounds where possible. Favoured habitat for the Desert Mouse includes thick hummock grass and litter, such as is associated with the Jimblebar Creek, to the south and east of the project area. Significant disturbance is not proposed along this drainage line. The Desert Mouse is not considered to warrant special conservation measures: its population and range fluctuates considerably depending on how good the seasons have been. Recent trappings in the Pilbara from 1998 to 2004 by staff from the WA Museum and CALM indicate the species has a widespread range. Although it is listed by the International Union for the Conservation of Nature (IUCN) it is not considered of special conservation significance under Australian (Federal or State) legislation. The Rainbow Bee-eater is a broad-ranging bird which is found in a wide range of habitats and is relatively common in the Pilbara. *ecologia* recorded its presence in the riparian areas of Jimblebar Creek, an area removed from minesite disturbances.

The EPA Service Unit raised the possibility of short-range endemic species living in areas to be disturbed by the proposed mining activities. Proponent consultations with specialists at the WA Museum, and a literature review, have revealed that there are no records or specific studies of short-range endemic species within the project area or in the immediate surrounds. Short-range endemic species are invertebrates (such as land snails, millipedes and certain spiders) with limited ability to disperse. They have very specific habitat requirements and often live in discontinuous habitat types. Physical barriers to dispersal that prevent migration between adjacent populations are probably the strongest determinant for endemism. Consequently an assessment of the physical characteristics of the project area with regard to the landscape attributes that might promote short range endemism was carried out to evaluate the risk of mining to the maintenance of biodiversity of local fauna species. It concluded that there were no known barriers to dispersal.

Assessment

The area considered for assessment of these factors is contained by the mining envelope, of which a total of 1960 hectares is expected to be disturbed for this proposal. The EPA's environmental objective for these factors is to maintain the abundance, diversity, geographic distribution and productivity of flora and fauna at species, community and ecosystem levels through the avoidance or management of adverse impacts and improvements in knowledge.

In its EPS, BHPB has listed general management strategies for managing potential impacts on flora and fauna which involve adjusting clearing boundaries to avoid disturbance to known significant flora species or significant fauna habitat. Where this is impractical BHPB would consult with CALM and develop management strategies to CALM's satisfaction. Where necessary, BHPB would undertake additional pre-clearance survey work to identify or improve knowledge of the distribution of the species of conservation significance. The company states that fauna monitoring sites will be established during operations and the return of fauna to rehabilitated areas will be promoted (by the enhancement of habitat, such as

native vegetation, resting points and habitat structures such as rock or wood piles). BHPB would regularly monitor all clearing done by the mining contractor and would maintain appropriate records of any impacted species, vegetation association, flora community and/or habitat areas of conservation significance.

The EPA notes that BHPB has strategies in place to minimise, within practical limits, impacts to flora and fauna. It is possible that some individual specimens of plants of conservation significance will be lost, but none of the listed species is in the endangered category. The Priority 2 flora species *Goodenia hartiana* has been recorded in several other locations throughout the northern half of WA and its conservation status would not change as a result of this proposal.

The EPA notes that the proponent has consulted with CALM officers in Perth and Karratha on several occasions to address their concerns with the amount of land (1960ha) which is to be cleared. BHPB is committed to considering key environmental aspects in the mine planning process and to adjust decisions, where possible, to minimise environmental impacts. A decision-making hierarchy is shown (Fig 3-6) in the EPS which includes consultation with CALM staff and the development of a management strategy to the satisfaction of CALM for affected significant species.

The EPA considers that, provided that CALM is consulted to its satisfaction prior to disturbance of significant flora, and habitats of significant fauna, the potential impacts on flora and fauna will be manageable.

With respect to the possible presence of short-range endemic invertebrates, the assessment found that the physical characteristics of the area are unlikely to specifically promote endemism because there are no known barriers to dispersal. The mesa-like physiography of the minesite is contiguous with similar terrain to the north and west. The distribution of fauna species that occupy these main landforms is therefore considered unlikely to be limited to the disturbance footprint.

Having particular regard to the vegetation associations and fauna habitat within the area being relatively common and widespread, the recommended conditions on weeds, for conservation of significant flora and fauna, and the proponent's commitment to prepare environmental management plans which will describe practices to minimise impacts on key environmental aspects including (but not restricted to) landforms, flora and fauna, it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for these factors.

4.2 Groundwater and subterranean fauna

Description

Groundwater

Proposed mining at Wheelarra Hill is entirely above the water table and impacts to stygofauna (should there be any in this area) are not expected within the mining envelope. However, the mine will be a large user of groundwater from the Jimblebar Wellfield, located some 2km south of the mine, in the valley drained by Copper Creek. Potable supplies for the mine administration area are separate from bores for uses such as dust suppression and ore handling. Water will be sourced from the Tertiary alluvials and underlying weathered dolomites. These units are extensive and thick and in direct contact with each other and are unconfined (ie. not significantly compartmentalised by aquitards or low permeability layers).

Due to the depth to the watertable (55m-65m) no drawdown effects on vegetation would be expected and none have been noticed in operations to date. The low open scrub and *Acacia*

aneura (Mulga) woodland are relatively shallow-rooted species which do not rely on deeper water table supplies and the dominant creekline tree species (*Eucalyptus victrix)* is recognised as a vadophyte (takes up water from a zone of intermittent saturation between the zone of no saturation and the water table).

The increased requirement for water from 1500kL to 3750kL each day will require thorough assessment of groundwater data based on current and past abstraction performance prior to the issue of a new groundwater licence. BHPB manages its water usage via a Water Management Programme. This incorporates water reduction initiatives and performance indicators and is detailed in the company's Environmental Protection Statement, section 3.5.2.

BHPB has an unbroken set of annual water quality data from its bores since 1995. The most recent report (2004) shows that water levels have remained fairly stable (fluctuations in the order of 0.5m up and down, probably depending on the amount of rain that fell) throughout the review period. Water levels in the regional observation bore JM6 located 1km to the south showed seasonal fluctuations but no effects associated with abstraction. BHPB's 2004 Triennial Aquifer Review concluded that the Jimblebar Wellfield aquifer can continue to sustain current and higher rates of extraction with little or no effect on groundwater levels for the foreseeable future.

Stygofauna

Sampling for stygofauna has not yet been undertaken within the project area. If stygofauna occur, then due to the aquifer characteristics there should be few impediments to their distribution within and movement across the alluvial sequences and the underlying weathered dolomite.

The Pilbara Biological Survey is a five year investigation being carried out by CALM and the WA Museum that began in 2002 with the aim of improving the knowledge of the region's biodiversity. BHPB has committed to undertaking stygofauna sampling and monitoring as part of this biological survey, with site-specific studies if necessary, to improve understanding of the local species composition and distribution and their conservation significance, as well as how the activities of the project might affect them. If, contrary to expectations, species distribution is found to be a significant conservation issue, BHPB would carry out additional sampling within the project area and implement a Stygofauna Assessment Plan that describes stygofauna in the project area and assesses threats to any species of conservation significance. Where necessary, measures agreed with CALM would be implemented to minimise the potential impacts of identified threats to stygofauna of conservation significance and these would be incorporated into the groundwater monitoring and management programme.

Assessment

Because all the pits in this proposal will remain above the water table and there should be no significant affect on stygofauna at the mine, the area for consideration of these factors is principally that of the Jimblebar Wellfield. The EPA's objectives for groundwater are:

- ensure that the planning and development of additional water resources for the Pilbara region is carried out in a coordinated and sustainable manner with appropriate assessment of potential environmental impacts; and
- maintain or improve the quantity and quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected consistent with the draft *WA Guidelines for Fresh and Marine Waters* (EPA, 1993) and the NHMRC / ARMCANZ *Australian Drinking Water Guidelines - National Water Quality Management Strategy*;

The EPA's environmental objectives in regard to subterranean fauna are to:

- maintain the abundance, species diversity and geographical distribution of subterranean fauna;
- ensure that subterranean fauna are adequately protected, in accordance with the *Wildlife Conservation Act 1950*; and
- improve understanding of subterranean fauna through appropriate research including sampling, identification and documentation.

BHPB has committed to the preparation of a Stygofauna Assessment Plan that would:

- detail subterranean fauna surveys to be conducted in areas that would be affected by water bore operations to establish the conservation significance of any species in the affected areas;
- describe subterranean fauna surveys that would be conducted in areas with similar habitats outside of the borefield operations to help to establish the conservation significance of fauna within the areas to be affected; and
- offer specific measures to record and preserve biological information on any species collected in the project area.

The EPA has endorsed this initiative and formalised it with a condition.

The EPA has reviewed the wellfield data tendered by BHPB and agrees with the Department of the Environment's hydrogeologists who have advised that the increased size of the drawdown cone associated with a greater rate of water extraction can be more appropriately addressed during the groundwater licensing process, when all supporting hydrogeological documentation for a thorough analysis will be provided by BHPB. However, the EPA believes that, even without increased levels of abstraction, there is some risk that both the quantity and quality of groundwater may deteriorate over the 50 year life of the mine, particularly as the severity of expected global climatic changes is unknown. With this in mind the EPA recommends that there should be a Water Management Plan in place. The objective of this would be to ensure that usage of groundwater does not adversely impact on beneficial or environmental uses of the water and that environmental values, including ecosystem maintenance, are protected.

Having regard to:

- current and proposed mining operations being carried out above the water table;
- BHPB's Water Management Programme (described in ***Section 4.3***);
- wellfield performance data since 1995 showing that groundwater levels and quality have remained relatively stable throughout the review period;
- the depth to the water table and lack of impacts to date on vegetation from water abstraction in the wellfield;
- BHPB's Triennial Aquifer Review concluding that the Jimblebar Wellfield aquifer can continue to sustain current and higher rates of extraction with little or no effect on groundwater levels for the foreseeable future;
- the thorough review of all groundwater data prior to granting approval that the Department of the Environment will require when BHPB applies for an upgrade to its groundwater licence;

- the proponent's undertaking to carry out stygofauna sampling and monitoring as part of the recommended Stygofauna Investigation Plan condition;
- the implementation of measures agreed with CALM to minimise identified threats to species of conservation significance; and
- the EPA's recommendation that a condition be imposed requiring a Water Management Plan;

it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for these factors.

4.3 Watercourses and surface water quality

Description

Surface drainage ultimately flows via ephemeral watercourses into Copper and Jimblebar Creeks. The latter lies to the east of the orebodies, flows generally northwards and is a major tributary of the Fortescue River. Copper Creek lies to the south of the minesite and flows east into Jimblebar Creek.

Monitoring of surface water quality takes place at four sites, two on Copper Creek (south of Wheelarra Hill) and two on Jimblebar Creek. Measurements typically show the water to be neutral to slightly acidic, with low conductivity. At times it has high total suspended solid concentrations as a result of heavy rainfall events.

The mining operations would change some surface flow patterns locally and may affect water quality as a result of accelerated erosion from disturbed areas, or accidental contamination from spills of chemicals or hydrocarbons used at the minesite.

BHPB has a Water Management Programme (part of its Environmental Management Plan) which aims to minimise the potential for contamination of the water and contains site-specific water management plans, practices, sediment and water reduction initiatives, and performance indicators. This is an existing, operational programme which is seen to fit within the EPA's recommended Water Management Plan (recommended condition 6).

Assessment

The area for assessment is the entire mining lease, but more specifically all disturbed ground, and areas downstream. The EPA's objectives for watercourses and surface water quality are:

(a) for watercourses- maintain their integrity, functions and environmental values; and,

(b) for surface water quality- maintain or improve the quality of surface water to ensure that existing and potential uses, including ecosystem maintenance, are protected, consistent with the draft *WA Guidelines for Fresh and Marine Waters* (EPA, 1993) and the NHMRC /ARMCANZ *Australian Drinking Water Guidelines - National Water Quality Management Strategy*.

A number of ephemeral watercourses, particularly on the more dissected north slopes of the Opthalmia Range at Wheelarra Hill, will be lost, via the creation of pits, overburden dumps or mine access roads. To set the context, after heavy rain most runoff in the Pilbara, including that from relatively undisturbed areas, initially carries high levels of sediment. Copper and Jimblebar Creeks are both removed from the immediate mine operations areas and there will be room at the foot of the range for surface waters to be controlled, and sediment loads to be deposited as stream velocities decrease on the adjacent alluvial outwash plain before the ephemeral creeks drain into these more major creek systems.

Having regard to BHPB's Water Management Programme which focuses on site sediment control, water usage reduction, data from water quality monitoring stations on Copper and Jimblebar Creeks and the EPA's recommended Water Plan condition, it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for this factor.

4.4 Greenhouse gas emissions

Description

The main sources of greenhouse gases from this proposal are from the use of fuels used in machinery, explosives and from the decay of vegetation cleared for the project. Electricity for the project is supplied from gas-fired generators at Newman, and a 50% increase in electrical power usage, from 500kVA to 750kVA, will be required for the additional tonnage of ore to be processed. No additional generators will be needed as there is currently excess capacity. The increase in gas fuel consumption would increase greenhouse gas emissions to a total of 26,000t of CO_2 equivalent, an increase of less than 1% of the total emissions from Newman power station. Total CO_2 emissions from the power station for 2002-3 were reported to be 114,388 tonnes. Rather than using onsite diesel generators to supply electricity, power will also be fed from the Newman Power station to the bores in the wellfield.

Strategies to minimise the emissions of greenhouse gases are as follows:

- restrict the amount of vegetation to be cleared to a minimum;
- progressively rehabilitate disturbed areas as they become available;
- minimise haulage distances and grades; and
- regularly maintain and update equipment to improve the efficiency of mining and ore processing equipment, resulting in a reduction in energy usage per tonne of ore won.

Assessment

The areas for assessment are the minesite and the town of Newman. While the emissions are low the EPA's objective for this factor is to:

- ensure that greenhouse gas emissions meet acceptable standards and requirements of Section 51 of the *Environmental Protection Act 1986* (all reasonable and practicable measures are taken to minimise greenhouse gas discharge); and
- use all reasonable and practicable measures to minimise the discharge of greenhouse gases on an ongoing basis and consider offsets to further reduce cumulative emissions.

Having regard to BHPB's ongoing strategies to minimise emissions it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for these factors.

4.5 Aboriginal culture and heritage

Description

The Karlka Nyiyaparli Aboriginal Group is the custodian of the project area. Representatives from this group and from the sub-group Jigalong Aboriginal Community have been involved since 1987 in a number of cultural heritage surveys at Wheelarra Hill. The surveys were carried out prior to disturbance of any areas to be mined. As a result of this work 20 Aboriginal sites and 16 potential heritage sites have been identified in the vicinity (shown on Fig 5-1 of the proponent's EPS). Karlka Nyiyaparli representatives, anthropologist Mr

Michael Gallagher and BHPB personnel visited the Wheelarra Hill Extension Project area and discussed one site and seven potential sites that are located within the proposed disturbance area of the pit and overburden dumps. The custodians expressed their support for the proponent to submit applications under Section 18 of the *Aboriginal Heritage Act 1972* (AH Act) to use the land containing the sites.

In November 2004, BHPB presented material on the proposed project to a wider group of Karlka Nyiyaparli Native Title claimants and interested parties. This presentation included information on the proposed project, environmental impacts and the consultations regarding heritage sites within the impact zone of the proposed project. BHPB asked those present whether they were satisfied with the heritage works and consultation undertaken to date with respect to those sites and potential sites from Wheelarra Hill that BHPB was proposing to subject to an application under Section 18 of the AH Act. Both the Karlka Nyiyaparli and Jigalong representatives spoke and gave their approval.

Approval conditions pursuant to the AH Act were subsequently obtained including:

- detailed recording of a site and its artefact assemblage;
- that the recovered cultural material be used for future historical displays; and
- that the Karlka Nyiyaparli representatives are present during test pitting and/or excavation of sites.

From February 21, 2005, representatives of the Karlka Nyiyaparli, consultants from Artefaxion, and BHPB conducted test pit excavations at seven rock shelters and a recording and collection project at the artefact scatter. The archaeological excavations undertaken at the rockshelters identified no Aboriginal cultural material, except at one location, where two stone artefacts were identified just below the surface. The cultural material collected during this project is currently stored in Newman as requested by the Karlka Nyiyaparli Custodians and will be further analysed and prepared for displays and/or storage in consultation with them. The results of these mitigation projects, the impact of the project on the sites and the ultimate storage place(s) of the cultural material will, in consultation with the Karlka Nyiyaparli representatives, be reported to the Western Australian Museum and the Department of Indigenous Affairs as per the conditions of consent from the Acting Minister for Indigenous Affairs.

Assessment

Under consideration are all areas likely to be disturbed by the range of activities associated with mining at this site. The EPA's objectives for this factor are to:

- ensure that the proposal complies with the requirements of the AH Act;
- ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.

The proponent's guiding principles for managing and minimising impacts to Aboriginal heritage can be summarised as:

- undertaking Aboriginal heritage surveys in consultation with the Karlka Nyiyaparli cultural heritage custodians and representatives;
- avoiding Aboriginal sites where possible and revising the mine plan if significant Aboriginal heritage sites are identified;
- obtaining appropriate approvals under the AH Act prior to disturbing any sites; and

- providing compulsory inductions for employees and contractors with regard to their responsibilities under the AH Act, and maintaining appropriate protective management measures for recorded Aboriginal sites.

The consultation process has not identified any potential for significant adverse impacts on cultural associations. Having regard to BHPB's management strategies for minimising impacts and its observance of the requirements to obtain all approvals under the AH Act it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for this factor.

4.6 Dust, noise and vibration

Description

Dust

Mining, transporting and processing of ore generates dust, which may have adverse effects on flora, fauna and humans. BHPB recognises this and has dust management principles and strategies in its Land Management Manual, including:

- sealing of the mine road from Newman;
- minimising areas of exposed soil by 'smart planning' and prompt rehabilitation;
- changing the method of train-loading from front-end loaders to a stockpile and hopper system. This will be more efficient and less dusty;
- wetting trafficked dirt roads and construction areas around the minesite; and
- enclosing transfer points and using water sprays strategically in the ore processing circuit.

During the analysis of impacts from this proposal a question was raised about the cumulative impacts of dust at the company shipping facility at Port Hedland. At current throughput rates at the port the Wheelarra Hill Extension would increase tonnages by less than 5%. From 2008, ore from Wheelarra Hill would be transported to Newman for crushing, screening and blending with ore from other mines in the area before being railed to Port Hedland. This change is expected to result in substantial reductions in both dust and noise emissions at Port Hedland where tertiary crushing and screening are now carried out. The Newman Hub, where all such activities will be sited for ores from Mt Whaleback and Opthalmia Range orebodies, is located some distance from the township of Newman and is not expected to create a dust problem for the town.

Noise and vibration

Noise and vibration onsite are caused by blasting, mobile machinery such as drills, haultrucks and trains, and the process plant, which includes the ore crusher. The nearest private residence, Sylvania Homestead, is 18km south, too far away to be affected. Noise levels at the mine are managed therefore to comply with the occupational health and safety requirements of the mine workforce as set out in the *Mine Safety and Inspection Regulations, 1995.* At Newman, the railway at its closest, is about 1km from residential areas. Noise generated by trains has not been an issue with Newman townspeople and no concerns were raised in this regard during consultations with the Newman community.

Assessment

Dust

The area for assessment of the effects of dust is the area encompassed by mining, processing and transportation activities, plus surrounding areas immediately downwind. The EPA's objectives for this factor are to ensure that:

- the dust levels generated do not adversely impact upon welfare and amenity;
- they do not cause health problems.

The mine is a significant user of water, much of it to control dust, and the proposal would increase current usage levels from 1500kL to 3750kL a day. The EPA recognises that dust will always be fugitive around opencut mines in a dry climate but that a balance must be sought between responsible water use and dust management. It believes that BHPB's dust management strategies as listed in its EPS, and its commitment to upgrade its Environmental Management Plan (EMP) at least every five years, to the requirements of the EPA in consultation with the DoE and DoIR, are acceptable. The EPA also hopes that viable means of suppressing dust other than with water may be developed through further research to reduce the proposed need for groundwater.

The proposed changes at Port Hedland in 2008 are expected to result in a substantial reduction in the levels of dust and noise there.

Noise and vibration

The area for assessment of noise and vibration is the mine area and the surrounding region wherever these effects may be perceived. The EPA's objectives are to:

- protect the amenity of nearby residents from activities generating noise and vibration;
- ensure that noise and vibration impacts emanating from the proposed plant comply with statutory requirements and acceptable standards.

Regarding noise and vibration, the EPA is satisfied that levels generated by the mining activities are largely contained within the mining envelope and that the associated occupational health and safety issues can be managed under the *Mine Safety and Inspection Regulations, 1995*. The increase in train movements to Newman is not expected to cause undue concern because the railway route is removed from residential areas of the township of Newman.

Accordingly, it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for these factors.

4.7 Landforms, mine closure planning and rehabilitation

Description

Existing landforms

The proposed mine is sited at the eastern end of the Opthalmia Range which consists of resistant mesa-like topography with cliffs and scree slopes. Drainage is young and only flows briefly after heavy rains. The landforms are well represented regionally and there are no known regionally significant or unique geo-conservation values. The Wheelarra Hill area is not overlooked by or adjacent to populated or sensitive areas such as beauty spots, settlements and national parks.

Previous mining activity

Mining activities to date have been focussed on the W4 pit and scree deposits downslope. Part of the pit has been backfilled with waste rock, with other overburden dumps located around its perimeter.

Mine rehabilitation to date

In the existing mining area, only about 63ha of the 440ha disturbed have been rehabilitated to date. Most of the un-rehabilitated ground comprises in-use access roads, process plant and infrastructure, as well as the open pits from which ore is still being mined, and the overburden dumps. There has been significant progress made in those limited areas which to date have been rehabilitated. These include the former administration/camp area, some parts of the W4 overburden dumps, stockpiled fines and various borrow pits and exploration tracks. When mining and backfilling of the W4 pit is complete it will be rehabilitated. Rehabilitation on the overburden dumps has been good, with good *Spinifex* growth.

The company has presented a summary of aspects of operational experience and monitoring (section 2.9 of its EPS, BHPB, 2005) showing areas of optimal and less-than-optimal performance. The latter areas are the subject of changed management practices to facilitate improvements. Additional planting (or seeding) is being carried out to ensure that problems stemming from vegetation all being of the same age are addressed and some batters of stockpiled fines have been found to be unstable at the final slope angle of 20^0, requiring a gentler slope for long term stability. In order to make insufficient supplies of recovered topsoil go further it is being blended with waste fines and trialled as a growth medium.

Proposed approach to mine planning and rehabilitation for new mining areas

BHPB states that closure planning and rehabilitation will be routinely integrated with mine planning during the life of the project. From the perspective of visual amenity, artificial landforms such as the overburden dumps and detrital mining areas would be designed to 'blend in' with the surrounding natural landforms, with due consideration to Department of Industry and Resources guidelines for such considerations as long-term slope stability. At the suggestion of the EPA Service Unit, BHPB has developed a flowchart as a basis for a systematic approach to the design of artificial landforms, such as the overburden and waste rock dumps (Figure 3-6, BHPB, 2005).

The walls of the pits would not be modified after mining, but there will be a considerable amount of re-profiling of the hill range as a result of mining operations. BHPB has explained that several of the pits would be left open in case underlying iron resources, which are not presently included in the economic ore reserve calculations, become part of the calculated reserves in the future.

Figure 3 shows the extent of the overburden dumps to be created adjacent to the proposed pits. Despite BHPB's strategy of minimising, where practical, the size and number of overburden dumps (by infilling, where practical, mined-out pits), the proposed dumps would cover a much bigger area than the pits themselves. The overall final slopes of these dumps would be laid back at an angle of about 15^{o} from horizontal.

Stockpiled topsoil and subsoils, where available, would be used to cover the dump-top surfaces and/or batters and the surfaces would be seeded with native seed mixes selected in consultation with CALM staff and consistent with vegetation associations of the pre-mining area. Other disturbed areas such as roads, administrative and processing areas may be re-profiled as required to blend in with the surrounds, ripped, seeded and fenced-off to promote the re-establishment of vegetation, which will help to reduce the potential transport of sediments during rains.

Rehabilitated areas would be monitored, reported on annually during the life of the project, and the results would be used to refine the ongoing rehabilitation programme. BHPB's Rehabilitation Monitoring Programme is used to determine whether the methods used to date are successful. Rehabilitated landforms would be inspected after heavy rains to assess their stability, check whether unacceptable erosion had occurred and to carry out maintenance. The design of subsequent overburden dumps would take into account any refinements thought to be advantageous to their long-term performance, and biological monitoring of rehabilitated areas would be performed at least every five years.

The post-mining land use for the mine as a whole is expected to revert to low-intensity cattle-grazing, but would be determined in consultation with stakeholders and approved by the administering authority.

Assessment

The area for assessment is the entire mining lease, plus the surrounding areas from which the mine can be seen. The EPA's objectives for these factors are:

- ensure that mine closure planning and rehabilitation are carried out in a coordinated, progressive manner and are treated as an integral part of mine development, consistent with the ANZMEC/MCA *Strategic Framework for Mine Closure* and best practice;
- ensure that visual amenity of the area and adjacent surrounds is not unduly affected by the proposal; and
- ensure that regionally significant landforms and geo-conservation values are protected.

The EPA notes that the proposed mine is not expected to have any significant visual amenity impacts and that there are no known regionally significant or unique landforms, landmarks or geo-conservation values in the areas to be mined.

The EPA considers that the large areas of disturbance, disruption to surface drainage patterns and generally dry climate coupled with infrequent but sometimes cyclonic rainfall events point to close attention to these elements being the key to an environmentally appropriate closure and rehabilitation outcome. The appearance of the overburden dumps of the existing operation is becoming progressively more natural as vegetation softens their profile. During the expected long life of the mine (+50 years) the practices of mining, monitoring, decommissioning and rehabilitation would be expected to evolve significantly in response to knowledge accumulated at the site and also to accommodate climatic changes.

The EPA notes that BHPB has committed to a closure planning process which is integrated with mine planning consistent with the ANZMEC/MCA *Strategic Framework for Mine Closure*. Key elements of the proposed closure planning process are:

- an **Environmental Management Plan** (EMP) that describes mechanisms for the protection of key environmental aspects during all phases of mining;
- a **Decommissioning and Final Rehabilitation Plan** which considers the decommissioning of infrastructure, rehabilitation of disturbed landforms and the final land use objectives consistent with the agreed guiding closure principles for the site; and
- a **Rehabilitation Monitoring Programme** to assess the performance of rehabilitated areas.

Critically important to integrated mine planning and progressive closure planning is periodic independent review to provide for benchmarking against best practice as a mechanism to ensure continuous improvement. The EPA considers also that the concept of progressive rehabilitation over the 50 year life of the mine is a vital element and recommends that the abovementioned three plans and programme be incorporated within two recommended integrative conditions, these being '*Progressive rehabilitation*' and '*Decommissioning and final rehabilitation'*.

The objective of the condition on progressive rehabilitation is to establish a process leading to the development and progressive refinement of agreed rehabilitation completion criteria. The process would be based on research, adaptive management and monitoring. The purpose of the second condition is to ensure that closure planning and rehabilitation are carried out in a coordinated, progressive manner consistent with best practice.

The EPA considers that the above plans would, if approved, enable the proposal to be managed to meet the EPA's objectives for these factors.

In addition to the above-listed plans and programmes BHPB has committed to prepare **Annual Environmental Reports** that discuss environmental management actions, summarise monitoring results and describe rehabilitation activities over the reporting period. These would be available for distribution to key stakeholders and other interested parties as required. The submission of annual environmental reports is a standard requirement under State Agreement Acts.

5. Conclusions

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The main issues identified in this proposal are as follows:

- loss of fauna, flora and habitat from clearing;
- the conservation of significant species;
- weed control;
- water management and the potential for impacts on stygofauna from the use of groundwater;
- potential for impact on Aboriginal heritage sites; and
- visual amenity, final landforms, rehabilitation and mine closure strategies.

The EPA has recommended conditions which address these issues. Furthermore, it considers that dust, noise and vibration; and greenhouse gas emissions are secondary factors in relation to this proposal which can be acceptably managed and do not require specific conditions under Part IV of the *Environmental Protection Act 1986*.

The proponent has consulted with stakeholders and agencies to address the various issues raised to the extent practicable. The EPA considers that the proposal could be carried out in an environmentally acceptable manner provided that the recommended conditions, together with the proponent's commitments, are implemented.

6. Recommendations

The EPA considers that the proponent has demonstrated, in the EPS document, that the proposal can be managed in an environmentally acceptable manner and provides the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for the Wheelarra Hill Iron Ore Mine Extension.
2. That the Minister considers the report on the relevant environmental factors as set out in Sections 4.1-4.7.
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions and proponent commitments as set out in Appendix 2.
4. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report.

Appendix 1

References

BHPB, 2005. *Wheelarra Hill Extension project. Environmental Protection Statement. BHPBilliton*, February 2005

ANZMEC/MCA, 2000. *Strategic Framework for Mine Closure.* Australian and New Zealand Minerals and Energy Council; and The Minerals Council of Australia, Canberra, ACT.

Appendix 2

Recommended Environmental Conditions

and Proponent's Commitments

Statement No.

RECOMMENDED CONDITIONS AND PROCEDURES

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

WHEELARRA HILL IRON ORE MINE EXTENSION
LIFE OF MINE PROPOSAL,
MINING LEASE 266SA, 40 KM EAST OF NEWMAN

Proposal: Life of mine proposal to mine and crush iron ore within Mining Lease 266SA at a rate of 12 million tonnes per annum, for transportation by rail to Newman; rehabilitation; and decommissioning of the site, as documented in Schedule 1 of this statement.

Proponent: BHP Billiton Iron Ore Pty Ltd

Proponent Address: 225 St George's Terrace PERTH WA 6000

Assessment Number: 1558

Report of the Environmental Protection Authority: Bulletin 1168

The proposal referred to above may be implemented by the proponent subject to the following conditions and procedures:

Note: The conditions of this statement supersede those of Statement No. 385.

1 Implementation

The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Commitments

The proponent shall implement the environmental management commitments documented in schedule 2 of this statement, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment will determine any dispute as to whether the proposal has been substantially commenced.

4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

a) the environmental factors of the proposal have not changed significantly;

b) new, significant, environmental issues have not arisen; and

c) all relevant government authorities have been consulted.

Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

5 Compliance Audit and Performance Review

5-1 The proponent shall prepare an audit programme and submit compliance reports to the Department of Environment which address:

a) the status of implementation of the proposal as defined in schedule 1 of this statement;

b) evidence of compliance with the conditions and commitments; and

c) the performance of the environmental management plans and programmes.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environment is empowered to monitor the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

5-2 The proponent shall submit a performance review report every five years following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, which addresses:

a) the major environmental issues associated with implementing the project; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives;

b) the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best practicable measures available;

c) significant improvements gained in environmental management, including the use of external peer reviews;

d) stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and

e) the proposed environmental objectives over the next five years, including improvements in technology and management processes.

5-3 The proponent may submit a report prepared by an auditor approved by the Department of Environment under the "Compliance Auditor Accreditation Scheme" to the Chief Executive Officer of the Department of Environment on each condition/commitment of this statement which requires the preparation of a management plan, programme, strategy or system, stating whether the requirements of each condition/commitment have been fulfilled within the timeframe stated within each condition/commitment.

6 Water

6-1 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Water Management Plan, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The objectives of this plan are to maintain the quantity and quality of water so that existing and potential environmental values, including ecosystem maintenance, are protected.

This plan shall address:

1. Jimblebar Wellfield licensing arrangements;

2. baseline monitoring data on groundwater levels and quality within the Jimblebar Wellfield;

3. the monitoring programme for the Jimblebar Wellfield and mine project areas (including ground and surface water measurement criteria, quality of groundwater; measurement sites, parameters, frequency; data verification and

management procedures; data review/interpretation procedures; data reporting mechanisms);

4. effects of drawdown on vegetation communities and any stygofauna within the project area, and remedial action if impacts are detected;

5. the principles of water use efficiency to be applied at the mine during operation of the wellfield; and

6. the effects of climate change on the wellfield.

6-2 The proponent shall prepare the Water Management Plan required by condition 6-1 to be consistent with the State Water Quality Management Strategy, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

6-3 The proponent shall prepare the Water Management Plan required by condition 6-1 to be consistent with current best practice (where practicable to site conditions) and subject to independent peer review every five years, or unless otherwise agreed with the administering authority, to ensure that there is continuous improvement, based on adaptive management and benchmarking against similar projects in Australia and internationally.

6-4 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act* 1986, the proponent shall implement the Water Management Plan required by condition 6-1 to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

6-5 The proponent shall make the Water Management Plan required by condition 6-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

7 Stygofauna

7-1 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Stygofauna Investigation Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

The objective of this plan is to maintain the abundance, diversity, geographic distribution and productivity of stygofauna at species and ecosystem levels through the avoidance or management of adverse impacts and through improvements in knowledge.

This plan shall include:

1. subterranean fauna surveys in areas affected by project operations to assist in establishing the conservation significance of any species within the affected areas;

2. subterranean fauna surveys in areas with similar habitats outside the areas to be affected by project operations to assist in establishing the conservation significance of fauna within the areas to be affected;

3. records of biological information on any species collected in the project area;

4. the effects that climate change may have on stygofauna in the wellfield;

5. a Stygofauna Management Plan where surveys indicate that species and/or communities of conservation significance exist within the impact areas.

[This plan will include a monitoring programme for species and/or communities of conservation significance and details of management measures to be implemented to ensure persistence of those species and/or communities];

6. reporting procedures and schedule.

7-2 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act* 1986, the proponent shall implement the Stygofauna Investigation Plan required by condition 7-1, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

7-3 The proponent shall make the Stygofauna Investigation Plan required by condition 7-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

8 Conservation of Significant Flora and Fauna

8-1 Within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Significant Species Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

The objective of this plan is to maintain the abundance, diversity, geographic distribution, conservation status and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

This plan shall include:

1. surveys, prior to ground-disturbing activities, where baseline surveys have identified the likelihood of significant impact (see note) on flora and fauna species, vegetation associations and habitat areas for species of conservation significance;

2. a description of the identified flora and fauna species (including short range endemics), vegetation associations and habitat areas for species of conservation significance;

3. modification of land clearing plans and evaluation of alternative mine plans or creek diversion designs, where practicable, to minimise or avoid impacts on identified flora and fauna species, vegetation associations and habitat areas for species of conservation significance;

4. demarcation of identified populations and/or individuals of species of conservation significance or habitat areas suitable for fauna species of conservation significance in the vicinity of the disturbance areas;

5. species-specific management plans where mining, climate change, changes to water flow patterns, or groundwater abstraction activities are likely to impact on known locations of significant flora and fauna species, vegetation associations and habitat areas of conservation significance;

6. records of impacted flora and fauna species, vegetation associations and habitat areas of conservation significance and consultation with regulators where potential impacts on conservation significant species are identified;

7. feral animal control strategies where native fauna is made more vulnerable due to activities associated with mining;

8. reporting procedures and schedule.

Note: 'Significant impact' will be determined by the Minister for the Environment acting on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

8-2 The proponent shall review the Significant Species Management Plan required by condition 8-1 at intervals not exceeding five years, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

8-3 Within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act* 1986, the proponent shall implement the Significant Species Management Plan required by condition 8-1 to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

8-4 The proponent shall make the Significant Species Management Plan required by condition 8-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

9 Weeds

9-1 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Weed Management Plan to the requirements of the

Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

The objective of this plan is to minimise the spread of weed species.

This plan shall include:

1. the location, approximate quantity and type of each weed species that has been recorded during previous vegetation surveys;

2. weed control and eradication measures and monitoring activities to manage weeds;

3. weed species that have not been recorded within the project area, but have the potential to occur;

4. the effects that climate change may have on the incidence of weed species in the project area;

5. weed control measures and/or monitoring activities to be used to minimise the potential for weed species not previously recorded in the project area from entering; and

6. reporting procedures and schedule.

9-2 The proponent shall review the Weed Management Plan required by condition 9-1 at intervals not exceeding five years, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

9-3 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act* 1986, the proponent shall implement the Weed Management Plan required by condition 9-1 to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

9-4 The proponent shall make the Weed Management Plan required by condition 9-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

10 Progressive Rehabilitation

10-1 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Progressive Rehabilitation Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

The objectives of this plan are to establish rehabilitation completion criteria, and to carry out successful rehabilitation works.

This plan shall include:

1. progressive rehabilitation works (i.e. new areas) and rehabilitation management activities (i.e. maintenance of existing areas);

2. how the planned works and activities have been developed, with consideration and incorporation (where practicable to site conditions) of:
   - the characteristics of the pre-mining ecosystems within the mining lease (through research and/or baseline surveys);
   - the performance of previously rehabilitated areas within the mining lease;
   - the effects of climate change on the progress of rehabilitated areas;
   - the performance of rehabilitated areas at the proponent's other operations in the Pilbara; and
   - best practice rehabilitation techniques used elsewhere in the mining industry.

3. the process and timing for developing rehabilitation performance objectives, parameters and completion criteria;

4. rehabilitation performance objectives, parameters and completion criteria;

5. rehabilitation monitoring (i.e. Ecosystem Function Analysis or an equivalent long-term systems-based monitoring programme) to be used to assess the performance of all rehabilitated areas against the completion criteria; and

6. reporting of rehabilitation and monitoring results.

10-2 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act* 1986, the proponent shall implement the Progressive Rehabilitation Management Plan required by condition 10-1, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

10-3 The proponent shall review and revise the Progressive Rehabilitation Management Plan required by condition 10-1 at intervals not exceeding five years, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

10-4 The proponent shall make the Progressive Rehabilitation Management Plan required by condition 10-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

11 Decommissioning and Final Rehabilitation

11-1 Within 12 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Decommissioning and Final Rehabilitation Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Department of Conservation and Land Management and the Department of Industry and Resources.

The objective of this plan is to ensure that closure planning and rehabilitation are carried out in a coordinated, progressive manner and are integrated with development planning, consistent with the ANZMEC/MCA Strategic Framework for Mine Closure and current best practice.

This plan shall include:

1. the key components of the mine (i.e. mining method, overburden management, ore processing, ore loading and transportation, water and power supply and service infrastructure);

2. development of a 'walk away' solution for the decommissioned mine site;

   Note: A 'walk away' solution means that the site shall either no longer require management at the time the proponent ceases mining operations, or if further management is deemed necessary, the proponent shall make adequate provisions so that the required management is undertaken with no liability to the State.

3. how the project will be closed and disturbance areas rehabilitated to fulfil the following closure principles:

   Landforms, Revegetation and Land Use

   - minimise the number and size of out-of-pit overburden storage areas and changes to water flow patterns;
   - retain the residual mine voids as run-of-mine where geotechnically stable, and profile as necessary to achieve long-term closure objectives;
   - within the constraints imposed by the physical nature of the materials, design the final landform to be similar to the existing regional landforms;
   - revegetate the mine landforms to establish local native vegetation suitable to the characteristics of the area;
   - take into consideration the effects of climate change on vegetation;
   - use Ecological Function Analysis or an equivalent long-term systems-based monitoring approach to track the course of rehabilitated areas towards self-sustaining status;
   - determine the end land use for the project area in consultation with stakeholders, and agreed with the administering government authority.

4. Management strategies and/or contingency measures in the event that operational experience and/or monitoring indicate that a guiding closure principle is unlikely to be achieved or any other significant environmental impact arises.

11-2 The proponent shall prepare and implement the Decommissioning and Final Rehabilitation Plan required by condition 11-1 to be consistent with current best practice (where practicable to site conditions), to be subject to independent peer review every five years or unless otherwise agreed with the administering authority, and to ensure that there is continuous improvement, based on adaptive management and benchmarking against similar projects in Australia and internationally, to the

requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

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11-3 The proponent shall review the Decommissioning and Final Rehabilitation Plan at intervals not exceeding five years, or when significant changes occur at the mine, taking into account the rehabilitation monitoring and management required by condition 10, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

11-4 The proponent shall make the Decommissioning and Final Rehabilitation Plan required by condition 11-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority", the Environmental Protection Authority will provide that advice to the Department of Environment for the preparation of written notice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.

3 Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.

Notes-

1 The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.

2 The proponent is required to apply for a Works Approval, Licence and Registration for this project under the provisions of Part V of the *Environmental Protection Act 1986*.

Schedule 1

The Proposal (Assessment No 1558)

The project is located on Mining Lease (ML) 266SA approximately 40 kilometres east of Newman, in the Hamersley Ranges of the Pilbara Region of Western Australia (Figure 1). The proponent holds the mining lease which is operated in accordance with the *Iron Ore (McCamey's Monster) Agreement Authorisation Act 1972*.

The Wheelarra Hill deposits occur as in-situ ores within the Brockman Iron Formation and scree deposits downslope. Previous environmental approvals for the mining operation were given to the proponent to mine at a rate of 8 million tonnes per annum (mtpy). The proponent proposes to mine the remaining areas of the Wheelarra Hill ridge within ML 266SA with progressive increases in annual tonnages to 12mtpa, and to rehabilitate all out-of-pit areas. As individual pits are mined, the voids may be partially infilled with overburden materials from other pits within the leases.

The project comprises:

- opencut mining of ore from the existing W4 deposit as well as from W1, W2, W3, W5 and W6 in-situ deposits and other scree deposits;
- progressive associated construction of haul and access roads in addition to the existing layout;
- placement of overburden in mine voids and out-of-pit storage areas;
- replacing the existing ore crushing, screening and train-loading facilities;
- crushing, loading and transportation of ore, with increased train frequencies;
- sealing of the main access road from Newman;
- upgrading of the Jimblebar Wellfield water supply system;
- increased requirements for power from Newman; and
- the provision of existing service infrastructure (e.g. workshops and administration areas).

Significant features of the proposal are:

- progressive mining and rehabilitation of the site over the life of the mine (expected to be at least 50 years); and
- permanent changes to the final landforms, including hill-like features of the out-of-pit overburden dumps, and residual final voids.

The key proposal characteristics are shown in Table 1 below.

Table 1 Key proposal characteristics

Location	Jimblebar, 40km east of Newman, on Sylvania Station, East Pilbara Region
Main activity	Continue mining in the currently approved W4 deposit, and extend the pit beyond the currently approved area
	Progressively develop other hard rock mining areas designated W1, W2, W3, W5 and W6 over the life of the mine, as well as previously approved, and new, detrital deposits
	Increase production to approx. 12Mtpa iron ore
Contingent activities	Extend existing, and create new, overburden dumps adjacent to new hard rock pits. Some overburden material will be placed in mined-out pits
	Progressively construct access and haul roads to proposed mine areas, overburden dumps and other infrastructure
	Rehabilitate mined-out areas, completed dumps and redundant roads
	Replace the existing ore processing facility (crushing and screening)
	Upgrade the ore-train loading facilities
	Staged increase of ore-train movements to Newman from 14 to 40 a week
	Increase water uptake from the Jimblebar Wellfield, from the current 1500kL/day to approx. 3750kL/day
	Periodically relocate the administration and workshop facilities to remain close to active mining areas
	Bituminise the access road from Newman
Area disturbed	1960ha
Power supply	750kVA from Newman Power Station
Duration	Approximately 50 years
Employment	Approx. 110 personnel

Figures (attached)

Figure 1 – Project location
Figure 2 – Existing project
Figure 3 – Proposed Wheelarra Hill Extension Project

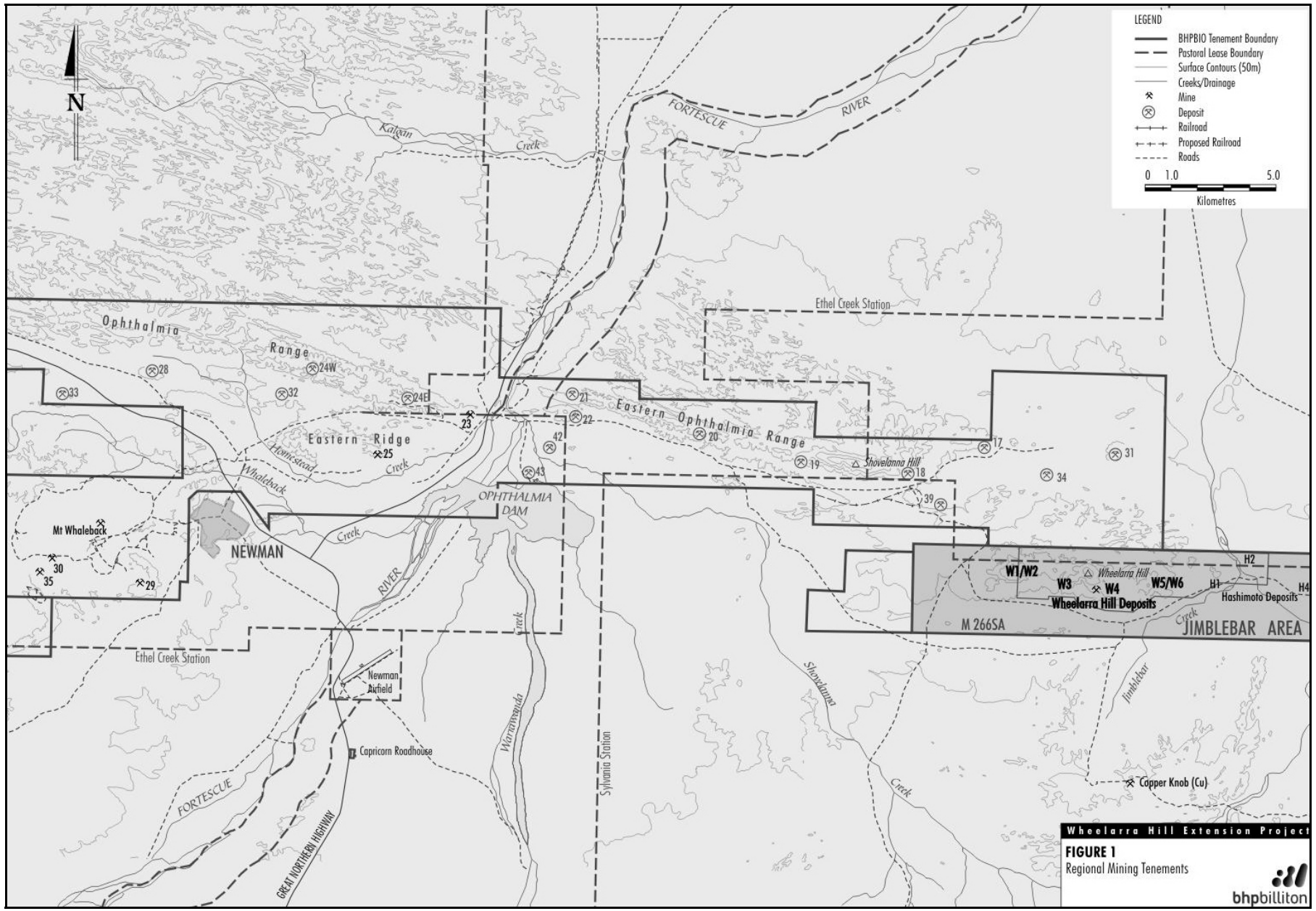

Figure 1: Project location

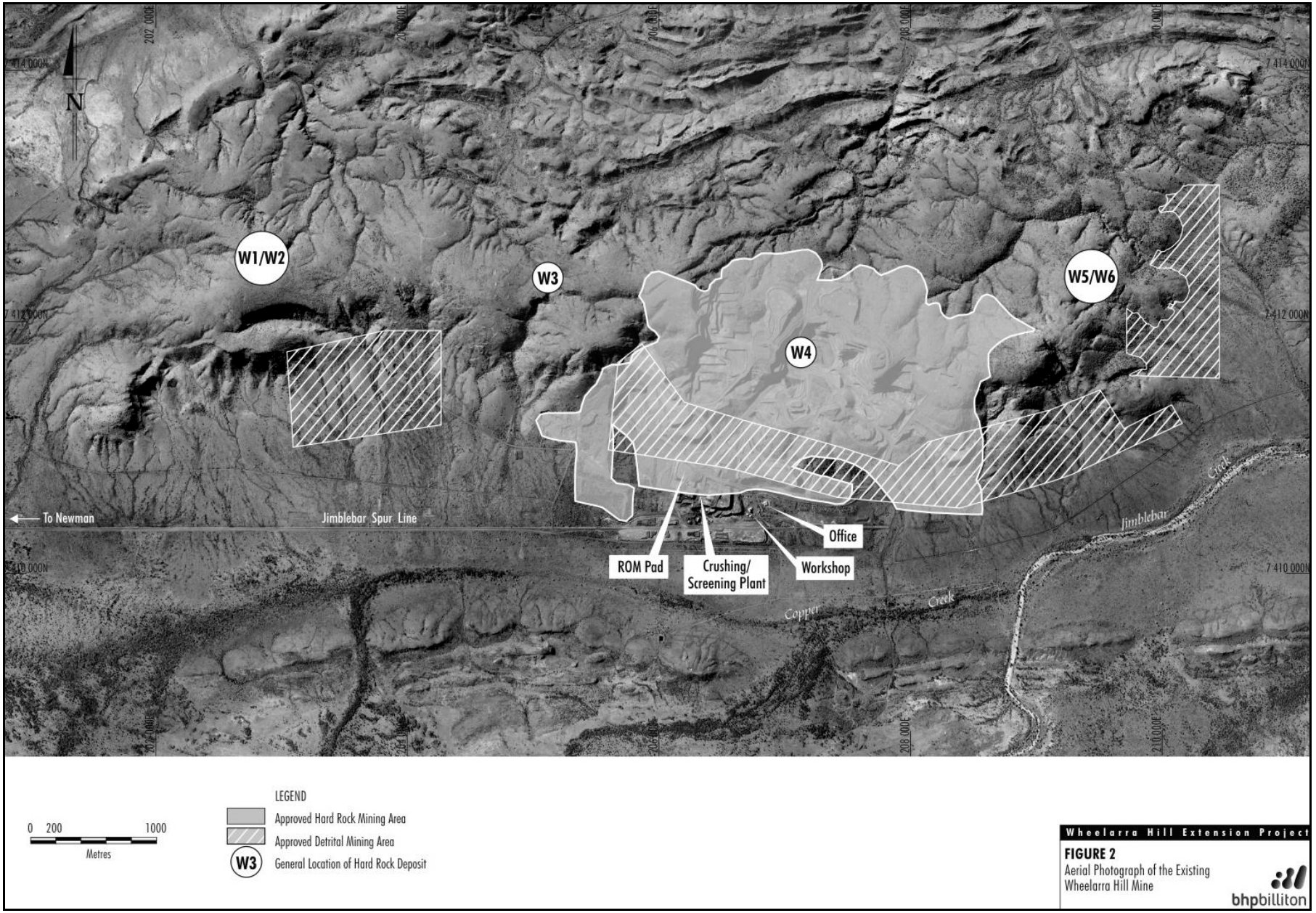

Figure 2: Existing project

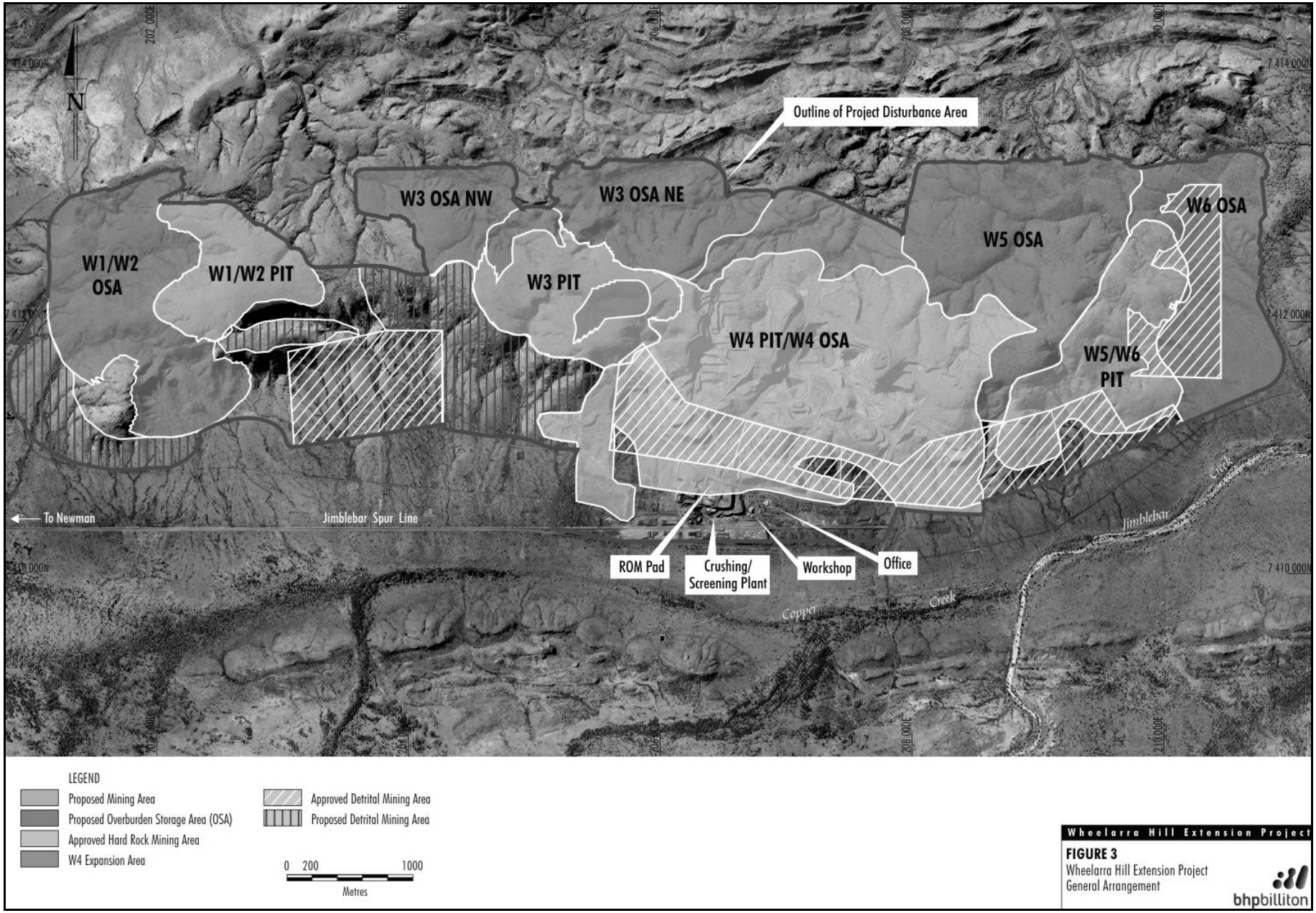

Figure 3: Proposed Wheelarra Hill Extension Project

Schedule 2

Proponent's Environmental Management Commitments

WHEELARRA HILL IRON ORE MINE EXTENSION
LIFE OF MINE PROPOSAL
MINING LEASE 266SA
40KM EAST OF NEWMAN

(Assessment No. 1558)

BHP Billiton Iron Ore Limited

Proposed Environmental Management Commitments

Number	Topic	Objective	Action	Timing	Advice
1	Environmental Management Plan.	Protection of key environmental aspects during all phases of mining.	• Prepare and implement an Environmental Management Plan that includes the following: 1. key components of the Project (ie. mining method, overburden management, ore processing, ore loading and transportation, water and power supply, and service infrastructure); 2. the Environmental Management System, and the Environmental Risk Assessment and Management systems that will be used at the Project. This section shall include a description of the findings of BHPB's most recent Environmental Risk Assessment of the Wheelarra Hill Mine. It shall also include a description of how best practicable environmental measures have been applied to risks that are identified (through the Risk Assessment Process) as requiring this level of management to reduce residual risk to an acceptable level; 3. the environmental management procedures and practices to be used to minimise impacts on key environmental aspects. These aspects are to include, but are not necessarily limited to: soil resources, landforms, surface water, groundwater, flora (including priority species and species of interest), fauna (including priority species and species of interest), air quality, noise, waste, dangerous goods and hazardous materials, and Aboriginal heritage; 4. for each environmental aspect the Environmental Management Plan will describe the overall management objective, potential impacts, management measures, and monitoring programme to track performance.	Revised at intervals of no more than five years during operations.	DOIR CALM
2			• The Environmental Management Plan will be reviewed and revised.	At intervals of no more than five years, or when significant changes occur at the Mine.	DOIR CALM
3			• A copy of each revision of the Environmental Management Plan will be provided to key stakeholders, and to other interested parties if requested		
4	Annual Environmental Report.	To enable environmental management and rehabilitation activities to be progressively monitored	• Prepare Annual Environmental Reports that discuss environmental management actions, summarise monitoring results and describe rehabilitation activities over the 12 month reporting period. • The AERs will be distributed to key stakeholders and copies will be provided to other interested parties if requested	Annually during operations.	CALM, DOIR
5	Mine Planning Process	Include consideration of key environmental aspects in mine planning process, and adjust designs where possible to minimise environmental impacts.	• Implement the mine planning process described in Section 3.4.2 and illustrated in Figure 3-6 of the EPS.	During the life of the mine.	CALM, DOIR