Goldsworthy Iron Ore Mines Extension Project

BHP Billiton Iron Ore P/L

Report and recommendations
of the Environmental Protection Authority

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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 (BHPB) to extend its iron ore mines in the Goldsworthy-Shay Gap area, 100-170km east of Port Hedland.

The EPA was advised of the proposal in September, 2004. Based on the information provided, the EPA considered that while the proposal had the potential to have an effect on the environment, the proposal could be readily managed to meet the EPA's environmental objectives. Consequently it was notified in *The West Australian* newspaper on 4th October 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 has prepared the EPS which accompanies this report (BHPB, May, 2005). The EPA considers that the proposal described can be managed in an acceptable manner subject to the recommended conditions and commitments to the proposal being 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 proposal is described in detail in Section 2 of the proponent's "*Goldsworthy Extension Project"* document (EPS).

BHPB's Goldsworthy mining operations are currently centred at Yarrie, with some mining also taking place at Sunrise Hill and Nimingarra to the west-see Figures 1 and 2. Mining at Mt Goldsworthy itself (by Goldsworthy Mining Limited) began in 1966 and ended in 1982 with the depletion of ore reserves. Subsequent phases of the operations in the region comprised an eastwards shift of mining activities to Shay Gap (now also mined-out), Sunrise Hill and Nimingarra. Activities at Mt Goldsworthy and Shay Gap are now directed towards the monitoring and maintenance of rehabilitated landforms.

BHP Iron Ore P/L and its Japanese partners acquired the Goldsworthy mining operations in 1990 and in 1992-3 BHPIO submitted a Consultative Environmental Review to the EPA for assessment of the Yarrie proposal under part IV of the *Environmental Protection Act 1986*. Subsequent expansions at Yarrie have been assessed by the EPA at the level of Informal Review with Public Advice. BHP merged with Billiton in 2001 to form BHP Billiton Iron Ore (BHPB).

This proposal involves extensions to mines at Yarrie and Sunrise Hill, new mines at Nimingarra (Nim I), Cattle Gorge and associated infrastructure such as haul roads and a power line. As well, the proposal seeks to revise the decommissioning and rehabilitation plan for the entire Goldsworthy operations.

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

Table 1 Summary of key proposal characteristics

Proponent	BHP Billiton Pty Ltd (BHPB)
Location	Goldsworthy to Yarrie, 100-170km east of Pt.Hedland, East Pilbara Region
Main activity	Extending existing mines at Yarrie: Y4A and Y10 north
	New mines at Cattle Gorge, Nimingarra: Nim I, and Yarrie: Y7 west
	Production continues unchanged at up to approximately 8.5Mtpa 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. The Nim I and Cattle Gorge pits which are mined to below the water table will be backfilled to at least 5m above the pre – mining water table
	(Previously approved) 11km haul road from Cattle Gorge to the Yarrie processing centre. Other access and haul roads to proposed mine areas, overburden dumps and other infrastructure
	Rehabilitate mined-out areas, completed dumps and redundant roads
	No changes to existing ore crushing and screening facilities, at Yarrie and Nimingarra
	No changes to ore-train loading facilities or train frequency (4 per day average)
	Existing borefield water supplies would continue to be used, supplemented where possible by mine dewatering
Area disturbed	97ha
Power supply	Existing supply, but requiring extension to Cattle Gorge area
Duration	Extends mining operations by 18 months to 2 years up to mid-2007
Employment	Marginal increase to 230 employees, fly-in, fly-out

YARRIE

The ore reserve figure for Yarrie is 2.2 million tonnes. The new pit proposed for Yarrie (Y7 west) is into a shallow crustal orebody which does not extend below the water table. All the Yarrie pits are shallow (averaging 6m) and no new out-of-pit overburden dumps would be required.

CATTLE GORGE

A reserve of 11mt has been delineated in this area. Some mining at the proposed Cattle Gorge pit is proposed for below the water table and this part of the pit would be backfilled to at least 5m above the water table to minimise impacts to ground water quality. The mining operation here would include several pits developed within the overall pit footprint for a mixture of detrital and hard-rock ores over an 18 month mining period. Initially some overburden would have to be placed outside of the pits, but once mined-out pit area becomes available, infilling would be undertaken, where practicable.

Ore from Cattle Gorge would be taken by six haul trucks 11km to the crusher at Yarrie on a 24 hour a day basis. Approval for this corridor has previously been given as a rail spur line off the main Yarrie-Port Hedland track. While it would have meant no need for water to reduce dust emissions from haul trucks, the disadvantages were high capital and environmental costs involved in land clearing of a wider (than for a haul road) disturbance corridor, large quantities of fill material for high embankments, and impediments to natural drainage. A haul road would be easier to rehabilitate at the end of mining. The option of a conveyor system was raised by EPASU staff because of the advantages of no dust from a haul

road, no road kills and less impediments to access for animals. For the short mining period of up to 2 years this option was considered to be uneconomic.

NIMINGARRA

Mining at Nim I would involve opening up two small pits to mine the 1mt of ore which has been outlined, and the building of a new 3.3km haul road to take ore to the existing Nimingarra crusher and rail loader. A portion of ore would be taken from below the water table and the pit would be backfilled to at least 5m above the water table at the completion of mining. A nearby overburden dump would be extended, but overburden would also be directed into the existing Nim F open pit.

EXISTING MINES

Previously approved mining activities would continue at Nimingarra B, Sunrise Hill, Sunrise Hill West and Yarrie (Y10 and crustal (shallow) ore areas).

Ore from the seven pits at Sunrise Hill and six at Sunrise Hill West is hauled approximately 5km to Nimingarra for processing.

None of the pits is expected to encounter pyritic shales, which are recognised from this stratigraphic level as being the source of acid-forming solutions. Consequently acid rock drainage is not expected. Just in case though, BHPB's management includes monitoring of blast holes for sulphides and, in the event of minerals such as pyrites being intersected, a containment plan would be developed and implemented in consultation with decision-making authorities.

Details of the ore reserves in each pit to be mined, its dimensions and the additional area required for the overburden dumps (termed OSA by the proponent) comprise Table 2-1 of the EPS. Blended medium grade ore from the entire mine complex is currently hauled by train to Port Hedland and this would continue unchanged.

Potentially viable ore deposits occur at Callawa and Cundaline Ridge (Figure 2) but further work is required to determine the feasibility of these deposits. They do not form a part of this proposal. Also, because the amount to be mined is expected to remain at current levels, the operations at Port Hedland and associated transport infrastructure will not change and do not form a part of this assessment.

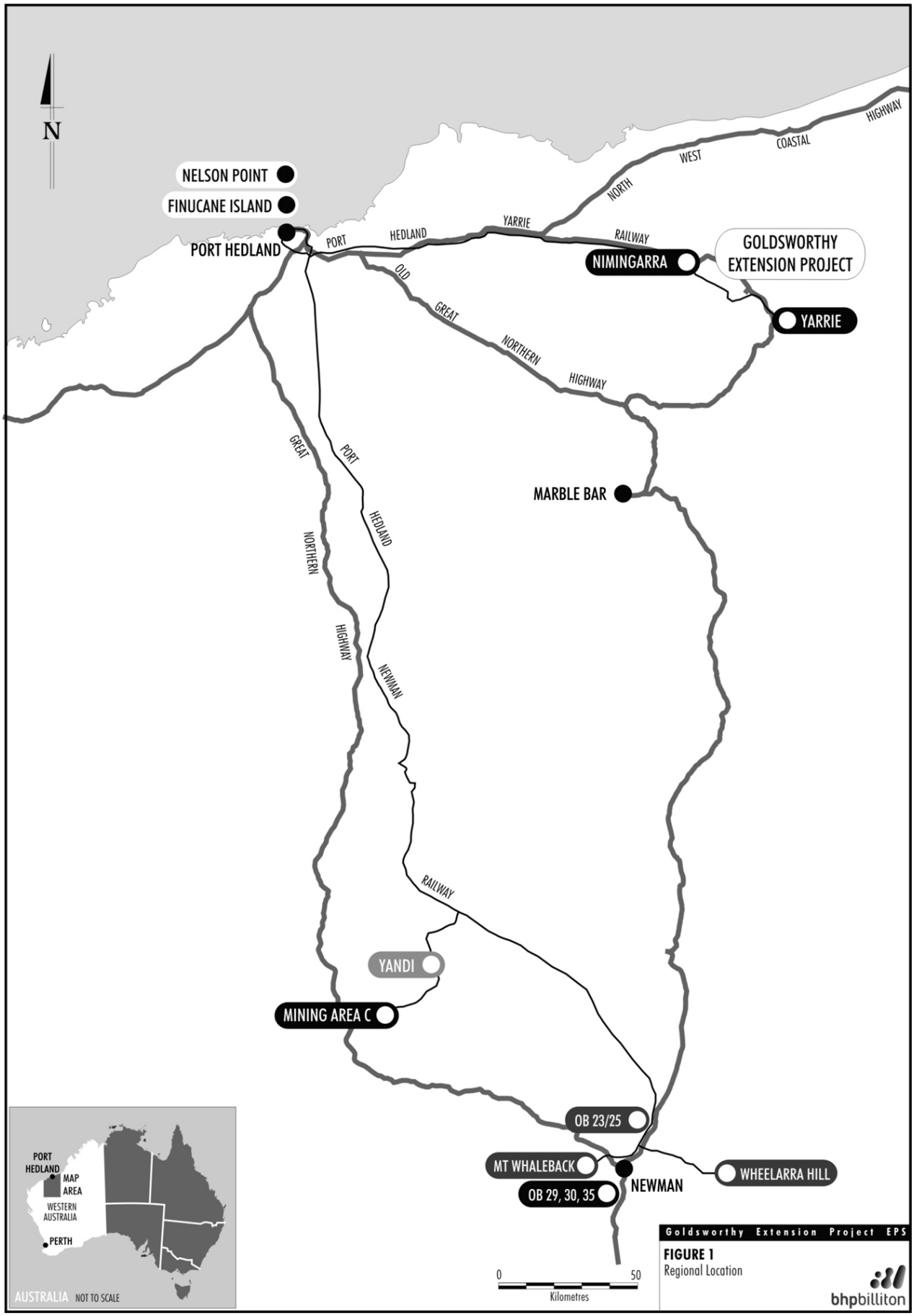

Figure 1: Regional location

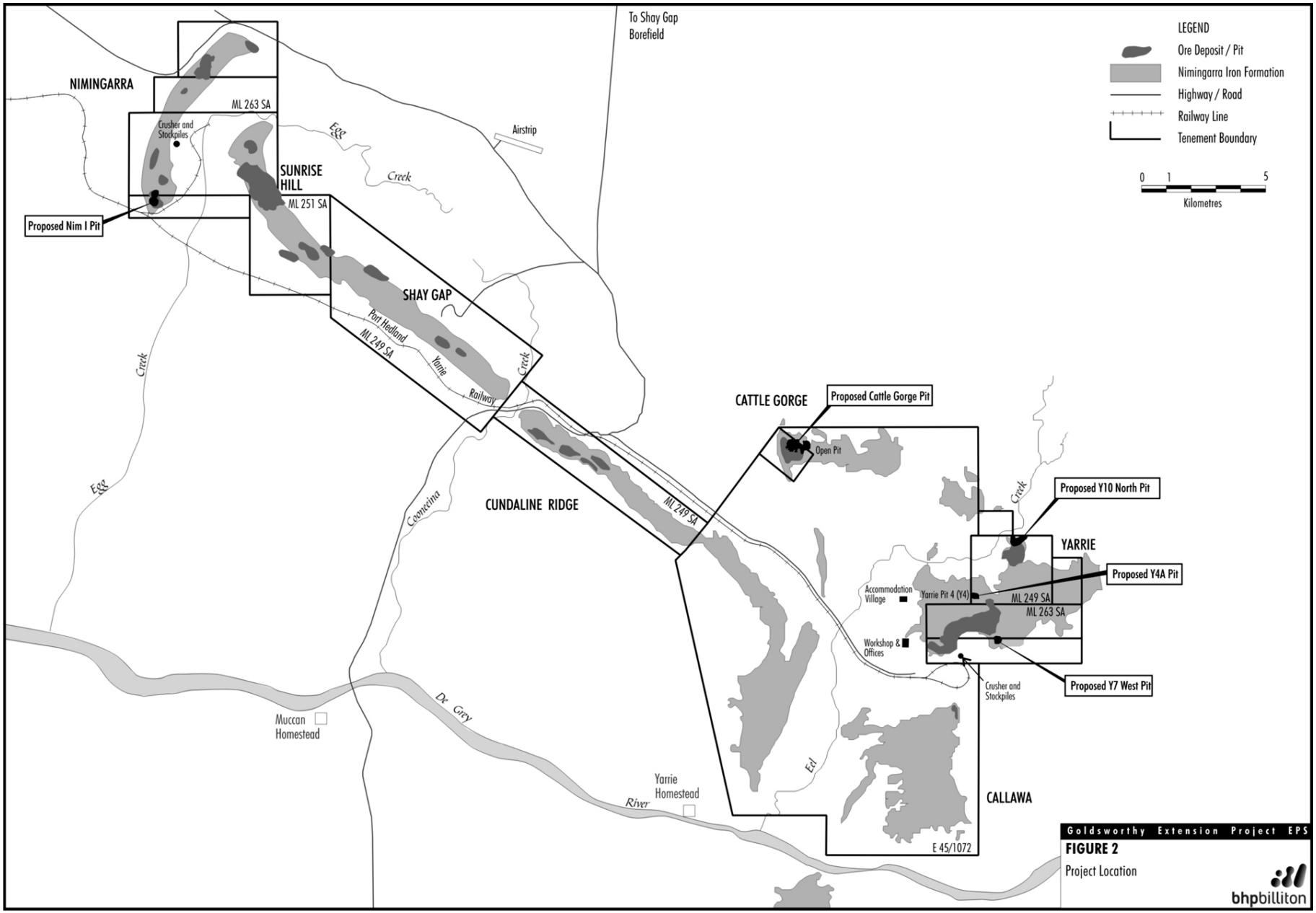

Figure 2: Project location

3. Consultation

During the preparation of the EPS, the proponent has undertaken consultation with government agencies and companies with a direct interest in the project, and other key stakeholders as shown below:

- East Pilbara Shire;
- Lang Coppin of Yarrie Station;
- Niamal People and Pilbara Native Title Services (PNTS);
- Wildflower Society; Conservation Council of WA;
- Department of Conservation and Land Management (CALM);
- Department of Industry and Resources (DoIR);
- Water and Rivers Commission (WRC);
- Department of Environment (DoE); and
- Environmental Protection Authority (EPA).

The organisations consulted, the comments received and the proponent's responses are included in Section 1.8.2. and Tables 1-4 and 1-5 of the EPS (*Goldsworthy Extension Project, BHPB, 2005*). Many of the above-listed agencies and stakeholders have had follow-up meetings.

4. Relevant environmental factors

The proponent's summary of the relevant environmental factors, their potential impacts and their proposed management is outlined in Table S-2 of the EPS.

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

- Flora and fauna;
- Groundwater and subterranean fauna;
- Surface water quality and mine discharges;
- Aboriginal culture and heritage;
- Dust, noise and vibration; and
- Landforms, mine closure planning and rehabilitation.

Having initially considered the potential for impact on areas of Aboriginal heritage as potentially significant, the EPA now believes it is less so, because consultations, which have been effective and ongoing with relevant stakeholders, have not identified any potential for significant adverse impacts on cultural associations, and no Aboriginal sites are located within the proposed disturbance areas.

As the power supply will be unchanged except for the addition of a spur power transmission line to the Cattle Gorge mine, greenhouse gas emissions are expected to remain at current levels.

Details on each of the main factors follow.

4.1 Flora and fauna

Description

Data from the Goldsworthy site-specific surveys described below are being compared against and added to the growing repository of knowledge of the Pilbara Biological Survey 2002-2007. The purpose of this survey is to discover and document the flora, fauna, aquatic life and ecosystems of approximately 800 sites across the Pilbara region. The survey is funded by government (mainly CALM), with assistance from the WA Museum and the mining industry, including BHPB.

FLORA

Flora surveys which have been conducted in the Goldsworthy project area include Goldsworthy Mining Ltd (1986) in the Nimingarra-Sunrise Hill area; Dames and Moore (1992) on the Yarrie Plateau and Callawa Ridgeline; Halpern Glick Maunsell [HGM] (1998); and *ecologia* (1994, 1999, 2004) in the Yarrie and Cattle Gorge areas. The 2004 survey at Nimingarra and Sunrise Hill was done at the end of the dry season and the full complement of annual and semi-perennial plants may not have been recorded. BHPB has committed to carrying out pre-clearance surveys for flora and fauna for the planned project disturbance areas at the appropriate time of the year. The surveys at Cattle Gorge and Yarrie areas were completed in more favourable times.

Details of the abovementioned work are described in the EPS, both in section 3.7.1 and Appendix D. Specific references to the reports mentioned are included in the Bibliography section of the EPS. An area-specific summary follows.

Nimingarra-Sunrise Hill
The vegetation in the Nimingarra-Sunrise Hill area was described by GML (1986) as Spinifex and native grasses, with stunted Eucalyptus occurring sparsely on the slopes and ridges and in clusters on the banks of Egg Creek, minor streams and depressions. The twenty six vegetation communities mapped were categorised as forest, woodland, scattered trees over shrubland, and various shrubland types over grasses and Spinifex. 183 flora species were recorded from Nimingarra and 201 species from Sunrise Hill. *Ecologia* also carried out a survey in 2004 for rare and priority flora in an area marked as an extension to an overburden dump for the Nim B pit. Twenty six species were found, but no weeds, declared rare flora (DRF) or priority species.

At Nim I the vegetation communities that would be affected by the planned project are widely recorded throughout the Nimingarra-Sunrise Hill Ridgeline survey. Two mapped vegetation communities (not affected by BHPB's proposed activities) are restricted pockets on the southern sides of the ridgeline at the base of cliff/gorge systems, associated with accumulated water and shaded environments. They are dominated by *Melaleuca argentea, Eucalyptus victrix* and/or *Ficus brachypoda*.

Yarrie
The Dames and Moore survey identified approximately 150 species and estimated a potential total of 250-300 species of vascular plants. No DRF or priority species were recorded. The 1999 survey by *ecologia* covered a larger area and was more comprehensive. It identified 12 vegetation associations based on vegetation structure, species composition and landform. The area is characterised as relatively homogeneous by comparison with other similar-size locations. Snappy Gum and Bloodwood tree steppe typified the higher rocky areas, and a shrub steppe dominated by *Grevillea wickhamii* and Acacia species is found on the slopes and

plains. Snappy Gum is more common on steep slopes and in creeks. The survey recorded a total of 209 species, including four weeds (Kapok, Buffel Grass, Rhodes Grass and Mimosa).

Around the Y10 pit the 1994 *ecologia* survey identified 56 plant species, the number being lower than the tally by Dames and Moore because of the smaller area, its relative homogeneity and the timing of the survey. It noted that the hills and ridges are dominated by Spinifex species with little overstorey. Minor drainage is dominated by *Eucalyptus microtheca* and/or tall Acacias over a mixed shrub and sparse understorey, and the gorges featured scattered low trees of *E. leucophloia, Ficus platypoda and Acacia tumidia*.

The other Yarrie crustal deposits were surveyed in 1998 by HGM. Two main vegetation types were described, these being a shrub steppe of *Grevillea wickhamii* and *Acacia inaequilatera* over Spinifex species *T. basedowii* and *T. pungens* on the low hills, and a tall dense shrubland of *A. tumida* over dense *T. pungens* in the minor creeklines. A total of 59 plant species were identified.

Cattle Gorge

The *ecologia* (2005) survey described seven separate vegetation communities on the basis of differing dominant Spinifex and shrub species and a total of 126 plant species. No weeds, DRF or priority species were recorded.

Recent surveys

So as to allow a wider assessment of the local significance of vegetation associations and species found in the planned new disturbance areas, the entire ridgelines at Nimingarra and Sunrise Hill were re-surveyed. The Cattle Gorge haul road route was also surveyed.

Botanists Griffin and Trudgen were commissioned to analyse the floristic variation in the quadrat data recorded in the vegetation surveys to allow comparison with other vegetation surveys in the sub-region, namely the Panorama area, 125km to the south-west of Yarrie and adjacent to the Shaw River and Gorge Range. The analysis found that the Nimingarra and Sunrise Hill areas were the sites most similar to each other, most likely due to their proximity. Sunrise Hill also had much in common with the Yarrie area. Cattle Gorge area was the least species-diverse and had the least in common with the other Goldsworthy areas, but displayed some similarities with the Panorama area.

Flora of conservation significance

In the Nimingarra-Sunrise Hill area two Priority species (*Eucalyptus clementii* and *Goodenia hartiana*) were recorded. The former was found at Nim B (*ecologia*, 2004) but not in the most recent survey by *ecologia*. *Goodenia hartiana* has been recorded from a site approximately 1km to the north of the Nim B pit.

In the vicinity of the Y9 deposit at Yarrie, Priority 2 species *Euphorbia clementii* was mapped. The Priority 2 species *E. drummondii* subsp. Pilbara was also recorded at Yarrie in an earlier survey (*ecologia*, 1999) but not in the proposed areas of disturbance.

Acacia glaucocaesia (Priority 3) was recorded at two sites along the planned Cattle Gorge access road and will be the subject of pre-clearance surveys that will also include searches in nearby areas to further assess the local occurrence and significance of this species.

A species (*Erythrophleum chlorostachys*)-considered by *ecologia* to be of regional interest as a new record for the east Pilbara-was found in the Nimingarra area (site 19 in Fig 3-6 of BHPB 2005). It is outside of the proposed areas of disturbance.

More details of these species can be found in BHPB's EPS, pages 3-37 to 3-41.

Weeds

While no declared weeds have been recorded, the following are established in the area: *Cenchrus ciliaris, Aerva javanica, Acacia farnesiana, Chloris gayana, Malvastrum americanum and Oleander* sp. Measures to minimise the potential for weeds to spread include:

- 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 and mobile machinery 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 they would then be treated with glyphosate. The soil would subsequently be inspected for further signs of weed growth and given follow-up treatment, if required, before use;
- regular inspections would be carried out in disturbed areas; and
- treatments would be implemented in consultation with CALM staff.

Kapok (*Aerva javanica*) is widespread in the area and, because it is one of the preferred feedstocks for the cattle on Yarrie Station, the pastoralist does not wish BHPB to control it. CALM was consulted; its advice to BHPB was that the benefits of undertaking a Kapok control programme on the mine leases would be negligible if it grows on the adjoining pastoral leases. Accordingly CALM would not have significant objections to BHPB discontinuing its Kapok control programme on the mine areas.

FAUNA

Previous fauna assessments in the Goldsworthy area were carried out by Goldsworthy Mining Ltd (1986) in the Nimingarra/Sunrise Hill area (opportunistic observations) with particular reference to Egg Creek; Yarrie (Y2 and Y3 mining areas); part of the Callawa Ridgeline was surveyed by Dames and Moore (1992); Pebble-mound Mouse monitoring was carried out on the Yarrie Plateau in 1993 and 1994 by Enviroscan, Chapman (1995) and HGM (1997, 1998); a baseline biological survey was done on the area of the Yarrie crustal deposits by HGM in 1998; and a comprehensive survey was carried on the same area in 1998 by *ecologia*. Finally, in 2004 and 2005, *ecologia* conducted studies of the proposed Cattle Gorge mining area and its connecting infrastructure corridor; as well as on sites along the Nimingarra-Sunrise Hill Ridgelines. Trapping, opportunistic searching, bird census and nocturnal bat recording techniques were all used. Details of all this work can be found in BHPB's EPS, section 3.8.1.

Yarrie

Five habitat types were identified:

- riverine:-with species of Eucalypt in the channels and Acacia thicket on the banks;
- gorge:-steep-sided, pools at base and with *E. leucophloia* over Spinifex;
- shrubland:-*Grevillea pyramidalis* over Spinifex;
- scree slope:-scattered mixed shrubs over Spinifex, thick shrubs in minor drainage lines;
- plateau/hilltop:-scattered mixed shrubs over Spinifex on skeletal soils.

The proposed pits Y4A, Y7 west and Y10 north all coincide with the plateau/hilltop habitat type.

The biological survey by *ecologia* (1999) recorded 87 species, including two recognised by Australian authorities as being of conservation significance, these being the Pebble-mound Mouse and Lakeland Downs Mouse.

Cattle Gorge

All the habitat types at Yarrie (above) were also mapped by *ecologia* (2005) in this area. Mining activities would affect mainly the scree and plateau/hilltop types.

Nimingarra

Four habitat types were recognised:

- sandplain/alluvial/outwash plain-with typically patchy stands of *Acacia tumida/A. colei* over dense to moderately dense Spinifex hummock grassland;
- gullies/major drainage-typically vegetated with *Corymbia hamersleyana* over mixed mid-level shrubs, with the slopes of the drainage dominated by Spinifex. Several of the creeks have large *Ficus* spp.;
- slopes/Spinifex steppe-typically with a rocky substrate;
- riverine-very sparse *C. hamersleyana* trees with open *Melaleuca argentea* woodland, dense in places, with disjunct beds of *Typha domingensis*.

Sunrise Hill

There is considerable overlap of habitat types with Nimingarra but six were identified, the additional two being:

- gorges-often with similar vegetation as the riverine habitat, but here much deeper, with high rock walls, often containing pools;
- Melaleuca woodland-at the base of gorges, this habitat is often inundated, either through runoff or from permanent seeps from adjacent rocks.

Fauna of conservation significance

The **Pilbara Olive Python** is listed as Vulnerable under the *Environment Protection Biodiversity Conservation Act* (EPBC Act) 1999 and under Schedule 1 of the State *Wildlife Conseravtion Act* (WC Act) 1950. A study by Pearson (2003) indicated that this snake is widespread across the Pilbara and that there are several sizeable populations. It has been recorded at the Callawa Mesa (Dames and Moore, 1992) approximately 2km south of the Yarrie Plateau, and at Cattle Gorge *(ecologia*, 2004, 2005). The locations are not in the proposed areas of disturbance, nor are the snake's preferred habitat types, in gorges and around rockpools. BHPB proposes a management plan, the fundamentals of which are described below.

The **Mulgara** is listed as vulnerable under the EPBC Act and in Schedule 1 under the WC Act. This species lives in a warren system and prefers sandy substrates vegetated with Spinifex. It has been observed on one occasion (*ecologia*, 2005), to the south east of the Cattle Gorge mining area. BHPB intends to minimise disturbance to Spinifex grasslands and to restrict vehicle speeds on the Cattle Gorge Haul Road to 50km/h.

The **Northern Quoll** has recently been listed as Endangered under the EPBC Act (not presently listed under the WC Act) and has been recorded from the Yarrie (HGM, 1992), Cattle Gorge (*ecologia*, 2004d), Nimingarra and Sunrise Hill areas (*ecologia*, 2005) on several occasions over the past decade. It has also been listed by the IUCN as lower risk/near threatened.

The records for the three species listed above are not within the planned disturbance areas, the proposal does not involve clearing of core habitat areas and is unlikely to significantly affect these species as long as BHPB continues to implement appropriate management measures. Because of this, BHPB and CALM agreed that species-specific management plans were not required for the abovementioned species. Nevertheless, BHPB has reviewed and updated its existing fauna management practices and documented these revisions in the EPS and EMP. They include: avoiding areas of core habitat, minimising land disturbance, promoting awareness amongst employees, and only allowing appropriately trained employees/contractors to relocate snakes.

The **Orange or Pilbara Leaf-nosed Bat** is listed as vulnerable under the EPBC Act and in Schedule 1 of the WC Act. A call of this species from a cave on the Nimingarra Ridgeline was recorded (*ecologia*, 2005) and, during the same survey, a bat was seen foraging in the sandplain to the south east of Cattle Gorge. Subsequent searches for potentially suitable cave sites have been conducted. None has been found within any proposed disturbance areas but several potential caves were found within a 10km radius. Surveys of potential cave sites are being undertaken in consultation with CALM to confirm whether the Pilbara Leaf-nosed Bat roosts at any of the caves. On the advice of CALM, BHPB has prepared a management plan for this bat species, the main points of which are:

- buffer zones will be established between mining activities and caves where the Pilbara Leaf-nosed Bat is recorded. Permission to enter the buffer zones will be restricted. Staff inductions will list the roost caves and their buffer zones;
- blasting will be restricted to daylight hours;
- directional night-time lighting at mining areas adjacent to buffer zones;
- the effectiveness of the control measures will be monitored and will include Anabat detection at known roosting caves, opportunistic monitoring at possible feeding points (eg. areas where lights are used), and assessment of the condition of roosting caves (eg. physical condition, noise and light assessments);
- the monitoring results will be regularly reported to the relevant Government agencies during the mining operations.

The following species are listed as Priority 4 under the *Wildlife Conservation Act 1950*:

- **Western Pebble-mound Mouse**:-(formerly classed as a species that is likely to become extinct, or is rare). Recorded at Yarrie on several occasions, but not at Cattle Gorge, Nimingarra or Sunrise Hill, even though suitable habitat occurs in these areas. BHPB's Management of this species currently involves monitoring and avoidance of active mounds, where possible;

- **Lakeland Downs Short-tailed Mouse**:-has only been recorded (*ecologia*, 1999) in shrubland habitat such as found near the Yarrie railway;

- **Star Finch and Pictorella Mannikin**:-have been recorded (*ecologia*, 2005) between Cattle Gorge and Yarrie in their preferred habitat in and around grassland, near water;

- **Australian Bustard**:-in the area between Cattle Gorge and Yarrie (*ecologia*, 2004d);

- **Bush Stone-curlew**:-in the Cattle Gorge area (*ecologia*, 2004d) and at Nimingarra (*ecologia*, 2005);

- **Ghost Bat**:-the first sighting was of a dead specimen (Dames and Moore, 1992) at Yarrie; subsequently calls have been recorded at a cave on the Nimingarra Ridgeline.

The **Delicate Mouse** is listed by the IUCN as lower risk/near threatened. One specimen was captured at Yarrie (*ecologia*, 2004d).

CALM has indicated to BHPB that species-specific management plans should not be required for these species since the records are not within the planned disturbance areas and the Project does not involve clearing of core habitat areas.

Nineteen species of water bird have been observed along Eel Creek and Cattle Gorge Creek. Most of the water bodies are aligned with the Yarrie access road and rail line. BHPB has noted that the construction of the haul road from Cattle Gorge needs to ensure that the flow regime of these creeks is not altered.

Short range endemic species

While there are no indications of short range endemic species (SRE) in the project area BHPB undertook a desktop literature database review and consulted experts at the WA Museum. An environmental risk assessment has also been done. It concluded that, as there are no known physical barriers to dispersal and the ridgeline and adjoining outwash plains are well represented in the area, the distribution of species that occupy the project area is considered to be unlikely to be restricted to the proposed disturbance areas.

Assessment

The area considered for assessment of these factors is contained by the mining envelope, of which an extra 97 hectares is expected to be disturbed for this proposal. The components are: 57ha at the proposed new Cattle Gorge pit; 18ha at the new Nim I pit; and 22ha collectively at the Yarrie Y4a, Y7 west and Y10 north pits. To date total disturbance for the Goldsworthy-Yarrie area is approximately 2200ha, of which 971ha is rehabilitated, or mine voids.

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. Under the provisions of the *Wildlife Conservation Act 1950* DRF and priority flora are to be protected, as well as other species of conservation significance.

In its EPS, BHPB has listed general management strategies for managing potential impacts on flora and fauna which require baseline surveys at each mining operation prior to land disturbance and involve minimising clearing through mine sequencing across the whole lease. In this way mined-out pits can sometimes be used for overburden disposal rather than by the clearing of new areas.

Flora

No DRF has been identified within the project area. Potential impacts to rare flora species or significant fauna habitat need to be identified and recorded on mine plans so that they can be managed appropriately. Where necessary, BHPB would undertake additional pre-clearance survey work to identify or improve knowledge of the distribution of the species of conservation significance and where possible, adjust clearing boundaries to avoid disturbance. CALM staff would be consulted to develop management strategies to CALM's satisfaction where significant flora or fauna, vegetation associations or habitat areas cannot practically be avoided. Monitoring of clearing to check whether only the intended areas are cleared is a part of the process. If subsequent surveys identify any DRF that cannot be avoided by adjusting the clearing boundaries BHPB would prepare and submit an application to take DRF pursuant to the *Wildlife Conservation Act 1950,* making any land disturbance in these areas subject to Ministerial approval.

Fauna

Several species of varying conservation significance have been outlined in fauna surveys. BHPB has consulted closely with CALM staff to determine appropriate management procedures for adequate levels of protection, which are tailored to the status of the species as well as their recorded proximity to mining operations. CALM has advised BHPB that it is satisfied that the management of impacts to fauna (and flora) species of significance are covered adequately as described in the EPS but wishes to see a specific management plan for the Pilbara Leaf-nosed Bat and the Ghost Bat. BHPB has prepared a draft bat management plan which is being finalised as the results of bat surveys (in May 2005) come to hand. Key aspects of the plan will be:

- the demarcation of caves in which the bats are found to roost and the creation of clearly marked buffer zones around them. To date two areas have been identified, at Cattle Gorge and Nimingarra B, and the width of these buffer zones will be determined by CALM;
- monitoring of caves to detect any gross physical changes that may be due to blast-related effects. In the event of adverse effects contingency measures would be developed and adopted to the satisfaction of CALM. These may include altering mine design, adjusting blasting times, reducing the size of the blasts, changing their frequency or using alternatives; and
- adjusting night lighting to ensure that it will be shielded from direct line of sight of known bat-roost caves.

The EPA notes that CALM is concerned specifically for the bat species; however it wishes to ensure that other species, such as the Pilbara Olive Python, Mulgara and Northern Quoll, will also be appropriately protected, should subsequent unforseen mining activities potentially impact on their habitats.

General fauna management strategies are also outlined in section 3.8.2 of the EPS covering aspects such as staff training, management of all vehicles, procedures to be adopted for clearing of ground, waste management, domestic and feral animals and the monitoring of all the above aspects.

BHPB is committed to considering key environmental aspects in the mine planning process and to adjust decisions, where possible, to minimise environmental impacts. The decision-making process includes consultation with CALM staff and the development of a management strategy to the satisfaction of CALM for potentially affected significant species.

The new Cattle Gorge haul road to the Yarrie crusher would be used by haul trucks 24 hours a day and could be expected to contribute to road kills. Fencing of the route would have the undesirable effect of cutting off access to fauna from one side of the road to the other. BHPB was asked to consider alternate means of transporting ore to Yarrie, such as a railway or a conveyor system. These options were discussed (above in Section 2) but were found to be uneconomic for the short period of time that mining of the Cattle Gorge deposits is to take place. Also, a railway formation would be much more difficult to rehabilitate. In response BHPB has committed to several measures to reduce the risk of road kills:

- haul trucks would be restricted to a maximum speed of 50km/h on the haul route;
- the pastoralist would be consulted with regard to mustering times;
- so as to minimise the number of stock in the vicinity of the haul road, watering points for stock would be established at least 1km away in consultation with the pastoralist;

- the haul road verges would be designed to minimise standing water and hence roadside fodder for stock; and
- trees immediately adjacent to the haul road would be trimmed to maximise verge visibility.

Conclusion

BHPB has summarised its proposed management plans into the table of commitments (Table S-2) in its EPS. The EPA commends the proposed strategies and notes CALM's interest in the two bat species. Accordingly, to ensure that the proposal can be managed to meet the EPA's environmental objective for these factors, the EPA recommends a condition requiring a significant species management plan (to include bats, and other species as needed, if indicated by the proposed pre-clearance surveys) to be prepared.

4.2 Groundwater and subterranean fauna

Description

In the mine area aquifers are associated with fracturing in the hematite orebodies and tend to be narrow and linear. Their permeability depends on the degree of fracturing and amount of mineralisation present. The main orebodies form the areas of higher permeability. Recharge into these aquifers is generally restricted to areas where the bodies outcrop. There is limited hydraulic connection to the groundwater system on the surrounding plains and therefore the mineralised aquifers are significantly higher in elevation than those beneath the surrounding plains.

On the plains the De Grey River system dominates. The aquifers, which are recharged by rainfall, are shallow and characterised by hydraulically isolated sedimentary sequences.

Dewatering continues at the SHW7 mine pit at Sunrise Hill where pit groundwater levels have been drawn down some 40m. Both in-pit bores and sump pumps are used. Groundwater levels at the perimeter of the pit show no impacts from dewatering.

Dewatering at the Nim B pit began in 2002. A combination of in-pit sump pumps and a dewatering bore is used. Some of the water is used for dust suppression, with the excess being discharged to a drainage line which flows into Egg Creek. Water levels in bores in the main orebody have been drawn down by around 10m to date, while water levels in bores outside of the immediate pit area show no response to the dewatering. A similar response around the pit perimeter was observed at the Nim A orebody. Dewatering at this pit ceased in 1977; water levels in the main aquifer are recovering and continue to be monitored. The dewatering discharge from the Nim B pit is fresh (TDS around 700mg/L) and infiltrates into the creek bed within 200-300m of the discharge point. As expected, the vegetation density in the vicinity has increased.

At Yarrie all dewatering is currently via sump pumps. Some of the water is used for dust suppression; the excess is discharged into the Eel Creek catchment. No drawdown-related effects have been observed on nearby vegetation, which typically consists of Spinifex and low shrubs (ie is not phreatophytic).

Water for the Yarrie village and ore crusher comes from the Shay Gap Wellfield. Water demand peaked in 1995 and has since decreased to about a quarter of that, with use of in-pit dewatering sources for dust suppression and more efficient site water use. The effects of pumping from this wellfield are very slight. At peak production in 1995 water drawdown levels were less than 5m and current levels are at or above pre-pumping levels due to reduced pumping and higher-than-average rainfall in recent years.

Mining below the water table is proposed at Cattle Gorge and Nim I. When groundwater is reached in these pits it will be used to supplement supplies from elsewhere, for dust suppression, etc. Water for Cattle Gorge (and the Yarrie pits) would be piped from the Yarrie supply system. Based on previous mining experience in the area drawdown effects from dewatering are likely to be restricted to the immediate vicinity of the orebodies and along strike.

The Cattle Gorge and Nim I pits would be backfilled to at least 5m above the water table on completion of mining. This would help to protect the quality of groundwater passing through the pit.

Stygofauna

Dewatering of pits and water abstraction from wellfields could potentially be harmful to stygofauna due to the loss of potentially occupied stygofauna habitat that occurs when the water table drops. The duration of mining for the two proposed pits to be mined below the water table is quite short-a maximum of 24 months-after which the pits would be partly backfilled to above the water table.

As part of the Pilbara Biological Survey, seven bores have been sampled to date for stygofauna, and identifications were made in three of those (see EPS Table 3-9). None of the bores sampled was sited in ore formation aquifers because the hydrogeological features and habitat characteristics of the orebody aquifers are not known to be particularly favoured by stygofauna.

BHPB is committed to further sampling and assessment for stygofauna at the Cattle Gorge and Nimingarra areas in order to improve understanding of the local distribution, species composition and potential effects of project activities on them.

Assessment

BHPB uses pit water for dust suppression and ore processing in preference to supplies from wellfields. In this way it has been able to reduce the amount of water abstracted from wellfields and to reduce the amount discharged to creeks. The amount of water that the proposal is expected to require is not expected to change significantly from that currently used. All discharges are licensed and are discussed further in the next section.

With respect to stygofauna, the EPA notes that, to date, dewatering at pits results in minimal out-of-pit changes to the ground water table and is largely restricted to the iron ore host rock formation. Generally speaking, in the Pilbara, the iron orebody aquifers are not favoured habitats for stygofauna. However, sampling in the immediate vicinity of the proposed pits needs to be carried out to establish whether this is also the case specifically.

The effects of pumping from the Shay Gap wellfield are noted as slight and, because this aquifer is extensive, the small amount of lost habitat associated with pumping is considered unlikely to have a significant impact on stygofauna populations in this area.

The EPA supports BHPB's commitment to carry out further work, prepare and implement a stygofauna assessment plan and recommends that the proposed work be formalised as a condition requiring a subterranean fauna management plan consistent with other, recent iron ore assessments.

4.3 Surface water quality and mine discharges

Description

The Goldsworthy area is located in the De Grey River catchment. Tributaries Egg, Coonjeena and Eel Creeks flow generally southwards through the mining leases to feed the De Grey River. They are usually dry, with broad channel beds from 20-100m wide, but carry significant flows during sustained high rainfall. The De Grey River lies to the south of the mining areas and here flows eastwards before turning north for the coast.

Drainage in the sandy plains to the north of the project area (ie in the vicinity of the Shay Gap Wellfield) is mostly internal, infiltrating to groundwater storage in the Canning Basin sediments.

BHPB has a licence to discharge excess water (ie after dust suppression) from mine dewatering activities into the creeks adjacent to the Sunrise Hill-Nimingarra and Yarrie mining areas. The water is transferred first to 'turkey nest' stilling ponds to reduce sediment loads, and from there into the creeks. The EMP (EPA, Appendix A, Table 4-2) shows that discharge volumes vary greatly but have been falling since 2002.

Water quality monitoring is carried out in the creek lines upstream (when waterflow is present) and downstream of the mining operations on a quarterly basis. There are three monitoring sites at Yarrie and two at Sunrise Hill-Nimingarra (locations shown on Figs 1-3 and 1-6 of the EPS).

Sampling of water quality at Chinaman Springs 4km to the east of Yarrie over the period 1997-2004 indicates that pH has varied from 6.1 to 7.2; and electrical conductivity (EC) from 470 in 1997 to 450 microsiemens per centimetre in 2004, with a peak of 780 but no obvious trends. Total suspended solids (TSS) varied from <5 to 450mg/L and total dissolved solids (TDS) from 250 to 500mg/L, both sets of data with no steady trends upwards or downwards. The results indicate that there is a considerable degree of natural variation in water quality but that it is not getting worse.

In the Yarrie area results from Eel Creek showed little variation in water quality between upstream and downstream monitoring points (Table 3-3 in the EPS). However, results from the west of Sunrise Hill-Nimingarra in Egg Creek showed more variation. Upstream results for EC ranged between 108 and 260 (fresh) compared with 180 to 2200 microsiemens per centimetre downstream. The latter value equates to brackish water quality. Similarly the values for TDS averaged 67mg/L upstream compared with 638mg/L at the downstream monitoring location.

Water discharges

The volume of water discharged from pits varies considerably from year to year, depending mainly on the amount of rain received (EPS, Table 3-2). Aside from that component, BHPB advises that the average volume that would be pumped from the pits to cope with groundwater influx is not expected to rise significantly.

Water quality data from the Nimingarra mine discharge point (SHW7) are available over the period 1997 to 2004. During this time TSS has shown little variation (around <5mg/L), TDS has, with one exception remained between 350 and 490mg/L, and EC has risen slowly from 680-800 microsiemens per centimetre, the latter values equating to a small increase in salinity.

At Yarrie records are available from 1999-2003. At Discharge Pipe 1 EC values trend upwards from 620-1000 microsiemens per centimetre and for TDS, from 310mg/L at the start of records, to 640mg/L for the latest reading. Similarly, at the W1 Discharge point, EC values range upward from 790-1800 microsiemens per centimetre and, for TDS, 510mg/L up to 1200mg/L for the most recent.

Proposed mining at Cattle Gorge will require a new haul road which would cross some watercourses that are already spanned by the Yarrie-Port Hedland railway.

BHPB's mining operation is subject to a water management programme which details the water supply scheme, water management practices, water reduction initiatives and performance indicators. Sediment control measures and water monitoring are components of this plan. It continues to be revised whilst mining and dewatering continue.

Assessment

The area for assessment is the entire mining area, but more specifically all ground disturbed by mining activities, 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*.

The Department raised with BHPB the issue of mine water discharges to the environment with a view to seeking an assurance that the volumes would be as low as practicable. This matter has been addressed in the EMP (EPS Appendix A, BHPB, 2005) under Project Water Management.

The mines are located on plateaux where drainage systems are poorly developed. There are no proposals to divert drainage systems as a result of mining. The more significant creeks occur on the surrounding plain, where they are crossed (but not diverted) by infrastructure, such as the abovementioned proposed Cattle Gorge haul road.

Control data at Chinaman Springs indicate that there is a significant amount of natural variation in some aspects of water quality. At Yarrie, downstream data show that mining operations do not appear to be having a significant effect on water quality in Eel creek, where results are very constant, whereas the water quality in Egg Creek downstream from the Sunrise Hill-Nimingarra operations does appear to be affected. Water quality from the mine dewatering discharge points at Yarrie shows a deterioration in EC and TDS values over the four year monitoring period.

The EPA sought advice from Department of Environment staff as to the significance of the water quality trends as shown by the monitoring data in Table 3-3 of the EPS. It is considered that the adverse trends were most likely being caused by the project activities, do not at this stage indicate serious deterioration, but warrant ongoing monitoring for cumulative effects.

Having regard to BHPB's Water Management Programme which describes site sediment control, data from water quality monitoring stations at Chinaman Springs, Eel and Egg Creeks, the maximisation of water for use in suppressing dust and in the ore processing facilities, (and hence the minimisation of water discharges) and in recognition of the Department's advice, it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for this factor.

4.4 Aboriginal culture and heritage

Description

Two native title claimant groups have claims within the project area, the Njamal and the Birrimaya. BHPB has reached agreement with both groups and is entering into the *Yarrie Continued Operations and Infrastructure Works Agreements* which contain agreed protocols and a process to consult on other matters (training, employment, mine access and developments, etc) within the project area.

Early surveys

Several archaeological and ethnographic surveys over the period from 1988 to 1992 have been carried out in the area and BHPB has consulted with the Njamal People and others from neighbouring language groups, such as the Nyangumarta. Twenty three sites and seven non-disturbance areas (the latter of ethnographic significance) were identified. Subsequently a site at Cattle Gorge has been added and another at Nimingarra (the Nimingarra Shelter). Eight additional archaeological and three ethnographic sites are on the records. Permission has been granted under Section 18 of the *Aboriginal Heritage Act 1972* to use the land at three of the archaeological sites. The remaining sites are protected from disturbance.

Current project work

The most recent work has been conducted in the Shay Gap, Cattle Gorge, Nimingarra and Sunrise Hill areas with the involvement of the Pilbara Native Title Service and Njamal claimants. This work defined two new sites and redefined another. Buffer zones will be established around these. The work has established that no Aboriginal sites are located within the project disturbance areas.

Consultation with Mr Lang Coppin of Yarrie Station raised a concern that mining at Cattle Gorge would adversely impact a site of ethnographic significance to the west of the mine. BHPB has given a commitment to establish a 400m wide buffer zone around it so as not to affect the amenity of the Cattle Gorge landmark.

Concerns about water catchment areas were also raised by the survey team. Discussions between Njamal claimants and BHPB personnel are ongoing and specific management of these areas will be included in the final ethnographic report.

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 *Aboriginal Heritage Act*; and
- 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 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 *Aboriginal Heritage Act* prior to disturbing any sites;

- providing compulsory inductions for employees and contractors with regard to their responsibilities under the *Aboriginal Heritage Act,* and maintaining appropriate protective management measures for recorded Aboriginal sites; and
- all employees promptly reporting any potential Aboriginal sites discovered in the vicinity of BHPB's operations.

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 *Aboriginal Heritage Act* it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for this factor.

4.5 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:

- minimising areas of exposed soil; and
- wetting trafficked dirt roads and construction areas around minesites.

This proposal does not seek to increase tonnages of ore shipped through Port Hedland. Therefore there will be no change regarding dust at the company shipping facility at the port.

Noise levels at the mine are created by blasting, machinery such as the crushers and screening equipment, trains, dump trucks and drill rigs. The minesite is quite remote, with the nearest homestead (Yarrie) being about 12km from the Yarrie mine complex. The station manager has not raised noise and vibration as an issue. Consequently any potential impacts from noise and vibrations are restricted to mine employees and visitors and are essentially related to occupational health and safety. Noise levels are managed to comply with occupational health and safety conditions as outlined in the *Mine Safety and Inspection Regulations, 1995*.

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; and
- they do not cause health problems.

The mine uses significant amounts of water to control dust. The water comes from mine dewatering operations and would otherwise be discharged into creek systems. BHPB uses the following practices to minimise dust:

- keeping areas of exposed soil to a minimum and rehabilitating unused areas;
- watering haul roads and other areas which could generate dust;
- chemical suppressants are applied to haul roads;

- water sprays and dust collectors installed at the crushers;
- water sprays used on ore stackers;
- transfer points enclosed and/or fitted with water sprays where practicable;
- dust curtains installed around hoppers; and
- ore is moisture-conditioned prior to rail transport.

The EPA considers that BHPB's dust management strategies are acceptable.

Noise and vibration

The area for assessment of noise and vibration is the mine area and wherever these effects may be perceived in the surrounding region. 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*.

Accordingly, it is the EPA's opinion that the proposal can be managed to meet the EPA's objectives for dust, noise and vibration.

4.6 Landforms, mine closure planning and rehabilitation

Description

Visual aspects of the landforms

The mine areas are remote, even by Pilbara standards. Users of the Shay Gap Road would continue to have views of the rehabilitating mine overburden dumps on the western side of the Nimingarra Ridge (Fig 2). All of the pits are located on top of the plateaux and are out of sight from where the public roads traverse the river flats below. New out-of-pit overburden dumps would be sited to extend escarpments (rather than sitting on top) and would have rounded shapes similar to the surrounding naturally occurring landforms. They would be rehabilitated with locally occurring species of vegetation.

A search of the National Geoheritage List indicated that no natural places with outstanding geoheritage values are in the area of the project.

Rehabilitation

Rehabilitation and mine closure would be integrated with mine planning during the life of the project. Mine overburden dumps, borrow pits, exploration tracks and drill pads at Shay Gap, Sunrise Hill and Nimingarra were first rehabilitated during 1993-5. More recent works have focussed on Yarrie (EPS Section 2.10). To date there are 451ha of rehabilitated ground in the Goldsworthy mining area. Work in the next 12 months is scheduled to re-shape overburden dumps at Yarrie and Nimingarra.

Rehabilitation strategies have been modified over the last decade or so. Some early overburden dumps allowed too much water to flow down the slopes in heavy rains, causing erosion. Subsequently dumps are designed to ensure that they drain water inwards, away from the slope face. 'Moonscaping'-a method of scalloping the slopes to enhance rainfall

infiltration and create microclimates-and the overall face slopes have also been revised to ensure that erosion of the faces is minimised. A final angle of 15^0 is considered to be ideal and will be adopted wherever possible. However, where waste dumps are made of competent (ie non-erosive) rock steeper slopes may be used. Rip lines must be exactly on the contour or they can encourage erosion.

Trials incorporating topsoil, weathered material or growth media on the surface of the dumps show that revegetation is more advanced than if the fresh, blocky Banded Iron Formation waste rock is left bare. However, the fine topsoil must be anchored into the underlying profile or it can be washed away during extreme rainfall events. All the earthworks should be completed before the start of the wet season and BHPB is considering the option of watering the slopes to allow for a degree of self-armouring prior to heavy rains.

Management strategies to minimise the effects of mining and dumping on landforms are summarised:

- mine structures would be designed and placed to minimise environmental impacts wherever practicable (an example being the proposed location of the new overburden dump for the Cattle Gorge mine, which was relocated from the initially preferred site to one from which dump runoff would not migrate into Cattle Gorge);
- new overburden dumps would be located either in valleys or as extensions to ridges and plateaus, and rehabilitated to blend with the surrounding landforms;
- disturbed areas which are no longer required would be re-contoured to blend with the surrounding topography, topsoiled and contour-ripped prior to seeding with native species as required;
- erosion and sedimentation control measures, such as biodegradable jute mesh material and sediment fences, would be positioned as needed to minimise potentially erosive sheet flow, the development of gullies and sedimentation into watercourses.

Closure

BHPB's decommissioning and rehabilitation plan (EPS Appendix B) encompasses Shay Gap, Sunrise Hill, Nimingarra, Yarrie and Cattle Gorge, so it addresses an area wider than the Goldsworthy Extension Project. The company's principal objective is to rehabilitate sites as close as possible to their original state in order to minimise long term environmental impacts. BHPB's Land Management Manual describes several broad completion criteria to be applied to mine sites, including:

- landforms post-mining should be stable and respond to erosive agents in the same way as do naturally occurring landforms;
- surface water quality should fall within guidelines for specific end land-uses;
- established vegetative cover should be self-sustaining and similar to the surrounding undisturbed vegetation;
- post-mining landforms should be consistent with other natural ones in the region; and
- there should be no significant off-site impacts.

At the end of mining operations the Nimingarra rail spur will be decommissioned by removing the rails, breaking up the concrete sleepers and placing them in areas of backfill or burying them at least 1.5m deep in-situ below rehabilitated surfaces, and the rail corridor will be re-profiled to blend in with the surroundings.

All power supply infrastructure and accommodation units will be removed. Concrete footings will be broken up and placed in areas of backfill or buried in-situ below rehabilitated surfaces.

Access roads will be re-profiled and will include removal of portions of embankments where necessary to blend in with the surroundings, to allow free drainage and minimise interference with surface water flows.

The future of Shay Gap airstrip will be determined in consultation with the administering authority and other relevant stakeholders.

Assessment

The areas for assessment are those surrounding mining activities in the areas proposed at Cattle Gorge, Yarrie and Nimingarra, as well as the surrounding areas from which mining activities 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. Cattle Gorge is a local feature of considerable importance and BHPB has committed to recognise its significance by formalising a broad buffer between it and mining operations, within which only authorised personnel would be permitted.

The EPA considers that the appearance of the overburden dumps of the past and existing operations is becoming progressively more natural as vegetation softens their profile, and that improvements to rehabilitation techniques have resulted in more stable and effective outcomes.

BHPB has committed to implement:

- an Environmental Management Plan (EMP-attached as Appendix A to the EPS) to encompass best practice environmental measures and procedures to minimise impacts on the key environmental aspects; and
- a Decommissioning and Rehabilitation Plan, which will address how the project would be closed and disturbance areas rehabilitated;

both of which would be reviewed whenever significant changes occur at the mine (or at intervals of no more than five years if the project were to extend beyond the estimated closure date of the second half of 2007). In addition, annual environmental reports would be prepared and provided to key stakeholders.

The EPA considers that the concept of progressive rehabilitation over the remaining life of the mine is a vital element and recommends that the abovementioned plans be incorporated within a recommended mine closure condition.

5. Proponent commitments

In earlier drafts of its EPS BHPB listed commitments encompassing its EMP, Annual Environmental Report, Cattle Gorge management actions, decommissioning and rehabilitation plans, stygofauna assessments, groundwater, pre-clearance surveys for Priority flora and a significant species management plan. Subsequently, so as to emphasise the importance it ascribes to those issues, the EPA has made recommendations for several conditions which recognise and in some cases broaden the scope of those original commitments. BHPB has accordingly modified its own list of commitments to include references to its EMP, Annual Environmental Report and Cattle Gorge management actions and has de-listed the others. For approval of this proposal it is recommended that BHPB undertakes the listed commitments and that the company be subject to the complementary suite of recommended conditions.

6. Other advice

This proposal would create an additional 97ha of disturbance, bringing the total for the Goldsworthy area to around 2200ha for mining and related activities. The EPA notes that additional areas (such as Cundaline Ridge and Callawa) are yet to be fully explored and may in the future be proposed for mining. If BHPB intends any future referrals to extend mining in the area the EPA considers that cumulative impacts would need to be a part of any further assessment.

With regard to the Environmental Management Plan which is attached to BHPB's EPS document, this is seen as a broad and generic plan applicable to many of BHPB's Pilbara iron mining camps. The EPA considers that future documentation needs to include a project-specific EMP.

7. 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 relevant factors identified in this assessment are as follows:

- Flora and fauna;
- Groundwater and subterranean fauna;
- Surface water quality and mine discharges;
- Aboriginal culture and heritage;
- Dust, noise and vibration; and
- Landforms, mine closure planning and rehabilitation.

The EPA has not recommended a separate condition to address the potential for impact on areas of Aboriginal heritage because no Aboriginal sites are located within the proposed disturbance areas and it considers that consultations, which have been effective and ongoing with relevant stakeholders, have not identified any potential for significant adverse impacts on cultural associations.

Dust, noise and vibration are considered to be secondary factors which can be acceptably managed and do not require specific conditions under Part IV of the *Environmental Protection Act 1986*.

The power demand for the site is expected to remain essentially unchanged as ore production rates are not expected to rise. Under this scenario greenhouse gas emissions are not considered to be a relevant factor.

The proponent has consulted with stakeholders and agencies to address the various issues raised to a satisfactory degree. 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.

8. Recommendations

The EPA considers that the proponent has demonstrated, in the EPS document, and by the rehabilitation practices it has employed at the minesite, that the proposal can be managed in an environmentally acceptable manner. Accordingly, the EPA provides the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is the Goldsworthy Extension Project.
2. That the Minister considers the report on the relevant environmental factors as set out in Sections 4.1-4.6.
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 .*Goldsworthy Extension Project. Environmental Protection Statement.* BHP Billiton Iron Ore. May, 2005.

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)

GOLDSWORTHY EXTENSION PROJECT
100-170km EAST OF PORT HEDLAND

Proposal: Proposal for extensions to current mines, and new pits, to mine and crush iron ore at the Yarrie, Nimingarra and Cattle Gorge mine areas at a continuing rate of up to approximately 8.5 million tonnes per annum, for transportation by rail to Port Hedland; 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: 1568

Report of the Environmental Protection Authority: Bulletin 1171

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

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 annual 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 Director-General 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 may submit a report prepared by an auditor approved by the Department of Environment under the "Compliance Auditor Accreditation Scheme" to the Director-General 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 Conservation of Significant Flora and Fauna

6-1 Prior to any ground-disturbing activity following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act* 1986 the proponent shall conduct pre-clearance surveys of the areas to be disturbed by the Project for priority flora and significant fauna species. The summary report of the results of the surveys will be provided to the Environmental Protection Authority and the Department of Conservation and Land Management within two weeks of it becoming available.

6-2 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 submit a significant species management plan or plans for the Pilbara Leaf-nosed Bat (*Rhinonicteris aurantius*), Ghost Bat (*Macroderma gigas*) and any other priority flora or significant fauna species recorded within the planned areas to be disturbed by the Project during the pre-clearance surveys required by condition 6-1. This plan or plans will be prepared 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 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(s) shall describe the significant, identified species of flora and fauna, and describe significant vegetation associations and habitat areas, and shall set out procedures and measures to:

1. delineate the identified populations and/or individuals of conservation-significant, identified species of flora and fauna, and map the extent of conservation-significant vegetation associations and habitat areas;

2. modify land clearing plans and evaluate alternative mine plans to minimise or avoid impacts on the conservation-significant, identified species of flora and fauna, vegetation associations and habitat areas;

4. minimise impacts where the proposed mining activities, changes to water flow patterns, or groundwater drawdown are likely to impact on conservation-significant, identified species of flora and fauna, vegetation associations and habitat areas;

5. monitor and record impacts on identified conservation-significant species of flora and fauna, vegetation associations and habitat areas; and

6. implement appropriate contingency plans where impacts on conservation-significant species of flora and fauna, vegetation associations and habitat areas are identified.

6-3 The proponent shall implement the Significant Species Management Plan(s) required by condition 6-2.

6-4 The proponent shall make the Significant Species Management Plan(s) required by condition 6-2 publicly available.

7 Weeds

7-1 The proponent shall not carry out land disturbing activities other than in accordance with a Weed Management Plan to the requirements of the Minister for the Environment on advice of the Department of Environment and the Department of Conservation and Land Management.

The objective of this plan is to control or eradicate both noxious and environmental weeds in the proposal area.

The plan shall:

1. describe the location and area affected for each weed species which occurs in the proposal area;

2. identify any additional weed species which have the potential to occur in the proposal area;

and the plan shall set out procedures and measures to:

3. monitor weed species;

4. control or eradicate weed species;

5. prevent the spread of weed species; and

6. prevent the introduction of any additional weed species.

7-2 The proponent shall implement the Weed Management Plan required by condition 7-1.

8 Subterranean 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 commence surveys for subterranean fauna in accordance with a Subterranean Fauna Survey Programme to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

This Subterranean Fauna Survey Programme shall set out procedures and measures to:

1. survey areas affected by project operations; and

2. survey areas with similar habitats outside the areas to be affected by project operations to establish the conservation significance of fauna within the areas to be affected.

8-2 If the results of the surveys required under Condition 8-1 indicate that there is a risk of loss of subterranean species or communities as a result of project operations, the proponent

shall institute management measures in accordance with a Subterranean Fauna 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. Management measures shall be put in place prior to the commencement of dewatering activities at Cattle Gorge or Nimingarra I.

This Subterranean Fauna Management Plan shall set out procedures and measures to:

1. avoid and/or manage impacts on subterranean fauna species and/or communities and their habitats where the long-term survival of those species and/or communities may be at risk as a result of project operations;

2. monitor the distribution and abundance of species and/or communities of subterranean fauna, groundwater levels, groundwater quality and other relevant aspects of subterranean fauna habitat to ensure that the long-term survival of subterranean fauna species and communities is not compromised as a result of project operations; and

3. take timely remedial action in the event that monitoring indicates that project operations may compromise the long-term survival of subterranean fauna and / or communities.

8-3 Prior to the commencement of dewatering activities at Cattle Gorge or Nimingarra I, the proponent shall implement the Subterranean Fauna Management Plan required by condition
8-2.

8-4 The proponent shall make the Subterranean Fauna Management Plan required by condition 8-2 publicly available.

9 Decommissioning and Final Rehabilitation

9-1 The proponent shall rehabilitate and decommission the new project areas in accordance with the Decommissioning and Rehabilitation Plan in the EPS (May, 2005), or subsequent revisions of the Plan, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Water and Rivers Commission, the Department of Industry and Resources and the Department of Conservation and Land Management.

9-2 The proponent shall review and revise the Decommissioning and Rehabilitation Plan at intervals not exceeding five years, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Water and Rivers Commission, the Department of Industry and Resources and the Department of Conservation and Land Management.
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, current best practice, and the agreed land uses.

Each revision of the Decommissioning and Rehabilitation Plan shall set out procedures and measures to:

1. manage over the long term ground and surface water systems affected by the open pits and waste rock dumps;

2. rehabilitate all disturbed areas to a standard suitable for the agreed end land use(s);

3. backfill the Nim I and Cattle Gorge pits, to at least 5 metres above the pre – mining groundwater table so as to minimise impacts to groundwater quality and subterranean fauna

4. identify contaminated areas, including provision of evidence of notification and propose management measures to relevant statutory authorities; and

5. develop management strategies and/or contingency measures in the event that operational experience and/or monitoring indicate that a closure objective is unlikely to be achieved.

9-3 The proponent shall make revisions of the Decommissioning and Rehabilitation Plan required by condition 9-2 publicly available.

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 may be required to apply for a Works Approval, Licence and/or Registration for this project under the provisions of Part V of the *Environmental Protection Act 1986*.

Schedule 1

The Proposal (Assessment No 1568)

The project is located on several mining tenements between 100 and 170km east of Port Hedland, in the Pilbara Region of Western Australia (Figure 1). The proponent holds the mining lease which is operated in accordance with the *Iron Ore (Goldsworthy) Agreement Act 1964*.

The Goldsworthy iron ore deposits occur as in-situ ores within the Nimingarra Iron Formation and shallow crustal hematite deposits. The proponent proposes to continue mining at Nimingarra and Yarrie and to develop a new mine area at Cattle Gorge. 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 Nimingarra area (Nim I deposit) and Yarrie areas (Y4a, Y7 west, Y10 north deposits) and from the new mine area to be developed at Cattle Gorge;
- 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;
- crushing, loading and transportation of ore, with no increase in train frequencies; and
- the continued use of existing service infrastructure (e.g. workshops and administration areas) at Yarrie.

Significant features of the proposal are:

- continued ore production at the current rate of up to approximately 8.5 mtpa over the remaining life of the mine, with expected closure of the area covered by this proposal by the end of 2007; and
- partial backfilling of Nim I and Cattle Gorge mine pits to at least 5m above the pre – mining water table where mining is proposed to go deeper than the water table.

The key proposal characteristics are shown in Table 1 below.

Table 1 Summary of key proposal characteristics

Proponent	BHP Billiton Pty Ltd (BHPB)
Location	Goldsworthy to Yarrie, 100-170km east of Pt.Hedland, East Pilbara Region
Main activity	Extending existing mines at Yarrie: Y4A and Y10 north
	New mines at Cattle Gorge, Nimingarra: Nim I, and Yarrie: Y7 west
	Production continues unchanged at up to approximately 8.5Mtpa 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. The Nim I and Cattle Gorge pits which are mined to below the water table will be backfilled to at least 5m above the pre – mining water table
	(Previously approved) 11km haul road from Cattle Gorge to the Yarrie processing centre. Other access and haul roads to proposed mine areas, overburden dumps and other infrastructure
	Rehabilitate mined-out areas, completed dumps and redundant roads
	No changes to existing ore crushing and screening facilities, at Yarrie and Nimingarra
	No changes to ore-train loading facilities or train frequency (4 per day average)
	Existing borefield water supplies would continue to be used, supplemented where possible by mine dewatering
Area disturbed	97ha
Power supply	Existing supply, but requiring extension to Cattle Gorge area
Duration	Extends mining operations by 18 months to 2 years up to mid-2007
Employment	Marginal increase to 230 employees, fly-in, fly-out

Figures

Figure 1 –Regional location
Figure 2 - Project location

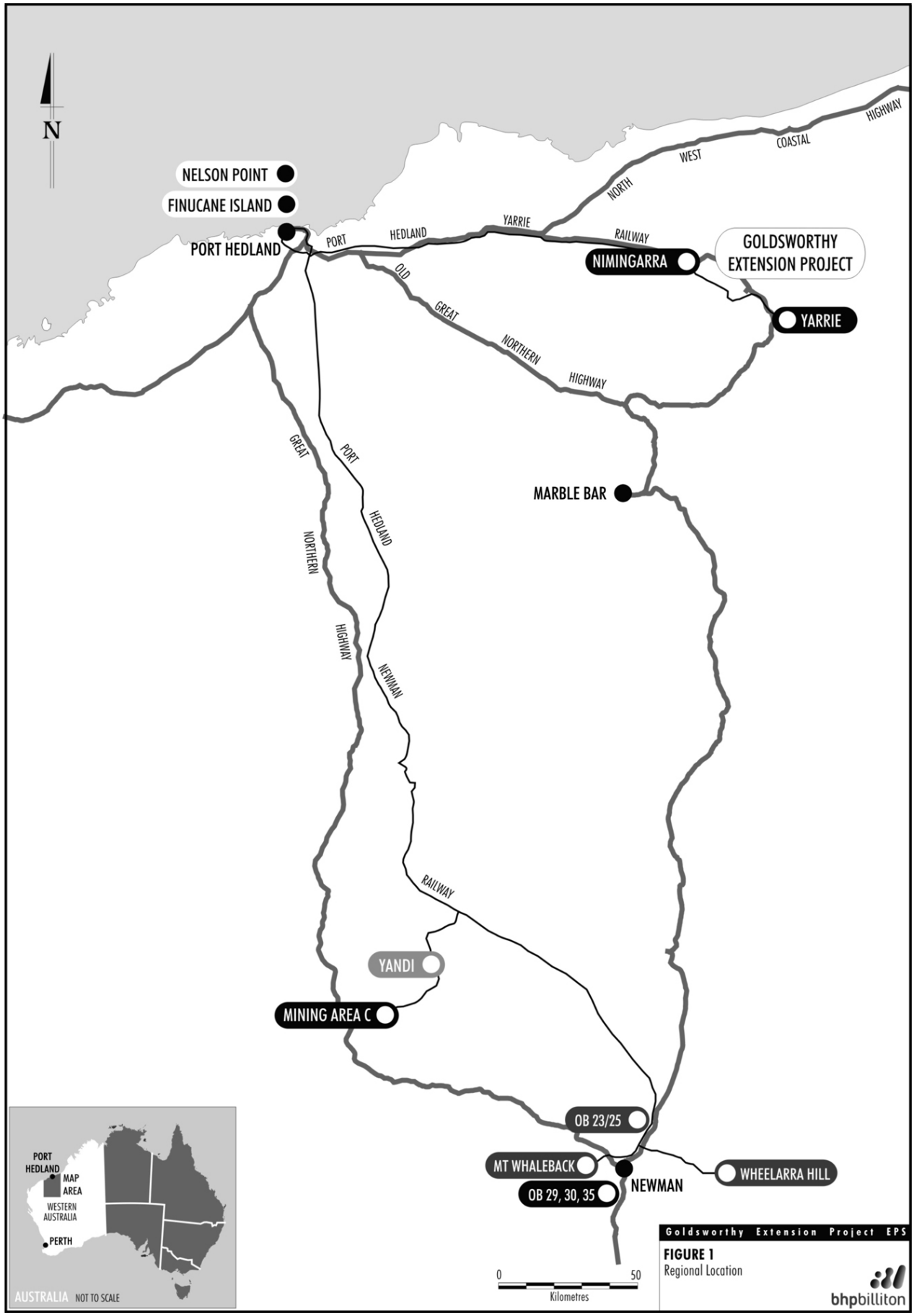

Figure 1: Regional location

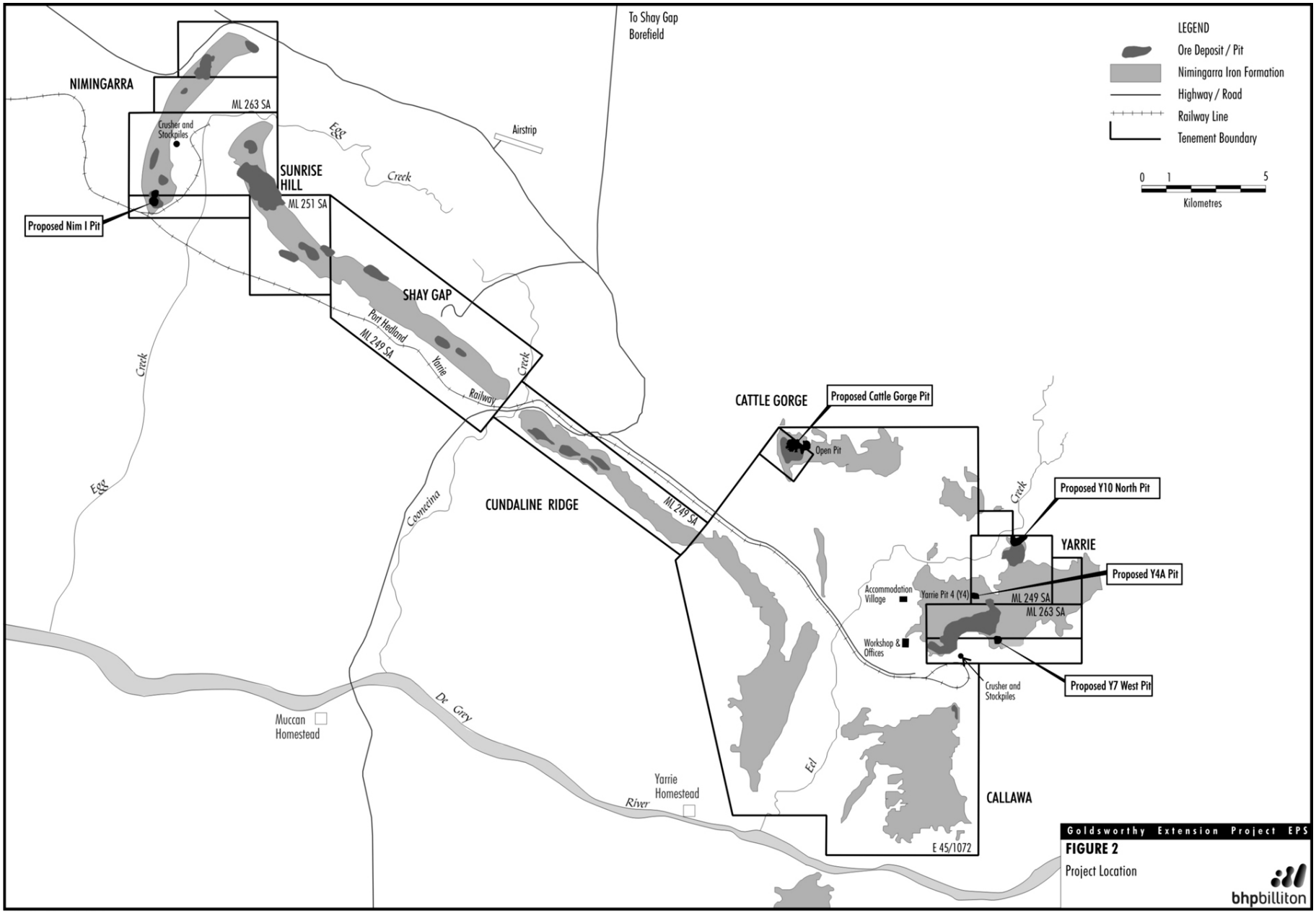

Figure 2: Project location

Schedule 2

Proponent's Environmental Management Commitments

GOLDSWORTHY EXTENSION PROJECT
100-170 KM EAST OF PORT HEDLAND

(Assessment No. 1568)

BHP Billiton Iron Ore Limited

Proposed Environmental Management Commitments

Number	Topic	Objective	Action	Timing	Advice
1	Environmental Management Plan.	Prepare and implement an Environmental Management Plan that describes procedures and practices for protection of key environmental aspects during all phases of mining.	• BHPBIO will implement an Environmental Management Plan for the Project that includes the following: o A description of key components of the Project (ie. mining method, overburden management, ore processing, ore loading and transportation, water and power supply, and service infrastructure). o A description of 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 BHPBIO's most recent Environmental Risk Assessment of the GEP operations. 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. o A description of 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. o For each environmental aspect the Environmental Management Plan will describe the overall management objective, potential impacts, management measures, and monitoring programme to track performance. • 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. • A copy of each new revision of the Environmental Management Plan will be provided to key Stakeholders, and to other interested parties if requested.	Revised at intervals of no more than five years during operations.	DoE DOIR CALM
2	Annual Environmental Report.	Annually prepare reports on environmental management, monitoring and rehabilitation.	• BHPBIO will prepare Annual Environmental Reports (AERs) that discuss environmental management actions, summarise monitoring results and describes rehabilitation activities at the Project over the 12 month reporting period. • The AERs will be made publicly available to key stakeholders and copies will be provided to other interested parties if requested.	Annually during operations.	-
3	Disturbance to Cattle Gorge	To minimise the potential for direct or indirect disturbance to the Cattle Gorge, which is located approximately 400 to 500 m east of the proposed Cattle Gorge mining area.	• BHPBIO will manage its proposed mining activities at the Cattle Gorge mining area to minimise the potential for direct or indirect disturbance to the Cattle Gorge through the implementation of the following measures: o a buffer zone of approximately 400 m will be established between all mining and land disturbance activities at the Cattle Gorge mining area and the Gorge itself. Permission to enter the buffer zone will be restricted to employees and contactors authorised by BHPBIO. o employees and contractors will be made aware of the environmental, heritage and land use values of Cattle Gorge, and their obligations to protect these values, via the Goldsworthy induction programme.	During operations	-