BHP Billiton Iron Ore Pty Ltd

GOLDSWORTHY IRON ORE MINING OPERATIONS

CUNDALINE AND CALLAWA MINING OPERATIONS

REFERRAL DOCUMENT

SEPTEMBER 2008

TABLE OF CONTENTS

Section			Page
1	INTRODUCTION		1
	1.1	BACKGROUND	1
	1.2	PURPOSE OF THE DOCUMENT	1
	1.3	IMPACT ASSESSMENT – QUALITATIVE REVIEW	4
2	PROPONENT AND PROPOSAL DETAILS		6
	2.1	PROPONENT INFORMATION	6
	2.2	PROPOSAL DESCRIPTION	6
3	POTENTIAL ENVIRONMENTAL IMPACTS AND MANAGEMENT		14
	3.1	GENERAL	14
	3.2	LANDFORMS AND MINE CLOSURE	14
	3.3	FLORA AND VEGETATION	16
	3.4	TERRESTRIAL FAUNA	18
		3.4.1 Terrestrial Vertebrate Fauna	18
		3.4.2 Terrestrial Short Range Endemics	20
	3.5	SUBTERRANEAN FAUNA	21
	3.6	WATER RESOURCES	22
		3.6.1 Surface Water	22
		3.6.2 Groundwater	23
	3.7	SOIL RESOURCES	25
	3.8	AIR QUALITY	26
	3.9	NOISE	28
	3.10	ABORIGINAL HERITAGE	29
	3.11	WASTE MANAGEMENT	31
	3.12	DANGEROUS GOODS AND HAZARDOUS MATERIALS	32
4	CONSULTATION		34
5	REFERENCES		35

LIST OF TABLES

Table 1 Cundaline and Callawa Mining Tenements
Table 2 Preliminary Qualitative Risk Evaluation of Environmental Aspects
Table 3 Key Characteristics of the Planned Cundaline and Callawa Mining Operations

LIST OF FIGURES

Figure 1 Regional Location
Figure 2 Project Location and Tenure
Figure 3a Planned Cundaline Mining Operations Conceptual General Arrangement
Figure 3b Planned Callawa Mining Operations Conceptual General Arrangement
Figure 4 Yarrie Operations General Arrangement

PART A – PROPONENT AND PROPOSAL INFORMATION

1 INTRODUCTION

1.1 BACKGROUND

BHP Billiton Iron Ore Pty Ltd (BHPBIO) operates the Goldsworthy Iron Ore Mining Operations (herein referred to as the Goldsworthy operations) which are located approximately 200 kilometres (km) east of Port Hedland in the north of the Pilbara Region of Western Australia (Figure 1).

The development of the Goldsworthy operations has been conducted in phases over the past 50 years. The Mount Goldsworthy mine was the first mining operation and commenced in the mid 1960s. Once it was mined out, the operations were progressively expanded to other Goldsworthy deposits that include the Shay Gap, Nimingarra, Sunrise Hill, Yarrie and Cattle Gorge deposits. Ore processing and rail loading occurs at facilities located at Yarrie and Nimingarra.

The current mining operations are centred at Yarrie, with some mining still taking place at the Nimingarra, Cattle Gorge and Sunrise Hill deposits (Figure 2). The Mount Goldsworthy and Shay Gap mining areas are no longer operational, with the majority of activities at these sites directed towards the monitoring and maintenance of rehabilitated landforms.

BHPBIO's Goldsworthy operations are conducted under the *Iron Ore (Goldsworthy) Agreement Act 1964,* and the *Iron Ore (Goldsworthy-Nimingarra) Agreement Act 1972*. Environmental requirements for the operations are specified in the Goldsworthy Extension Project Notice of Intent (NOI) (GML, 1986), and the conditions of Ministerial Statement's No. 000303 and No. 000682 issued by the Minister for the Environment, issued under Part IV and Licences 5561 and 4412 issued under Part V of the *Environmental Protection Act, 1986* (EP Act), respectively.

BHPBIO's exploration programmme has identified iron ore deposits at the Cundaline and Callawa ridgelines (Figure 2). The deposits are located within existing BHPBIO mining leases shown below in Table 1.

Table 1
Cundaline and Callawa Mining Tenements

Mine	Mining Tenement
Cundaline	M249SA Sec4
Callawa	ML45/594 ML45/558 ML45/1016

1.2 PURPOSE OF THE DOCUMENT

This document has been prepared to accompany a referral to be submitted in accordance with Section 38(1) of the *Environmental Protection Act, 1986* (EP Act) for the planned Cundaline and Callawa mining operations. It provides information about the existing environment of the area, potential impacts of the proposal and management measures to be implemented to minimise and mitigate potential impacts. This information is considered by the proponent to be relevant in assisting the Environmental Protection Authority (EPA) to decide whether or not to assess the proposal, and, if the proposal is to be assessed, the level at which the environmental impact assessment (EIA) is to be conducted.

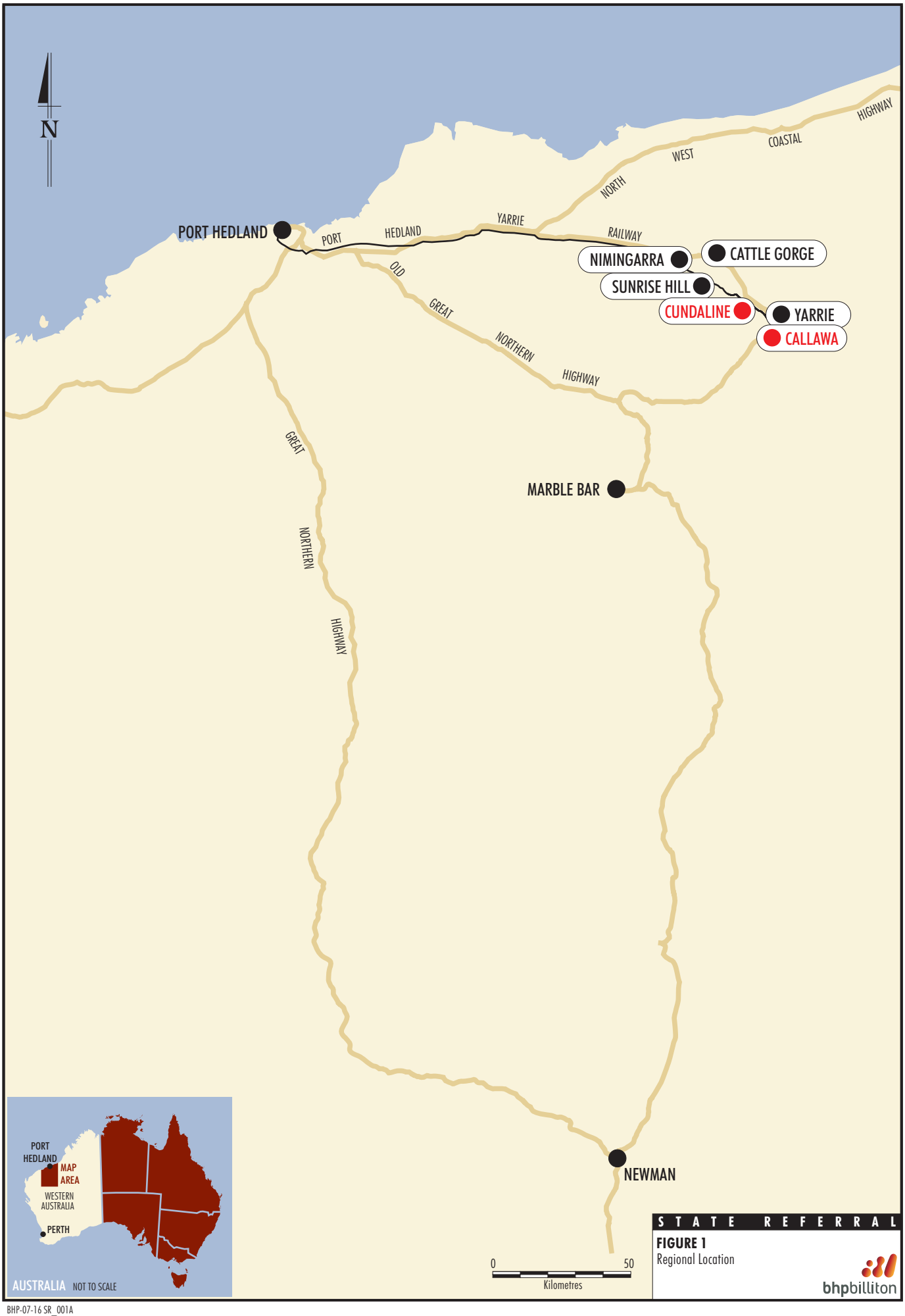

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FIGURE 1
Regional Location

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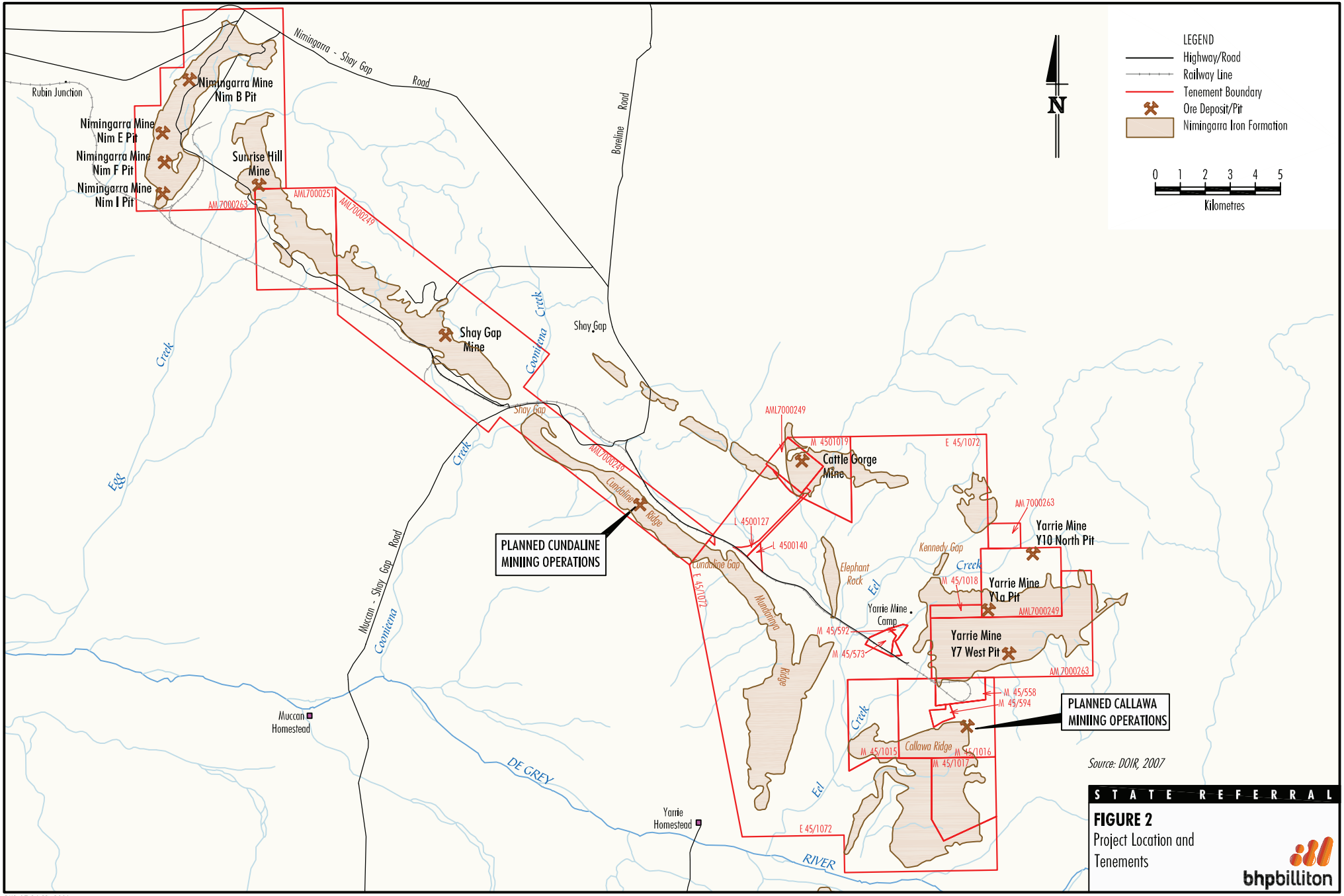

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FIGURE 2
Project Location and
Tenements

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In accordance with the requirements stated in the EPA's Referral Form, the information provided in this document is based on information known to the proponent. This document provides the overall proposed project concepts. Project characteristics may be subject to change as more detailed project planning is conducted.

Based on BHPBIO's preliminary risk assessment and evaluation of potential environmental impacts, it is considered that the planned Cundaline and Callawa mining operations could potentially be assessed and approved under the EP Act at the level of Environmental Protection Statement (EPS). BHPBIO has previously used the EPS approval route at Goldsworthy for a similar scale project (i.e. the 2005 proposal to develop satellite operations at Cattle Gorge, Yarrie and Nimingarra) (BHPBIO, 2005a).

In parallel or following the EP Act approval process, BHPBIO would also lodge the necessary approval documentation with the relevant administering agencies under the State Agreement Act (ie. mining proposal), *Mining Act, 1978* (ie. Mining Proposal), *Aboriginal Heritage Act, 1972* (Section 18 approvals), and any other relevant legislation.

On the 21 May 2008, BHPBIO referred the planned Callawa and Cundaline mining operations to the Commonwealth Department of the Environment, Heritage and Water Resources (DEWHA) under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). DEWHA evaluated the referral and on 27 June 2008, notified BHPBIO that the proposal was not a controlled action.

1.3 IMPACT ASSESSMENT – QUALITATIVE REVIEW

BHPBIO has conducted a preliminary and qualitative assessment of environmental factors and potential risks relevant to the proposed Callawa and Cundaline mining operations. The risk-based assessment was conducted at the referral stage to enable the environmental impact assessment to focus on key factors of relevance to the proposal. The factors relevant to the proposal were identified based on BHPBIO's operational experience at Goldsworthy, the results of environmental studies and monitoring in the region, the findings of previous EIAs, and consultation with Government stakeholders.

The assessment identified that as a minimum, the 13 factors covered in the existing Goldsworthy Environmental Management Plan (EMP) (BHPBIO, 2005b), plus mine closure, should be evaluated and the relevant parts of the existing Goldsworthy EMP and Decomissioning and Rehabilitation Plan (DRP) (BHPBIO, 2005c) be updated to accommodate the proposed new mining areas. The review also identified that as a result of recent project approvals elsewhere in the Pilbara and EPA policy developments since 2006, Short Range Endemic (SRE) fauna should be added as a subset of 'Fauna', and 'Stygofauna' should be expanded to become Subterranean Fauna, which would encompass both stygofauna and troglofauna.

The preliminary evaluation used a three level hierarchy (ie. low, medium and high) to classify each factor in terms of potential risk. Table 2 lists the factors and their categories. As indicated in the table, no factors were classified as high risk, and only four were classified as having medium risk.

Table 2
Preliminary Qualitative Risk Evaluation of Environmental Factors

Medium Risk	Low Risk
▪ landforms and mine closure ▪ vegetation and flora ▪ terrestrial fauna (including SRE fauna) ▪ subterranean fauna (inc. stygofauna and troglofauna)	▪ surface water ▪ groundwater ▪ soil resources ▪ air quality ▪ greenhouse gas ▪ noise ▪ Aboriginal heritage ▪ waste management ▪ dangerous goods and hazardous materials

Whilst it is considered likely that the potential impacts on these four 'medium' factors will be able to be readily managed, it is possible that some adjustments to existing management controls contained in the Goldsworthy EMP will be required to accommodate the particular site characteristics of the Cundlaline and Callawa sites. These four factors are therefore considered to be key factors for the EIA of the proposed Callawa and Cundaline mining operations. This emphasis however, would be subject to review during the preparation of the EIA documentation, and would be based on the findings of the specialist surveys and assessments, comments received during the stakeholder consultation programme, BHPBIOs mine planning and feasibility assessments, and the EPA's assessment of the proposal under Part IV of the EP Act.

It is considered likely that the EIA will be able to conclude that potential impacts on the factors rated as 'low' risk would be able to be managed using the existing management controls contained in the Goldsworthy EMP.

The EIA documentation would describe how environmental risks associated with the proposed Callawa and Cundaline mining operations would be managed to minimise the likelihood of an environmental hazard occurring, and minimise the impact of an environmental hazard should it occur.

2 PROPONENT AND PROPOSAL DETAILS

2.1 PROPONENT INFORMATION

The proponent of this proposal is:

BHP Billiton Iron Ore Pty Ltd
Level 7, 225 St Georges Terrace
PERTH WA 6000.

The key contact for this proposal is:

Mr Gavin Price
Ph 08 6224 4024
Fax 08 6224 4593
Email: Gavin.H.Price@bhpbilliton.com

2.2 PROPOSAL DESCRIPTION

The Cundaline and Callawa deposits would be developed as satellite mining operations and would use the Goldsworthy operations' infrastructure and facilities as far as practicable.

Major components of mining infrastructure and activities associated with the Cundaline and Callawa mining operations include:

- pre-stripping, open pit mining and stockpiling of overburden and ore at the Cundaline and Callawa pits;
- placement of overburden in mined-out voids and out-of-pit overburden stockpile areas (OSAs) adjacent to the Cundaline and Callawa pits;
- trucking of the Callawa ore to the Yarrie crushing, screening and rail loading facilities, which are located approximately 2 km to the north;
- trucking of the Cundaline ore to the Yarrie crushing, screening and rail loading facilities, which are located approximately 12 km to the south-east, or use of a mobile crushing and screening plant to be located at the Cundaline area;
- stockpiling, crushing, screening and load-up of iron ore at the Yarrie processing facilities and/or the mobile Cundaline facilities;
- continued groundwater abstraction from the Shay Gap Wellfield to meet operational demands, and distribution through the existing water supply system and pipeline extensions to the Cundaline and Callawa areas;
- construction and use of small day rooms, workshop facilities and storage areas at the Cundaline and Callawa areas;
- supply of power to the facilities at the Cundaline and Callawa areas either via connecting electricity lines from the existing power network, or use of on-site diesel generators;
- construction and use of haul and access roads to the Cundaline and Callawa areas; and
- mine closure and rehabilitation of areas disturbed as part of the Cundaline and Callawa project.

The general arrangements of the Cundaline and Callawa mining operations are shown on Figures 3a and 3b, respectively. The open pits, stockpiles, roads and OSAs shown are based on the current mine plan. As the mining operation progresses the final designs will be refined using updated planning information and operational experience, consequently some adjustments to general arrangement may occur. For example, more overburden may be placed in the pits than currently envisaged (in which case the size of the OSAs may be reduced), or a lower batter angle may be used on the final OSAs in order to achieve a better rehabilitation outcome (in which case the OSAs may occupy a larger area). In order to allow for this eventuality, a maximum disturbance boundary has been included, which defines the maximum area in which the proposed operations would occur.

Table 3 provides the likely key characteristics of the planned Cundaline and Callawa mining operations.

Table 3
Key Characteristics of the Planned Cundaline and Callawa Mining Operations

Aspect	Description
Proponent	BHP Billiton Iron Ore Pty Ltd, 225 St Georges Terrace, PERTH, WA 6000
Mine Life	2009 - 2016
Planned Production	5.6 Mt (Cundaline) and 4 Mt (Callawa).
Production Rate	Up to 5 Mtpa.
Total Overburden	11 Mt (Cundaline) and 17 Mt (Callawa).
Land Disturbance Area	Approximately 350 to 400 ha.
Ore Crushing and Screening	Crushing and screening of the Callawa ore would be undertaken at the Yarrie processing facilities. Crushing and screening of the Cundaline ore would either be undertaken at the Yarrie processing facilities, or at a mobile crushing and screening plant to be located at the Cundaline deposit.
Overburden Storage	Placement in OSAs to the north of the Cundaline pits and to the east of the Callawa pits.
Water Supply	Continued groundwater abstraction from the Shay Gap Wellfield to meet operational demands, and distribution through the existing water supply system and pipeline extensions.
Employment	Approximately 140 - 150 operational personnel.
Power Demand and Supply	Electricity requirements would be provided by either extending the existing 22 kV electricity line from the Yarrie Mine, or by diesel-fuelled generator sets located on-site.
Ore Transport	Ore would either be transported from the Cundaline and Callawa deposits to the Yarrie processing facilities via trucks, then railed from the Yarrie processing facilities to Port Hedland via the existing rail line, or directly loaded onto trains from Cundaline.
Off-site Transport of Ore	Use of existing rail facilities, with approximately one train per day (on average). Each train would consist of approximately 60 wagons, each carrying up to 80 t, and a total train capacity of approximately 4,800 t.

Mining Description

The mining method employed at the planned Cundaline and Callawa mining operations would involve the selective removal of vegetation, soil and overburden, followed by the mining of ore and waste rock using conventional drill, blast and haul mining methods. Mining would be undertaken in benches. Following drilling and blasting, broken ore and waste rock would be loaded by hydraulic excavators or front-end loaders to off-highway dump trucks for transport to the Yarrie crushing/screening facilities and/or temporary stockpiles or OSAs.

Mining operations would be conducted 24 hours per day, seven days per week.

Mining below the water table is not expected to be required for the Cundaline or Callawa pits, therefore no pit dewatering is expected to be necessary.

Ore Processing

Ore mined from the Callawa deposit would be hauled to Yarrie for processing in the crushing and screening plant. The ore would then be stockpiled in the existing ore stockpiling areas, from where it would be placed into the train loader using front-end loaders. The ore would be transported from the Yarrie processing facilities to Port Hedland via the existing railway line.

Ore mined from the Cundaline deposit would either be trucked to the Yarrie processing facilities for processing, or it would be processed in a mobile crushing and screening plant located on-site, and then loaded onto trains to the immediate north of the Cundaline deposit for transport to Port Hedland via the existing rail line.

Ore Transport

Mined ore would be hauled to the Yarrie crushing and processing facilities via upgraded existing haul roads and new access roads into the Cundaline and Callawa areas. A fleet of road trains would be used to transport the ore. Based on a processing rate of 2 Mtpa, a fleet of three road trains would operate on day shift and would transport of ore from the Cundaline deposit (approximately 18 loads per day) and Callawa (approximately 6 loads per day). At an ore processing rate of 5 Mtpa the number of trips would increase by 2.5 times. To accommodate this an additional truck would be used, and the haulage operation would be conducted 24 hours per day.

Crushed ore would be loaded onto trains from the ore stockpiles to the immediate north of the Cundaline deposit (i.e. for the Cundaline processing option) for transport to Port Hedland. Crushed ore is also hauled to the ore stockpiles located adjacent to the Yarrie train loading facility for transport to Port Hedland (i.e. both Cundaline and Yarrie processing options).

Up to three trains per day would be required to transport crushed ore to Port Hedland, comprising 60 ore cars (each ore car having an 80 t capacity).

Overburden Management

BHPBIO would manage overburden in the mining areas to maximise the infilling of pits and minimise out-of-pit dumping. The approximate location of OSAs is shown on Figures 3a and 3b.

Sediment control measures would be designed and implemented downstream of the OSAs and other disturbance areas occurring in the mining areas, as required in order to minimise the potential for erosive sheet flow and/or the development of gullies, as well as sedimentation in downstream watercourses.

Exploration drilling undertaken in the proposed mining areas has not intersected any potentially acid forming material to date. As a result, none of the overburden that is to be mined in the proposed new pits is expected to be acid forming. Despite the low risk of potentially acid forming materials being encountered, BHPBIO would continue to conduct routine monitoring of blast holes, including sulphur analysis during the Cundaline and Callawa mining operations. In the unlikely event that potentially acid generating material is encountered, suitable management measures similar to existing operations would be developed and implemented in consultation with the administering authorities.

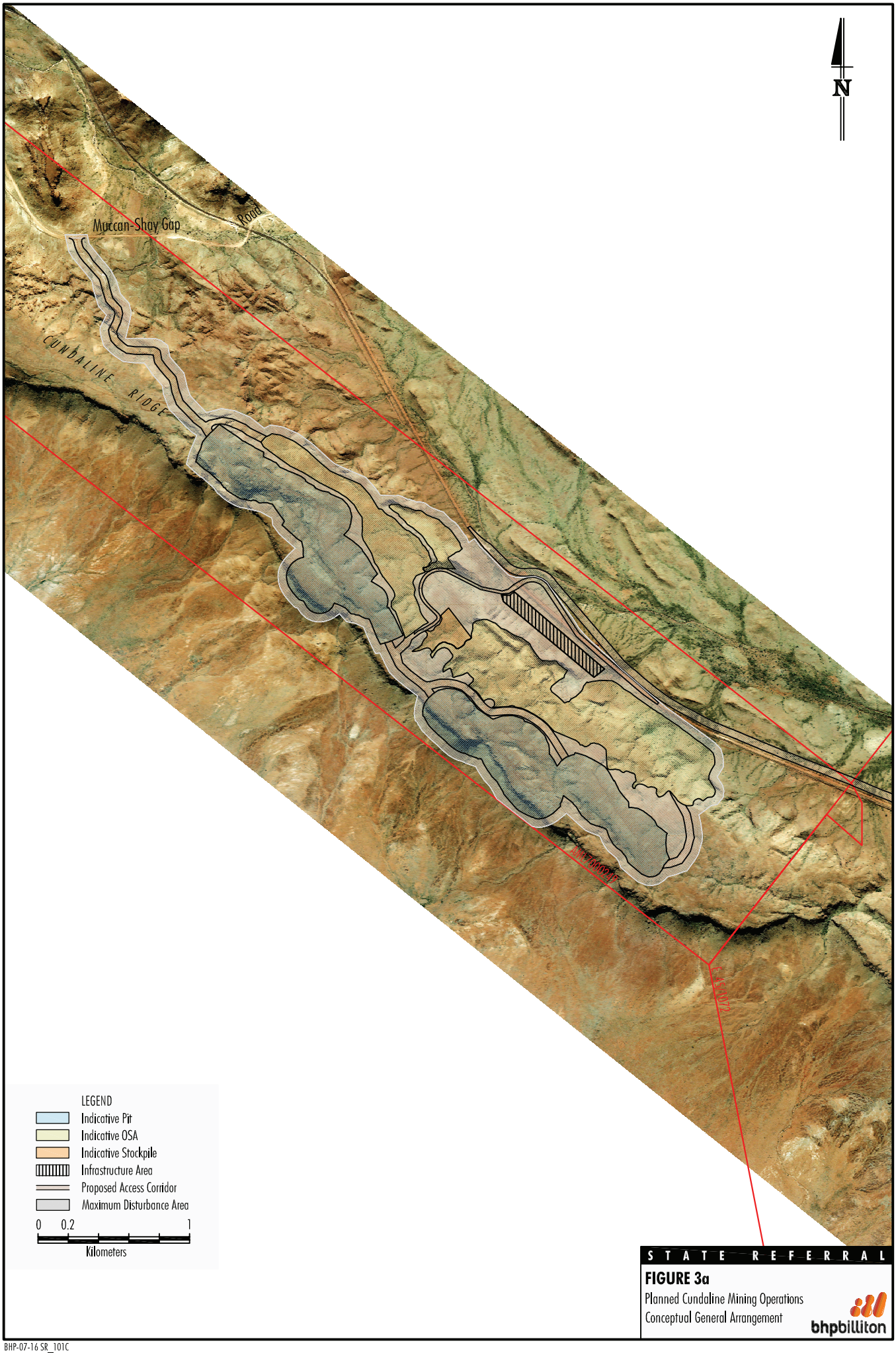

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FIGURE 3a

Planned Cundaline Mining Operations
Conceptual General Arrangement

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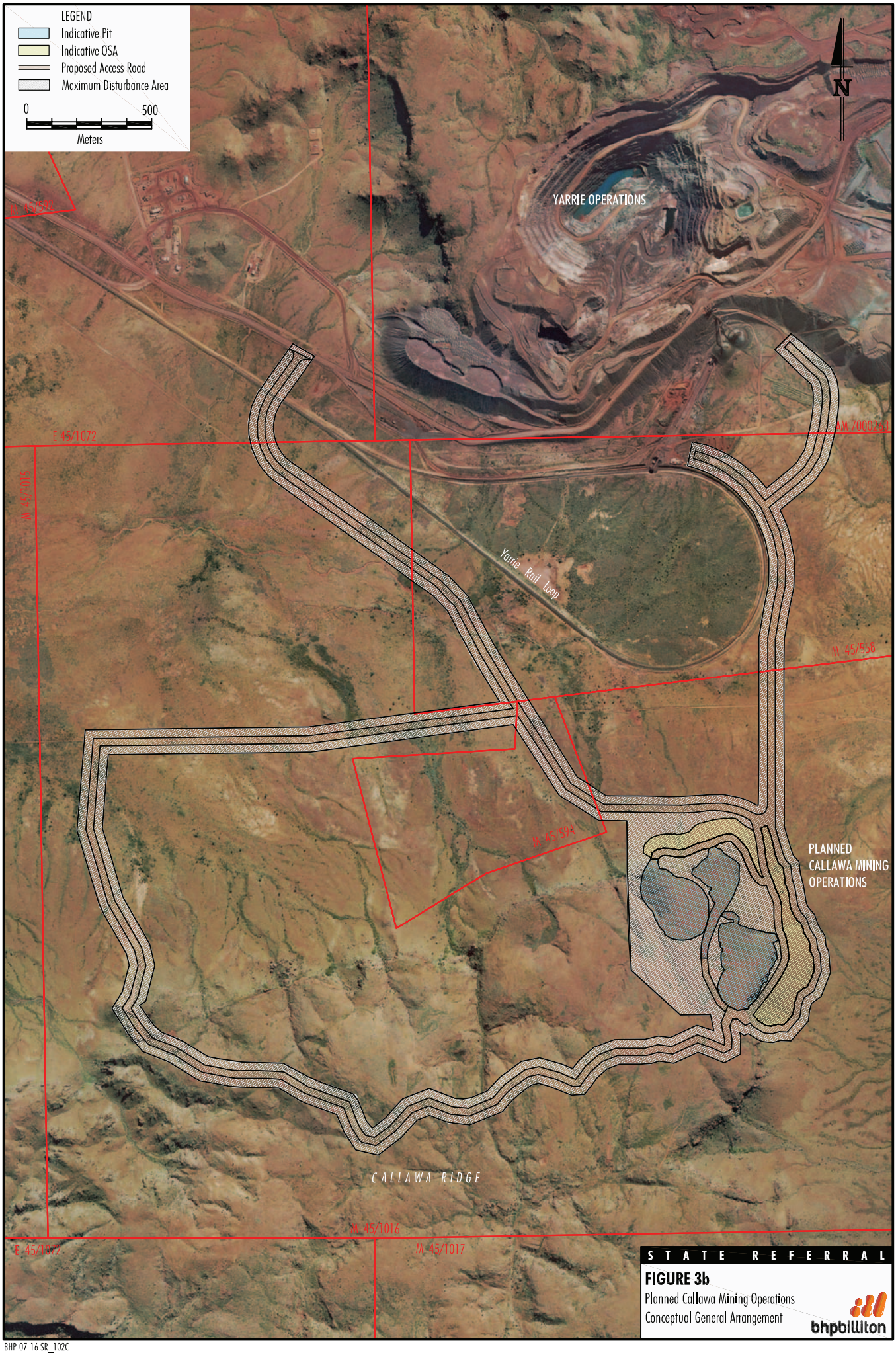

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FIGURE 3b

Planned Callawa Mining Operations
Conceptual General Arrangement

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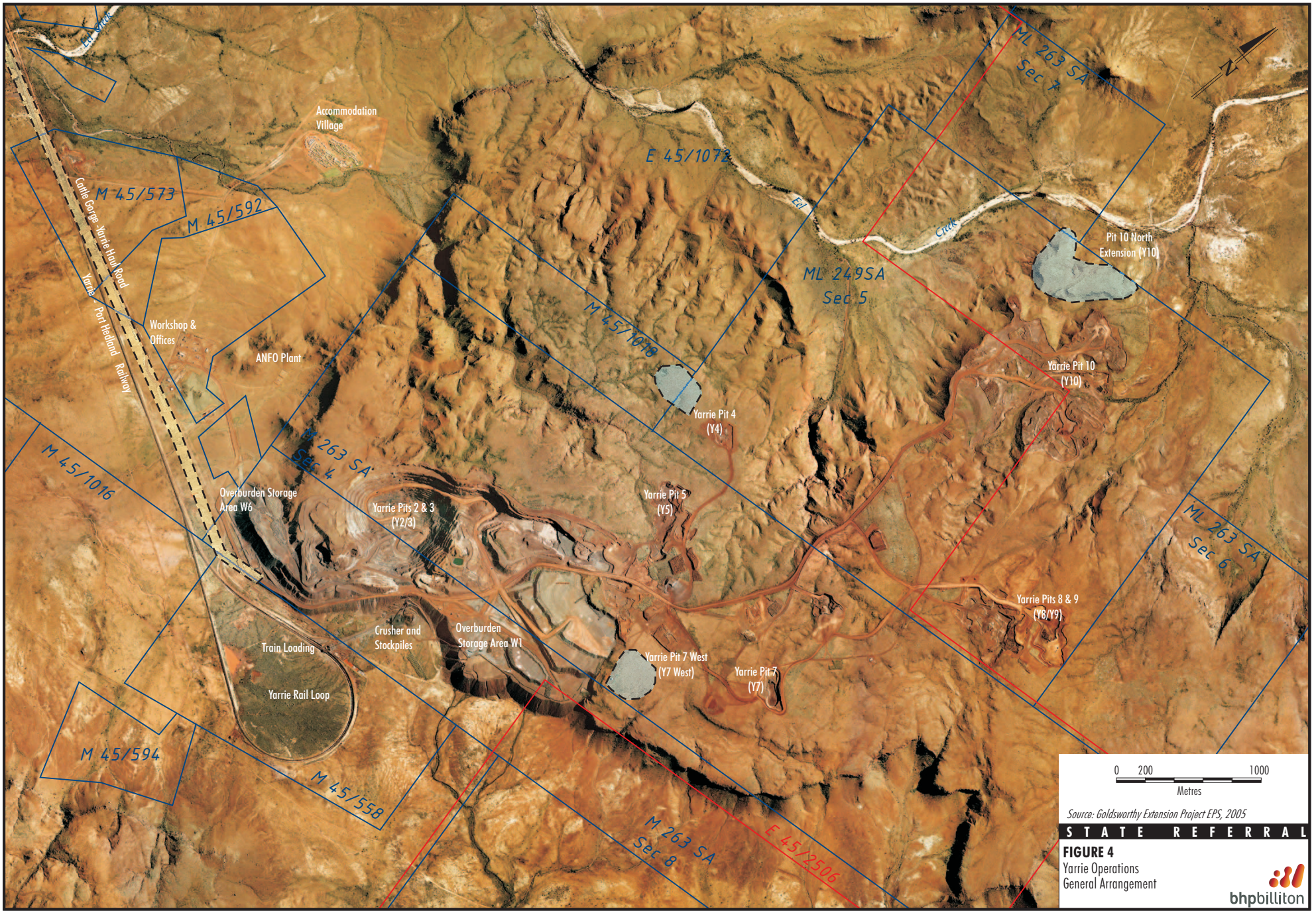
Ancillary Infrastructure

The Cundaline and Callawa mining operations would use existing administration facilities, main workshops, waste facilities and storage areas (i.e. explosives, fuel, oil and ore stockpiles) at the Yarrie operations (Figure 4). No major upgrades to these facilities or additional infrastructure would be required for the Yarrie operations. Personnel working at the Cundaline and Callawa areas would make use of the Yarrie accommodation village and aerodrome.

Infrastructure located at the Cundaline area would include an office, toilet facilities, crib room, fuel storage, refuelling facilities and a turkey's nest dam. The infrastructure at the Callawa area would consist of an office, toilet facilities, crib room and a turkey's nest dam.

Water would be supplied to the Cundaline and Callawa areas via new connecting pipelines constructed from the existing water supply network. Water would be sourced from the Shay Gap Wellfield and would not exceed the current licensed allocation.

An electricity transmission line would be constructed to the Cundaline area from the existing electricity transmission line at the Yarrie operations or diesel-fuelled generators would be set up at the Cundaline area. Power would be supplied to the Callawa area via an electricity transmission line extension from the existing power supply or diesel-fuelled generators would be set up at the Callawa area.



Source: Goldsworthy Extension Project EPS, 2005

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FIGURE 4
Yarrie Operations
General Arrangement

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PART B - ENVIRONMENTAL IMPACTS AND MANAGEMENT COMMITMENTS

3 POTENTIAL ENVIRONMENTAL IMPACTS AND MANAGEMENT

3.1 GENERAL

The following sections provide an overview of the environmental values and potential environmental impacts which would be relevant to the planned Cundaline and Callawa mining operations. Environmental aspects of relevance to the planned operations have been identified through the preliminary risk-based assessment and are listed in Table 2 in Section 1.3.

A summary of the environmental objectives, potential impacts and proposed environmental management measures for the relevant aspects is presented in Sections 3.2 to 3.13.

Details of the management measures currently implemented at the Goldsworthy operations are contained in the Goldsworthy environmental management plans, available at:

> www.bhpbilliton.com/bb/ourBusinesses/ironOre/healthSafetyAndEnvironment/lifeOfMineManagementPlans.jsp

These plans would be reviewed and revised to include the planned Callawa and Cundaline mining operations.

3.2 LANDFORMS AND MINE CLOSURE

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Medium***

Existing Environment

The landforms of the Goldsworthy area are dominated by rocky ridges and plateaus, separated by the wide plains and floodplains of the De Grey River and its tributaries. To the north-east is the predominantly flat expanse of the Great Sandy Desert. The ridges and plateaus of the Goldsworthy area typically rise sharply from the surrounding plains, and in many areas cliffs and steep escarpments up 100 m in height have formed. Scree slopes typically form below the escarpments, and areas of the ridges and plateaus are heavily dissected with steep V-shaped valleys, gorges and dendritic drainage patterns.

The Goldsworthy operations have altered the natural landforms at Nimingarra, Sunrise Hill, Shay Gap, Cattle Gorge and Yarrie through the creation of mine voids and OSAs. The majority of the pits have been mined into the top surface of the ridges and plateaus (i.e. rather than being mined from the side). As a result, in most cases they are not visible from the surrounding plains, and can only be clearly seen when on the ridge itself or from the air.

The OSAs at the Goldsworthy operations have generally been constructed near to the pits by placing overburden over the edge of the natural escarpments. These OSAs are therefore much more visible than the pits. Notwithstanding, the OSAs have been designed and rehabilitated to have similar shapes to the naturally occurring scree slopes, and in most cases blend in with the pre-mining topography (particularly where revegetation of the area is advanced).

The land types predominantly associated with the Cundaline and Callawa areas (Van Vreeswyk *et al.*, 2004) include:

- Land Type 1 - “Hills and Ranges with Spinifex Grasslands”;
- Land Type 3 - “Plateaux, Mesas and Breakaways with Spinifex Grasslands”;
- Land Type 8 – “Stony Plains with Spinifex Grasslands”; and
- Land Type 13 – “Alluvial Plains with Soft Spinifex Grasslands”.

Potential Impacts

Potential visual impacts from the planned Cundaline and Callawa mining operations would be predominantly associated with the development of the open pits (including the removal of small portions of the southern face of the Cundaline Ridge) and construction of OSAs.

Changes to existing landforms would also occur as a result of cut and fill works associated with service infrastructure (i.e. general access, extension to existing haul roads and the haul roads linking the planned Cundaline and Callawa mining operations to the Yarrie crusher).

Management Objectives

To maintain the integrity, ecological function and environmental values of landforms.

To minimise the impact of mining operations so that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable.

Rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values.

Maintain and protect any significant geoheritage and landscape values.

Management Measures

An assessment of visual impacts would be conducted for the planned Cundaline and Callawa mining operations.

Measures used to minimise the impact of the existing operations on visual amenity are described in the Goldsworthy EMP. These measures are summarised below:

- New OSAs would be located in existing valleys and as extensions to existing ridges and plateaus, rather than new stand alone emplacements on the surrounding valleys and plains.
- New OSAs would be rehabilitated so that they generally blend in and have shapes that are compatible with the surrounding landforms.
- Where possible, the location and layout of infrastructure areas and mine landforms would be designed in a manner such that environmental impacts (including potential changes to existing landforms and drainage channels) are kept to a minimum.
- Suitable erosion and sedimentation control measures would be designed and implemented downstream of OSAs and other disturbance areas as required in order to minimise the potential for erosive sheet flow and/or the development of gullies, as well as sedimentation in downstream watercourses.

- Mine infrastructure areas (e.g. access tracks, borrow pits, topsoil stockpiles, buildings etc.) that are no longer required would be decommissioned, and the disturbed area re-contoured to blend with the surrounding topography, topsoiled, contour ripped (or equivalent) in preparation for seeding with native species as necessary.
- visual screens would be constructed where necessary using vegetation and/or earth and rock bunds;
- general housekeeping (e.g. storage of waste in appropriate facilities) would be undertaken.

The Goldsworthy EMP and DRP would be updated as necessary to include the planned Cundaline and Callawa mining operations. These plans provide further detail of the rehabilitation principles that would be implemented for the planned Cundaline and Callawa mining operations to minimise impacts on landforms and associated impacts to visual amenity.

3.3 FLORA AND VEGETATION

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Medium***

Existing Environment

A flora and vegetation survey was conducted during May and June 2005, in the wider area surrounding the Cundaline and Callawa deposits (*ecologia*, 2005a and 2005b).

Vegetation types within the Cundaline and Callawa areas have been mapped by *ecologia* (2005a and 2005b), and predominately consist of shrublands with patches of woodland and forest.

The soil resources on the ridges and plateaus are generally limited to very thin, poorly developed skeletal soils in between rocky outcrops. Thus, species and associations on the hills and slopes, particularly of flora and vegetation, tend to be correlated with geological conditions rather than soil type (Beard, 1975).

Targeted searches for declared rare and threatened or priority flora species and communities have also been conducted by *ecologia* (2005a and 2005b), however none were recorded during the surveys. Additional flora survey works were also conducted by ENV Australia in March 2008. The report documenting the survey findings would be attached to the assessment of flora and vegetation impacts that would be conducted for the planned Cundaline and Callawa mining operations.

In addition to the above, the DEC database has been reviewed and no declared rare and threatened or priority flora species or communities occur within the Cundaline and Callawa areas.

Potential Impacts

The main potential impacts of the planned Cundaline and Callawa mining operations on flora would be through the direct loss of vegetation due to the proposed additional land clearing required for the development of the mining areas and OSAs. Other potential impacts could arise from dust deposition on vegetation in adjoining undisturbed areas, the spread of weed species, and potential changes to the frequency and/or intensity of bushfires.

Management Objective

To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities through the avoidance or management of adverse impacts and improvement in knowledge.

Protect Declared Rare Flora consistent with the provisions of the *Wildlife Conservation Act, 1950*.

Protect other flora species of conservation significance.

Mitigation Measures

BHPBIO's overall principles for managing the potential impacts of its Pilbara operations on flora are documented in its *Land Management Manual* (BHPBIO, 2003a) and include the following:

- baseline surveys should be undertaken at each mining operation prior to land disturbance; and
- land clearing should be minimised.

These overriding principles would be applied at the planned Cundaline and Callawa mining operations through the implementation of specific management strategies, as summarised below:

- Pits and OSAs would be designed to limit land clearing to the practicable minimum. This would be achieved through the consideration of mine sequencing across the whole lease (i.e. use of mined out scree and hard rock deposits for overburden disposal rather than clearing new areas).
- Vehicles and machinery would be parked only in designated locations and off-road recreational activities would be prohibited.
- Dust control measures such as road watering, use of sprays on the main ore transfer points, and progressive rehabilitation of disturbed areas would be used to minimise dust generation from the site.
- Where possible planned clearing boundaries would be adjusted to avoid disturbance to known significant flora/fauna species, vegetation associations and/or habitat areas.
- Where it is not practicable to avoid known significant flora/fauna species, vegetation associations and/or habitat areas, BHPBIO would consult with DEC regarding the proposed land disturbance.

Management measures that would be undertaken at the planned Cundaline and Callawa mining operations to minimise the potential for the spread of weed species are listed below.

- Areas of known weed infestation would be shown on mine plans and marked on the ground in order to minimise the potential for inadvertent access and spread of weeds.
- Mobile machinery and equipment would be cleaned on a regular basis, with particular attention being given to machinery that operates in areas of known weed infestation.
- Topsoil that is stripped from areas known to be infested with weeds would be treated before use.
- Regular inspections for the presence of weeds within areas of disturbance would be conducted.

While fire is accepted to be a part of the natural Pilbara landscape, BHPBIO would implement several control measures at the Cundaline and Callawa areas to minimise the potential for significant anthropogenic changes to the local fire regime. These would include the following:

- Fire hazard awareness and management training would be provided to BHPBIO personnel and contractors.
- Fire-fighting equipment would be provided in work areas according to fire hazard.
- Fire-fighting equipment would be regularly inspected and maintained.
- Where necessary, controlled burns would be conducted in consultation with relevant government agencies in order to reduce local fuel loads
- Fire breaks surrounding the electricity transmission line and dewatering pipeline would be graded as required.

The management measures summarised above are documented in the Goldsworthy EMP, Significant Species Management Plan (SSMP) and Weed Management Plan (WMP). These management measures would be implemented for the planned Cundaline and Callawa mining operations in order to minimise potential impacts to flora.

3.4 TERRESTRIAL FAUNA

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Medium***

3.4.1 Terrestrial Vertebrate Fauna

Existing Environment

A fauna survey was conducted during May and June 2005, in the wider area surrounding the Cundaline and Callawa deposits (*ecologia*, 2005a and 2005b). The broad type of fauna habitats which were recorded are:

- ridgetop;
- minor channel/drainage line;
- hill top/slope;
- gorge/major drainage channel; and
- scree slope.

The surveys included systematic sampling, opportunistic sampling and targeted searches for fauna species of conservation significance.

The following fauna of conservation significance were recorded in this survey:

- One threatened bird species (i.e. Rainbow Bee-eater [*Merops ornatus*]) and two Priority listed bird species (i.e. Peregrine Falcon [*Falco peregrinus*] and Australian Bustard [*Ardeotis australis*]).
- One threatened reptile (i.e. Pilbara Olive Python [*Liasis olivaceus barroni*]).
- Two threatened mammals (i.e. Pilbara Leaf-nosed Bat [*Rhinonicteris aurantius*], and Northern Quoll [*Dasyurus halucatus*]) and two Priority listed mammals (i.e. Ghost Bat [*Macroderma gigas*] and Western Pebble-mound Mouse [*Pseudomys champani*]).

Some records of these species were from habitat inside the proposed disturbance areas and some were from habitat which is outside proposed disturbance areas.

Many of these species (including the Pilbara Olive Python, Pilbara Leaf-nosed Bat and Northern Quoll) were previously recorded during surveys for the Goldsworthy operations (*ecologia*, 2005c).

In addition to the above, the DEC database has been reviewed and no records, additional to those recorded for the Goldsworthy operations, occur within the Cundaline and Callawa areas.

Potential Impacts

The additional disturbance associated with the development of the Cundaline and Callawa mining operations has the potential to impact local fauna through direct impacts during land clearing (i.e. fauna mortalities) and through the loss of fauna habitat. More mobile fauna species such as birds, macropods and larger lizards are considered likely to move away from disturbed areas into adjoining areas of similar habitat, however, the development of the Cundaline and Callawa areas has the potential to result in impacts on local populations of less mobile species.

There is the potential for feral animals to be attracted to the Cundaline and Callawa areas by the creation of new habitat opportunities (e.g. stockpiled timber and/or rocks from cleared mine and OSA areas), discarded food scraps and other rubbish. These factors could result in an increase in the population or the introduction of new feral species in and around the proposed mining areas. The proposed additional land clearing would also have the potential to leave native fauna more exposed to predation (particularly by feral fauna).

Management Objective

To maintain the abundance, species diversity, geographic distribution and productivity of terrestrial fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

Management Measures

BHPBIO's overall guiding principles for managing the potential impacts of its Pilbara operations on fauna are documented in its *Land Management Manual* (BHPBIO, 2003a) and include the following:

- baseline fauna assessments should be undertaken at each mining operation prior to land disturbance;
- land clearing should be minimised;
- fauna monitoring sites should be established during operations; and
- the return of fauna to rehabilitated areas should be promoted.

These overriding principles would be applied to the planned Cundaline and Callawa mining operations through the implementation of site-specific management strategies, which are summarised below:

- The disturbance footprint of mining areas and OSAs would be designed to limit land clearing to the practicable minimum.
- Vehicles and machinery would be parked only in designated locations and off-road recreational activities would be prohibited.

- The environmental component of the site induction would be used to raise workforce awareness of local fauna specifies of interest and relevant conservation issues.
- Domestic animals would be prohibited on site and a clean, rubbish-free environment would be maintained across the site to minimise the potential for colonisation by feral animals.
- Firearms will be prohibited on site, except where they are to be used by suitably trained and authorised personnel to control declared pest species pursuant to the *Agriculture and Related Resources Protection Act, 1976*.
- The capture of fauna will be prohibited except where required for baseline surveys.

An additional fauna assessment was conducted by Outback Ecology in July 2008. The assessment findings would be documented in the assessment of fauna impacts that would be conducted for the planned Cundaline and Callawa mining operations.

A Management Plan for Bat Species has also been prepared for the Goldsworthy operations which provided species specific management measures for the Pilbara Leaf-nosed Bat (*Rhinonicteris aurantius*) and Ghost Bat (*Macroderma gigas*).

The Management Plan for Bat Species also describes monitoring to be undertaken at the surrounding Goldsworthy operations, including monitoring of one cave south of the Callawa deposit (*ecologia*, 2005d, 2006a, b and c, 2007; ENV Australia, 2007). Several records of both Pilbara Leaf-nosed Bats and Ghost Bats have been made at the Callawa cave since monitoring began in 2005 (*ibid.*). As described in Section 1.2, BHPBIO referred the planned Callawa and Cundaline mining operations to DEWHA under the EPBC Act in order to confirm whether the planned activities were considered to constitute a controlled action on matters of National Environmental Significance (in particular the EPBC Act listed Pilbara Leaf-nosed Bat). DEHWA evaluated the referral and notified BHPBIO that the proposal was not a controlled action.

The management measures summarised above are documented in the Goldsworthy EMP, SSMP and the Management Plan for Bat Species. These plans would be reviewed and revised as necessary to include the Cundaline and Callawa mining operations.

3.4.2 Terrestrial Short Range Endemics

Potential Impacts

The disturbance associated with the planned Cundaline and Callawa mining operations may impact short-range endemic fauna were they to occur in the planned disturbance area.

Management Objective

To minimise the impact of mining operations on local short-range endemic fauna populations.

To minimise the impact of mining operations so that the survival of short-range endemic fauna species is not threatened.

Management Measures

Terrestrial short-range endemic surveys were conducted by ENV Australia in April/May 2008 and Outback Ecology in July 2008. The survey findings would be documented in the assessment of potential impacts on terrestrial short-range endemics that would be conducted for the planned Cundaline and Callawa mining operations.

3.5 SUBTERRANEAN FAUNA

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Medium***

Existing Environment

Subterranean fauna is a term used to describe both troglofauna and stygofauna. The difference between the two is that troglofauna occur in underground air chambers and stygofauna occur in groundwater. Subterranean fauna are usually characterised by the loss of eyes and body pigment (EPA, 2003).

Stygofauna are aquatic subterranean invertebrates which can be found in groundwater systems (EPA, 2003). Groundwater abstraction for the planned Cundaline and Callawa mining operations would continue to be sourced from the Shay Gap Wellfield. No stygofauna species have been recorded at the Shay Gap Wellfield (Biota, 2006a).

Potential Impacts

The EPA's *Guidance for the Assessment of Environmental Factors: Consideration of subterranean fauna in groundwater and caves during environmental impact assessment in Western Australia* (EPA, 2003) indicates the following could potentially have a significant impact on stygofauna or troglofauna and their habitats:

- lowering the watertable sufficiently to dry out the zone in which some species live, or otherwise artificially changing watertables;
- changing water quality (e.g. increasing salinity levels or altering haloclines, increasing nutrient levels or the availability of organic matter, or introducing other pollutants); or
- destroying or damaging caves (including changing their temperature and humidity).

Management Objective

To minimise the impact of mining operations on local subterranean fauna populations.

Survival of subterranean fauna species is not threatened.

Management Measures

In the period from December 2007 to April 2008, two phases of troglofauna sampling were conducted in the Goldsworthy area.

The sampling programme has been developed and implemented in consultation with the DEC and in consideration of the EPA Guidance Statement No. 54a – '*Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia*'. If troglofauna are encountered, BHPBIO will minimise disturbance, avoid if significant, or manage as otherwise agreed with the DEC.

3.6 WATER RESOURCES

3.6.1 Surface Water

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

Existing Environment

The Cundaline and Callawa deposits are located in the De Grey River catchment. The De Grey River basin covers an area of 56,717 km^2 and extends nearly 410 km inland in the north-west region of Western Australia (ANRA, 2007). The De Grey River is a major river system with an extensive sediment filled floodplain and numerous tributary rivers and creeks. The river is located some 11 km and 7 km to the south of the Cundaline and Callawa deposits, respectively.

Most rivers and creeks in the De Grey basin are ephemeral and only flow following cyclonic activity over the summer months and can have several years of no flow, followed by flood events. The De Grey River has an annual mean flow of around 1,000 gigalitres (GL) per year (Aquaterra, 2005) and is listed in *A Directory of Important Wetlands in Australia* (Environment Australia, 2001).

Drainage channels in the Goldsworthy area collect and direct overland flow to the various tributary creeks of the De Grey River including Egg Creek, Eel Creek and Coonjeena Creek (Figure 2). These creeks are generally dry and sandy with broad channel beds in the order of 20 m to 100 m wide (BHP, 2005a). Significant flows occur during sustained high intensity rainfall events associated with cyclones and rain depressions. However, on a regional scale Egg Creek, Eel Creek and Coonjeena Creek are considered to be very minor tributaries of the De Grey River.

Potential Impacts

The planned Cundaline and Callawa mining operations have the potential to impact surface water resources by changing local surface water flow patterns (i.e. through the construction of the new open pits, OSAs, and haul roads), erosion and sedimentation from new disturbance areas or contamination from chemicals/hydrocarbons.

Management Objective

To maintain or improve the quality of surface water so that existing and potential uses, including ecosystem maintenance are protected, in consideration of the Australian and New Zealand Water Quality Guidelines (ANZECC, 2000).

Maintain the integrity, functions and environmental values of watercourses and surface water flow.

Management Measures

A surface water impact assessment would be conducted for the planned Cundaline and Callawa mining operations.

The management of water resources at all of BHPBIO's Pilbara operations is governed by a Water Management Programme, which is aligned with the BHPB *Health Safety, Environment and Community Management Policy* (HSEC Policy) and Charter.

Water management practices which could be implemented at the planned Cundaline and Callawa mining operations to improve water use efficiency and minimise the potential for sedimentation or contamination are summarised below.

- Sediment control measures would be designed and implemented as required; downstream of active mine areas, OSAs and other disturbance areas.
- Water quality monitoring and data collection would be conducted during mining operations.
- Wherever practicable, water use would be minimised and recycling undertaken.
- Controlled wastes, as defined by the *Environmental Protection (Controlled Wastes) Regulation 2001,* would be properly handled prior to removal from the site.
- On-site solid waste disposal would be minimised and properly managed.
- Hazardous substances would be stored in properly bunded facilities to minimise the potential for land, surface water or groundwater contamination.
- Progressive rehabilitation of disturbed areas would be undertaken.

The management measures summarised above are documented in the existing Goldsworthy EMP.

It is anticipated that they could be directly transferred to the planned Cundaline and Callawa mining operations in order to minimise potential impacts on surface water resources.

3.6.2 Groundwater

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

Existing Environment

Local aquifers are associated with hematite orebodies that have developed within the Banded Iron Formation (BIF) horizons, which form prominent topographical ridges (Aquaterra, 2005). The permeability of the aquifers varies according to the mineralisation and degree of fracturing present.

Due to the linear nature of the mineralisation and the tendency for it to be bounded by lower permeability materials such as unmineralised BIF, granites and mudstones, the aquifers are generally of a strip type (along strike) with the main orebodies forming areas of higher permeability (Aquaterra, 2005). Recharge into the BIF aquifers is generally restricted to areas where the orebodies outcrop at the surface, and because of the limited hydraulic connection to the groundwater system on the surrounding plains, these aquifers are significantly higher in elevation than the aquifers beneath the surrounding plains.

The topography to the south of the Goldsworthy operations is dominated by the drainage system of the De Grey River, where a shallow aquifer associated with alluvial sediments within the De Grey River floodplain is located (Aquaterra, 2005). The topography to the north of the BIF ridges is characterised by flat to gently undulating sand plains with occasional small rocky outcrops and stony hills (*ibid.)*. Aquifers in this area are associated with hydraulically isolated sedimentary sequences within a broad Jurassic to Cretaceous-aged Canning Basin. This aquifer system is recharged by infiltration of rainfall runoff at the margins of the basin.

Minor local, limited area fractured rock aquifers also occur in areas near the seasonal creeks and are recharged by the infiltration of wet season stream flow in the overlying alluvium or direct infiltration of runoff to the aquifer (Aquaterra, 2005).

Preliminary hydrological investigations indicate that the local water table in vicinity of the Cundaline deposit is in the order of 118 m to 141 m below local ground levels. Further investigations are required to determine the the local groundwater levels in the vicinity of the Callawa deposit.

The Shay Gap Wellfield is located approximately 165 km south-east of Port Hedland and approximately 35 km north-west of the Yarrie operations. The wellfield currently supplies potable and raw water to the Yarrie operations.

Potential Impacts

Potential impacts on groundwater resources include:

- drawdown of local watertables where borefield pumping (i.e. from the Shay Gap Wellfield) is undertaken; and
- adverse impacts on groundwater quality as a result of potential contamination by hydrocarbons, chemicals or mine waste (i.e. potentially acid forming overburden).

The Callawa and Cundaline pits are not expected to extend below the watertable, and as a result no mine dewatering is expected to be required.

Management Objective

To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance are protected.

To maintain or improve the quality of groundwater so that existing and potential uses, including ecosystem maintenance are protected, in consideration of the Australian and New Zealand Water Quality Guidelines (ANZECC, 2000).

Management Measures

A groundwater impact assessment would be conducted for the planned Cundaline and Callawa mining operations.

Measures to minimise the impacts of the Goldsworthy operations on groundwater resources, other users and groundwater dependant ecosystems are documented in the Goldsworthy EMP. It would be reviewed and revised as necessary to include the planned Cundaline and Callawa mining operations.

3.7 SOIL RESOURCES

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

Existing Environment

The ridges and plateaus that form the main topographical features in the Goldsworthy area are remnants of a sedimentary plateau landform (BHPBIO, 2005a). Due to the combination of sparse vegetation and the erosive force of summer rains, much of the soil that develops in these areas is eroded during rain events and transported into creek gullies and down to the surrounding valleys and plains (*ecologia*, 2005a and 2005b). The soil resources on the ridges and plateaus are therefore generally limited to very thin, poorly developed skeletal soils in between rocky outcrops. Thus, species and associations on the hills and slopes, particularly of flora and vegetation, tend to be correlated with geological conditions rather than soil type (Beard, 1975).

The Cundaline and Callawa ridges both lie within a region of soils that have been broadly mapped by Bettany *et al.* (1967) as "gradational soils with a neutral reaction trend through the profile".

Potential Impacts

Potential impacts of the planned Cundaline and Callawa mining operations on soils during construction and operational mining activities relate primarily to:

- clearing of vegetation that would increase the likelihood of soil erosion and sediment movement by both wind and water;
- alteration of soil structure and/or soil chemistry beneath infrastructure items, hardstand areas and roads (e.g. through compaction or contamination with hydrocarbons or chemicals); and
- alteration of soil structure, changes to soil chemistry, and changes to the natural soil evolution/forming processes caused by stripping, stockpiling and reusing topsoil from disturbed areas in rehabilitation.

Management Objective

To maintain the integrity, ecological function and environmental values of the soil resources.

Management Measures

BHPBIO has prepared a *Land Management Manual* for its Pilbara mining operations (BHPBIO, 2003a). The purpose of the Manual is to outline the aspects relevant to the management of clearing and rehabilitation of land (e.g. rehabilitation is progressive when land becomes available).

BHPBIO has also prepared a *Topsoil Management Manual* (BHPBIO, 2003b), which describes the overall objectives and strategies relating to the four main components of soil management at BHPBIO's Pilbara operations. These components are centred on the following directives:

- baseline topsoil surveys should be undertaken prior to disturbance;
- stripping of soil resources should be to appropriate depths and at appropriate times;
- stripped soils should be stockpiled in an appropriate manner; and
- appropriate planning should be undertaken so that stripped topsoil can be efficiently and effectively used during rehabilitation.

The following specific soil resource management practices would be used at the planned Cundaline and Callawa mining operations to minimise soil loss through erosion, preserve soil structure and chemistry and to maximise the potential for re-using stripped materials in rehabilitation programmes:

- Where practicable, topsoil and other identified suitable growth medium materials would be stripped prior to the commencement of mining activities.
- Where mine scheduling allows, stripped topsoil and other materials would be directly applied to areas being rehabilitated. Where this is not possible, stripped materials would be stored in separate stockpiles for later use. The stockpiles (both long and short-term) would be constructed and managed in a manner that encourages the continuation of the soil's biological activity.
- Where practicable, the storage and reuse of topsoil would be conducted in a manner that minimises the potential for significant changes to the structure and chemical properties of the soil, and allows natural soil evolutionary processes to continue once the soil is replaced in rehabilitated areas.
- The locations of soil stockpiles would be planned so that potential sites for future mine and infrastructure disturbance areas are taken into consideration.

Erosion from cleared areas would be managed through the minimisation of land clearing, progressive rehabilitation and installation of runoff controls where necessary. Water monitoring would be undertaken where necessary if land disturbance occurs near drainage lines.

The above measures are used at the Goldsworthy operations and are documented in the Goldsworthy EMP. It would be reviewed and revised as necessary to include the planned Cundaline and Callawa mining operations.

3.8 AIR QUALITY

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

Existing Environment

The Cundaline and Callawa deposits are located in a remote area, approximately 85 km from Marble Bar and some 11 km south-west to the nearest non-BHPBIO residence (Yarrie Homestead). The area has limited vegetation cover and experiences extended periods of low rainfall. As a result, dust is naturally generated during dry windy conditions or dust storms.

Greenhouse gas emissions from the planned Cundaline and Callawa mining operations would be generated through the combustion of diesel in generator sets, the use of mobile equipment, clearing of native vegetation and through the use of electricity to power processing operations at the Yarrie operations and infrastructure at the Cundaline and Callawa areas.

Potential Impacts

The types of potential air quality impacts associated with the planned Cundaline and Callawa mining operations are expected to be similar to the Goldsworthy operations. However, their development would include additional land clearing, which would increase the overall area susceptible to wind and water erosion.

Dust generating activities would include the following major activities:

- vegetation clearing;
- topsoil stripping;
- drilling and blasting;
- loading operations;
- ore and overburden hauling;
- haul truck unloading (tipping);
- primary crushing;
- conveyor transfer points;
- rail load-out; and
- movement of light vehicles.

Excessive dust deposition has the potential to result in adverse impacts on environmental values of the surrounding area (e.g. other land users, flora, fauna, and Aboriginal heritage sites in the areas immediately adjacent to the disturbance and operational areas).

Greenhouse gas emissions from the Goldsworthy operations, including the planned Cundaline and Callawa mining operations, are expected to remain largely unchanged as the Goldsworthy operations' production rate (i.e. approximately 8.5 Mtpa) and power demand would remain unchanged. Notwithstanding, greenhouse gas emissions from the planned Cundaline and Callawa mining operations would be assessed as part of an air quality assessment.

Management Objective

An air quality impact assessment would be conducted for the planned Cundaline and Callawa mining operations.

To minimise the impact of mining operations so that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

To minimise the impact of mining operations so that dust emissions do not adversely affect flora and fauna.

Management Measures

The general principles for managing dust related impacts at BHPBIO's Pilbara operations are provided in the *Land Management Manual* (BHPBIO, 2003a). These principles include:

- Watering or using chemical suppressants (e.g. Dustex®, a non-toxic, liquid dust suppressant) on haul roads and other potential dust generating areas.
- Using collectors to extract dust from potential dust generating fixed equipment.
- Rehabilitating disturbed areas as they become available.

Specific mitigation measures for minimising dust generation and potential impacts on environmental values are summarised below.

- Watering of haul roads and other operating areas with significant potential to generate dust, including unsealed roads and construction areas.
- Use of chemical dust suppressants on haul roads (where practicable).
- Minimising areas of exposed soil (where practicable).
- Progressive rehabilitation.
- Maintenance of dust suppression equipment.
- During the site induction process employees and contractors would be informed of the importance of minimising ambient dust levels.

Greenhouse gas emissions at the planned Cundaline and Callawa mining operations would be minimised by adopting the following management strategies:

- restricting the amount of native vegetation that is cleared to a practical minimum;
- progressively rehabilitating mine landforms and disturbed areas as they become available;
- regularly maintaining and replacing fixed and mobile equipment to minimise fuel consumption; and
- minimising haulage distances and grades.

The management measures summarised above are documented in the Goldsworthy EMP. These measures would be implemented for the planned Cundaline and Callawa mining operations, where relevant, in order to minimise potential air quality impacts.

3.9 NOISE

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

Existing Environment

Current background noise levels at the Cundaline and Callawa areas are typical of a remote undeveloped area, with some influence by the Goldsworthy operations (i.e. distant blasting activities, operation of the mining mobile fleet and the ore crushing and screening equipment). Rail noise from the Goldsworthy operations is also generated by loading and ore transport.

Potential Impacts

The planned Cundaline and Callawa mining operations have some potential to alter the noise emissions from the Goldsworthy operations as a result of the following:

- drilling, blasting and mining activities; and
- ore haulage.

Although the planned Cundaline and Callawa mining operations would potentially alter the distribution of noise sources in the Goldsworthy area, the Cundaline and Callawa areas are not significantly closer to any sensitive receptors (the closest being 11 km south-west of the Callawa deposit at the Yarrie Homestead).

As the production rate at the Goldsworthy operations (approximately 8.5 Mtpa) would not change as a result of the planned Cundaline and Callawa mining operations, no additional train movements would be required and rail noise levels are expected to remain unchanged.

Management Objective

A noise impact assessment would be conducted for the planned Cundaline and Callawa mining operations.

To protect the amenity of nearby residents from noise impacts resulting from activities associated with the planned operations by ensuring the noise levels meet statutory requirements and acceptable standards.

Management Measures

The following management measures could be implemented to reduce noise levels and blasting-related impacts:

- use of low-noise equipment where practicable; and
- restricting all blasting activities to daylight hours.

The management measures summarised above are documented in the Goldsworthy EMP. These measures would be implemented (where appropriate) for the planned Cundaline and Callawa mining operations, in order to minimise potential noise impacts.

3.10 ABORIGINAL HERITAGE

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

The Cundaline and Callawa deposits lie within the traditional lands of the Njamal speaking people, whose territory was centred on the Oakover, lower Nullagine and central De Grey Rivers (BHPIO, 1992).

BHPBIO commissioned a number of archaeological and ethnographic Aboriginal heritage surveys and consulted widely with principle Njamal heritage custodians (and others from the neighbouring language groups such as the Nyangumarta) during the planning and development for earlier mining activities associated with the Goldsworthy operations (O'Connor and Quartermaine 1988; O'Connor *et al.,* 1991; O'Connor and Quartermaine, 1992a; O'Connor and Quartermaine, 1992b). Several ethnographic and archaeological sites were recorded as a result of survey work in the region.

There are two Aboriginal heritage sites within the Cundaline area that are registered with the Department of Indigenous Affairs (DIA) (DIA, 2008):

- Shay Gap 3 (Site ID 6286); and
- Shay Gap 4 (Site ID 6287).

Both of these sites consist of artefact scatters and rockshelters, and are located in the north-west extremity of the Cundaline area.

Three registered Aboriginal heritage sites are located in the vicinity of the Callawa area (DIA, 2008):

- Kimberley Gap (Site ID 6970), an artefact scatter located in the vicinity of the existing rail loop and proposed haul road;
- Callawa Ridge (Site ID 21380), a ceremonial and mythological site encompassing Callawa Ridge (approximately 5 m x 5 m), with the Callawa deposit located in the far north-east corner; and
- Yarrie Birmal (Site ID 12140), comprising of a repository/cache and artefact scatter, is a closed site for which the exact location is not available to the public.

Potential Impacts

The potential impacts of the planned Cundaline and Callawa mining operations on Aboriginal heritage sites are related primarily to direct disturbance of sites and include:

- damaging sites during mining operations and construction of project infrastructure;
- collecting or excavating artefacts from heritage sites;
- damaging artefacts by off-road use of vehicles; and
- trespassing on sites by unauthorised personnel and culturally inappropriate behaviour (including defacing artefacts or artworks).

Management Objective

For the proposal to comply with the requirements of the *Aboriginal Heritage Act, 1972*.

To minimise the impact of mining operations so that changes to the biophysical and physical environment resulting from the development of the planned Cundaline and Callawa mining operations to not adversely affect cultural associations within the area.

Management Measures

The general guiding principles for managing Aboriginal heritage and minimising potential impacts at BHPBIO's mining operations are described in the *Land Management Manual* (BHPBIO, 2003a) and include:

- undertaking Aboriginal heritage surveys at disturbance areas in consultation with the Njamal cultural heritage custodians and representatives;
- avoiding Aboriginal sites where possible and revising the mine plan if significant Aboriginal heritage sites are identified; and
- obtaining appropriate approvals and permits under the *Aboriginal Heritage Act, 1972* prior to disturbing any sites.

The management measures summarised above are documented in the Goldsworthy EMP. These measures would be implemented for the planned Cundaline and Callawa mining operations in order to minimise potential impacts on Aboriginal heritage.

3.11 WASTE MANAGEMENT

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

The types of wastes that would be produced during the planned Cundaline and Callawa mining operations include:

- equipment/vehicle washdown water;
- scrap metal;
- non-metal scrap (e.g. uncontaminated piping, plastic, fibreglass, wood or concrete rubble);
- general refuse;
- office and administrative wastes (e.g. paper, cardboard, etc.);
- domestic putrescible wastes;
- medical wastes (e.g. bandages, medicine, syringes etc. from first aid kits);
- sewage waste (i.e. sludge from sewage treatment unit);
- tyres and conveyor belts;
- explosives packaging;
- batteries;
- miscellaneous chemical packaging and chemical wastes; and
- hydrocarbon waste.

These wastes would be disposed of in the Yarrie landfill.

Potential Impacts

Waste materials have the potential to adversely affect the environment (e.g. contamination of soil and water resources) if improper management/treatment procedures are applied.

Management Objective

To minimise the impact of mining operations so that disposal/management of wastes to not adversely affect environmental values, or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

Minimise the risk to the environment resulting from potentially acid forming materials.

Management Measures

Management of waste at the Goldsworthy operations is governed by the BHPBIO Mining Operations Waste Management Programme which observes the waste management hierarchy of elimination, reduction, reuse, recycling, treatment and disposal.

Management practices that would be implemented at the planned Cundaline and Callawa mining operations to minimise impacts from waste generation are summarised below:

- Materials such as batteries and scrap metal would be recycled.
- Materials to be recycled would be neatly stored in a designated area until they are removed from the site.

- All waste collecting systems would be designed for ease of use and prevention or capture of spillage.
- Oily wastes generated at site would be collected and disposed of in accordance with the *Environmental Protection (Controlled Waste) Regulations, 2001*.
- All soil contaminated by hydrocarbons would be removed to the bioremediation landfarm for treatment in accordance with *Oil Farming for Oily Wastes* (EPA, 1990).
- Controlled wastes transported off-site for disposal would be managed in accordance with the *Environmental Protection (Controlled Waste) Regulations, 2001.*
- Non-controlled solid wastes would be disposed of at the Yarrie Mine landfill in accordance with the licence conditions.

The management measures summarised above are documented in the Goldsworthy EMP. These management measures would be implemented for the planned Cundaline and Callawa mining operations, where appropriate, in order to minimise potential waste-related impacts.

3.12 DANGEROUS GOODS AND HAZARDOUS MATERIALS

Preliminary Qualitative Risk Evaluation of Environmental Factors (Section 1.3) – ***Low***

Potentially hazardous materials such as fuels, lubricants, detergents, explosives and paints would be required for the planned Cundaline and Callawa mining operations. Where applicable, these materials would be transported to the Cundaline and Callawa areas in accordance with the *Dangerous Goods (Transport) (Road and Rail) Regulations 1999* and the *Australian Code for the Transport of Dangerous Goods by Road and Rail*.

The planned Cundaline and Callawa mining operations would use the hazardous materials and explosive storage areas at the Yarrie processing facilities. No upgrades of these areas would be required for the Yarrie processing facilities. Consumables would be trucked to the Cundaline and Callawa areas on a demand basis. Fuel storage facilities would be constructed at the Cundaline area, and would be above ground, bunded and constructed and operated in accordance with applicable Australian Standards. Diesel would be transported to the Cundaline and Callawa areas in road train fuel tankers.

Potential Impacts

The use of hazardous materials, such as fuels, lubricants, detergents, explosives and paints at the planned Cundaline and Callawa mining operations would have the potential to cause atmospheric, ground or water contamination. However the types and amounts of hazardous materials used is not expected to change significantly from the existing Goldsworthy operations consumption levels as the ore production rate (i.e. approximately 8.5 Mtpa) would remain unchanged.

Management Objective

Dangerous or hazardous goods are transported, stored and used in accordance with applicable legislation or standards.

Management Measures

The strategies for minimising impacts from hazardous substances and dangerous goods associated with the planned Cundaline and Callawa mining operations are summarised below:

- Compliance with all regulations relating to the storage, handling, use and disposal of hazardous materials.
- Storage of bulk fuel in above ground tanks within impermeable, bunded enclosures and minor storage vessels in accordance with licence conditions and applicable Australian Standards (e.g. AS 1940).
- Storage of explosives in remote magazines.
- Storage of all toxic or hazardous mining or process materials within weatherproof enclosures, with impervious flooring and perimeter bunding.
- Transportation of all hazardous materials (including controlled wastes) is to comply with the provisions of a Licence to Transport Dangerous Goods.

The management measures summarised above are documented in the Goldsworthy EMP. These management measures would be implemented for the planned Cundaline and Callawa mining operations, where necessary, in order to minimise potential dangerous goods and hazardous materials related impacts.

4 CONSULTATION

BHPBIO's Health, Safety, Environment and Community (HSEC) Policy (BHP, 2002) states that wherever the Company operates it will:

> *communicate with, and engage employees, contractors, business partners, suppliers, customers, visitors and communities to:*
>
> - *build relationships based on honesty, openness, mutual trust and involvement; and*
> - *share responsibility for meeting the requirements of this policy.*

BHPBIO would conduct a consultation programme which would include, but not necessarily be limited to, the following:

- Department of Environment and Conservation;
- Environmental Protection Authority;
- Department of Industry and Resources;
- Department of Water;
- East Pilbara Shire Council;
- Njamal Aboriginal Group;
- Local landholders; and
- Other non-government organisations that express an interest in the planned Cundaline and Callawa mining operations (e.g. WA Conservation Council, Wildflower Society, etc.).

The main objectives of the consultation programme would be to:

- confirm the approval process for the development of the planned Cundaline and Callawa mining operations with relevant government agencies and local authorities;
- provide information and an opportunity to comment for groups or individuals who may potentially be interested in the development of the planned Cundaline and Callawa mining operations;
- discuss and agree with stakeholders the key long term guiding principles for development of the mining operations and ultimate relinquishment of the mining leases;
- periodically provide updated information and results of the environmental assessment and planning process to stakeholders as more information becomes available; and
- where possible, allow for adjustments to the design and/or management of the planned Cundaline and Callawa mining operations to accommodate the concerns or issues raised by stakeholders during the consultation process.

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