Orebody 31

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Orebody 31 Iron Ore Mine Project

Environmental Referral Document

March 2015

Document tracking

Item	Detail
Project name	Orebody 31 Iron Ore Mine Project
Project/document number	
Saved location of document	G:\AssetDev\Environmental Approvals (beta)\06 Sustaining Tonnes\003 OB18-Jimblebar-Wheelarra Hill\0004 EPActApprovals\
Prepared by	BHP Billiton Environmental Approvals Team (Sally Pickard and Sonya Brunt)
Reviewed by	Renelle Thorpe
Approved for release by	Mark Garrahy
Status/version number	Final Version 2
Date saved	20/03/2015

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Abbreviations, acronyms and definitions

Abbreviation/Acronym	Full Title
AER	Annual Environmental Report
AHA	*Aboriginal Heritage Act 1972*
AMD	Acid and Metalliferous Drainage
ANC	Acid Neutral Capacity
BIF	Banded Iron Formation
AWT	Above water table
DEC	Department of Environment and Conservation
DER	Department of Environment Regulation
Development Envelope	The boundary of the Proposal – as per the requirements of the Environmental Protection Authority's *Environmental Assessment Guideline 1 – Defining the Key Characteristics of a Proposal* (EPA, 2012).
DMP	Department of Mines and Petroleum
DoW	Department of Water
DPaW	Department of Parks and Wildlife
DRF	Declared Rare Flora
DSD	Department of State Development
EAG	Environmental Assessment Guideline
EIA	Environmental Impact Assessment
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
ERD	Environmental Referral Document
ESD	Ecologically Sustainable Development
GDV	Groundwater dependent vegetation
GL/a	Gigalitres per annum
GWL	Groundwater well license
ha	Hectares
HSEMS	Health, Safety and Environmental Management System
IBRA	Interim Biogeographic Regionalisation for Australia
Indicative Disturbance Boundary or Maximum Disturbance Boundary	Historic reference to a disturbance area used by BHP Billiton Iron Ore in all Part IV projects prior to the release of EPA EAG 1 (EPA, 2012). It is also the terminology used to carry out environmental impact assessment studies prior to determining a final Proposal Development Envelope.
km	kilometre
km2	square kilometre
LVIA	Landscape and visual impact assessment
m	metres
mbgl	metres below ground level
mg/L	milligrams per Litre
ML/d	Megalitres per day

Abbreviation/Acronym	Full Title
mRL	metres Reduced Level
Mt	Million tonnes
Mtpa	Million tonnes per annum
NVCP	Native Vegetation Clearing Permit
NTC	Native Title Claim
OEPA	Office of the Environmental Protection Authority
OSA	Overburden Storage Area
PAF	Potentially acid forming
PEAHR	Project Environment and Aboriginal Heritage Review
PEC	Priority Ecological Community
PWRMS	Pilbara Water Resource Management Strategy
RIWI Act	*Rights in Water and Irrigation Act 1914*
TEC	Threatened Ecological Community
VSR	Visually Sensitive Receptor
WAH	Western Australian Herbarium
PM_{10}	Particulate matter with an equivalent aerodynamic equal to or less than 10 µm in diameter.
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic equal to or less than 2.5 µm in diameter.

EPA REFERRAL SUMMARY

BHP Billiton Iron Ore Pty Ltd (BHP Billiton Iron Ore) proposes to develop and operate a new iron ore deposit at Orebody 31 (the Proposal), located approximately 40 kilometres (km) east of Newman in the Pilbara Region of Western Australia. The Proposal is located immediately east of the existing Orebody 18 Hub Mine. The Orebody 18 deposit is reaching the end of its economic life, with available ore reserves expected to be depleted by 2019. Additional ore sources are required to provide sufficient blend feed in order to maintain the current level of iron ore production from the Eastern Pilbara mines. The Proposal will utilise the existing Orebody 18 Hub Mine ore handling facilities, including primary crusher, stockpiles and train load out facilities. This approach reflects BHP Billiton Iron Ore's current approach of developing new orebodies which are able to utilise existing infrastructure around established mining hubs. This approach will also minimise the amount of clearing required for development of the new deposit.

The Proposal ore resource has been estimated at approximately 500 Million tonnes (Mt). This Proposal considers two development scenarios for this resource. The first is a base scenario of 15 Million tonnes per annum (Mtpa) as a long-term replacement for Orebody 18 and the second is a growth scenario of 30 Mtpa. These scenarios reflect bookends, as the orebody will be mined at a rate between 15 Mtpa and 30 Mtpa, as determined by the business plan and market conditions.

Open pits will be developed using conventional drill and blast techniques. Mining will be undertaken using conventional open pit iron ore mining activities below water table and will require mine dewatering ahead of mining to facilitate dry mining conditions. For the base scenario (15 Mtpa), ore will be transported via road or an overland conveyor to existing ore handling facilities at the Orebody 18 Mine Hub, then railed to the Mount Whaleback Mine, where it will be blended with the ore produced by the Newman Joint Venture.

Under the growth scenario (30 Mtpa), some of the additional 15 Mt of ore will be transported to the existing ore handling facilities at the Orebody 18 Mine Hub and some may be transported to the Wheelarra Hill (Jimblebar) Mine Hub, either via road or an overland conveyor in future. Ore from either or both the Orebody 18 Mine Hub and Jimblebar Mine Hub will be railed to the Mount Whaleback Mine Hub and blended with ore produced by the Newman Joint Venture prior to being transported via rail to Port Hedland.

The Proposal ore resource is estimated to be 70 per cent (%) below the water table. As such, the Proposal will require in-pit and ex-pit mine dewatering (i.e. groundwater abstraction) to facilitate dry mining conditions 12 months ahead of mining.

This Environmental Referral Document (ERD) provides supporting information to the Environmental Protection Authority (EPA) in order to determine the Level of Assessment (LOA). This document provides information about the existing environment, potential impacts of implementation of the Proposal and also explains BHP Billiton Iron Ore's new regional management approach towards potential impacts for each of the EPA's environmental factors.

BHP Billiton Iron Ore's new regional management approach has been introduced and discussed during regular meetings with the Office of the EPA (OEPA) over the past year. The approach is being introduced as part of an increased business focus on simplification, improving the way we do business and achieving better environmental outcomes around five key areas, namely water planning, mine closure, biodiversity, noise and air quality. BHP Billiton Iron Ore considers that this Proposal provides an opportunity to present and discuss the approach.

BHP Billiton Iron Ore has operated around the Newman area for over 30 years. Numerous studies have been carried out to support a number of proposals in the Pilbara region, including in the vicinity of this Proposal, in order to support previous government approval submissions, or as part of BHP Billiton Iron Ore's ongoing management of all of its operations in the Pilbara region. BHP Billiton Iron Ore has used its knowledge of the environment, together with an understanding of the environmental impact assessment process in the Pilbara region to undertake an internal risk assessment for this Proposal. This risk assessment identified the environmental factors which may be relevant to the implementation of the Proposal and the aspects of the Proposal which may affect those factors.

The risk assessment took into consideration the EPA's *Environmental Assessment Guideline 8 for Environmental Factors and Objectives* (EPA, 2013a) and identified the following as potential preliminary key factors:

- flora and vegetation;
- hydrological processes (surplus water);
- subterranean fauna (stygofauna); and
- rehabilitation and decommissioning.

Other factors which were considered in relation to this assessment are:

- landforms;
- terrestrial fauna (including short range endemics);
- subterranean fauna (troglofauna);
- terrestrial environmental quality;
- inland waters environmental quality;
- air quality and atmospheric gases;
- amenity;
- heritage; and
- human health (noise).

Preliminary advice received from the OEPA in November 2014 adv ised that subterranean fauna should be considered to be a preliminary key factor in relation to styofauna. As such, BHP Billiton Iron Ore has assessed this as a key preliminary factor throughout this referral document.

The significance of the implementation of the Proposal on the above environmental factors was assessed in line with the EPA's *Environmental Assessment Guideline 9 Application of a significance framework in the environmental impact assessment process* (EPA, 2013b). BHP Billiton Iron Ore has concluded that some factors may be considered potential Key Environmental Factors. This is shown in Chart ES-1 below.

This document has been re-written to adhere to the EPA's recently released *Environmental Assessment Guideline 14 Preparation of an API-A Environmental Review Document* (EPA, 2015a) and *Environmental Assessment Guideline 16 Referral of a Proposal under s38 of the Environmental Protection Act 1986* (EPA, 2015b). It also adheres to the new Mitigation Process in the recently published *Western Australian Government's Offsets Guidelines* (WA Government, 2014). A figure illustrating the range of actions taken to address the 'Mitigation Hierarchy' is provided in Figure ES-1.

BHP Billiton Iron Ore considers that the information and as sessment presented in this ERD adequately identifies and addresses environmental aspects and issues relevant to the Proposal and is adequate to enable the EPA to set the LOA at Assessment on Proponent Information, Category A.

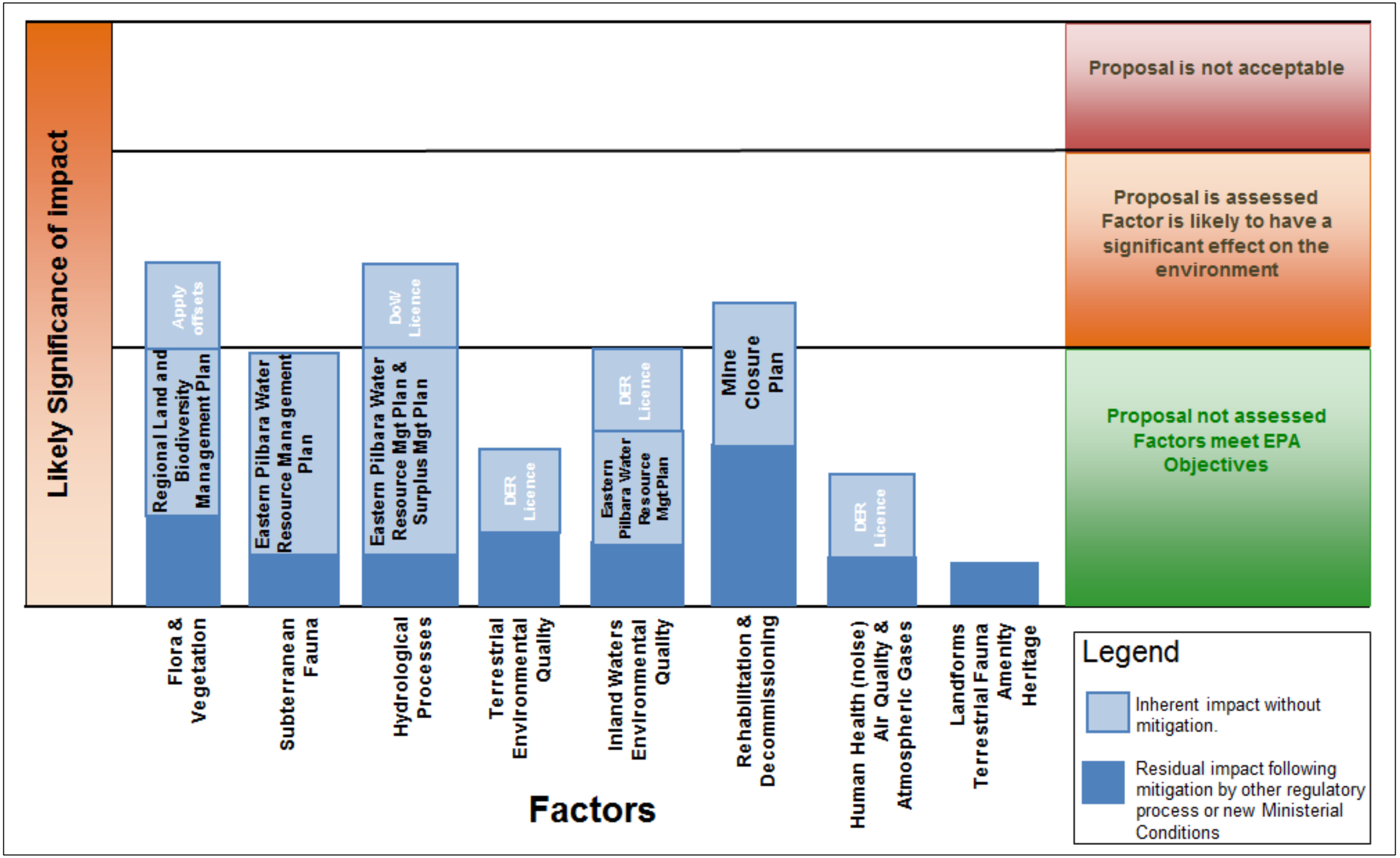
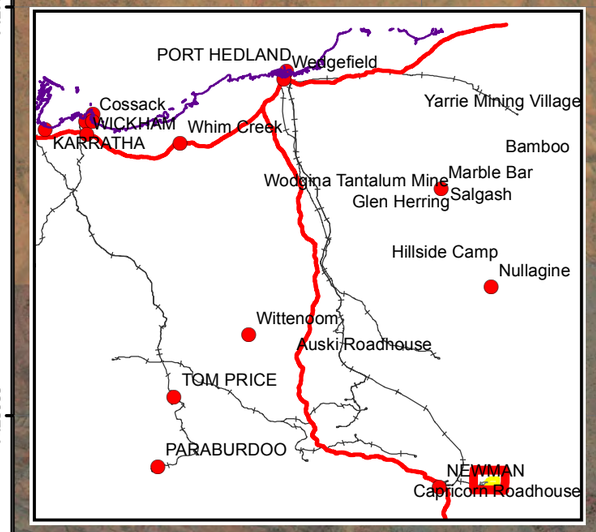


Chart ES-1: Significance of Environmental Factors

191277 195277 199277 203277 207277 211277

7427655 7423655 7419655 7415655 7411655



Legend

- Orebody31 Development Envelope
- OB31 Indicative Haul Rd & Overland Conveyor
- OB31 Indicative Pit, OSA & facilities area
- Orebody 18 Approved Boundary (Min Statement 439)

SPECIES

- Acacia clelandii
- Goodenia nuda
- Rhagodia sp. Hamersley (M.E. Trudgen 17794)
- Triodia sp. Mt Ella (M.E. Trudgen 12739)
- Acacia sp. East Fortescue

0 1 2 3 4
Kilometers

Addressing the Mitigation Process for Key Environmental Factors:

Flora and Vegetation

Hydrological Processes

Closure and Rehabilitation

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Orebody 31 Iron Ore Mine Project

Implementing the Mitigation Hierarchy as per the Offsets Guidelines (WA Govt. 2014)

SCALE (A3): 1:60,000	DATUM: GDA94/MGA 50	**FIGURE ES1**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 11 March 2015	Dwg:STJIM_OB31_ES1_RevC_0

BHP Billiton Iron Ore is proposing to implement the Eastern Pilbara Water Management Plan and Surplus Water Management Plan to implement a hierarchy of surplus water management options in line with the DoW Guidelines. These are:
- re-use on site;
- discharge into Ophthalmia Dam;
- reinjection into MAR; and
- discharge to nearby creek lines.

OSA designs are currently being revised to avoid impact on this population of Acacia sp. East Fortescue

Development Envelope has been reduced to exclude these records of Rhagodia sp.

Development Envelope has been reduced to exclude the majority of Acacia sp. East Fortescue

Designs are currently being revised to pursue a shorter HV Haul Road direct from Orebody 17 to the Orebody 31 Pit at this location. This will reduce the road from 8km down to 3km.

Surplus water discharge will be released here into a low-flow unnamed drainage line, as opposed to direct into the higher-flow Jimblebar Creek

Orebody 31 indicative OSA boundaries

Orebody 31 indicative pit boundary

The discharge of surplus water to Ophthalmia Dam is an existing management approach for a numberof BHP Blliton Iron Ore Mine Hubs which are subject to established ongoing monitoring programmes

Orebody 18 Mine Hub (approved and in operation)

Creek discharge is the least-preferred option in a proposed hierarchy of surplus water management options. It will be used if other preferred options are unavailable for various reasons

Indicative OSA boundries illustrate the ex-pit (worst-case) scenario. They are likely to be smaller if options for progressive backfill of Orebody 17 and/or Orebody 31 are implemented

Development Envelope has been reduced to remove this large area classified as 'Excellent' vegetation condition

Tenement boundary

Tenement boundary

The Proposal will utilise Orebody 18 Mine Hub failities (HV Workshop, crusher, etc.) as opposed to constructing new at Orebody 31

Development Envelope has been reduced to exclude these two large populations of Triodia sp.

Jimblebar Creek

Shovelanna Creek

1. Proponent and key proposal characteristics

1.1 Overview

BHP Billiton Iron Ore Pty Ltd (BHP Billiton Iron Ore) is seeking approval to develop and operate a new mine at Orebody 31 (the Proposal). The Proposal has been identified as the preferred option to replace ore sources from the Orebody 18 deposit which are expected to be depleted by 2019.

The Proposal will involve conventional open pit iron ore mining of the mineralised Brockman Iron Formation. The bulk of this orebody lies below the water table and will require mine dewatering in advance to facilitate dry mining conditions.

The Proposal area is located approximately 40 kilometres (km) east of Newman Township and approximately 8 km east of the existing Orebody 18 Mine Hub in the Pilbara region of Western Australia (WA) (Figure 1, Figure 2 and Figure 3).

A Referral Form has been prepared for the Proposal in accordance with Section 38(1) of the *Environmental Protection Act 1986* (EP Act) and the Western Australian Environmental Protection Authority's (EPA) *General Guide on Referral of Proposals* (EPA, 2010a).

The purpose of this Environmental Referral Document (ERD) is to provide supporting information to the EPA in order to determine the Level of Assessment (LOA). BHP Billiton Iron Ore has evaluated the characteristics of this Proposal and considers that this Proposal falls into the LOA of Assessment on Proponent Information (API) – Category A. This document has been prepared in accordance with Environmental Assessment Guideline 14 for *Preparation of an API – Category A Environmental Review Document* (EPA, 2014a). It provides information regarding the potential factors which have been determined through risk assessments, as well as a range of technical studies, which have been carried out to address potential impacts for each of the relevant environmental factors.

1.2 The proponent

The proponent for the proposal is:

BHP Billiton Iron Ore Pty Ltd
ABN: 46 008 700 981
125 St Georges Terrace
Perth WA 6000

BHP Billiton Iron Ore is the authorised manager and agent of the project for the Newman Joint Venture (NJV), which is comprised of the companies listed below with their respective interests:

- BHP Billiton Minerals Pty Ltd (ABN 93 008 694 782) 85%;
- Mitsui – Itochu Iron Pty Ltd (ABN 84 008 702 761) 10%; and
- Itochu Minerals & Energy of Australia Pty (ABN 44 009 256 259) 5%.

BHP Billiton Iron Ore is authorised as the manager and agent of the proponents to submit this Proposal and execute the works as approved. All references to BHP Billiton Iron Ore are references to it acting in that capacity. Refer to the letter at Appendix A, which confirms that BHP Billiton Iron Ore has the authority to act for the NJV.

The key contact for this Proposal is:

Name: Mark Garrahy
Position: Manager Environmental Approvals
Phone: 6321 2183
Email: mark.garrahy@bhpbilliton.com

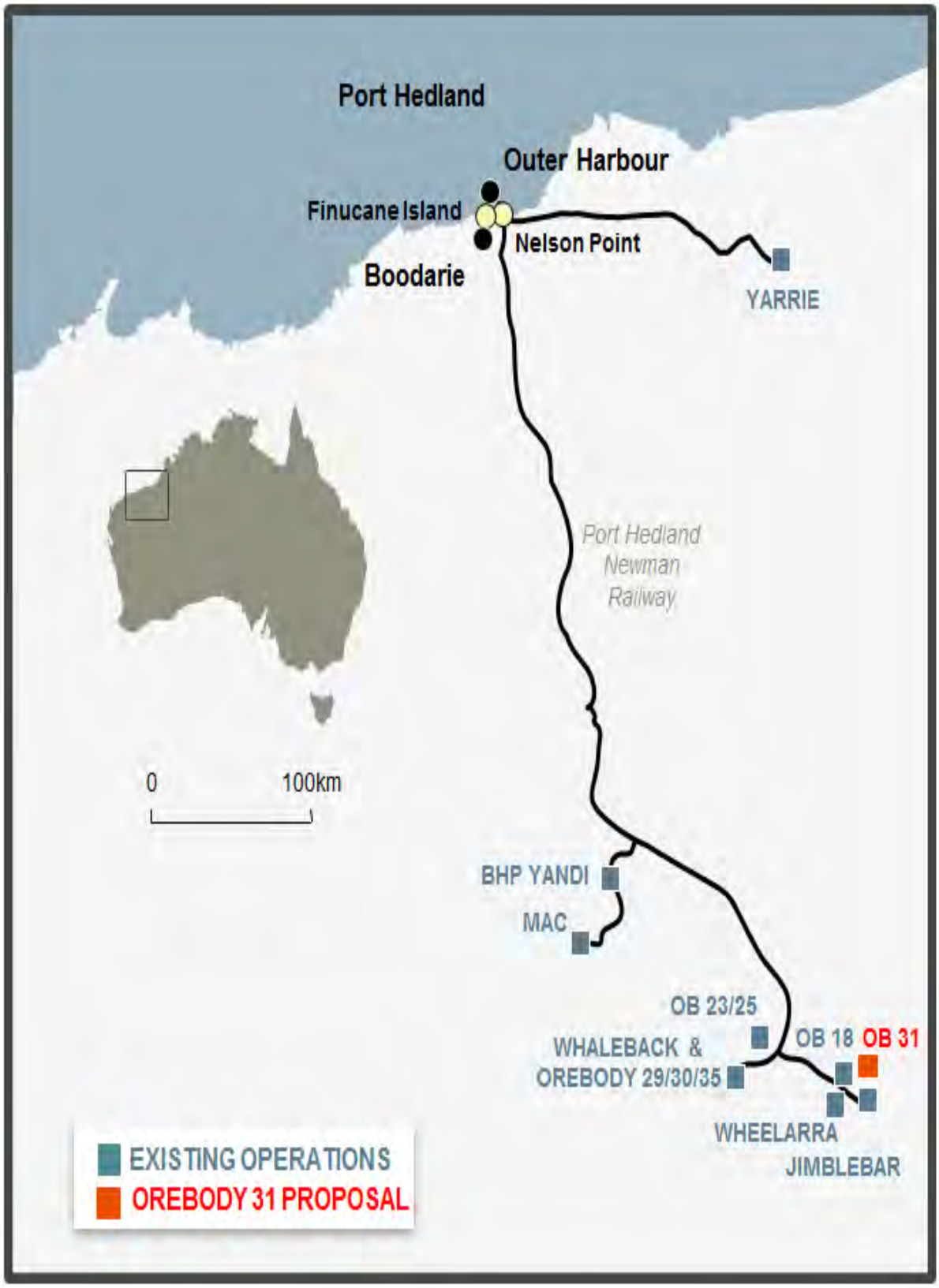
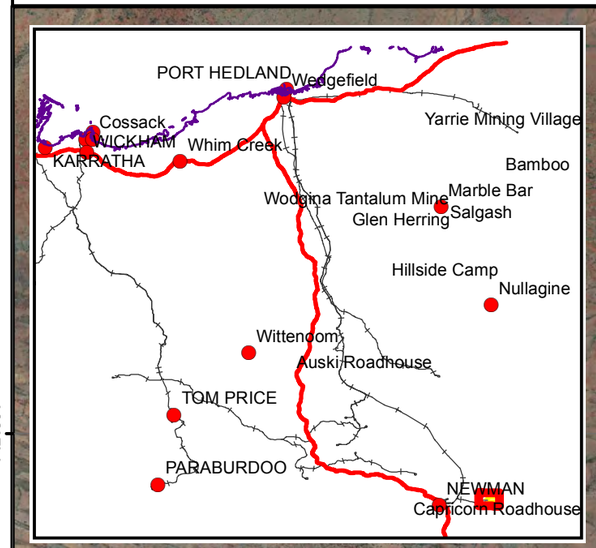


Figure 1: Regional Overview



0 0.75 1.5 2.25 3

Kilometers

Legend

- Tenement Boundary
- Orebody 31 Development Envelope
- Orebody 18 Approved Boundary (Min Statement 439)
- OB31 Indicative Haul Rd & Overland Conveyor
- OB31 Indicative Pit, OSA & facilities area

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Orebody 31
Iron Ore Mine Project

Local Context

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 2**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 30 December 2014	Dwg:STJIM_OB31_002_RevA_0

Orebody 31 Development Envelope

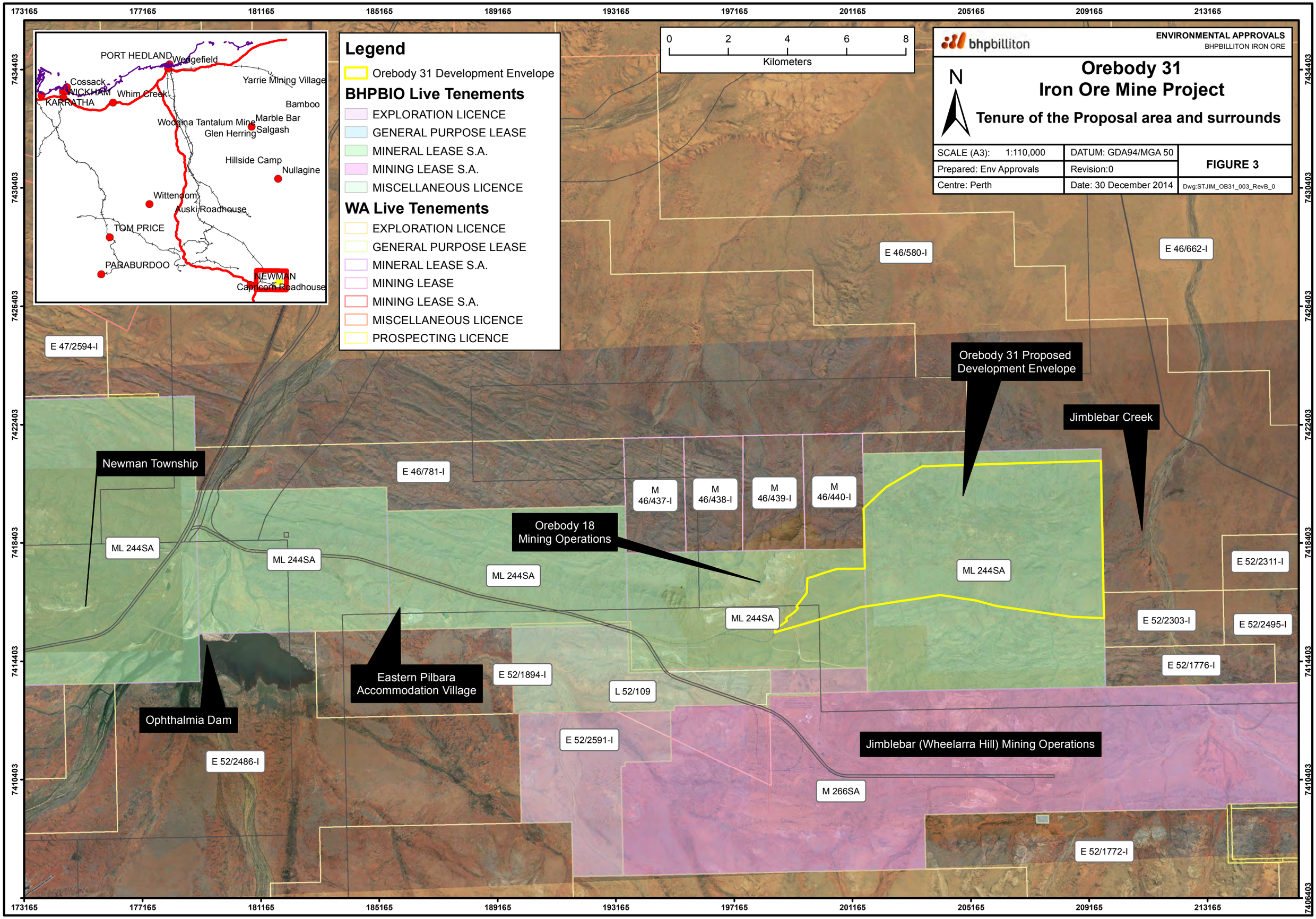
Orebody 18 Approved Part IV boundary (MS 439)

Mining Tenement Boundary AML244SA

Mining Tenement Boundary AML244SA

195026 199026 203026 207026

7421304 7417304 7413304


PORT HEDLAND
Wedgefield
Cossack
WICKHAM
Whim Creek
KARRATHA
Yarrie Mining Village
Bamboo
Marble Bar
Wodgina Tantalum Mine
Salgash
Glen Herring
Hillside Camp
Nullagine
Wittenoom
Auski Roadhouse
TOM PRICE
PARABURDOO
NEWMAN
Capricorn Roadhouse
Legend
Orebody 31 Development Envelope
BHPBIO Live Tenements
EXPLORATION LICENCE
GENERAL PURPOSE LEASE
MINERAL LEASE S.A.
MINING LEASE S.A.
MISCELLANEOUS LICENCE
WA Live Tenements
EXPLORATION LICENCE
GENERAL PURPOSE LEASE
MINERAL LEASE S.A.
MINING LEASE
MINING LEASE S.A.
MISCELLANEOUS LICENCE
PROSPECTING LICENCE
0 2 4 6 8
Kilometers
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Orebody 31
Iron Ore Mine Project
Tenure of the Proposal area and surrounds
SCALE (A3): 1:110,000
DATUM: GDA94/MGA 50
FIGURE 3
Prepared: Env Approvals
Revision:0
Centre: Perth
Date: 30 December 2014
Dwg:STJIM_OB31_003_RevB_0
E 46/580-I
E 46/662-I
E 47/2594-I
Orebody 31 Proposed Development Envelope
Jimblebar Creek
Newman Township
E 46/781-I
M 46/437-I
M 46/438-I
M 46/439-I
M 46/440-I
Orebody 18 Mining Operations
ML 244SA
ML 244SA
ML 244SA
ML 244SA
ML 244SA
E 52/2311-I
E 52/2303-I
E 52/2495-I
E 52/1776-I
Eastern Pilbara Accommodation Village
E 52/1894-I
L 52/109
Ophthalmia Dam
E 52/2591-I
Jimblebar (Wheelarra Hill) Mining Operations
E 52/2486-I
M 266SA
E 52/1772-I
173165
177165
181165
185165
189165
193165
197165
201165
205165
209165
213165
7434403
7430403
7426403
7422403
7418403
7414403
7410403
7406403

1.3 Key proposal characteristics

The EPA's *Environmental Assessment Guideline 1 for Defining the Key Characteristics of a Proposal* (EPA, 2012, p. 12), provides guidance on the Key Proposal Characteristics. In accordance with this guidance, BHP Billiton Iron Ore has prepared a Key Characteristics Table (Table 1).

Table 1: Key proposal characteristics

Summary of proposal

Proposal Title	Orebody 31 Iron Ore Project
Proponent Name	BHP Billiton Iron Ore Pty Ltd
Short Description	This Proposal is to develop and operate a new below water table deposit at Orebody 31, approximately 40 km east of Newman, Western Australia, including the construction of an overland heavy vehicle haul road (short term) and an overland conveyor (long term) from Orebody 31 to existing operations at the Orebody 18 Mine Hub or the Wheelarra Hill (Jimblebar) Mine Hub as well as the construction of associated mine infrastructure (overburden storage areas, offices, workshops, roads, dewatering infrastructure, ore and topsoil stockpiles and associated facilities).

Physical elements

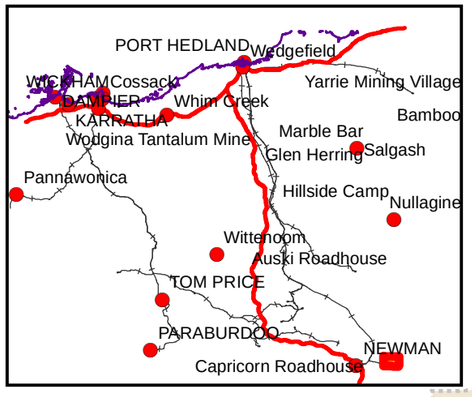
Element	Location	Proposed Extent
Mine pit void	Figure 4	Clearing no more than 778 ha within a 4,075 ha Development Envelope
Overburden storage areas	Figure 4	Clearing no more than 952 ha within a 4,075 ha Development Envelope
Infrastructure and supporting facilities (including water infrastructure)	Figure 4	Clearing no more than 520 ha within a 4,075 ha Development Envelope
Topsoil stockpiles	Figure 4	Clearing no more than 250 ha within a 4,075 ha Development Envelope

Operational elements

Element	Location	Proposed Extent
1. Dewatering	Figure 4	Maximum of 16.2 GL/a
2. Surplus water discharge	A hierarchy of options in accordance with the proposed Eastern Pilbara Surplus Water Management Plan	Maximum of 16.2 GL/a Discharge in accordance with the Eastern Pilbara Surplus Water Management Plan as per the following hierarchy: • re-used onsite in mining operations; • transferred to other nearby operations for use onsite; • discharged via Ophthalmia Dam; • reinjected back into the aquifer via a Managed Aquifer Recharge programme; or • discharged into the nearby environment during wet season or during maintenance of Ophthalmia pipeline for a maximum of three months – maximum discharge under this last-case option is 4 GL/a.
3. Ore Processing	Figure 4	Processing of no more than 30 Mtpa

Description of clearing

Infrastructure and ancilliary	520 ha
Pit area	778 ha
Overburden storage areas	952 ha
Topsoil stockpiles (final location yet to be determined)	250 ha
Total:	2,500 ha



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Kilometers

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ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

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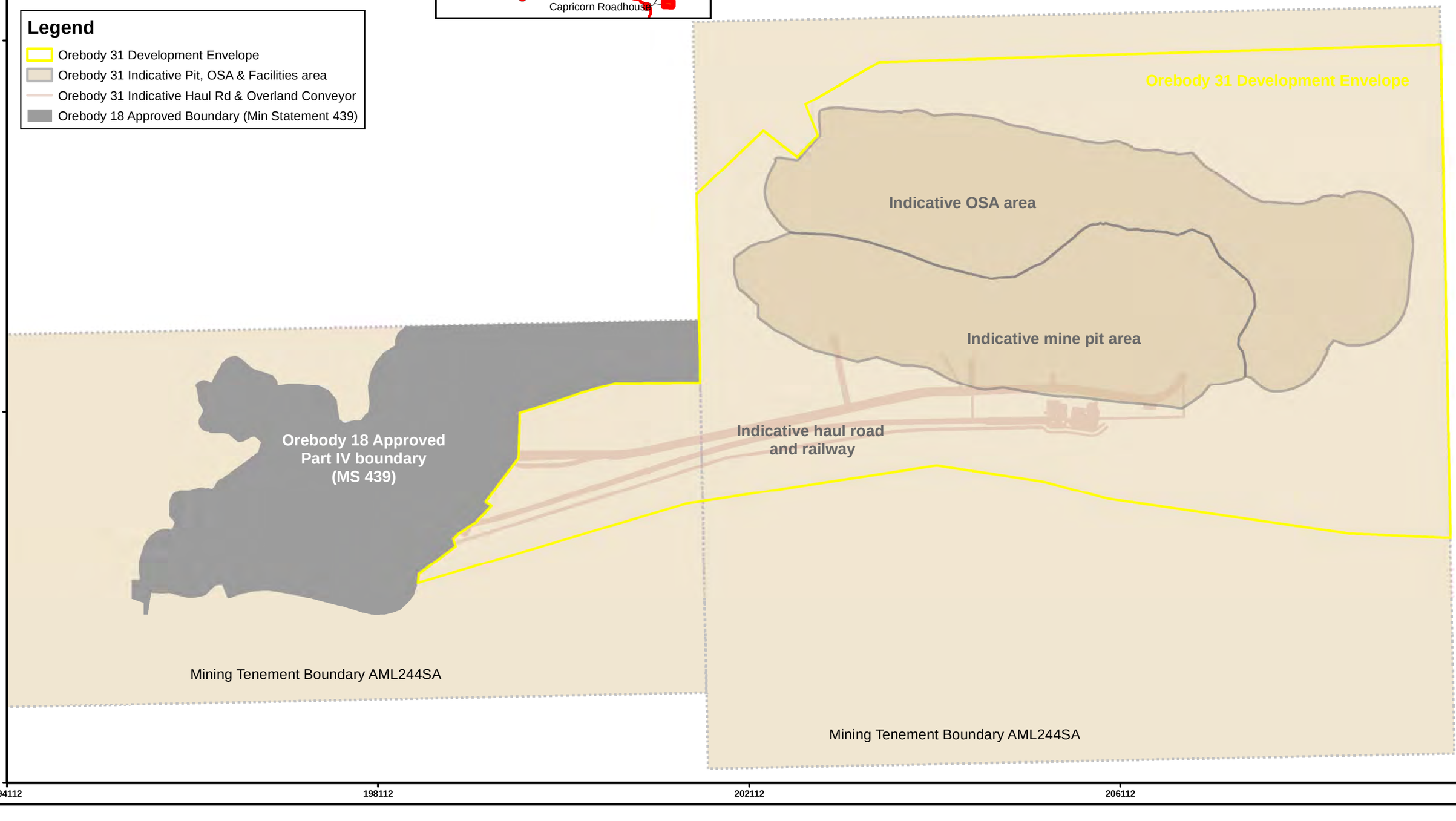
Orebody 31
Iron Ore Mine Project
Proposal Development Envelope (in accordance with EAG 1)

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 4**
Prepared: Env Approvals	Revision:0	
Centre: Perth	Date: 11 March 2015	Dwg:STJIM_OB31_004_RevA_0

Legend

- Orebody 31 Development Envelope
- Orebody 31 Indicative Pit, OSA & Facilities area
- Orebody 31 Indicative Haul Rd & Overland Conveyor
- Orebody 18 Approved Boundary (Min Statement 439)



194112 198112 202112 206112
7421225 7417225 7413225

2. General description of proposal

2.1 Proposal location

The Proposal area is located in the Pilbara region of WA (Figure 1) and is located approximately 40 km west of the Newman Township (Figure 2). The Proposal area is located approximately 8 km east of BHP Billiton Iron Ore's Orebody 18 Mine Hub. The Proposal area is located primarily on Mineral Lease ML244SA and therefore also subject to the same State Agreement legislation (Figure 3).

2.2 The Proposal

BHP Billiton Iron Ore proposes to develop and operate a new mine at Orebody 31 with the intent to extract 15 Million tonnes per annum (Mtpa) as a long-term replacement for Orebody 18, including a growth scenario of 30 Mtpa. These rates reflect bookends, as the orebody will be mined at a rate between 15 Mtpa and 30 Mtpa, as determined by the business plan and market conditions. Additional ore sources are required to provide sufficient blend feed in order to maintain the current level of iron ore production from the Eastern Pilbara mines. The Proposal involves abstraction of groundwater in advance of mining in order to allow campaign mining of iron ore and overburden below the groundwater table through conventional open cut mining methods.

2.3 Proposal description

In summary, the key components of the Proposal are listed below:

- campaign open pit mining at Orebody 31 at a base mining rate of 15 Mtpa with a growth mining rate of 30 Mtpa; and
- dewatering of the orebody aquifers and the preferential use of the water for operational purposes, with an option to manage the surplus volumes via means such as discharge to Ophthalmia Dam, re-injection, infiltration and surface discharge to local creek lines, as outlined in the Eastern Pilbara Surface Water Management Plan (refer Section 0).

2.3.1 Mining method

The Proposal involves campaign mining of iron ore and overburden through conventional open cut mining methods. Campaign mining involves drilling, blasting, and categorisation of blasted material into iron ore or waste rock.

2.3.2 Ore processing and transport

The Proposal will be supported by existing infrastructure and facilities at the Orebody 18 Mine Hub and the Wheelarra Hill (Jimblebar) Mine Hub. Processing and transportation of ore from the base case of 15 Mtpa will be handled at the Orebody 18 Mine Hub. However, additional plant such as crushers and overland conveyors, may be required as part of the Proposal in the future.

Approximately 600 million tonnes (Mt) of iron ore is estimated to be mined above and below the water table from the Proposal.

This Proposal considers two development scenarios for this resource. The first is a base scenario of 15 Mtpa as a long-term replacement for Orebody 18 and the second is a growth scenario of 30 Mtpa. These scenarios reflect bookends, because the Orebody will be mined at a rate between 15 Mtpa and 30 Mtpa, as determined by the business plan and market conditions.

For the base scenario (15 Mtpa), ore will be transported via road or an overland conveyor to existing ore handling facilities at the Orebody 18 Mine Hub, then railed to the Mount Whaleback Mine, where it will be blended with the ore produced by the Newman Joint Venture.

Under the growth scenario (30 Mtpa), 15 Mtpa will be transported to the existing ore handling facilities Orebody 18 Mine Hub with the remaining 15 Mtpa sent either to the Orebody 18 Mine Hub or to the Wheelarra Hill (Jimblebar) Mine Hub, either via road or future overland conveyor. Ore from both the

Orebody 18 Mine Hub and Wheelarra Hill (Jimblebar) Mine Hub will be railed to the Mount Whaleback Mine Hub and blended with ore produced by the NJV before transported via rail to Port Hedland.

2.3.3 Overburden management

Overburden will be stockpiled in approved Overburden Storage Areas (OSAs). Where possible, overburden may also be placed back into the pit void/s at either Orebody 31 or nearby Orebody 17 to assist in achieving closure objectives for various sites. Topsoil, where recoverable, will first be removed and placed into stockpile areas for later use in rehabilitation. The likelihood of encountering small volumes of potentially acid-forming (PAF) material is probable given the lithologies underlying the Orebody 31 pit (i.e. Mount McRae Shale). Technical studies to assess the likelihood of encountering PAF and a broader assessment of Acid and Metalliferous Drainage (AMD) risk have been carried out and are explained further in Section 7.

2.3.4 Mine dewatering, water use and disposal of surplus water

Groundwater abstraction (i.e. dewatering volumes and monitoring) is regulated by the Department of Water (DoW) licensing (5C licence process) and various groundwater operating strategies under the *Rights in Water and Irrigation Act 1914* (the RIWI Act).

The Proposal will require in-pit and ex-pit mine dewatering (i.e. groundwater abstraction) to facilitate dry mining conditions. A hydrodynamic trial, not part of the scope of this Proposal, has recently commenced to improve the understanding of the groundwater conditions and dewatering volume requirements.

During operations, the abstracted water will be preferentially used as a preference to supplement the water requirements for the Proposal mining operations. However, the dewatering volume is anticipated to be on average greater than the operational demand and surplus water will be produced.

Surplus water not utilised at the Proposal mining operations will be managed in accordance with the Eastern Pilbara Surplus Water Management Plan (BHP Billiton Iron Ore, 2015c). This plan will include the following hierarchy of management options:

- re-used onsite in mining operations;
- transferred to other nearby operations for use onsite;
- discharged via Ophthalmia Dam;
- reinjected back into the aquifer via a Managed Aquifer Recharge (MAR) programme; and
- discharged into the nearby environment.

In relation to the hierarchy of preferred options stated above, it is important to note that:

- Ophthalmia Dam discharge is the proposed primary surplus water management option for the majority of surplus water volume;
- Jimblebar Creek will provide a short term discharge option (up to three months) either as an operational back-up (if discharge to Ophthalmia is not operationally possible) or seasonal discharge during the wet season (between November and April);
- discharge on an ongoing basis to Jimblebar Creek is not part of this Proposal, but may be considered following baseline studies, hydrodynamic trial results and further assessment in future; and
- MAR into the dolomite formations and orebodies along the Ophthalmia Range is presented as an emerging option to be tested.

With regard to the discharge of surplus water into Ophthalmia Dam, BHP Billiton Iron Ore proposes to construct a short connecting pipeline from the Proposal down to tie into the approved pipeline corridor to Ophthalmia Dam, which was assessed and approved under the Jimblebar Iron Ore Project Ministerial Statement of Approval 857. This short connecting pipeline will be laid under an existing native vegetation clearing permit (CPS 3609/2), which negates the need for additional native vegetation clearing under this Proposal.

2.3.5 Proposal location and development envelope

In accordance with Figure 1 of the EPA's EAG 1 (EPA, 2012), a 'Development Envelope' has been compiled for this Proposal and is illustrated in Figure 4.

In 2013, BHP Billiton Iron Ore created boundaries around Orebody 31 known as 'study areas' and 'indicative disturbance boundaries', which were based on early concept designs. These boundaries were provided to a range of specialist consultants who were commissioned to carry out baseline surveys and/or identify environmental values that may be impacted and/or require protection (i.e. environmental impact assessments). This boundary terminology is therefore used in many of the supporting baseline survey and environmental impact assessment documents appended to this ERD.

Furthermore, selected figures throughout this ERD illustrate an 'Infrastructure Development Envelope' and a 'Mine and OSA Development Envelope', which were used by specialists to better assess and describe impacts in the two different areas as part of various environmental impact assessment studies. However, as part of this final ERD, BHP Billiton Iron Ore is seeking one outer Development Envelope to be included in the Key Characteristics Table as presented in Table 1.

BHP Billiton Iron Ore has used the results of specialist baseline surveys and impact assessment studies to inform and create a Proposal footprint. Following release of the *WA Environmental Offsets Guideline* in August (WA Government, 2014), the 'Mitigation Hierarchy' was also then applied to further reduce the footprint.

Throughout this ERD, the infrastructure corridor and the mine area are now collectively named the 'Development Envelope' in accordance with the terminology used in EAG 1 (EPA, 2012) and the individual areas are referred to as the 'Infrastructure Development Envelope' and 'Mine Development Envelope' where relevant in relation to explaining impacts.

During pre-referral discussions in October 2014, officers of the EPA advised that one Development Envelope would be acceptable and it was agreed that one Development Envelope would be progressed as part of the final Proposal (Figure 4). Note that the final Development Envelope boundary presented in Figure 4 has removed a small section of land on the north-western boundary, to reflect BHP Billiton Iron Ore's commitment to avoiding the majority of a new species of *Acacia.* sp East Fortescue.

2.3.6 Existing operations

BHP Billiton Iron Ore currently operates a number of iron ore mines and associated rail and port infrastructure within the Pilbara region of Western Australia. Current mining operations in proximity to the Proposal include:

- Newman Joint Venture hub, located approximately 40 km west of the Proposal, which consists of Mount Whaleback and Orebodies 29, 30 and 35;
- Orebody 17/18 Mine, located approximately 8 km west of the Proposal;
- Wheelarra Hill (Jimblebar) Mine, located approximately 5 km south of the Proposal; and
- Orebodies 23, 24 and 25, located approximately 30 km west of the Proposal.

The closest operations to the Proposal are the Orebody 17/18 Mine and Wheelarra Hill (Jimblebar) Mine (Figure 3).

2.3.7 Part IV approvals – Environmental Protection Act 1986

Orebody 17/18

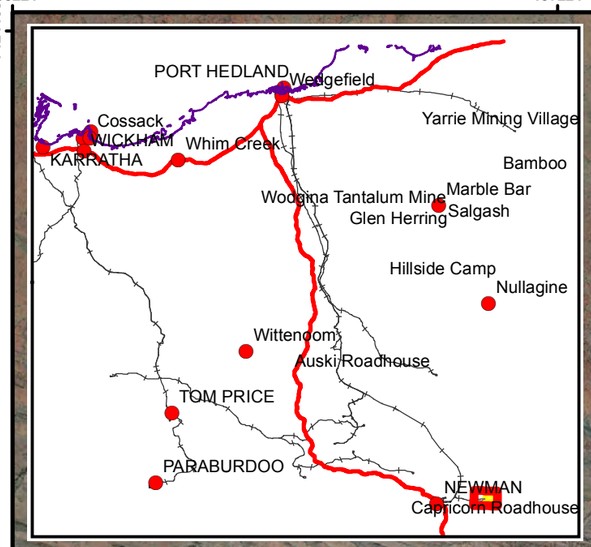
Orebody 18 was originally approved in 1997 under Part IV of the EP Act as Ministerial Statement of Approval 439. Since the original approval, two changes have been assessed and approved under Section 45C (S45C) of the EP Act. The first of these S45C approvals was granted in 2008 to allow for modification of pit areas and depths and the establishment of a maximum disturbance boundary (MDB) for the project. In 2013, the second S45C approval was granted to allow for minor increases in the disturbance areas for pits (to encompass Orebody 17 and OSAs). This second S45C approval also allowed for an increased overall area of disturbance within the MDB and several administrative changes to the key characteristics table for the purpose of improved reporting and compliance purposes. A third application under S45C of the EP Act was submitted to the EPA in late 2014 and has recently been approved. This approval permits the mining the balance of the Orebody 17 pit, construction of associated infrastructure (haul roads, OSAs and other stockpiles) and additional operational disturbance areas for the balance of the Orebody 18 Mine Hub pit. This recent approval includes all expected disturbance required for the life of the Orebody 17 and 18 deposits.

Wheelarra Hill (Jimblebar) Mine

The Wheelarra Hill (Jimblebar) Mine has historically been subject to five Ministerial Statement of Approvals, two of which have been superseded and three which are still applicable to this Mine. This project was formally known as McCamey's Monster when it was first approved in 1988 under Part IV of the EP Act as Ministerial Statement of Approval 22. In 1995, changes to this proposal under Section 46 (S46) of the EP Act were assessed and Ministerial Statement of Approval 385 was subsequently granted, permitting an expansion of the Mine. Both Statements 22 and 385 were superseded in 2005 when the Wheelarra Life of Mine proposal was assessed and Ministerial Statement of Approval 683 was granted, permitting an increase in the production rate to 12 Mtpa. In 2009, a second proposal was referred to the EPA to increase the mining rate at the Wheelarra Hill Mine from 12 Mtpa to 45 Mtpa, increase native vegetation clearing and construct a new rail spur, loop and train load-out facilities. This proposal was assessed and a second Ministerial Statement of Approval 809 was granted. In February 2011, a third proposal was referred to the EPA to extend the existing Wheelarra Hill open pits, develop the South Jimblebar and Hashimoto deposits, increase the rate of mining to 75 Mtpa and mine below the water table. This proposal was assessed and the third Ministerial Statement of Approval (857) was granted. Currently, all three statements (683, 809 and 857) are active and applicable to the Wheelarra Hill (Jimblebar) Mine.

2.3.8 Part V approvals – Environmental Protection Act – Native Vegetation Clearing Permits

BHP Billiton Iron Ore currently holds five Native Vegetation Clearing Permits (NVCPs) over parts of the Development Envelope for mineral exploration and production and associated activities (Figure 5). The permits have been issued by the Department of Mines and Petroleum (DMP) and are summarised in Figure 5 and Table 2.



0 1 2 3 4
Kilometers

Legend

- Orebody 31 Development Envelope
- CPS4875_1
- CPS4677_2
- CPS3609_2
- CPS2527_3
- CPS2296_2

bhpbilliton

ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

N

Orebody 31
Iron Ore Mine Project
Current Native Vegetation Clearing Permits

SCALE (A3): 1:45,000	DATUM: GDA94/MGA 50	**FIGURE 5**
Prepared: Env Approvals	Revision:0	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_005_RevA_0

CPS 4677/2
Mineral Exploration

CPS 2527/3
Mineral Exploration

CPS 2296/2
Mineral Exploration

CPS 3609/2
Mineral Production

CPS 4875/1
Mineral Exploration

193221 197221 201221 205221 209221

7424403 7420403 7416403 7412403

Table 2: BHP Billiton Iron Ore current NVCPs

Permit number	Purpose	Area of clearing approved (ha)	Total amount cleared to end of FY13	Area remaining	Expiry date
CPS 2296/2	Mineral exploration, hydrological investigations, geotechnical investigations, supporting infrastructure and associated activities	152	28.72	125.27	30 June 2028
CPS 2527/3	Mineral exploration, construction of access tracks and ammonium nitrate storage facility	50	29.63	22.31	30 September 2019
CPS 4677/2	Mineral exploration, hydrological investigations and associated infrastructure	200	56.41	101.36	31 December 2021
CPS 4875/1	Mineral exploration, hydrological and geotechnical investigations and associated activities	90	23.89	71.06	2 June 2022
CPS 3609/2	Mineral production*	83	19.87	63.13	8 May 2015
	Total	**575**	**149.64**	**383.13**	

* Application for permit extension submitted to DMP on 6 March 2015

2.3.9 Part V approvals – *Environmental Protection Act 1986* – Licence to Operate

BHP Billiton Iron Ore does not currently hold a Licence to Operate for the Proposal. Details of the closest 'Licence to Operate' approvals for adjacent operations are:

- Orebody 18 Licence Number: L8044/1987/2; and
- Wheelarra Hill (Jimblebar) Licence Number: L5415/1988/8

BHP Billiton Iron Ore will consult with the Department of Environment Regulation (DER) regarding this Proposal, following which, applications for Works Approvals will be submitted for all activities which trigger a prescribed premises requirement under Schedule 1 of the Environmental Protection Regulations 1987.

2.3.10 Rights in Water and Irrigation Act 1914

The Proposal will involve conventional open pit iron ore mining activities below water table and will require mine dewatering ahead of mining below the water table to facilitate dry mining conditions.

Groundwater abstraction (i.e. dewatering volumes and monitoring) will be managed by DoW licensing (5C licence) and a Groundwater Operating Strategy under the RIWI Act and implemented in accordance with the proposed Eastern Pilbara Surplus Water Resource Management Plan (BHP Billiton Iron Ore, 2015c) and the Eastern Pilbara Water Resource Management Plan (BHP Billiton Iron Ore, 2015d). BHP Billiton Iron Ore has consulted with the DoW regarding the proposed management plans.

2.3.11 Hydrodynamic Trial

While initial numerical modelling has been undertaken for this assessment, additional field work is required to more fully understand the groundwater conditions and dewatering volume requirements associated with the yearly mine plan for operation. A hydrodynamic trial, involving dewatering pumping, has recently commenced.

The hydrodynamic trial is not part of the scope of this Proposal. BHP Billiton Iron Ore has submitted a 5C Licence amendment application, including a Groundwater Operating Strategy, under the RIWI Act for approval to commence this trial. DER advised that approval to install infrastructure to undertake

the hydrodynamic trial and the subsequent operation of the trial will not be required under Part V of the EP Act.

For the operation of the trial and to evaluate the feasibility of creek discharge, determine the potential wetting front, the pumped water will be released to a tributary of Jimblebar Creek for a period of up to 18 months.

Baseline riparian vegetation and hydrological condition surveys have been undertaken for the area of Jimblebar Creek where the proposed discharge will be undertaken. During this trial, changes to the baseline conditions and potential impacts to the riparian vegetation and surrounding land use will be evaluated to determine whether creek discharge is feasible in the longer term.

2.4 Proposal tenure

The Proposal is located entirely within Mineral Lease ML244SA and subject to the *Iron Ore (Mount Newman) Agreement Act 1964* (Newman Agreement Act) (Figure 3). There is no underlying pastoral lease.

3. BHP Billiton Iron Ore management approach

3.1 Environmental management overview

BHP Billiton has developed a *Company Charter and Sustainable Development* Policy for its operations. The *Company Charter and Sustainable Development Policy* (BHP Billiton Iron Ore, 2013a) are guiding resources for maintaining an emphasis on health, safety, environment and community and clarifying a broader commitment to aspects of sustainability including biodiversity, human rights, ethical business practices and economic contributions at all BHP Billiton sites. To interpret and support the Company Charter and BHP Billiton Iron Ore's Sustainable Development Policy, BHP Billiton Iron Ore has developed an Environmental Governance Hierarchy, an Environmental Management System and is currently developing a series of Regional Management Strategies.

3.2 Environment Governance Hierarchy

BHP Billiton Iron Ore now operates under an Environmental Governance Hierarchy (Figure 6). The Environment Governance Hierarchy provides the processes and practices that enable BHP Billiton Iron Ore to achieve its environmental objectives, reduce its environmental impacts and increase its operating efficiency. It enables environmental legal compliance to be undertaken and audited and provides for continual improvement in environmental performance.

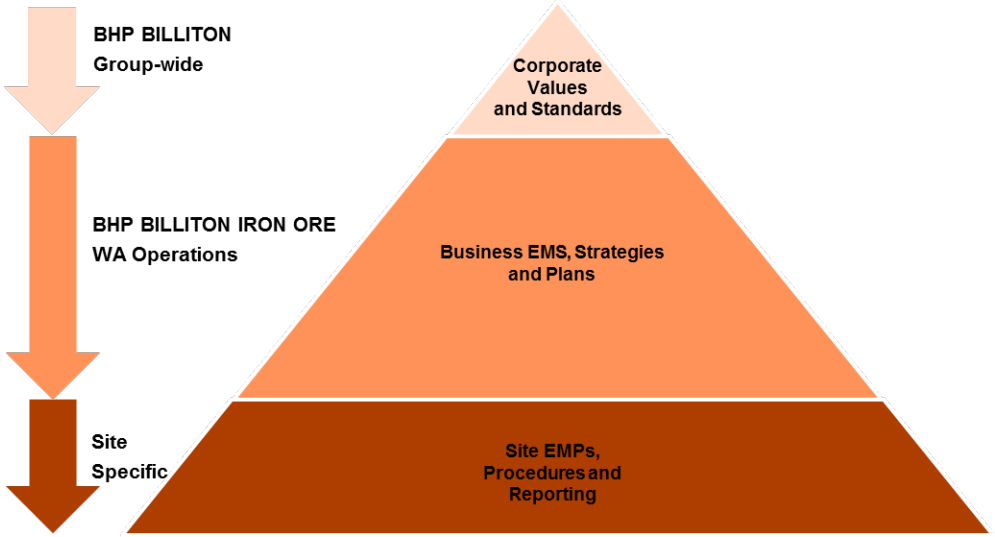


Figure 6: BHP Billiton Iron Ore Environmental Governance Hierarchy

As shown in Figure 6, BHP Billiton Iron Ore's environment governance hierarchy is broadly comprised of three tiers, representative of BHP Billiton Iron Ore's different levels of management – BHP Billiton (corporate level), BHP Billiton Iron Ore (Business Unit level) and site specific (operations level) – and reflective of BHP Billiton's top-down approach to environmental management across the Group.

At the corporate, or Group level, the fundamental values that underpin all aspects of BHP Billiton's activities are enshrined within BHP Billiton's Corporate Charter – *Our BHP Billiton Charter* (BHP Billiton, 2013b) – which are translated into measureable minimum performance standards in BHP Billiton's Group Level documents (GLDs). These standards are mandated across all BHP Billiton Business Units (including BHP Billiton Iron Ore) and form the foundation for developing and implementing environmental management systems at the Business Unit level. BHP Billiton's GLD.009 (Environment) (BHP Billiton, 2014a) is the key reference for environmental management across the Group.

At the Business Unit level, BHP Billiton Iron Ore's environmental management system, environment strategy and regional plans collectively describe the environmental outcomes BHP Billiton Iron Ore is committed to for the Pilbara region and the mechanisms through which BHP Billiton Iron Ore will meet these outcomes consistent with the GLDs and other internal and external requirements. BHP Billiton Iron Ore's Business Level Documents (BLDs) and Sustainability Policy are critical environmental governance documents, which translate the general Group-wide GLD standards into overarching requirements that are relevant and specific to BHP Billiton Iron Ore's operations.

BHP Billiton Iron Ore's Annual Environmental Report (AER) is the Company's primary document for reporting its overall annual environmental compliance performance. In addition to compliance reporting, BHP Billiton reports its Group-wide sustainability performance in the BHP Billiton Annual Sustainability Report.

3.3 Environmental Management System

The BHP Billiton Iron Ore Environmental Management Framework provides the processes and practices that enable the business to achieve its environmental objectives, reduce its environmental impacts and increase its operating efficiency. The Environmental Management Framework enables environment legal compliance to be easily undertaken and audited and provides for continual improvement in environmental performance.

A key component of the environmental management framework is the environmental management system, which is certified to Australian and New Zealand Standard AS/NZS ISO 14001 (Standards Australia, 2004) and is aligned with BHP Billiton's Corporate Charter.

3.4 Western Australia Iron Ore Environment Strategy and Regional Plans

BHP Billiton Iron Ore has developed standard business approaches to manage key environmental aspects. These standard business approaches form elements of the Western Australian Iron Ore Environment Strategy, the elements are:

- Pilbara Water Resource Management Strategy;
- Land And Biodiversity Strategy;
- Air Quality Strategy; and
- Western Australian Iron Ore Closure and Rehabilitation Strategy.

These documents describe how BHP Billiton Iron Ore will manage the changes resulting from BHP Billiton Iron Ore mining in the Pilbara region on the key receiving receptors (environment, social and third-party operations). The documents that demonstrate these approaches will be included in the BHP Billiton Iron Ore Pilbara Expansion Public Environmental Review Strategic Proposal submission in 2015. These standard business approaches have guided the development of management measures associated with this Proposal.

3.4.1 Regional Management Plans

To detail and implement the standard business approaches described in the Western Australia Iron Ore Environment Strategy, BHP Billiton Iron Ore has drafter regional management plans to support these key areas. The management plans that are applicable to the implementation of the Proposal are:

- Eastern Pilbara Water Resource Management Plan (Appendix N);
- Regional Land And Biodiversity Management Plan (Appendix L); and
- Orebody 31 Mine Closure Plan (Appendix P).

3.4.2 Site Specific Environment Management Plans

Site-specific management, monitoring and reporting is undertaken in a manner consistent with the above outcomes, and in accordance with internal and external requirements, via site-based Environmental Management Plan (EMP), procedures and registers.

3.4.3 Project Environmental and Aboriginal Heritage Reviews

To support these management documents BHP Billiton Iron Ore has an internal Project Environmental and Aboriginal Heritage Review (PEAHR) Procedure. The purpose of the procedure is to manage implementation of environmental, Aboriginal heritage, land tenure and legal commitments prior to and during land disturbance. All ground disturbance activities will meet the requirements of the PEAHR procedure, all relevant legislative and regulatory requirements, the BHP Billiton Iron Ore's Sustainable Development Policy, industry standards, and codes of practice.

4. Stakeholder consultation

BHP Billiton Iron Ore's commitment to community engagement is articulated in the company's Code of Business Conduct, whereby:

> *Our aim is to be the company of choice, valued and respected by the communities in which we operate. We do this by engaging regularly, openly and honestly with people affected by our operations, and by taking their views and concerns into account in our decision-making.*

To support this commitment, BHP Billiton Iron Ore has comprehensive company standards and dedicated resources to ensure our activities are underpinned by continuous community engagement and feedback.

BHP Billiton Iron Ore has identified stakeholders with diverse interests in this Proposal. Based on an analysis of the Proposal location, effected land users and potential impacts and risks, BHP Billiton Iron Ore has commenced consultation with the stakeholders as outlined in Table 3.

Table 3: Details of stakeholder consultation

Stakeholder	Date	Topic/Issue Raised	Proponent response / outcome
Department of Parks and Wildlife (DPaW)	Phone call discussion with Murray Baker on 3 July 2014	Potential biodiversity impacts. New species of Acacia.	DPaW advised that no pre-referral meeting is required and that the DPaW will review the Proposal as part of the standard Decision-Making Authority consultation with the OEPA. (*note that this was prior to advice from the OEPA during November 2014 in which recent changes to consultation were outlined. These being that the OEPA are now seeking a technical level of consultation with stakeholders prior to the formal submission of a referral package*).
DPaW	Phone discussion with Sandra Thomas on 1 December 2014 regarding new EPA requirements for pre-referral consultation with regulators.	BHP Billiton Iron Ore advised the DPaW that the EPA is seeking technical comments on potential impacts to a new species of *Acacia* sp. *East Fortescue* one stygofauna singleton.	BHP Billiton Iron Ore committed to providing the DPaW with a draft referral package for review.
DPaW	A draft referral package including relevant environmental impact assessment studies was provided to the DPaW (Sandra Thomas) on 19 December 2014.	BHP Billiton Iron Ore sought technical comments from the DPaW and also sought opportunity for a meeting to further discuss if required, BHP Billiton Iron Ore also committed to submit a copy of a draft management plan to address impacts on *Acacia* sp. *East Fortescue* in early 2015.	The DPaW confirmed receipt of draft referral package in January 2015.
DPaW	A draft Land and Biodiversity Management Plan was submitted to the DPaW (Sandra Thomas and Murray Baker) on 19 February 2015.	The draft plan outlines BHP Billiton Iron Ore's commitments in addressing the potential impacts on a new species of *Acacia* sp. East Fortescue. In addition to the plan, further technical details on *Acacia* sp. *East Fortescue* were provided to the DPaW in tabular format to address the DPaWs preferred method of assessing impacts on conservation significant species.	BHP Billiton Iron Ore advised that all outstanding information has now been submitted to the DPaW as requested to allow technical assessment to commence.

Stakeholder	Date	Topic/Issue Raised	Proponent response / outcome
DPaW	The DPaW provided written response to BHP Billiton Iron Ore on 27 February 2015.	The DPaW has provided comments and has recommended regional targeted surveys on *Acacia* sp. East Fortescue.	BHP Billiton Iron Ore has committed to carrying out regional targeted surveys on *Acacia* sp. East Fortescue. These surveys are currently being commissioned and this commitment is included in the new Regional Land and Biodiversity Management Plan.
DER – Regional offices	BHP Billiton Iron Ore submitted an Application Enquiry Form on 11 September 2014 under Part V of the EP Act regarding a proposed Hydrodynamic Trial, which will support the long-term surplus water management options being sought in this ERD.	The Proposed Hydrodynamic Trial, which proposes short-term discharge to Jimblebar Creek. Acknowledged that the trial does not form part of this Proposal, however, will inform the long-term options being sought in this ERD.	The DER advised that a Works Approval is not required for trial activities, which are being pursued to inform exploratory scientific studies, prior to development of a mining project. However, a Works Approval and licence will be required once Part IV approval is granted, triggering a prescribed premises requirement relating to a mining operation.
DOW	BHP Billiton Iron Ore coordinated a site visit on 7-9 July 2014 to visit a number of its Pilbara operations. Gary Humphreys, Penny Wallace-Bell, Tasnim Poligadu and Hermes Medina from the DoW attended.	BHP Billiton Iron Ore's proposed Eastern Pilbara Water Resource Management Plan, operation and management of Ophthalmia Dam, regional surplus water management and more specifically, Orebody 31 Proposal was also discussed and the site of the proposal was visited.	The DoW was supportive of the catchment-style approach to managing surplus water.
DOW	BHP Billiton Iron Ore provided a draft referral package including relevant technical and modelling studies, a draft Eastern Pilbara Water Resource Management Plan and a draft Eastern Pilbara Surplus Water Management Plan to the DOW on 12 February 2015.	BHP Billiton Iron Ore sought technical comments from the DOW and also sought the opportunity for a meeting to further discuss if required.	BHP Billiton Iron Ore advised that all outstanding information has now been submitted to the DOW to allow technical assessment to commence.
OEPA	Meeting on 27 February 2014 and 23 July 2014 with Sally Bowman and Peter Walkington.	BHP Billiton Iron Ore provided an overview of the preliminary key environmental impacts, conclusion of the impact assessment and discussion regarding rehabilitation and closure mechanisms. The OEPA sought an understanding of project scope, key characteristics and proposed native vegetation clearing.	BHP Billiton Iron Ore outlined preliminary key factors and timeframe for remainder of EIA studies as well as the anticipated submission timeframe. BHP Billiton Iron Ore committed to further reviews of the proposed native vegetation clearing allocation and consider further opportunities to reduce the proposed allocation.

Stakeholder	Date	Topic/Issue Raised	Proponent response / outcome
	Meeting on 22 October 2014 with Sally Bowman, Matt Spence and John Guld.	BHP Billiton Iron Ore provided the OEPA with an update on the environmental impact assessment results and a revised smaller Development Envelope. Proposed surplus water discharge to creek was discussed. The OEPA enquired about the management strategy for this.	BHP Billiton Iron Ore advised that the Proposed clearing allocation has been reduced by 25% to meet API LOA requirements and to address recently published Offsets requirements. BHP Billiton Iron Ore committed to draft and submit an Eastern Pilbara Surplus Water Management Plan with the final ERD as well as clearly define that the proposed discharge will only be for a maximum of three months during the wet season as contingency should other options not be available.
	BHP Billiton Iron Ore provided a draft version of the ERD for the Proposal to officers of the OEPA for an informal review and advice on 6 November 2014 following a request from officers of the OEPA.	BHP Billiton Iron Ore received Part 1 of the preliminary advice from the OEPA on 19 November 2014 regarding the structure of the ERD, the key characteristics, pre-referral consultation with relevant agencies, preliminary key factors, environmental offset metrics and other minor comments. BHP Billiton Iron Ore received further advice regarding flora and vegetation and terrestrial fauna from the OEPA on 6 January 2015, following further review of the Proposal supporting technical studies by officers of the OEPA. The OEPA also provided advice from the WA Herbarium regarding the proposed name for a new species of Acacia recorded within and surrounding the Development Envelope (*Acacia* sp. East Fortescue).	BHP Billiton Iron Ore advised the OEPA that the ERD would be updated based on the advice received. BHP Billiton Iron Ore postponed the Proposal submission date from late 2014 to March 2015 to address the new OEPA pre-referral Regulator technical consultation requirements.

Stakeholder	Date	Topic/Issue Raised	Proponent response / outcome
	Meeting on 27 January 2015 with Sally Bowman, Matt Spence and John Guld	This meeting focused on the revised assessment process for API-A proposals, requirements for pre-referral technical consultation with regulators, a new species of *Acacia* sp. *East Fortescue* recorded within the Development Envelope, survey methodology for short-range endemic invertebrate fauna and timeframes for surplus water discharge to Jimblebar Creek.	BHP Billiton Iron Ore explained its pre-referral timeframe in light of the new API-A process. BHP Billiton Iron Ore advised that an Eastern Pilbara Surplus Water Management Plan has been drafted to address OEPA comments raised during previous meeting. BHP Billiton Iron Ore has also provided additional information in this ERD regarding the proposed short-term seasonal discharge to Jimblebar Creek.
	BHP Billiton Iron Ore provided further information to the OEPA on 10 February 2015 regarding short-range endemic invertebrate fauna and flora.	BHP Billiton Iron Ore provided a range of additional technical information and mapping in response to questions raised around the potential links between short-range endemic fauna and a new species of *Acacia* sp. *East Fortescue*. BHP Billiton Iron Ore also committed to additional regional targeted surveys for *Acacia* sp. *East Fortescue* and advised this commitment will be included in the Regional Land and Biodiversity Management Plan, which will is being proposed for conditioning as part of this Proposal.	The OEPA advised it was satisfied with the additional technical supporting information regarding short-range endemic fauna. The OEPA also acknowledged BHP Billiton Iron Ore's commitment to additional targeted regional surveys for *Acacia* sp. *East Fortescue*.
DMP	Meeting on 31 July 2014 with Danielle Risbey	BHP Billiton Iron Ore provided an overview of the Proposal and proposed waste management. BHP Billiton Iron Ore committed to engaging the DMP in further meetings as the draft plans progress.	The DMP concurred that it makes sense from a closure planning and implementation perspective, to consider waste from a regional perspective.
	Discussion on 3 December 2014 with Danielle Risbey	This meeting focused on rehabilitation across all current and future BHP Billiton Iron Ore hubs, including Orebody 31. There was discussion of progress to date on achievements and challenges in the development of	BHP Billiton Iron Ore committed to reporting progress in the BHP Billiton Iron Ore Annual Environmental Review documents on an annual basis.

Stakeholder	Date	Topic/Issue Raised	Proponent response / outcome
		Ecological Completion Criteria and alignment on new target date for defining agreed draft criteria, possibly 2020.	
	Discussion on 29 January 2015 with Danielle Risbey.	This meeting provided the DMP with a general update on closure planning for the Orebody 18 Mine Hub, Eastern Ridge and the proposed Orebody 31 deposit. Discussion concerning Orebody 31 focused on the new EPA assessment process and requirement for technical consultation of a draft MCP with DMP prior to formal submission of a Referral to the EPA. BHP Billiton Iron Ore outlined its proposed Integrated Closure Strategy for Orebody 31 and the existing Orebody 18 Mine Hub as part of its adaptive management approach to mine void closure.	BHP Billiton Iron Ore committed to providing the DMP with technical briefings on key closure aspects (AMD and Hydrological impacts) as part of addressing technical consultation. The DMP agreed to an update cycle of five years for a proposed Orebody 31 Mine Closure Plan, given the long life of project. The DMP acknowledged there is an opportunity to integrate the existing Orebody 18 Mine Closure Plan with the proposed Orebody 31 Mine Closure Plan in future.
DMP	A draft Orebody 31 Mine Closure Plan and a copy of the draft ERD was provided to the DMP on 12 February 2015.	The draft Orebody 31 Mine Closure Plan provides an overview of how BHP Billiton Iron Ore intends to address closure planning for the Orebody 31 Iron Ore Project, as well as waste management from a regional perspective (opportunities for a hub-based approach with the Orebody 18 Mine Hub).	BHP Billiton Iron Ore sought comments from the DMP and the opportunity to meet to address any questions or comments from the DMP.
Department of State Development	Regular have been provided to the DSD, most recently 7 October 2014.	Update on scope and timing of referral and State Agreement proposal.	No concerns.

5. Environmental studies and survey effort

A number of environmental studies, investigations and surveys have been undertaken to inform this environmental referral document. Table 4 details the studies, investigations and surveys undertaken to date, the study area covered, the guidelines referred to and any limitations of the study.

Table 4: Environmental studies and surveys

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
Flora and Vegetation (including Groundwater Dependent Vegetation)	Onshore Environmental Consultants (2015)	*Orebody 31 Flora and Vegetation Environmental Impact Assessment*	This report was compiled in 2014 and 2015 and covered the entire Development Envelope and wider tenement boundary incorporating various studies as listed below. This environmental impact assessment study was carried out to review the Proposal footprint against a range of baseline survey data captured in an extensive range of reports dating back to 1996. The below reports are only those reports, which overlap all or parts of the Development Envelope, however this EIA study (refer Appendix B) provides information on all regional studies which were reviewed.	EPA Guidance Statement No. 51. *Terrestrial Flora and Vegetation Surveys for Environmental Impact in Western Australia* (EPA, 2004a) EPA Guidance Statement No. 2. Environmental Protection of Native Vegetation in Western Australia: Clearing of native vegetation with particular reference to agricultural areas (EPA, 2000a) Consultation with DPaW as per details provided in Table 3.	Appendix B
	Onshore Environmental Consultants (2014a)	*Jimblebar Creek Riparian Vegetation Baseline Survey*	8-12 September 2014. Targeted Flora Survey of Riparian Vegetation along Jimblebar Creek.	Guidance documents - as above This baseline survey covered a 20 km length of Jimblebar Creek and an additional 81 relevé sites were also assessed.	Consolidated in Appendix B
	Onshore Environmental Consultants (2014b)	*Orebody 31 / Wheelarra Hill North Targeted Flora Survey*	24-30 April 2014. Targeted Flora Survey. Overlays the entire Development Envelope boundary.	As above	Consolidated in Appendix B

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
	Onshore Environmental Consultants (2014c)	*Orebody 31 Level 2 Flora and Vegetation Survey*	1-14 October 2013. Level 2 Survey. Overlays the northern-most three quarters of the tenement boundary.	As above	Consolidated in Appendix B
	Onshore Environmental Consultants (Onshore 2014d)	*Orebody 18 to Orebody 31 Proposed Infrastructure Corridor Targeted Flora Survey*	13 September 2014. Targeted Flora Survey. Overlays the western corridor extension of the tenement boundary.	As above	Consolidated in Appendix B
	Syrinx Environmental (2011)	*Orebody 31 Flora and Vegetation Assessment*	Two season survey. First season from 10-15 February and second season from 9-13 March 2011. Overlays the northern-most three quarters of the tenement boundary.	As above	Consolidated in Appendix B
	Syrinx Environmental (2012)	*Wheelarra Hill North Level 2 Flora and Vegetation Assessment*	Two season survey. First season from 17-29 May 2011 and second season from 4-12 October 2011. Overlays the lower half of the Development Envelope and tenement boundary	As above	Consolidated in Appendix B
	Onshore Environmental (2013)	*Orebody 17/18 Derived Vegetation Association Mapping Report*	Desktop survey in 2013. Overlaps a small area of OB17/18 located directly northwest of the tenement boundary.	As above	Consolidated in Appendix B
	ENV Australia (2006)	*Orebody 18 Flora and Vegetation Assessment Phase 2*	25 July – 2 August 2006. Overlaps the western part of the Development Envelope.	As above	Consolidated in Appendix B

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
	GHD Australia (2008)	*Mesa Gap Biological Survey*	September / October 2007. Overlaps the south-west corner of the tenement boundary.	As above	Consolidated in Appendix B
Landforms	360 Environmental Consultants (2014)	*Orebody 31 Landscape and Visual Impact Assessment*	This study was completed in 2014. It included data captured from pre-determined vantage points in the vicinity of the Proposal area. It also utilised modelling to assess the impact on viewsheds and landscape character types in the Eastern Pilbara region.	EPA Guidance Statement No. 6 *Rehabilitation of Terrestrial Ecosystems* (EPA, 2006a) *Guidelines for Preparing Mine Closure Plans* (DMP and EPA, 2011) EPA Guidance Statement No, 33 *Environmental Guidance for Planning and Development* (EPA, 2008a)	Appendix C
Subterranean Fauna	Bennelongia (2014a)	*Subterranean Fauna Environmental Impact Assessment at Orebody 31*	This study was completed in 2014. This was a desktop environmental impact assessment review of potential impacts to stygofauna and troglofauna within the indicative Orebody 31 pit area and the regional drawdown footprint. This environmental impact assessment study was carried out in Perth to review of the Proposal footprint against the baseline survey data. In relation to stygofauna, the pit and groundwater drawdown area is considered the Proposal footprint.	EPA Environmental Assessment Guideline 12. *Consideration of subterranean fauna in environmental impact assessment in Western Australia* (EPA, 2013c) EPA Guidance Statement No. 54a. *Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia* (EPA, 2007a) Consultation with DPaW as per details provided in Table 3	Appendix D
	Bennelongia (2014b)	*Subterranean Fauna Survey at Orebody 19 and Orebody 31*	Three round sampling: Sample 1: March – May 2013 Sample 2: June – August 2013 Sample 3: September – October 2013 This study utilised drilling holes from exploration programmes in the indicative	EPA Environmental Assessment Guideline 12. *Consideration of subterranean fauna in environmental impact assessment in Western Australia* (EPA, 2013c) EPA Guidance Statement No. 54a. *Sampling Methods and Survey*	Consolidated in Appendix D

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
			Orebody 31, 18, 19, 34 and 39 resources.	*Considerations for Subterranean Fauna in Western Australia* (EPA, 2007a)	
Terrestrial Environmental Quality	Earth Systems (2014)	*Preliminary Acid and Metalliferous Drainage Risk Assessment for the Orebody 31 Deposit*	This study was completed in 2014. This study reviewed the potential impacts to key environmental receptors from potentially acid-forming materials within the Orebody 31 deposit.	Commonwealth Department of Industry, Tourism and Resources [DITR] (2007) *Leading Practice Sustainable Development Program for the Mining Industry - Managing Acid and Metalliferous Drainage* International Network for Acid Prevention (2012) *Global Acid Rock Drainage Guide* (GARD Guide) Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000), Australian Water Guidelines for Fresh and Marine Waters and its updates Consultation with DMP as per details provided in Table 3	Appendix E
Terrestrial fauna (including short-range endemics)	Biologic (2014a)	*Orebody 31 Vertebrate Fauna Environmental Impact Assessment*	This study was completed in 2014. This study was an environmental impact assessment review of potential impacts to terrestrial vertebrate fauna within the indicative Orebody 31 Development Envelope.	EPA Position Statement No. 3, Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002a) EPA Guidance No. 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004b) Consultation with DPaW as per details provided in Table 3.	Appendix F
	Biologic (2014b)	*Orebody 31 Vertebrate Fauna Survey*	1 season with trapping in 2012 Overlaps most of eastern part of the	As above	Consolidated in Appendix F

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
			Development Envelope		
	ENV (2012)	*Wheelarra Hill North Fauna Assessment*	2 seasons with trapping in 2012 Overlaps the southern part of the Development Envelope	As above	Consolidated in Appendix F
	ENV (2011)	*Orebody 31 Fauna Assessment*	1 season with trapping in 2011 Overlaps the eastern part of the Development Envelope.	As above	Consolidated in Appendix F
	GHD (2008)	*Mesa Gap Biological Survey*	1 season with no trapping in 2008 Overlaps the majority of the Development Envelope	As above	Consolidated in Appendix F
	ENV (2007)	*Orebody 18 Fauna Assessment Phase II*	1 season with no trapping in 2007 Overlaps the western part of the Development Envelope	As above	Consolidated in Appendix F
	Ecologia (1995)	*Orebody 18 Biological Assessment Survey*	1 season with no trapping in 1995 Overlaps the western part of the Development Envelope	As above	Consolidated in Appendix F

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
	Biologic (2014c)	*SRE EIA report*	This study was completed in 2014. This study was an environmental impact assessment review of potential impacts to short range endemic invertebrate fauna within the Proposal Development Envelope and wider regional area.	EPA Position Statement No. 3. *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA, 2002a) EPA Guidance No. 56. *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b) EPA Guidance No. 20 *Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia* (EPA, 2009a)	Appendix G
	Biologic (2014d)	*Orebody 19 and 31 short range endemic survey*	Two season survey. Season 1: March 2013 Season 2: September 2013 Overlaps the entire Development Envelope	As above	Consolidated in Appendix G
	Rapallo (2011)	*Wheelarra Hill North short range endemic survey*	May 2011. Overlaps the southern part of the Development Envelope.	As above	Consolidated in Appendix G

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
Hydrological Processes	RPS Aquaterra (2014a)	*Orebody 31 Surface Water Impact Assessment*	This study was completed in 2014. This study was an environmental impact assessment review of potential impacts to surface water from the Proposal.	*Operational Policy No.1.02 Policy on water conservation/efficiency plans (DoW, 2009)* Operational Policy No. 5.08 *Use of Operating Strategies in the water licensing process* (DoW, 2011) *Western Australia Water in Mining Guideline* (DoW, 2013a) *Pilbara Regional Water Plan 2010-2030* (DoW, 2012) *Pilbara Groundwater Allocation Plan,* (DoW, 2013b) *Pilbara Regional Water Supply Strategy: a long-term outlook of water demand and supply* (DoW, 2013c) *Use of Mine Dewatering surplus,* (DoW, 2013d). Consultation with DOW as per details provided in Table 3.	Appendix H
	BHP Billiton Iron Ore (2015a)	*Orebody 31 Hydrogeological Impact Assessment*	This study was completed in 2015. This study consolidated the outcomes of three modelling studies which are: • Orebody 31 Dewatering Predictions (BHP Billiton Iron Ore, 2014b); • Regional Numerical Modelling of Orebody 31 Summary Report (RPS Aquaterra, 2015); and • Memorandum - Ethel Gorge Assessment of the Impact of Orebody 31 Dewatering Discharge into Ophthalmia Dam – Groundwater and Salt Balance Modelling (RPS	As above	Appendix I

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
			Aquaterra, 2014a)		
Inland Waters Environmental Quality	RPS Aquaterra (2014b)	*Orebody 31 Surface Water Impact Assessment*	This study was completed in 2014. This was a desktop environmental impact assessment review of potential impacts to surface water from the Proposal.	Water Quality Protection Guidelines – Mining and Mineral processing *Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh* management area – Section 16e advice (EPA, 2013d) Limitation: This report was carried out based on the mine plan at the time the report was commissioned. As the mine plan evolves, surface water infrastructure will be revised and updated as required. Consultation with DoW as per details provided in Table 3.	Appendix H
	BHP Billiton Iron Ore	*Orebody 31 Hydrogeological Impact Assessment*	This study was completed in 2015. This study consolidated the outcomes of three modelling studies which are: • Orebody 31 Dewatering Predictions (BHP Billiton Iron Ore, 2014); • Regional Numerical Modelling of Orebody 31 Summary Report (RPS Aquaterra, 2015); and • Memorandum - Ethel Gorge Assessment of the Impact of Orebody 31 Dewatering Discharge into Ophthalmia Dam – Groundwater and Salt Balance Modelling (RPS Aquaterra,	Guidance as above. Limitations: The main uncertainties associated with the model are: • Lack of any long term transient calibration data in the OB31 area commensurate with long term mine dewatering. • Uncertainty over hydraulic connection between the orebody aquifers and the regional aquifers through the Mt McRae Shale. • Uncertainty in the hydraulic characteristics of the orebody stratigraphic along strike (to the	Appendix I

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
			2014b).	west). • Assumptions inherent in the mine plan (i.e. rate, sequence, timing and depth of pushbacks). • Assumptions in closure settings (particularly backfill properties and evaporation rates). Consultation with DoW as per details provided in Table 3.	
Air Quality and Atmospheric Gases	Pacific Environment Limited (2014)	*Orebody 31 Air Quality Impact and Greenhouse Gas Assessment*	This study was completed in 2014. This study utilised modelling to assess air quality based on a range of potential development scenarios based on no dust controls, standard dust controls and leading dust controls at selected sensitive receptors within the regional area.	*EPA Guidance Statement No. 12, Minimising Greenhouse Gas Emissions* (EPA, 2002b).	Appendix J
Amenity	360 Environmental (2014)	*Orebody 31 Landscape and Visual Impact Assessment*	This study was completed in 2014. It included data captured from pre-determined vantage points in the vicinity of the Proposal area. It also utilised modelling to assess the impact on viewsheds and landscape character types.	*EPA Guidance Statement No. 33, Environmental Guidance for Planning and Development* (EPA, 2008a). *Visual Landscape Planning in Western Australia*: A Manual for Evaluation, Assessment, Siting and Design (DPI, 2007).	Appendix C
Heritage		*A number of archaeological and ethnographical surveys have been carried out.*	Surveys have covered the entire Development Envelope.	*EPA Guidance Statement No. 41. Assessment of Aboriginal Heritage* (EPA, 2004c) Consultation with the Traditional Owners (*Nyiyaparli*) as per details provided in Table 3.	
Human Health	SVT (2014)	*Orebody 31 Noise Environmental Impact*	This study was completed in 2014. This study utilised modelling to assess a	*Environmental Assessment Guideline No. 13 for consideration of*	Appendix K

Factor	Consultant	Survey/Investigation Name	Study area, type and timing	Study standard/guidance and limitations	Appendix
		Assessment	range of potential development scenarios and determine noise levels at selected sensitive receptors within the regional area.	*environmental impacts from noise* (EPA, 2014)	
Rehabilitation and Decommissioning	Earth Systems (2014)	*Preliminary Acid and Metalliferous Drainage Risk Assessment for the Orebody 31 Deposit*	This study was completed in 2014. This study reviewed the potential impacts to key environmental receptors from potentially acid-forming materials within the Orebody 31 deposit.	*EPA Guidance Statement No. 6 Rehabilitation of Terrestrial Ecosystems (EPA, 2006a)* *Guidelines for Preparing Mine Closure Plans (DMP and EPA, 2011)* *Leading Practice Sustainable Development Program for the Mining Industry - Managing Acid and Metalliferous Drainage (DITR, 2007)* *EPA involvement in mine closure, (EPA, 2013e)*	Appendix E
Offsets (integrating factor)	n/a	Studies are currently underway to support a business-wide approach to offsets during 2015.	BHP Billiton Iron Ore has applied the 'Mitigation Hierarchy' to the Proposal footprint and Development Envelope during 2014 and 2015.	*WA Environmental Offsets Policy* (EPA, 2011) *WA Environmental Offsets Guidelines* (WA Government, 2014) *Environmental Protection Bulletin No. 1 - Environmental Offsets – Biodiversity* (EPA, 2010b) *WA environmental offsets template*	Appendix O

6. Assessment of preliminary key environmental factors

6.1 Preliminary key environmental factors

To identify the likely preliminary key environmental factors, BHP Billiton Iron Ore undertook a preliminary risk assessment. Following this, environmental impact studies were commenced to quantify the potential environmental impacts and determine the significance of the environmental factors identified in the preliminary risk assessment against the EPA Significance Framework (EPA, 2013b). Following the completion of these studies, the results of the preliminary risk assessment were reviewed and the potential key environmental factors, as defined in EAG 8 (EPA 2013d), were determined. A summary of the preliminary key environmental factors applicable to this Proposal is provided in Table 5.

Table 5: Preliminary key environmental factors

EPA Factor	Environmental Aspect	Impact
Flora and Vegetation	Clearing of 2,500 ha of vegetation in 'Good to Excellent' condition. Clearing of a new species of *Acacia* sp. *East Fortescue* recorded within the Development Envelope.	Reduction in flora and vegetation species density and diversity in the Hamersley and Fortescue IBRA sub-regions. Clearing of 72 (13.48%) of all known and recorded individuals of *Acacia* sp. East Fortescue.
Subterranean Fauna	Groundwater level drawdown through pro-active mine dewatering. Surplus water quality management	Potential for regional drawdown to extend 22 km into regional aquifer and 0.01 % into the Ethel Gorge TEC buffer area. Quality of mine dewater released into Ophthalmia Dam may have the potential to slightly increase the salinity of the Dam and the Ethel Gorge TEC via infiltration.
Hydrological Processes	Groundwater level drawdown through pro-active mine dewatering. Regional surplus water management (volumes and groundwater recovery rates).	Potential for groundwater levels to increase/decrease within and surrounding the Proposal area as well as at Ophthalmia Dam and subsequent infiltration rates to Ophthalmia Dam.
Offsets	Clearing of 2,500 ha of vegetation in 'Good to Excellent' condition (as per Flora and Vegetation preliminary key factor).	Reduction in flora and vegetation species density and diversity in the Hamersley and Fortescue IBRA sub-regions (as per Flora and Vegetation preliminary key factor).
Rehabilitation and Decommissioning	Creation of a pit void post closure.	Potential for pit void to become pit lake post-closure.

6.2 Assessment of preliminary key environmental factors

The preliminary key environmental factors identified in Table 5 are discussed in detail in Table 6. For each preliminary key environmental factor the following information is provided:

- context, including a concise description of the relevant environmental values;
- the inherent significant impacts resulting from implementation of the Proposal;
- environmental aspects that may cause significant impacts;
- a description of ongoing mitigation for each significant impact;
- the regulation process required to make sure adequate mitigation occurs; and
- a statement of the outcome and justification to demonstrate that the EPA's objective would be achieved.

Table 6: Assessment of preliminary key environmental factors – Flora and Vegetation

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective
Vegetation and Flora – To maintain representation, diversity, viability and ecological function at the species, population and community level.				
Context • The Proposal is seeking a total of 2,500 ha of native vegetation clearing within a defined Development Envelope. • No Threatened Flora, Declared Rare Flora (DRF), Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) were recorded within the Development Envelope. • Three priority flora species have been recorded (two P3 and one P4) (Figure 7). • A new species of *Acacia* sp. *East Fortescue* has been recorded within and around the Development Envelope. Preliminary advice from the OEPA has indicated this taxon may be listed as a P1 in future (Figure 7). • *Acacia* sp. *East Fortescue* appears to be habitat-specific, occurring on exposed orange rock under eroded BIF ironstone (Woongarra Rhyolite under Boolgeeda Iron Formation). • A small area, along a medium drainage line in the south-east corner of the Development Envelope could potentially support Groundwater Dependent Vegetation (where the groundwater is less than 20 m below ground level) (Figure 8). • The vegetation condition has been rated Good (21.6%), Very Good (73.1%) and Excellent (5.3%) (Figure 9). • No significant flora were identified during a recent baseline survey along 20 km of Jimblebar Creek. • Four introduced species have been recorded (Figure 10). **Impacts** *(details provided in Appendix B – Onshore, 2015))* • Direct impact to 2,500 ha of 'Good-to-Excellent' native vegetation. • Directly impact on approximately 72 individuals of *Acacia* sp. East Fortescue, which represent 13.48% of all known and recorded plants. • Direct impacts to *Triodia sp. Mt Ella* (P3), *Goodenia nuda* (P4) and *Acacia clelandii* (P3). • Direct impacts to a small area of potential Groundwater Dependent Vegetation in the south-east corner of Development Envelope. • Potential impacts to Mulga if surface water flows are disrupted based on poorly designed infrastructure. • Potential impacts to riparian vegetation along Jimblebar Creek from surplus water discharge are considered unlikely due to the proposed	• Clearing of vegetation in 'Good to Excellent' condition. • Clearing of a new species of *Acacia* sp. *East Fortescue* within and adjacent to the Development Envelope. • Introduction or spread of weeds through machinery, vehicles and land clearing. • Increased levels of particulate matter.	**Mitigation Action 1:** Use of existing infrastructure and facilities at the adjacent Orebody 18 Mine Hub to reduce the Proposal Development Envelope clearing down by 25% based on the original concept design. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Avoid* – the clearing of vegetation to construct additional supporting infrastructure **Reduction in impact:** During preliminary discussions with the EPA regarding a concept Proposal in February 2014, native vegetation clearing was originally estimated at 3,400 ha. Following the implementation of the steps outlined in the 'Mitigation Process' of the Offsets Guideline (WA Government, 2014), native vegetation clearing has been reduced to 2,500 ha. Implementing this process at the EIA stage has enabled BHP Billiton Iron Ore to present a 25% reduction in proposed clearing at the time of submission of this Referral. The original concept Proposal includes the development of a new separate 8 km HV haul road from the Orebody 18 Mine Hub to the proposed Orebody 31 pit as well as the construction of new facilities such as the installation of a new HV workshop area within the original indicative disturbance area. As a result of design reviews, one HV haul road is now currently being designed, which will service the requirements of the Orebody 18 Mine Hub pits and then continue on towards the Orebody 31 pit. This scenario will have the potential to reduce the length of the HV haul road from 8 km down to 3 km. Various scenarios for reducing clearing will continue to be investigated throughout the life of this Proposal. **Mitigation Action 2:** Modify the Proposal footprint to avoid the majority of identified habitat containing *Acacia* sp. *East Fortescue* through modifying the OSA design. **Step in the WA Government Offsets Guideline 'Mitigation Process:** *Minimise* – the clearing of known recordings of this new *Acacia* sp. East Fortescue. **Reduction in impact:** During baseline surveys, five populations consisting of 534 plants were identified occurring across 8 ha along the north-west corner of an original indicative disturbance area. BHP Billiton Iron Ore then revised its Proposal footprint to remove 348 of these plants constituting 5.5 ha. Furthermore, BHP Billiton Iron Ore is continuing to reduce the indicative OSA designs to exclude impact on the western recorded population of this species within the Development Envelope. As a result of the two above actions, at the time of submission of this Referral, BHP Billiton Iron Ore has reduced potential impact down to 13.48% of all known recordings of this Acacia.	An outcome-based Ministerial Condition is suggested at the end of this table to implement a new Regional Land and Biodiversity Management Plan (2015b, Appendix L), which contains commitments for the ongoing management of *Acacia* sp. East Fortescue. BHP Billiton Iron Ore is also committing to financial offsets to address residual impacts for each hectare of 'Good-to Excellent' vegetation cleared as part of this Proposal (Refer to Offsets Factor).	**This factor is considered a preliminary key environmental factor. BHP Billiton Iron Ore has suggested implementation of a condition as part of this Referral to address this factor.** Native vegetation clearing is estimated at 2,500ha within a Development Envelope of 4,055ha. The Development Envelope excludes an extensive area of vegetation to the south, which has been rated as 'Excellent' condition. None of the vegetation associations expected to be impacted are considered conservation significant at the Commonwealth or State level. The Development Envelope contains no Threatened Flora, DRF, TEC or PEC and the majority of taxa have been recorded in adjacent tenements. Through design changes and a number of footprint minimisation initiatives, the implementation of the Proposal is now only expected to impact 13.48% of all 534 known and recorded individuals of *Acacia* sp. East Fortescue A small part of the Development Envelope contains groundwater less than 20m below ground level and is identified as a medium drainage line which flows into Jimblebar Creek. The drainage line supports the vadophytic tree species *Eucalypt victrix* and vegetation that has also been recorded in other areas with a groundwater level greater than 20 m outside of the Development Envelope. No phreatophytic species occur within the Development Envelope.

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective
short-term (three-month) duration of the discharge and also the seasonal timing (during the Pilbara wet-season). • Potential increased density of introduced (weed) species if not appropriately managed. • Potential increased levels of particular matter causing decline in species diversity along high-usage unsealed roads and adjacent to OSAs if standard dust controls are not implemented. Studies from the Pilbara, such as Butler (2009) and Paling et al (2001) have not recorded evidence of negative effects on plant function resulting from inert particulate matter deposition.		**<u>Mitigation Action 3:</u>** Modify the Development Envelope boundary to avoid the majority of identified habitat containing *Triodia* sp. Mt Ella (M.E. Trudgen 12739). **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Avoid* – the clearing of recordings of this Triodia species. **Reduction in impact:** During baseline surveys, two large populations comprising 50 spot location points were recorded within the southern area of the tenure. BHP Billiton Iron Ore has removed these two large populations from the Development Envelope. At the time of submission of this Referral, there are now only seven plants remaining inside Development Envelope, which may potentially be impacted. **<u>Mitigation Action 4:</u>** Modify the Development Envelope boundary to avoid the majority of vegetation which has been rated as 'Excellent' condition. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – the clearing of vegetation rated as 'Excellent' condition. **Reduction in impact:** During baseline surveys, vegetation in the southern part of the tenure was identified as being in 'Excellent' condition. BHP Billiton Iron Ore has since modified the Development Envelope, to avoid impact on the southern part of the tenure. At the time of referral of this Proposal, only 5.3% of vegetation in 'Excellent' condition now remains within the Development Envelope. **<u>Mitigation Action 5:</u>** Monitor the health of conservation significant flora or vegetation adjacent to high dust sources, including OSAs. Monitoring will be undertaken visually, by an appropriately qualified person, on an ongoing basis. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – the impacts to conservation significant flora species from dust. **Reduction in impact:** Visual monitoring may have the potential to mitigate impacts on of the health of conservation significant species resulting from dust deposition.		

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective

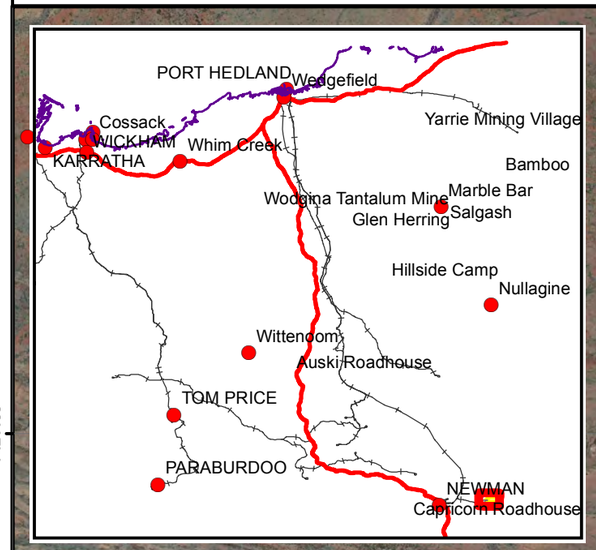
Suggested outcome-based ministerial conditions

In accordance with the EAG 11 - *Recommending Environmental Conditions* (EPA, 2013f), BHP Billiton Iron Ore has prepared suggested Proposal implementation conditions as follows:

Key Environmental Factor	Flora and Vegetation
EPA Objective	To maintain representation, diversity, viability and ecological function at the species, population and community level.
BHP Billiton Iron Ore Objective	To restore, conserve and promote terrestrial biodiversity, to ensure healthy and enduring landscapes.
Assessment (in summary)	The Proposal contains no Threatened Flora, DRF, TEC or PEC and the majority of taxa have been recorded in adjacent tenements. Following the discovery of *Acacia* sp. East Fortescue, a total of 462 plants have been removed from the Development Envelope to reduce impact on this species down from 100% to 13.48%. The small percentage of the south-eastern corner of the Development Envelope contains groundwater less than 20m below ground is identified as a medium drainage line which flows into Jimblebar Creek. The vegetation recorded in this area has also been recorded in other areas with a groundwater level greater than 20 m.
Management Objective	The proponent shall ensure that implementation of the Proposal maintains the representation, diversity, viability and ecological function of conservation significant flora and vegetation.
Recommended Condition	The proponent shall ensure that implementation of the Proposal maintains the representation, diversity, viability and ecological function at the species, population and community level. **Regional Land and Biodiversity Management Plan** The Proponent shall implement a Regional Land and Biodiversity Management Plan. 1. The Regional Land and Biodiversity Management Plan required by condition X shall: (1) when implemented, manage the implementation of the proposal to meet the requirements of condition X-1; and (2) be to the requirements of the CEO on advice of the Department of Parks and Wildlife. 2. Revisions to the Regional Land and Biodiversity Management Plan may be endorsed by the CEO on the advice of the Department of Parks and Wildlife. 3. The proponent shall implement revisions of the Regional Land and Biodiversity Management Plan required by condition X.

195172 199172 203172 207172

7421158 7417158 7413158



0 0.75 1.5 2.25 3

Kilometers

Legend

Orebody 31 Development Envelope

SPECIES

- Acacia clelandii
- Goodenia nuda
- Rhagodia sp. Hamersley (M.E. Trudgen 17794)
- Triodia sp. Mt Ella (M.E. Trudgen 12739)
- Acacia sp. East Fortescue

bhpbilliton

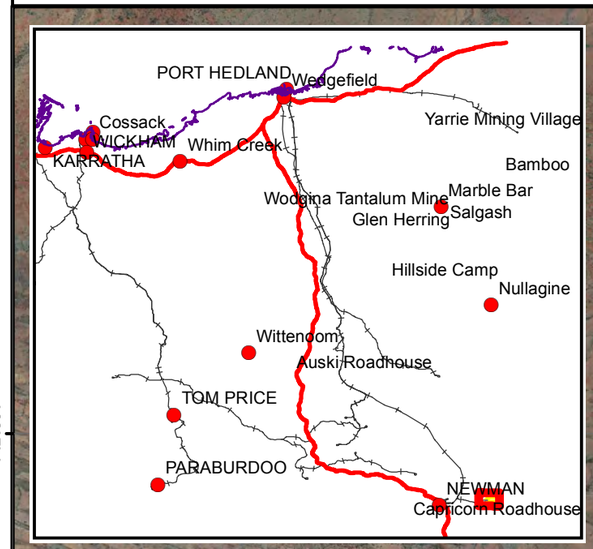
ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

N

Orebody 31
Iron Ore Mine Project

Conservation Significant Flora Species

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 7**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_007_RevA_0



0 0.75 1.5 2.25 3

Kilometers

Legend

- Orebody 31 Development Envelope
- Groundwater within 20 metres of surface

bhpbilliton

ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

N

Orebody 31
Iron Ore Mine Project

Groundwater within 20m of surface

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 8**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_008_RevA_0

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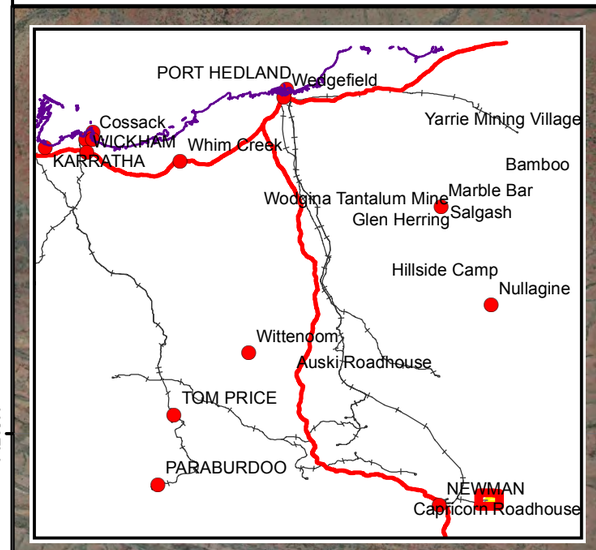
7421304 7417304 7413304

194994 198994 202994 206994

7421077 7417077 7413077



0 0.75 1.5 2.25 3

Kilometers

Legend

Orebody 31 Development Envelope

Vegetation Condition

- Excellent
- Good
- Very Good

bhpbilliton

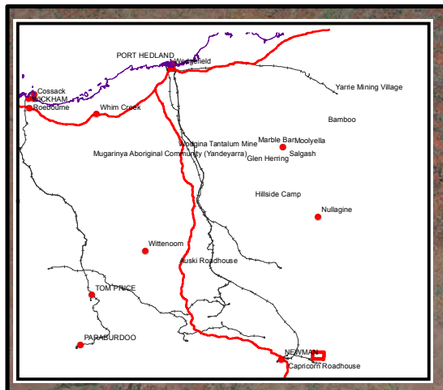
ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

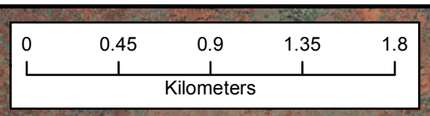
N

Orebody 31
Iron Ore Mine Project

Vegetation Condition

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 9**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_009_RevB_0





Legend

Proposal Development Envelopment

GENUS

- *Bidens
- *Cenchrus
- *Malvastrum

bhpbilliton

ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

N

Orebody 31
Iron Ore Mine Project

Introduced flora species

SCALE (A3): 1:30,000	DATUM: GDA94/MGA 51	**FIGURE 10**
Prepared: Env Approvals	Revision: 1	
Centre: Perth	Date: 29 October 2014	

Table 7: Assessment of preliminary key environmental factors – Subterranean Fauna

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective
Subterranean Fauna – To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.				
Context • Eleven species of stygofauna and 17 species of troglofauna have been recorded in the predicted groundwater drawdown area and the Development Envelope, respectively. • Of the 17 troglofauna species, four are only known from the Development Envelope (Figure 11). • Of the 11 species of stygofauna, one is only known from the predicted groundwater drawdown area. *Enchytraeus* sp. Ench3 was collected from a single bore within the Development Envelope (Figure 12). • Ethel Gorge, located approximately 20 km to the west of Orebody 31, is listed by the DPaW as a TEC and is registered as the Ethel Gorge Aquifer Stygobiont Community TEC. The Proposal involves the discharge of surplus water into Ophthalmia Dam which has the potential to infiltrate into the Ethel Gorge. • Predicted groundwater drawdown of 2 m extends into approximately <0.1% of the TEC buffer. **Impacts** *(details provided in Appendix D – Bennelongia, 2014b)* • Discharge to Ophthalmia Dam may result in a very minor increase in water levels within the dam and a very minor increase in the salinity of the dam water. • Potential impact to stygofauna species. • Potential impact to troglofauna species.	• Pit excavation (stygofauna and troglofauna). • Groundwater drawdown (stygofauna). • Quality of surplus water discharge released into the Ophthalmia Dam, which may infiltrate into the Ethel Gorge TEC.	**Mitigation Action 1:** Implement the BHP Billiton Iron Ore Eastern Pilbara Surplus Water Management Plan (BHP Billiton Iron Ore, 2015c) and the BHP Billiton Iron Ore Eastern Pilbara Water Resource Management Plan (BHP Billiton Iron Ore, 2015d). **Step in the WA Government Offsets Guideline 'Mitigation Process:** *Minimise* – impact on the Ethel Gorge TEC, through the introduction of triggers and thresholds regarding water management. **Reduction in Impact:** Impact will be reduced by implementing management actions listed for each trigger level outlined in the management plans to achieve outcome-based conditions.	BHP Billiton Iron Ore standard management practices will be implemented to manage impacts on troglofauna within the Orebody 31 Development Envelope. BHP Billiton Iron Ore is suggesting a Ministerial Condition, which address water management as part of its proposed regulatory mechanisms for ensuring mitigation of impacts on the Hydrological Processes preliminary key factor. These are discussed in the Hydrological Processes assessment in Table 8. BHP Billiton Iron Ore is of the view that those proposed conditions can effectively regulate potential impacts on the Ethel Gorge TEC to ensure the EPA's objective for Subterranean Fauna (stygofauna) can also be met. Refer to the Hydrological Processes Factor for suggested conditions.	**This factorwas considered a preliminary key environmental factor in relation to stygofauna based on pre-referral advice from the OEPA.** **Based on the low level of impact and the ability of the minor residual impact to be mitigated BHP Billiton Iron Ore considers the Proposal meets the EPA's objective for this factor and no longer considers this to a key environmental factor.** Baseline studies have recorded a relatively low level of stygofauna and troglofauna in the Development Envelope when compared with other surveys around Newman. All stygofauna and troglofauna species, which have been recorded in the Development Envelope, either have been recorded elsewhere or are likely to have ranges which extend beyond the area of impact (pit and predicted groundwater drawdown area), with the exception of one stygofauna species (*Enchytraeus* sp. Ench3). *Enchytraeus* sp. Ench3, has not been recorded elsewhere in the Pilbara, this record is known only as a singleton record; it was identified through DNA sequencing, and only a very small amount of worms in the Eastern Pilbara have been sequenced; most enchytraeid worms collected in the Pilbara appear to be widespread; and all other stygofauna species recorded from the indicative groundwater drawdown area are known from beyond the predicted groundwater drawdown area. BHP Billiton Iron Ore is of the view that potential impacts to stygofauna species will not be significant. The minor increases in salinity resulting from surplus water discharge to Ophthalmia Dam are anticipated to remain within existing known ranges and will be masked by natural (seasonal) variations.

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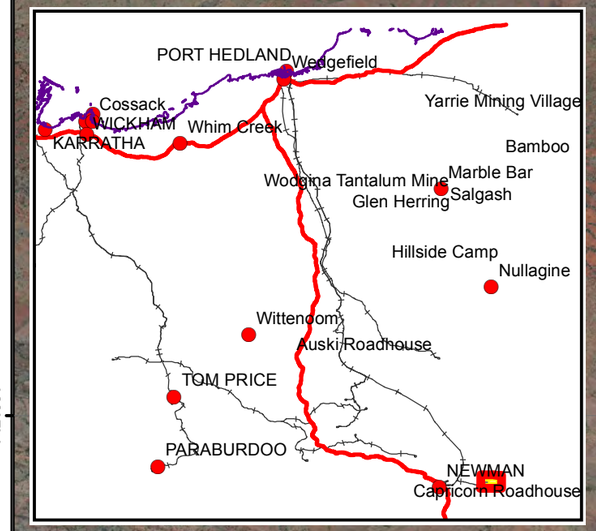
7421091 7417091 7413091



0 0.75 1.5 2.25 3

Kilometers

Legend

- Orebody 31 Development Envelope
- OB31 Indicative Pit, OSA & conservative buffer

Troglofauna Species

- Hanseniella sp. B20
- Palpigradi sp. B16
- Troglarmadillo sp. B49
- Tyrannochthonius sp. B28

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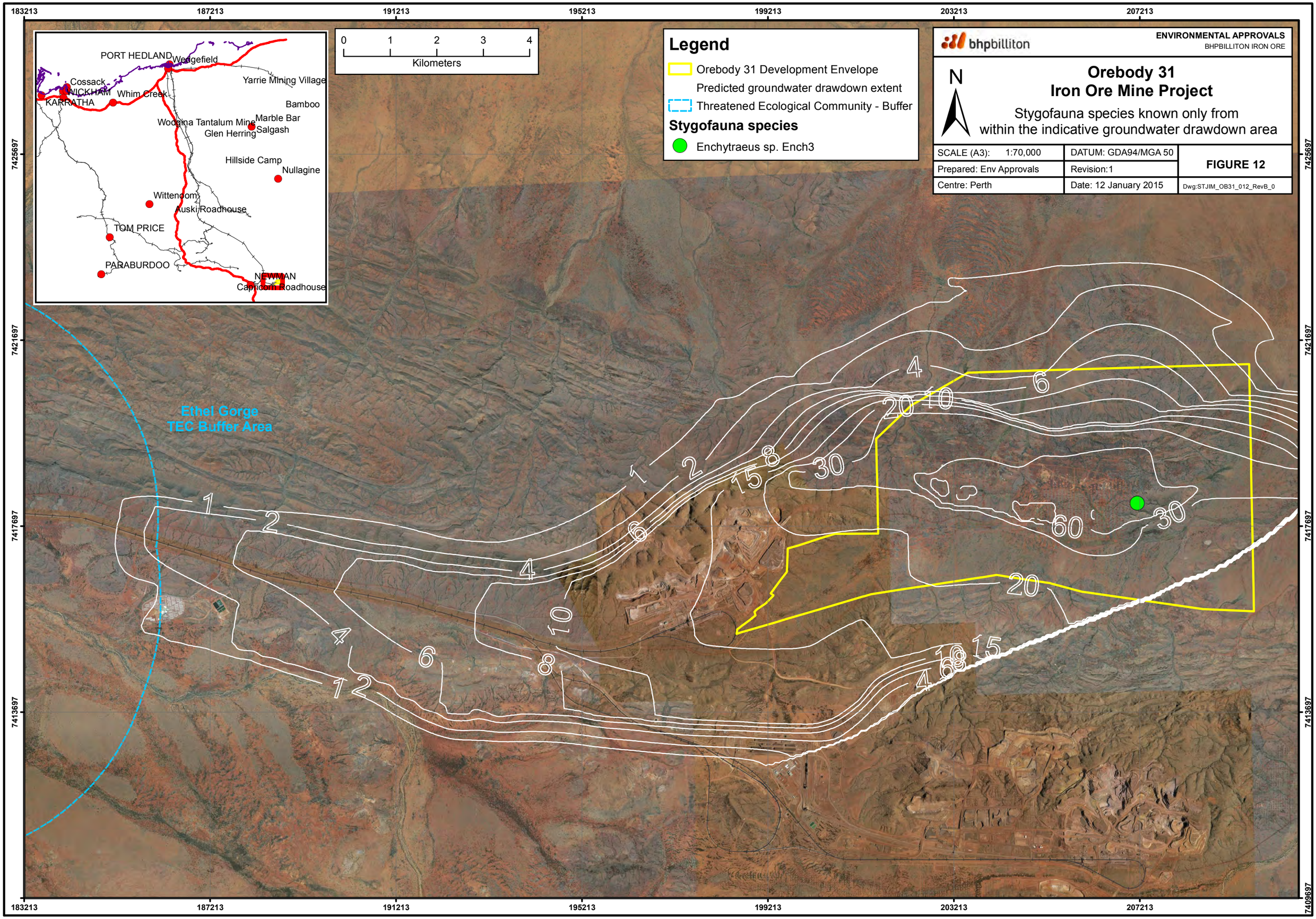
Orebody 31
Iron Ore Mine Project

Troglofauna species

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 11**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_012_RevB_0


183213
187213
191213
195213
199213
203213
207213
7425697
7421697
7417697
7413697
7409697
PORT HEDLAND
Wedgefield
Cossack
WICKHAM
Whim Creek
KARRATHA
Yarrie Mining Village
Bamboo
Wodgina Tantalum Mine
Marble Bar
Salgash
Glen Herring
Hillside Camp
Nullagine
Wittenoom
Auski Roadhouse
TOM PRICE
PARABURDOO
NEWMAN
Capricorn Roadhouse
0 1 2 3 4
Kilometers
Legend
Orebody 31 Development Envelope
Predicted groundwater drawdown extent
Threatened Ecological Community - Buffer
Stygofauna species
Enchytraeus sp. Ench3
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Orebody 31
Iron Ore Mine Project
Stygofauna species known only from
within the indicative groundwater drawdown area
SCALE (A3): 1:70,000
DATUM: GDA94/MGA 50
FIGURE 12
Prepared: Env Approvals
Revision:1
Centre: Perth
Date: 12 January 2015
Dwg:STJIM_OB31_012_RevB_0
Ethel Gorge
TEC Buffer Area
1
2
4
6
8
10
12
15
20
30
60

Table 8: Assessment of preliminary key environmental factors – Hydrological Processes

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective
Hydrological Processes – To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.				
Context • The Orebody 31 resource is approximately 70% below the water table and will require proactive dewatering. • Numerical modelling indicates that the dewatering volume is likely to be greater than the operational water demand and surplus water will be produced. • The predicted drawdown area will extend 22 km from the pit into the regional aquifer (Figure 13). • No creek diversions are proposed within the Development Envelope. • Dewater is proposed to be used as an operational water supply. Surplus water not utilised at the Proposal mining operations will be managed in accordance with the Eastern Pilbara Surplus Water Management Plan. This plan will include the following hierarchy of management options: - re-used onsite in mining operations; - transferred to other nearby operations for use onsite; - discharged via Ophthalmia Dam; - reinjected back into the aquifer via a Managed Aquifer Recharge (MAR) programme; and - discharged into the nearby environment. (salinity resulting from surplus water management is addressed under the Inland Waters Environmental Quality factor in Table 14) **Impacts** *(details provided in Appendix H – RPS Aquaterra, 2014a and Appendix I – BHP Billiton Iron Ore, 2015a)* • There is the potential to impact the current hydrogeological regimes of groundwater and surface water. • The predicted drawdown area will extend 22 km into the regional aquifer and will impact 0.1% of the Ethel Gorge TEC (Figure 13). • Discharge to the surrounding environment is **not** expected to impact Innawally Pool due to the Pool being located approximately 5 km south (upstream) of the Proposal surface water discharge location. • Interruptions in natural surface water flow patterns have potential to increase or decrease surface water run-off in the local environment if not appropriately managed.	• Abstraction of groundwater to access below water table ore deposits. • Disposal of surplus dewater. • Alteration to natural surface water flows.	**Mitigation Action 1:** Implement the BHP Billiton Iron Ore Eastern Pilbara Regional Water Resource Management Plan and the BHP Billiton Iron Ore Eastern Pilbara Surplus Water Management Plan to manage water from a regional, catchment-style level. **Step in the WA Government Offsets Guideline 'Mitigation Process:** *Minimise* – impact on hydrological processes, through the introduction of triggers and thresholds regarding groundwater recovery rates in the Eastern Pilbara Regional aquifers. **Reduction in Impact:** Managing water from a regional, catchment-level contributes to reducing the impacts on the Hydrological Processes factor by: • maximising water-use efficiency between various hubs; • optimizes the use of mine dewatering surplus, either on site or off site, to maximize efficiency and reduce adverse effects of releases to the environment; and • minimising the adverse effects of the abstraction and release of water on environmental, social and cultural values.	Groundwater abstraction (i.e. dewatering volumes and monitoring) is anticipated to be managed through the DoW licensing (5C licence) process and various groundwater operating strategies under the RIWI Act. BHP Billiton Iron Ore has developed the proposed Eastern Pilbara Surplus Water Management Plan (2015c, Appendix M) and the Eastern Pilbara Water Resource Management Plan (2015d, Appendix N), which incorporate a hierarchy of management options in line with the DoW's recently released guidelines for the management of water in the Pilbara region (DoW, 2013a). Outcome-based Ministerial Conditions are suggested at the end of this table specific to Hydrological Processes.	**This factor is considered a key environmental factor. BHP Billiton Iron Ore has suggested implementation conditions as part of this Referral to address this factor.** Although the proposed groundwater drawdown is anticipated to extend 0.1% into the TEC buffer, this is not considered significant due to the overall, because the TEC and buffer together have a total area of 33,327 ha. Impacts on the conservation value of the TEC are considered most unlikely. No impacts are anticipated at Innawally Pool due to the Pool being located 5 km upstream of this Proposal. In relation to the hierarchy of preferred options listed as context for this factor, it is important to note that: • Ophthalmia Dam discharge is the proposed primary surplus water management option for the majority of surplus water volume; • Jimblebar Creek will provide a short term discharge option (up to three months) either as an operational back-up (if discharge to Ophthalmia is not operationally possible) or seasonal discharge during the wet season (between November and April); • discharge on an ongoing basis to Jimblebar Creek is not part of this Proposal, but may be considered following baseline studies, hydrodynamic trial results and further assessment in future; and • MAR into the dolomite formations and orebodies along the Ophthalmia Range is presented as an emerging option to be tested. BHP Billiton Iron Ore is of the view that this factor can be managed under existing approvals under the RIWI Act as well as being supported by the proposed new management plans.

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective

Suggested outcome-based ministerial conditions

In accordance with the EAG 11 - *Recommending Environmental Conditions* (EPA, 2013f), BHP Billiton Iron Ore has prepared suggested Proposal implementation conditions as follows:

Key Environmental Factor	Hydrological Processes
EPA Objective	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.
BHP Billiton Iron Ore	To manage the range of potential hydrological changes (groundwater, surface water and/or soil moisture) resulting from BHP Billiton Iron Ore operations impacting on receiving receptors to an acceptable level.
Assessment (in summary)	The discharge of surplus water into the Ophthalmia Dam will be managed in accordance with the Eastern Pilbara Surplus Water Management Plan and the Eastern Pilbara Water Resource Management Plan. These plans incorporate a hierarchy of management options in line with the Department of Water's Water in Mining Guideline for the protection of the Ethel Gorge TEC. Changes to water quality in the Ethel Gorge TEC as a result of discharge of surplus water into the Ophthalmia Dam are not expected to affect the persistence of stygofauna. Historical data collected from the dam shows that the salinity ranges are generally between 1,000 and 2,500 mg/L. Modelling has predicted a minor increase in salinity as a result of surplus water discharge from all approved operations in the area as well as additional discharge from this Proposal. This slight increase is still anticipated to remain within the existing salinity ranges and therefore, not impact on the persistence of the stygofauna species within the Ethel Gorge TEC. Water management from a regional catchment-style level will be undertaken over the life of the Proposal in order to monitor and manage any potential impacts on the Ethel Gorge TEC.
Management Objective	**Implement the Eastern Pilbara Surplus Water Management Plan** The Proponent shall implement the Eastern Pilbara Surplus Water Resource Management Plan, which incorporates options for management of surplus water including: • re-used onsite in mining operations; • transferred to other nearby operations for use onsite; • discharged via Ophthalmia Dam; • reinjected back into the aquifer via a Managed Aquifer Recharge programme; or • discharged into the nearby environment.
Recommended Condition	X-1 The proponent shall implement the Eastern Pilbara Surplus Water Management Plan, endorsed by the CEO, and any subsequent revisions, during discharge of surplus mine water from Orebody 31 Iron Ore Project until advised otherwise by the CEO.
Management Objective	**Implement the Eastern Pilbara Water Resource Management Plan** The Proponent shall implement the Eastern Pilbara Resource Management Plan, which includes triggers and thresholds for the protection of the Ethel Gorge TEC.
Recommended Condition	X-1 The proponent shall implement the Eastern Pilbara Water Resource Management Plan, endorsed by the CEO, and any subsequent revisions, during discharge of surplus mine water from Orebody 31 Iron Ore Project until advised otherwise by the CEO.

183580 187580 191580 195580 199580 203580 207580

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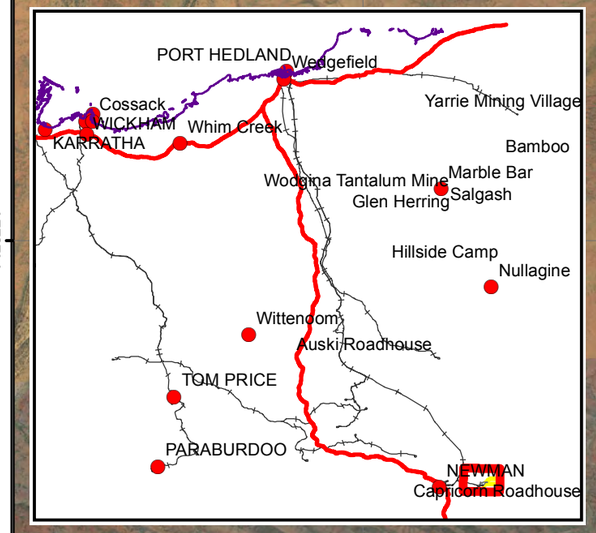

0 1 2 3 4
Kilometers

Legend

- Orebody 31 Development Envelope
- Predicted groundwater drawdown extent

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Orebody 31
Iron Ore Mine Project

Predicted groundwater drawdown extent

SCALE (A3): 1:70,000	DATUM: GDA94/MGA 50	**FIGURE 13**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_013_RevB_0

1 2 4 6 10 20 8 15 30 60

Orebody 31
Development Envelope

Orebody 18
Mine Hub

Eastern Pilbara
Accommodation Village

Wheelarra (Jimblebar) Hill
Mine Hub

Table 9: Assessment of preliminary key environmental factors – Offsets

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective
Offsets – To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets				
Context • The Proposal is seeking a total of 2,500 ha of native vegetation clearing within a defined Development Envelope. • The vegetation condition has been rated Good (21.6%), Very Good (73.1%) and Excellent (5.3%). **Impacts** • Direct impact to 2,500 ha of 'Good-to-Excellent' native vegetation within the Pilbara's Hamersley and Fortescue IBRA sub-regions.	• Clearing of vegetation in 'Good to Excellent' condition.	Figure 14 provides an illustrative summary to demonstrate how BHP Billiton Iron Ore has addressed the 'Mitigation Hierarchy' outlined in the Offsets Guideline (WA Government, 2014). Offsets are proposed to address all outstanding residual impacts remaining after all other mitigation actions listed in this ERD have been implemented.	BHP Billiton Iron Ore is committing to financial offsets for in accordance with the *Offsets Guideline* (WA Government, 2014). A suggested Ministerial Condition is presented below. A completed Offsets Form and supporting documentation is at Appendix O.	**This factor is considered a key environmental factor. BHP Billiton Iron Ore has suggested implementation conditions as part of this Referral to address this factor.**

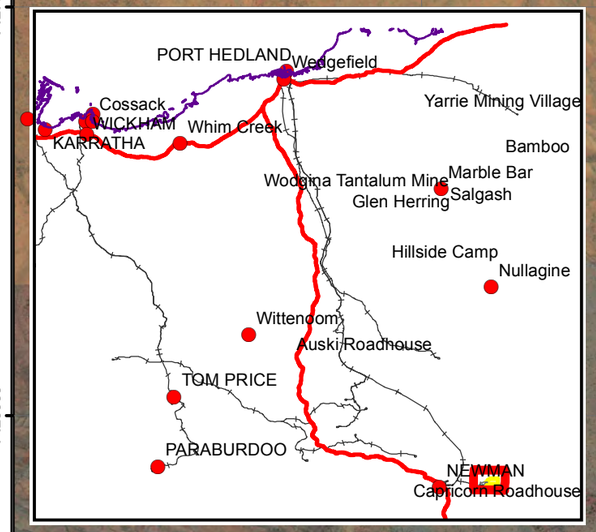
Suggested outcome-based ministerial conditions

In accordance with the EAG 11 - *Recommending Environmental Conditions* (EPA, 2013f), BHP Billiton Iron Ore has prepared suggested Proposal implementation conditions as follows:

Key Environmental Factor	Offsets
EPA Objective	To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets.
Assessment (in summary)	The Proposal will directly impact up to 2,500 ha of 'Good-to-Excellent' vegetation within the Pilbara's Hamersley and Fortescue IBRA sub-regions.
Management Objective	**Offsets** X-1 In view of the significant residual impacts and risks as a result of implementation of the proposal, the proponent shall contribute funds for the clearing of native vegetation, in accordance with the *Offsets Guideline* (Western Australian Government, 2014) or its updates. This funding shall be provided to a government-established conservation offset fund or an alternative offset arrangement providing an equivalent outcome as determined by the Minister. X-2 The proponent's contribution to the strategic regional conservation initiative shall be paid biennially, the first payment due in the second year following the commencement of ground disturbance. The amount of funding will be made in accordance with the approved Impact Reconciliation Procedure required by condition X-3: X-3 The proponent shall prepare and submit an Impact Reconciliation Procedure to the satisfaction of the CEO.

191277 195277 199277 203277 207277 211277

7427655 7423655 7419655 7415655 7411655



Legend

- Orebody31 Development Envelope
- OB31 Indicative Haul Rd & Overland Conveyor
- OB31 Indicative Pit, OSA & facilities area
- Orebody 18 Approved Boundary (Min Statement 439)

SPECIES

- Acacia clelandii
- Goodenia nuda
- Rhagodia sp. Hamersley (M.E. Trudgen 17794)
- Triodia sp. Mt Ella (M.E. Trudgen 12739)
- Acacia sp. East Fortescue

0 1 2 3 4
Kilometers

Addressing the Mitigation Process for Key Environmental Factors:

Flora and Vegetation

Hydrological Processes

Closure and Rehabilitation

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Orebody 31 Iron Ore Mine Project

Implementing the Mitigation Hierarchy as per the Offsets Guidelines (WA Govt. 2014)

SCALE (A3): 1:60,000	DATUM: GDA94/MGA 50	FIGURE 14
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 11 March 2015	Dwg:STJIM_OB31_ES1_RevC_0

BHP Billiton Iron Ore is proposing to implement the Eastern Pilbara Water Management Plan and Surplus Water Management Plan to implement a hierarchy of surplus water management options in line with the DoW Guidelines. These are:
- re-use on site;
- discharge into Ophthalmia Dam;
- reinjection into MAR; and
- discharge to nearby creek lines.

OSA designs are currently being revised to avoid impact on this population of Acacia sp. East Fortescue

Development Envelope has been reduced to exclude these records of Rhagodia sp.

Development Envelope has been reduced to exclude the majority of Acacia sp. East Fortescue

Designs are currently being revised to pursue a shorter HV Haul Road direct from Orebody 17 to the Orebody 31 Pit at this location. This will reduce the road from 8km down to 3km.

Surplus water discharge will be released here into a low-flow unnamed drainage line, as opposed to direct into the higher-flow Jimblebar Creek

Jimblebar Creek

Orebody 31 indicative OSA boundaries

Orebody 31 indicative pit boundary

The discharge of surplus water to Ophthalmia Dam is an existing management approach for a numberof BHP Blliton Iron Ore Mine Hubs which are subject to established ongoing monitoring programmes

Orebody 18 Mine Hub (approved and in operation)

Creek discharge is the least-preferred option in a proposed hierarchy of surplus water management options. It will be used if other preferred options are unavailable for various reasons

Indicative OSA boundries illustrate the ex-pit (worst-case) scenario. They are likely to be smaller if options for progressive backfill of Orebody 17 and/or Orebody 31 are implemented

Development Envelope has been reduced to remove this large area classified as 'Excellent' vegetation condition

Tenement boundary

Tenement boundary

The Proposal will utilise Orebody 18 Mine Hub failities (HV Workshop, crusher, etc.) as opposed to constructing new at Orebody 31

Development Envelope has been reduced to exclude these two large populations of Triodia sp.

Shovelanna Creek

Table 10: Assessment of preliminary key environmental factors – Rehabilitation and Decommissioning

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective
Rehabilitation and Decommissioning – To ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner.				
Context • The Proposal is at the early stages of the project life cycle (Figure 16). A number of closure scenarios are currently being considered as part of a proposed Mine Closure Plan (Figure 17). • Acid and Metaliferous Drainage and impacts on groundwater, surface water and soil quality are considered a moderate to low risk. • A Landforms and Soil Impact Assessment has been carried out to inform the topsoil volumes and rehabilitation requirements. **Impacts** *(details provided in Appendix E – Earth Systems, 2014 and Appendix P – BHP Billiton Iron Ore, 2014d)* • Post-closure impacts of the mine, particularly formation of pit lakes in mine voids (as a worst-case scenario) are discussed further in the Mine Closure Plan (Appendix P).	• Pit lake formation (inland environmental quality). • Alteration of landforms.	Various options are being explored to mitigate post-closure residual impacts. The following mitigating actions have been considered as part of this Proposal: **<u>Mitigation Action 1:</u>** Backfilling depleted mine pits at the Orebody 18 Mine Hub and/or the Proposal with waste material where practicable. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – the legacy issues associated with empty pits post mining and impact on final landforms. **Reduction in Impact:** Waste categorisation studies are currently considering a range of options which include the potential to backfill depleted pits at the adjacent Orebody 18 Mine Hub, in order to reduce the amount of waste being directed to the Proposal OSAs and impacts to final landforms. **<u>Mitigation Action 2:</u>** Implement an adaptive management approach to closure management (Figure 15). **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – the legacy issues associated with empty pits post mining and impact through adaptive management. **Reduction in Impact:** The Adaptive Management Approach (AMA) aims to reduce impact by embedding a cycle of monitoring, reporting and implementing change where required. It allows an evaluation of the mitigation controls so that they are progressively improved and refined, or alternative solutions adopted, to achieve the desired environmental outcomes. BHP Billiton Iron Ore's AMA is underpinned by its corporate commitments, which collectively articulate and mandate the Company's core values and minimum performance standards for environmental management and sustainability. The AMA is required in evolving political, social and natural environments. It provides the necessary flexibility to respond to conservation significance changes (e.g. new species are listed); the development of new technologies; and as the understanding of assets, values, species, threatening processes and impacts (e.g. climate change) improves.	A Ministerial Condition is suggested at the end of this table specific to Rehabilitation and Decommissioning. BHP Billiton Iron Ore has proposed a Mine Closure Plan (2015e, Appendix P).	**This factor is considered a key environmental factor. BHP Billiton Iron Ore has suggested implementation conditions as part of this Referral to address this factor.** BHP Billiton Iron Ore is obliged under its the tenure requirements of the Mining Lease, issued under the *Iron Ore (Mount Newman) Agreement Act 1964* ensure that premises are closed, decommissioned and rehabilitated in an manner consistent with current government standards and without unacceptable liability to the State. To support this, a Mine Closure Plan has been developed.

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate the Proposal meets EPA objective

Suggested outcome-based ministerial conditions

In accordance with the EAG 11 - *Recommending Environmental Conditions* (EPA, 2013f), BHP Billiton Iron Ore has prepared suggested Proposal implementation conditions as follows:

Key Environmental Factor	Rehabilitation and Decommissioning
EPA Objective	To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State.
BHP Billiton Iron Ore Objective	Create a safe, stable, non-polluting and sustainable landscape that is consistent with key stakeholder agreed social and environmental values and aligned with creating optimal business value.
Assessment (in summary)	BHP Billiton Iron Ore is obliged under its the tenure requirements of the Mining Lease, issued under the *Iron Ore (Mount Newman) Agreement Act 1964* ensure that premises are closed, decommissioned and rehabilitated in an manner consistent with current government standards and without unacceptable liability to the State. To support this requirement, BHP Billiton Iron Ore has prepared a Mine Closure Plan for Orebody 31.
Measurable outcome	The proponent shall ensure that premises associated with the Proposal are closed, decommissioned and rehabilitated in an ecologically sustainable manner and without unacceptable liability to the State. **Implement a Mine Closure Plan** The proponent shall implement the Mine Closure Plan. 1. The Mine Closure Plan required by condition X shall: (1) when implemented, manage the implementation of the proposal to meet the requirements of condition X-1; (2) be prepared in accordance with the Guidelines for Preparing Mine Closure Plans, June 2011 (Department of Mines and Petroleum and Environmental Protection Authority) or its revisions; and (3) be to the requirements of the CEO on advice of the Department of Mines and Petroleum and the Department of Water. 2. Prior to ground disturbing activities commencing or as otherwise agreed by the CEO the proponent shall submit the Mine Closure Plan to the CEO unless otherwise agreed by the CEO. 3. Revisions to the Mine Closure Plan may be approved by the CEO on the advice of the Department of Mines and Petroleum and the Department of Water. 4. The proponent shall implement revisions of the Mine Closure Plan required by condition X.

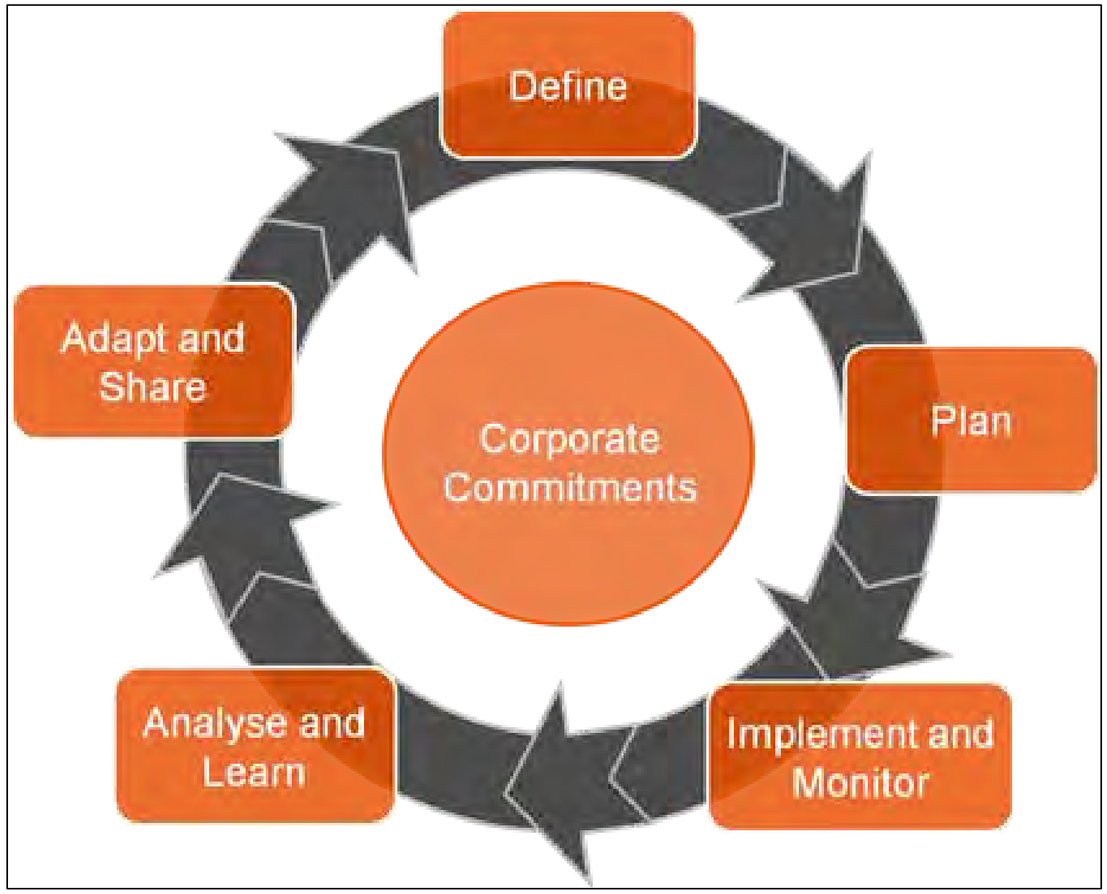


Figure 15: BHP Billiton Iron Ore's Adaptive Management Approach

The five key steps of BHP Billiton Iron Ore's adaptive management approach are as follows:

1 Define: Conduct baseline and impact assessments (including cumulative impact assessments where required) to understand how the proposed operation or expansion may impact sensitive receptors. Define management outcomes consistent with regulatory and internal requirements and set performance criteria to ensure these outcomes are met.

2 Plan: Develop management plans (site specific or air shed) that describe how the performance criteria will be met through the application of the management hierarchy, monitoring and reporting measures.

3 Implement and Monitor: Implement management measures and monitor against performance criteria during construction and operations. Conduct internal audits to verify management measures are being implemented in line with regulatory and internal standards.

4 Analyse and Learn: Use monitoring data to verify models and validate assumptions and identify relevant internal and external changes (e.g., change in regulatory requirements or advancements in technology) and address where applicable. Assess data and information acquired to ensure that management measures and performance criteria remain appropriate over the life of the operation.

5 Adapt and Share: Report management performance and relevant metrics according to external and internal reporting requirements (e.g., Annual Environmental Reporting, BHP Billiton's Annual Sustainability Report). Where shortcomings and/or improvement opportunities in the management approach are identified, adapt the management approach. Implement and communicate the changes with a view to share learnings externally and contribute to improvements across industry.

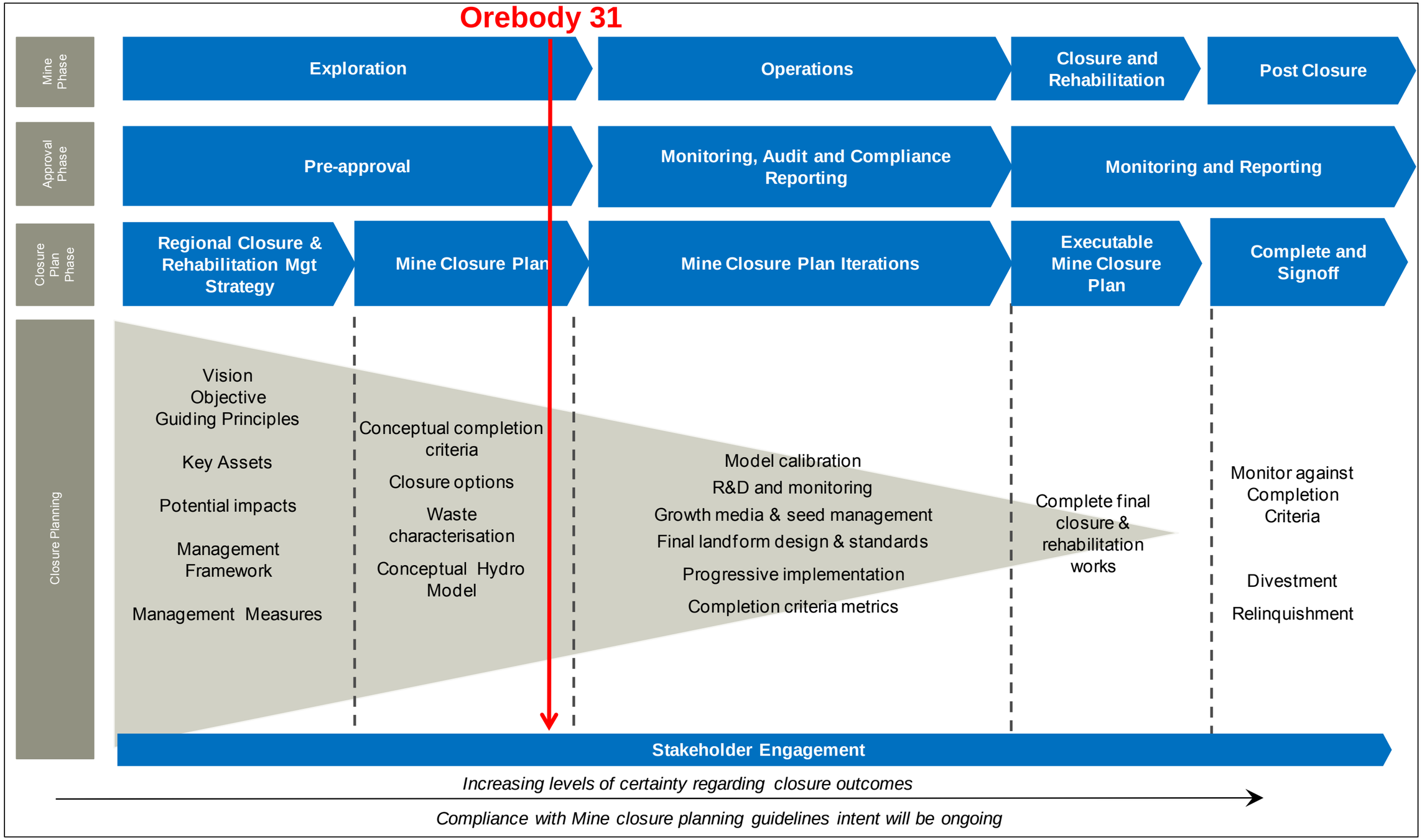


Figure 16: BHP Billiton Iron Ore closure planning over the project lifecycle

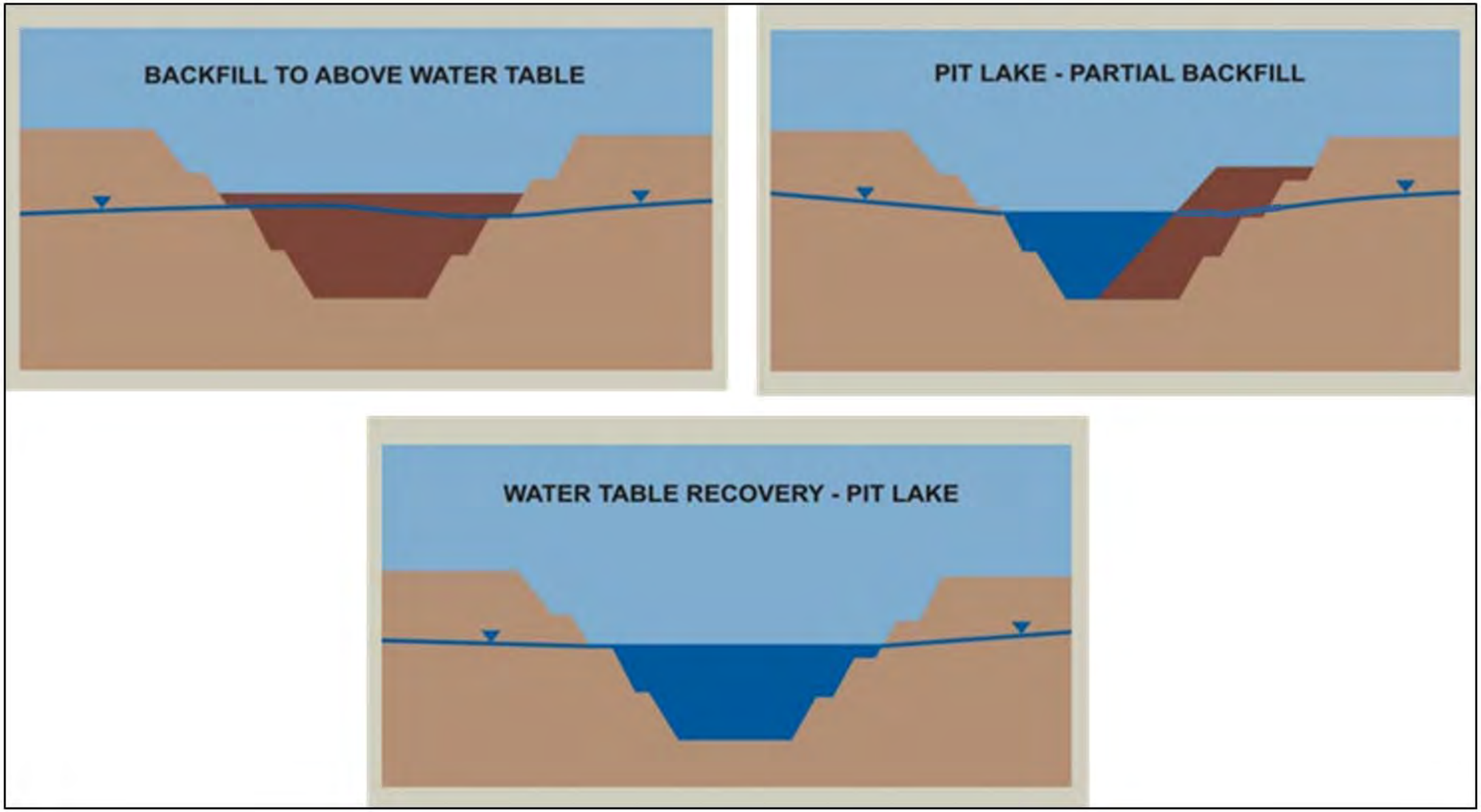


Figure 17: Schematic representation of the different pit closure scenarios assessed for Orebody 31

7. Other environmental factors

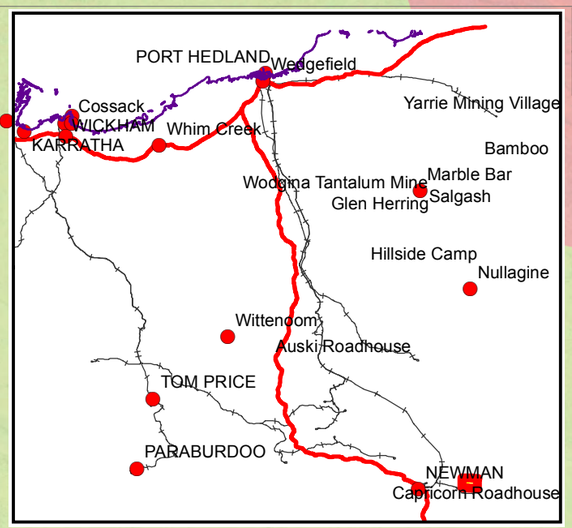
An assessment of those environmental factors not considered to be key environmental factors is provided in Table 11.

This summary table provides the following information:

- environmental factor / EPA objective;
- a description of the activity and potential impact;
- relevant aspect of the Proposal;
- mitigation actions to address residual impacts; and
- proposed mechanism for mitigation.

Table 11: Assessment of other environmental factors - landforms

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Landforms *To maintain the variety, integrity, ecological functions and environmental values of landforms.*			
The Proposal may potentially impact 0.11% of the Fortescue Valley and 0.05% of the Hamersley Plateaux Landscape Character Types. The Proposal will impact two soil types (based on Bettenay *et. al*, 1967) within the Pilbara region. These are Fa13 and Mz2. The following land systems are located within the Development Envelope: • Newman land system (41.58%); • Boolgeeda land system (41.58%); • McKay land system (0.86%); and • Washplain land system (8.43%).	Alteration of landform through creation of pits, OSAs and overland infrastructure corridors.	Similar to the Closure and Decommissioning Factor, various options are being further explored to reduce the impact of OSAs on existing landforms, including using overburden to backfill depleted pits at the adjacent Orebody 18 Mine Hub or backfilling depleted pits at Orebody 31. Where this is not possible, any required OSAs will be designed to blend with the natural landforms.	The Proposal will have less than one per cent impact on the two identified LCTs within the Development Envelope. Therefore, the EPA objective for this factor can be met. BHP Billiton Iron Ore will manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System. A Mine Closure Plan is also being proposed as a Ministerial Condition under the Rehabilitation and Decommissioning key factor related to this Proposal.



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Kilometers

Legend

Orebody 31 Development Envelope

Soil unit

Fa13: Plains associated with the Fortescue Valley

Mz25: Ranges of banded jaspilite and chert along with shales

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Orebody 31
Iron Ore Mine Project

Soil types

SCALE (A3): 1:30,000	DATUM: GDA94/MGA 50	**FIGURE 18**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 12 January 2015	Dwg:STJIM_OB31_018_RevB_0

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Table 12: Assessment of other environmental factors – terrestrial environmental quality

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Terrestrial Environmental Quality *To maintain the quality of land and soils so that the environmental values, both ecological and social, are protected.*			
During operations, the PAF material balance is estimated to represent 0.01% of total overburden expected to be produced as part of the Proposal. Potential for acid mine drainage to occur if PAF materials are inappropriately managed or if new unknown materials are encountered. Potential to contaminate land and soils with waste materials and dangerous goods, if not managed appropriately.	Mining of PAF material during operations. Generation of waste materials. Storage and handling of dangerous goods.	**Mitigation Action 1:** The segregation of PAF overburden, construction of PAF OSA's in accordance with leading practice to minimise AMD generation and treating pit water during operations, if required, to protect receiving receptors. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – the impact on terrestrial environmental quality during operations from unmanaged PAF. **Reduction in impact:** With AMD risk mitigation measures in place the Preliminary AMD Risk Assessment (Earth Systems, 2014)found that: • the likelihood of release of AMD from unsaturated pit wall rock is reduced to unlikely and the consequence insignificant; and • the likelihood of acid generation from in-pit or ex-pit storage of PAF overburden is reduced to unlikely.	**The Proposal meets the EPA's objective for this factor and is therefore not considered a key environmental factor. BHP Billiton Iron Ore considers that this factor can be addressed under Part V of the *Environmental Protection Act 1984*.** Given the results of the studies undertaken and the well-established strategies for PAF, it is likely that the EPA objective to maintain the quality of the land and soils so that ecological values can be protected can be met. BHP Billiton Iron Ore will manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System. Approvals under Part V of the *Environmental Protection Act 1986* will be sought for the handling and storage of dangerous goods. BHP Billiton Iron Ore will also manage its operations in accordance with the specific requirements for the management of solid waste, which are expected to form part of the prescribed premises boundary operating conditions licensed under Part V of the EP Act.

Table 13: Assessment of other environmental factors – terrestrial fauna

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Terrestrial Fauna (terrestrial vertebrate fauna and invertebrate short-range endemic fauna) *To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.*			
Potential impact to fauna habitat, which may lead to a decline in species representation. Possible direct mortality, fauna entrapment and vehicle strikes during clearing and operations. Indirect impacts may include habitat fragmentation and barriers to movement, habitat degradation, behavioural impacts Introduction of new (feral) species.	Clearing of up to 2,500 ha of potential fauna habitat. Creation of conditions attractive to feral animals (putrescibles waste from crib rooms, water tanks, etc.)	**Mitigation Action 1 (*as previously discussed under Flora and Vegetation*):** Use of existing infrastructure and facilities between the Orebody 18 Mine Hub and the Proposal to reduce the Proposal Development Envelope clearing down by 25%. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Avoid* – the clearing of potential fauna habitat to construct additional supporting infrastructure. **Reduction in impact:** During preliminary discussions with the EPA regarding a concept Proposal in February 2014, native vegetation clearing was originally estimated at 3,400 ha. Following the implementation of the steps outlined in the Mitigation Process (WA Government, 2014), native vegetation clearing has been reduced to 2,500 ha. Implementing this process at the EIA stage has enabled BHP Billiton Iron Ore to present a 25% reduction in potential fauna habitat at the time of submission of this Referral. **Mitigation Action 2:** Modify the Development Envelope boundary to avoid some areas known to be SRE invertebrate fauna habitat **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – the clearing of known SRE invertebrate fauna habitat. *Avoid* – modification of landforms known to provide habitat for SRE invertebrate fauna. **Reduction in impact:** The original indicative disturbance area extended to the north and south of the tenure area and included areas containing records of a range of SRE species. BHP Billiton Iron Ore has revised its Development Envelope to remove the southern part of the tenure and a strip along the northern part of the tenure. These areas are considered to be habitat for the Selenopid Spider species *Karaops* 'ARA004-DNA', and Isopod species *Buddelundia* '10NM' and *Buddelundia* '49'. At the time of submission of this Referral, there are now more records of each of the SRE species outside of the final Development Envelope, than there are within it.	**The Proposal meets the EPA's objective for this factor and is therefore not considered a key environmental factor**. BHP Billiton Iron Ore will manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System. Baseline terrestrial fauna studies indicate that no PECs or TECs relating to terrestrial fauna were located within 100 km of the Development Envelope. None of the six conversation significant fauna species or the six potential short range endemic invertebrate species (or their habitat) are considered restricted to the Development Envelope. The Development Envelope is not considered to be the whole of or part of, or be necessary for the maintenance of, a significant habitat for fauna indigenous to WA. The main habitats identified in the Development Envelope are widespread throughout the Pilbara.

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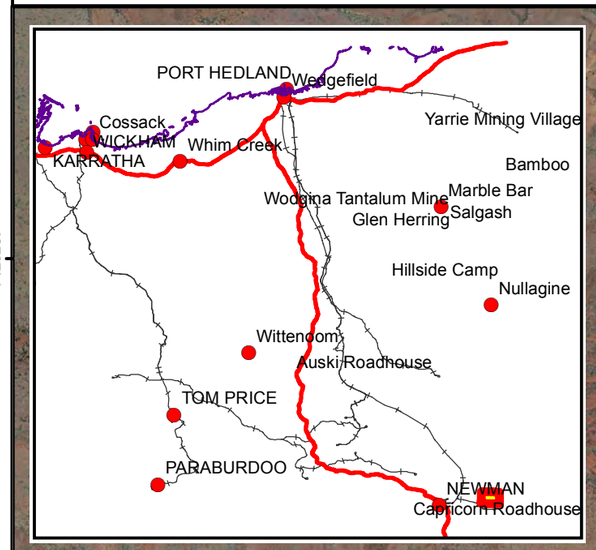

0 0.75 1.5 2.25 3

Kilometers

Legend

Orebody 31 Development Envelope

Species Name

- Australian Bustard
- BIRD - P4 (DPaW record)
- Brush-tailed Mulgara
- Bush Stone-curlew
- Common Sandpiper
- Fork-tailed Swift
- MAMMAL - P4 (DPaW record)
- Pilbara Flat-headed Blindsnake
- Rainbow Bee-eater
- Western Pebble-mound Mouse

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Orebody 31
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Vertebrate fauna species

SCALE (A3): 1:35,000	DATUM: GDA94/MGA 50	**FIGURE 19**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 30 December 2014	Dwg:STJIM_OB31_019_RevA_0

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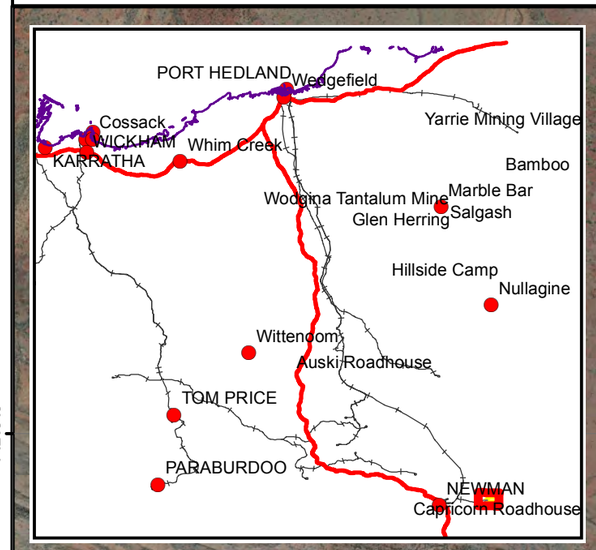

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Kilometers

Legend

Orebody 31 Development Envelope

Species name

- Buddelundia '10NM'
- Buddelundia '49'
- Buddelundiinae 'WN'
- Karaops 'ARA003-DNA'
- Karaops 'ARA004-DNA'
- Xenolpium 'PSE079'

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ENVIRONMENTAL APPROVALS
BHPBILLITON IRON ORE

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Orebody 31
Iron Ore Mine Project

Short range endemic invertebrate species

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	**FIGURE 20**
Prepared: Env Approvals	Revision:1	
Centre: Perth	Date: 13 January 2015	Dwg:STJIM_OB31_0120RevB_0

Table 14: Assessment of other environmental factors – inland waters environmental quality

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Inland Waters Environmental Quality *To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.*			
Discharge of surplus water to Ophthalmia Dam may result in a very minor increase in the salinity of the dam water. The Proposal will potentially mobilise sediment to natural drainage systems. Potential to impact groundwater quality from formation of pit lakes at mine closure (addressed under key factor Rehabilitation and Decommissioning). Potential impacts on natural surface water quality.	Management and discharge of surplus water from mine dewatering. Mobilisation of sediment into natural surface water courses during construction and operation.	**Mitigation Action 1:** Implement the proposed BHP Billiton Iron Ore Eastern Pilbara Surplus Water Management Plan (BHP Billiton Iron Ore, 2015c) and the Eastern Pilbara Regional Water Resource Management Plan (BHP Billiton Iron Ore, 2015d). **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Avoid* – water quality impacts to key ecological receptors such as the Ethel Gorge TEC. **Reduction in impact:** BHP Billiton Iron Ore is using known historical salt ranges within Ophthalmia Dam as the ranges to inform trigger levels and thresholds as outlined in the management plans. This will ensure that water quality is managed and that impacts are avoided as far as reasonably practicable.	**The Proposal meets the EPA's objective for this factor and is therefore not considered a key environmental factor. BHP Billiton Iron Ore considers that this factor can be addressed under Part V of the *Environmental Protection Act 1984*.** BHP Billiton Iron Ore will manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System. BHP Billiton Iron Ore will also manage potential impacts in accordance with the proposed BHP Billiton Iron Ore Eastern Pilbara Surplus Water Management Plan (BHP Billiton Iron Ore, 2015c) and the BHP Billiton Iron Ore Eastern Pilbara Water Resource Management Plan (BHP Billiton Iron Ore, 2015d), which are being suggested as Ministerial Conditions in relation to the Hydrological Processes potential key factor (refer to Table 8). In addition, water quality will be managed in accordance with specific requirements which are expected to form part of the prescribed premises boundary operating conditions licensed under Part V of the EP Act.

Table 15: Assessment of other environmental factors – air quality and atmospheric gases

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Air Quality and Atmospheric Gases *To maintain air quality for the protection of the environment and human health and amenity, and to minimise the emission of greenhouse and other atmospheric gases through the application of best practice.*			
The Proposal is located approximately 18 km from the nearest sensitive receptor – the Eastern Pilbara Accommodation Village and approximately 40 km from sensitive receptors in the Newman Township. There are no third-party operators in between the Proposal and the identified sensitive receptors which need to be taken into consideration during assessments. Greenhouse gas emissions from the Proposal are anticipated to contribute to 0.26% of Western Australia's 2011/2012 greenhouse inventory. On a national scale, greenhouse gas emissions from the Proposal are anticipated to contribute 0.033% towards Australia's 2011/2012 greenhouse inventory.	Excavating and handling of iron ore and overburden including blasting. Wind erosion from iron ore stockpiles and overburden storage areas. Vehicle movements associated with the transfer of iron ore and overburden. Combustion of hydrocarbons, clearing of native vegetation, use of explosives during blasting operations and the use of electricity.	**Mitigation Action 1:** Implement standard dust controls across operations. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – dust emissions at nearby sensitive receptors. **Reduction in impact:** With the implementation of standard dust controls, particulate matter emissions resulting from the Proposal are not expected to exceed criteria at nearby sensitive receptors. **Mitigation Action 2:** Identify several opportunities to reduce atmospheric gas emissions across operations to be implemented where appropriate. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Minimise* – atmospheric gas emissions in future. **Reduction in impact:** With the implementation of reduction projects, Greenhouse Gas Emissions are expected to support BHP Billiton's Public Commitment to reduce emissions to below the FY06 baseline by FY17. In addition, the risk to the business due to change climate is also being assessed against the controls in place to ensure it is adequately managed.	**The Proposal meets the EPA's objective for this factor and is therefore not considered a key environmental factor**. **BHP Billiton Iron Ore considers that this factor can be addressed under Part V of the *Environmental Protection Act 1984*.** Potential impacts can be managed under Part V of the EP Act (Environmental Licence to Operate), the *Clean Energy Act 2011* (Cth) and the *National Greenhouse and Energy Reporting Act 2007* (Cth). BHP Billiton Iron Ore will manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System.

Table 16: Assessment of other environmental factors – amenity

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Amenity *To ensure that impacts to amenity are reduced as low as reasonably practicable.*			
The highest potential impact to a view shed was anticipated to be 1.11% with many of the sites anticipating no impact to viewsheds at all.	Modification of landforms. Presence of Proposal infrastructure, mine pit and OSAs.	There are no residual impacts which require mitigation. Notwithstanding this, BHP Billiton Iron Ore will continue to manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System.	**Through the Landscape and Visual Impact Assessment, it has been determined that the Proposal is expected to have little to no impacts on viewsheds. Therefore, it is considered that the Proposal meets the EPA Objective for this factor.** BHP Billiton Iron Ore will manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System.

Table 17: Assessment of other environmental factors – heritage

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Heritage *To ensure that historical and cultural associations, and natural heritage, are not adversely affected.*			
The Development Envelope lies within the *Nyiyaparli* native title claim. Surveys have been conducted within the Development Envelope and sites have been identified.	The Proposal will require the clearing of native vegetation clearing and will involve land disturbance.	**Mitigation Action 1 (as previously discussed in Flora and Vegetation):** Use of existing infrastructure and facilities between the Orebody 18 Mine Hub and the Proposal to reduce the Proposal Development Envelope native vegetation clearing down by 25%. **Step in the WA Government Offsets Guideline 'Mitigation Process':** *Avoid* – impacts on some heritage sites through the reduction in the Proposal Development Envelope. **Reduction in impact:** The reduction in Proposal footprint area has resulted in a number of heritage sites being removed from the Proposal Development Envelope. This contributes to an overall reduction in the impacts on historical and cultural, and natural heritage.	**The Proposal meets the EPA's objective for this factor and is therefore not considered a key environmental factor**. All archaeological and ethnographical surveys have been conducted and approvals have been sought to impact selected heritage sites. Identified heritage sites are avoided where practicable through design, planning and engineering solutions. For sites which cannot be avoided, a ministerial consent under Section 18 of the *Aboriginal Heritage Act 1972* has been granted to impact selected heritage sites within the Development Envelope for the purpose of mining. Should any previously unknown/unrecorded heritage sites be discovered in the vicinity of the Development Envelope, BHP Billiton Iron Ore will promptly report this to the *Nyiyaparli.*

Table 18: Assessment of other environmental factors – human health

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
Human Health *To ensure that human health is not adversely affected.*			
Based on the worst-case modelling scenario, received noise levels at the Eastern Pilbara Accommodation Village are predicted to be 22.1 dB(A) and are therefore below the 35 dB(A) assigned noise level. Received noise levels at the Newman Township are predicted to be 11.8 dB(A) and are therefore compliant with, and lower than, the 30 dB(A) assigned noise level. At the noise levels predicted, the Proposal will not be audible in the Eastern Pilbara Accommodation Village or Newman Township. There are no third-party operators in between the Proposal and the identified sensitive receptors which need to be taken into consideration.	Creation of noise emissions which may have the potential to impact human health (hearing). Noise sources may include: • mobile plants such as excavators, graders, haul trucks and drill rigs; • fixed plant such as conveyors, ore processing facilities and the rail loader; and • blasting noise.	Received noise levels are predicted to be below assigned noise levels at the two closest sensitive receptors (Eastern Pilbara Accommodation Camp and the Newman Township). However, BHP Billiton Iron Ore will continue to manage the Proposal to protect the amenity of occupants at the Eastern Pilbara Accommodation Camp and the Township of Newman from noise and vibration impacts resulting from activities associated with the Proposal by ensuring levels continue to meet statutory requirements and acceptable standards and that human health is not adversely affected.	**The Proposal meets the EPA's objective for this factor and is therefore not considered a key environmental factor**. **BHP Billiton Iron Ore considers that this factor can be addressed under Part V of the *Environmental Protection Act 1984*.** Any anticipated noise impacts will be managed under the Environmental Protection (Noise) Regulations 1997. BHP Billiton Iron Ore will also manage this factor as part of its standard Pilbara-wide Health, Safety and Environment Management System.

8. Principles of the Environmental Protection Act

The concept of sustainable development came to prominence at the World Commission on Environment and D evelopment (1987), in the report entitled Our Common Future, which defined sustainable development as:

> *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

In recognition of the importance of sustainable development, the Commonwealth Government developed a N ational Strategy for Ecologically Sustainable Development (Commonwealth of Australia, 1992) that defines Ecologically Sustainable Development (ESD) as:

> *…using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.*

The principles of ESD are incorporated into the *Environmental Protection Act 1986* and the EPA's Position Statement No. 7 - Principles of Environmental Protection (EPA, 2004d). These principles are:

- the precautionary principle;
- the principle of intergenerational equity;
- the principle of the conservation of biological diversity and ecological integrity;
- principles in relation to improved valuation, pricing and incentive mechanisms; and
- the principle of waste minimisation.

Table 19 provides a summary of how BHP Billiton Iron Ore has considered the principles of ESD for the Proposal.

Table 19: Consideration of principles of the Environmental Protection Act

Principle	Description in Environmental Protection Act 1986	Relevant Yes/No	If Yes, Consideration
Precautionary Principle	Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by: • careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and • an assessment of the risk-weighted consequences of various options.	Yes	Biological surveys have been carried out. Specialist technical impact assessments have been carried out to assess potential impacts and propose potential management strategies.
Intergenerational Equity	The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	Yes	BHP Billiton Iron Ore has prepared a credible environmental impact assessment to inform the public debate about whether and how the Proposal should proceed. Technical studies and modelling have been carried out to inform this impact assessment.
Conservation of Biological Diversity and Ecological Integrity	Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Yes	Baseline biological surveys have been completed. Technical impact assessments have been completed. Standard industry management measures can be used or adapted to mitigate biodiversity and ecological impacts associated with implementation of the Proposal.
Improved Valuation, Pricing and Incentive Mechanisms	Environmental factors should be included in the valuation of assets and services. The polluter pays principle - those who generate pollution and waste should bear the cost of containment, avoidance or abatement. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	Yes	Environmental factors have been considered throughout the development of this ERD. Specialist technical studies have been carried out to inform detailed impact evaluations and management measures which aim to minimise pollution and waste.

Principle	Description in Environmental Protection Act 1986	Relevant Yes/No	If Yes, Consideration
Waste Minimisation	All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Yes	Standard waste management measures are a key element for the implementation of this Proposal. It is standard practice for BHP Billiton Iron Ore to apply the waste management hierarchy to all sites and this will be the case in relation to this Proposal (i.e. avoidance, reuse, recycling, recovery of energy, treatment, containment and disposal).

9. Conclusion

9.1 Proponent's conclusion

This ERD has provided supporting information to the EPA in order to determine the Level of Assessment. This document has provided information about the existing environment and potential impacts of implementation of the Proposal. This ERD has also explained BHP Billiton Iron Ore's new regional management approach of potential impacts for each of the EPA's environmental factors and has suggested potential implementation conditions to address those factors which may be considered potential key factors,

The Proposal has been designed to avoid or minimise impacts to the preliminary key environmental factors where practicable, resulting in a 25% decrease in the Proposal footprint from 3,400 ha to 2,500 ha. In addition, BHP Billiton Iron Ore proposes to implement regional management plans to enable management of BHP Billiton Iron Ore operations on a landscape and catchment scale. This will result in improved environmental outcomes across a l arger area than just the Proposal development envelope including the protection of regional key environmental assets.

The identified preliminary key environmental factors can be adequately managed to meet the EPA's objective, provided the proposed management plans are implemented and an offset is applied to counterbalance the potentially significant residual environmental impact resulting from clearing of good to excellent vegetation in the Pilbara.

BHP Billiton Iron Ore considers that the information and assessment presented in this ERD has adequately identified and addressed environmental aspects and issues relevant to the Proposal, and is adequate to enable the EPA to set the LOA at 'Assessment on Proponent Information'.

9.2 Application of the significance framework

BHP Billiton Iron Ore has applied the significance framework detailed in EPA Environmental Assessment Guideline 9 during the assessment of this proposal. Figure 21 provides a conceptual illustration of how the significance framework has been applied by BHP Billiton Iron, indicating the level of uncertainty remaining and the mitigation measures to be adopted. This conceptual illustration is intended to provide the EPA with confidence that the objective for each preliminary key environmental factor will be met.

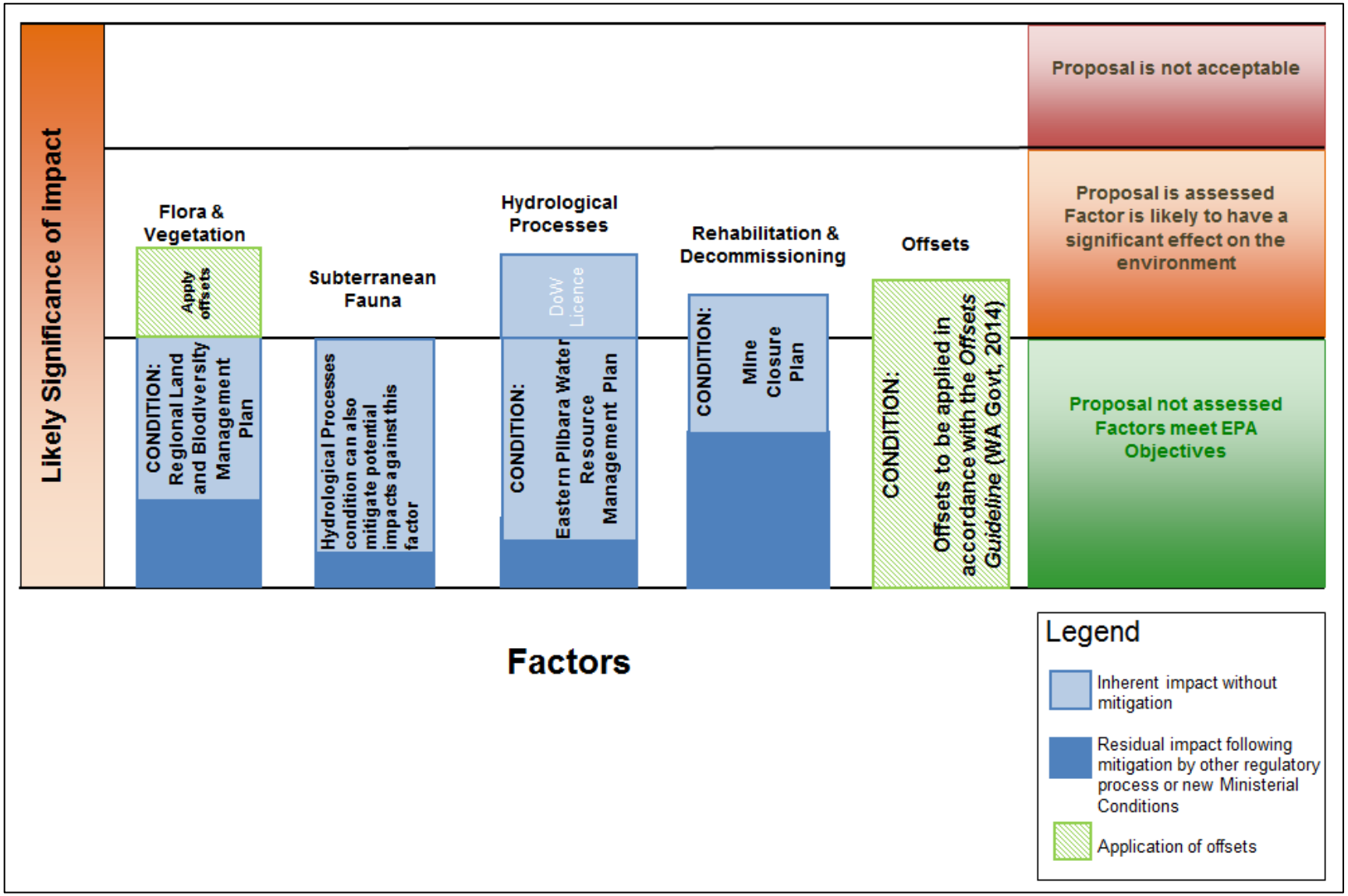

Figure 21: Conceptual application of the EPA's significance framework following internal assessment

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Appendices

Appendix A: Authority as proponent under the JV

Appendix B: Orebody 31 Flora and Vegetation Environmental Impact Assessment (Onshore, 2014b)

Appendix C: Orebody 31 Landscape and Visual Impact Assessment (360 Environmental, 2014)

Appendix D: Orebody 31 Subterranean Impact Assessment Study (Bennelongia, 2014b)

Appendix E: Preliminary Acid and Metalliferous Drainage Risk Assessment for the Orebody 31 Deposit (Earth Systems, 2014)

Appendix F: Orebody 31 Vertebrate Fauna Environmental Impact Assessment (Biologic, 2014)

Appendix G: Orebody 31 Short Range Endemic Fauna Environmental Impact Assessment (Biologic, 2014c)

Appendix H: Orebody 31 Surface Water Environmental Impact Assessment (RPS Aquaterra, 2014a)

Appendix I: Orebody 31 Hydrogeological Environmental Impact Assessment (BHP Billiton Iron Ore, 2015a)

Appendix J: Orebody 31 Air Quality and Greenhouse Gas Emissions Impact Assessment (Pacific Environment Limited, 2014)

Appendix K: Orebody 31 Noise Environmental Impact Assessment (SVT, 2014)

Appendix L: Regional Land and Biodiversity Management Plan (BHP Billiton Iron Ore, 2015b)

Appendix M: Eastern Pilbara Surplus Water Management Plan (BHP Billiton Iron Ore Pty Ltd, 2015b)

Appendix N: Eastern Pilbara Water Resource Management Plan (BHP Billiton Iron Ore Pty Ltd, 2015c)

Appendix O: Completed Offsets Form for the Proposal

Appendix P: Orebody 31 Mine Closure Plan (BHP Billiton Iron Ore, 2015d)