Western Australia Iron Ore

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resourcing the future

Regional Land and Biodiversity Management Plan

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Contents

List of tables

List of figures

1. Introduction

1.1. Purpose

BHP Billiton Iron Ore Pty Ltd (BHP Billiton Iron Ore) is one of the world's leading iron ore producers, with operations in Australia and Brazil. Its principal iron ore operations are located in the Pilbara region of Western Australia, which currently comprises seven mining operations, over 1000 kilometres (km) of rail and port facilities in Port Hedland. The company manages almost 1.5 million hectares of tenure in the Pilbara region (including pastoral leases), which is approximately 8% of the total land area of the Pilbara.

A number of conservation significant vegetation communities and flora species occur within the area managed by BHP Billiton Iron Ore. From time to time these species and or communities, may be impacted as a result of BHP Billiton Iron Ore's activities, and will require specific management to reduce the significance of any potential impact. Native flora and vegetation is protected under both Western Australian (WA) State and Commonwealth legislation.

This management plan (the Plan) has been prepared to provide a consistent and standard approach to the management of significant flora and vegetation communities within all BHP Billiton Iron Ore Western Australian (WAIO) tenements. It has been developed in consideration of the legal requirements relevant to native flora and vegetation (Section 4) and BHP Billiton requirements (Section 3). This Plan complies with the requirements of the relevant Acts administered by the State and Federal government and BHP Billiton Iron Ore guiding principles.

Further, this Plan considers guidance documents developed by the State and Federal governments, including recovery plans, threat abatement plans and conservation advice. It largely complies with these guidelines but may deviate from these where they conflict with BHP Billiton Iron Ore internal safety policies, or are not practical for implementation in the Pilbara environment.

1.2. Objective of this Plan

The Plan provides a consistent approach to the management of conservation significant flora and vegetation across all of BHP Billiton Iron Ore's Western Australian (WAIO) operations. The objective of this Plan is to, where practicable, avoid and mitigate impacts to significant flora species and vegetation communities, where they occur within BHP Billiton Iron Ore's area of influence, by:

- prescribing standardised systems and processes to avoid conservation significant flora species and vegetation communities;
- detailing the management actions and strategies that will be implemented to mitigate potential impacts to significant flora species and vegetation communities during the planning, construction and operation of BHP Billiton Iron Ore mines, projects and associated infrastructure; and
- outline the monitoring, inspection, reporting, and management plan review programs that will be implemented in a consistent manner during the life of BHP Billiton Iron Ore's projects.

Where specific management measures are required that are localised to a particular operation or situation, and are in addition to, or above and beyond, the measures outlined, these will be detailed in Appendix 1 for that operation or project. Where there is any contradiction between the management measures applicable to a site-specific EMP (as required and approved under a Ministerial Statement) and those outlined in this plan, the site specific management measures shall apply.

2. Environmental Management Framework

The Iron Ore Health, Safety and Environment (HSE) Management System is hierarchical, as illustrated in Figure 1. This management plan sits at the Asset level of the management system, and aims to align with the Biodiversity Management Standard, Regional Management Strategies and the requirements of the BHP Billiton Charter and Group Level Documents (GLD's) as described in Sections 1.2.1 and 1.2.2 below.

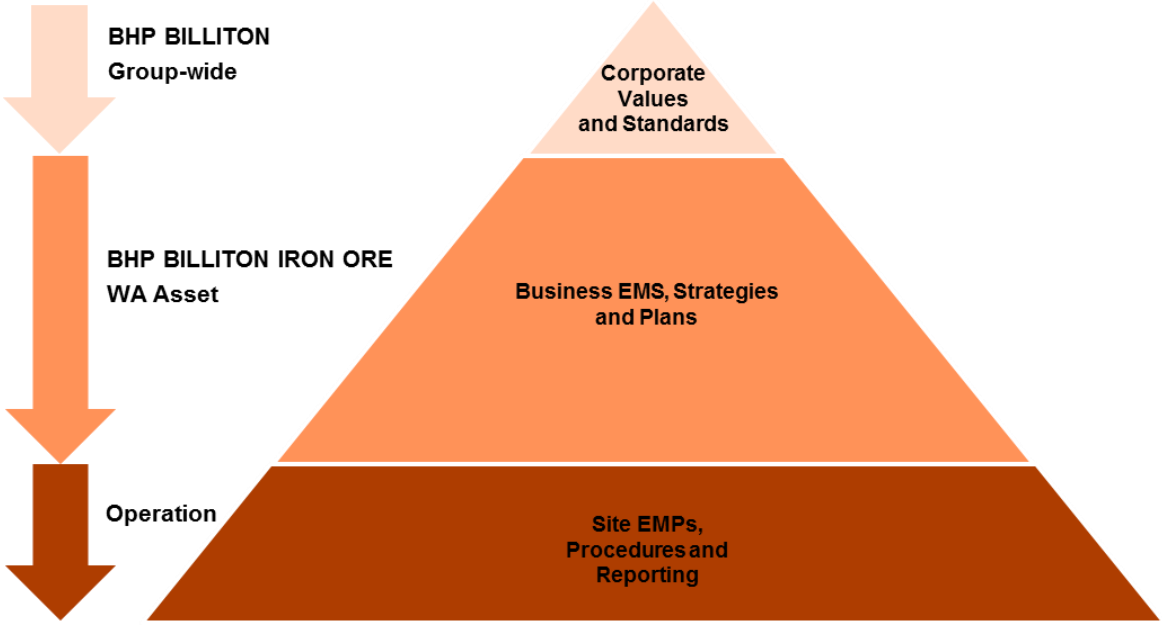


Figure 1: BHP Billiton Iron Ore's Health Safety & Environment Management Pyramid

2.1.1. BHP Billiton Charter

The BHP Billiton Charter explains BHP Billiton's mission statement and core values. This Plan has been prepared to address the following core values:

- Putting health and safety first, being environmentally responsible and supporting our communities.
- Doing what is right and doing what we say we will do.
- Embracing openness, trust, teamwork, diversity and relationships that are mutually beneficial.
- Achieving superior business results by stretching our capabilities.
- Focusing our efforts on the things that matter most.
- Defining and accepting responsibility and delivering on our commitments.

2.1.2. BHP Billiton Iron Ore Policy and Standards

The BHP Billiton Iron Ore Policy and Standards explained in BHP Billiton's Group Level Documents (GLDs) outline the company's environmental commitments.

This document is guided by the WAIO Biodiversity Management Standard and Regional Management Strategies which describe a regional approach to biodiversity management. A regional approach to management provides the benefits of standardisation and consistency in management across all WAIO sites. The approach is outcomes based and adaptive in nature, taking on board the concept of continual improvement.

The Group Level Document (GLD 009) relates to Environment and includes land and biodiversity management. Requirements of GLD 009 relevant to the management of conservation significant flora and vegetation are:

- Identify and map key features and define the area of influence.
- Establish the baseline or reference conditions for land, biodiversity, water resources and air within the area of influence.
- Document the type and extent of actual and reasonably foreseeable environmental impacts associated with our activities within the area of influence.
- Assess the risks of our activities with actual and reasonably foreseeable environmental impacts within the area of influence.

- Define and obtain authorisation for target environmental outcomes for land, biodiversity, water resources and air consistent with the assessed risks and impacts.
- Implement controls demonstrating application of the mitigation hierarchy (avoid, minimise and rehabilitate environmental impacts, prior to applying compensatory actions) to manage the identified risks and achieve target environmental outcomes.
- Monitor the design and operational effectiveness of these controls.
- Maintain a disturbance approval process that meets regulatory requirements and takes into account stakeholder expectations and potential impacts to areas of important biodiversity and/or ecosystems.
- Maintain a rehabilitation plan that supports Life of Asset and closure plans, and rehabilitates disturbed areas no longer required for operational purposes consistent with the pre-disturbance land use or alternate land use developed taking into account regulatory requirements and stakeholder expectations.
- Do not explore or extract resources within or adjacent to the boundaries of International Union for Conservation of Nature (IUCN) Protected Areas Categories I to IV unless authorisation is obtained and a plan implemented that meets regulatory requirements, takes into account stakeholder expectations and contributes to the values for which the protected area is listed.
- Do not operate where there is a risk of direct impacts to ecosystems which could result in the extinction of an IUCN Red List Threatened Species in the wild.

2.2. Project Environmental Aboriginal Heritage Review (PEAHR)

BHP Billiton Iron Ore has a Project Environmental Aboriginal Heritage Review (PEAHR) process to manage the implementation of its environmental, Aboriginal heritage, land tenure and legal obligations prior to and during land disturbance activities. Additionally, the PEAHR procedure provides a mechanism whereby technical and professional advice can be provided to the business regarding environmental issues, land access and Aboriginal heritage planning and management issues. The PEAHR system is accessible to all employees and consists of an electronic workflow process linked to a geographical information system.

The objectives of the PEAHR process are to:

- Identify the significant environmental, Aboriginal heritage and legal aspects of proposed activities;
- Ensure that, through appropriate environmental Aboriginal heritage and land access planning and management, BHP Billiton Iron Ore activities comply with all legal and other obligations;
- Avoid, minimise and mitigate the number and nature of environmental, Aboriginal heritage and land tenure events and ensure the environmental performance of BHP Billiton Iron Ore operations; and
- Provide a mechanism for continuous improvement.

3. Legal Framework

Native flora is protected under the WA *Wildlife Conservation Act 1950* (WC Act), the *Environmental Protection Act 1986* (EP Act), and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which are administered by the WA Department of Parks and Wildlife (DPaW), the WA Department of Environmental Regulation (DER), and the Commonwealth Department of the Environment (DoE), respectively.

For the purposes of this Plan, conservation significant flora is;

- native flora that has been gazetted and listed under the Western Australian *Wildlife Conservation Act 1950* as Threatened Flora and declared as Rare Flora (DRF) by the WA state Minister for the Environment;
- flora listed under the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999;*
- flora listed under the threatened categories (Vulnerable, Endangered and Critically Endangered on the IUCN Red List; and
- native flora that is rare and poorly known, and which have been assigned a priority status (Priority Flora) by DPaW for consideration for declaration as 'rare flora'.

For the purposes of this Plan, conservation significant vegetation is:

- vegetation that forms a defining component of declared Threatened Ecological Communities (TEC's);
- vegetation communities listed under the *Environment Protection and Biodiversity Conservation Act 1999 as threatened communities;*
- vegetation that forms a defining component of Priority Ecological Communities (PEC's) as defined by DPaW; and
- vegetation as a component of Environmentally Sensitive Areas (ESA's) as defined in *the Environmental Protection Act 1986.*

3.1. *Environmental Protection Act* 1986

The WA *Environmental Protection Act 1986* provides for the establishment of the Environmental Protection Authority (EPA), which has the objective of overseeing the prevention, control and abatement of pollution and environmental harm, and the conservation, preservation, protection, enhancement and management of the environment. The EPA has developed policies to assist with achieving its objective. These include policies on the use of the precautionary principle, consideration of intergenerational equity, the conservation of biological diversity and ecological integrity, and waste minimisation. The EPA also provides advice to the public and the WA Minister for Environment on the environmental protection aspects of any proposal brought to it.

Part IV of the *EP Act* establishes provisions for the EPA to carry out Environmental Impact Assessments (EIA) in WA. Where relevant, the EPA issues and directs proponents to comply with Guidance Statements that contain the EPA's minimum requirements for the protection of elements of the environment such as flora and fauna. Guidance Statement 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004) requires proponents to assess flora and vegetation of conservation significance in their EIA.

The EPA's position on the clearing of native vegetation in WA is broadly described in Position Statement 2 – Environmental Protection of Native Vegetation in Western Australia. (EPA 2000)

Part V Division 2 of the EP Act establishes provisions for the clearing of native vegetation. Prior to the clearing of any native vegetation under Part V of the EP Act a Native Vegetation Clearing Permit (NVCP) must be obtained. NVCPs are assessed against the clearing principles set out in Schedule 5 of the Act. Clearing principles C and D prevent the clearing of the native vegetation if the vegetation it includes is necessary for the continued existence of, rare flora, or it is necessary for the maintenance of, a threatened ecological community. A NVCP application that is seriously at variance with the clearing principles will not be granted unless, in the opinion of the CEO of the government department administering the Act, there is a good reason for doing so.

Section 51(B) of the EP Act enables the WA Minister for Environment to declare an Environmentally Sensitive Area (ESA). Vegetation clearing exemptions do not apply within an ESA and all clearing requires a permit and consultation with the Department of Parks and Wildlife.

3.2. *Wildlife Conservation Act*, 1950

The WA *Wildlife Conservation Act 1950* provides for the conservation and protection of flora and fauna. Rare or endangered flora species are identified as 'threatened flora' and declared to be Rare Flora (DRF) for the purposes of the Act (i.e. "flora that is likely to become extinct or is rare or otherwise in need of special protection"). Threatened flora species that are declared rare by the WA Minister for Environment are listed in the Wildlife Conservation (Rare Flora) Notice, which is updated regularly and published in the State Government Gazette.

The WC Act requires licenses to be issued for the taking of protected and rare flora.

3.3. *Environment Protection and Biodiversity Conservation Act*, 1999

"The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as matters of national environmental significance" (DOE 2014). The EPBC Act provides for the listing of nationally threatened native species and ecological communities. The list is divided into groups according to conservation status and updated regularly by the Federal, Threatened Species Scientific Committee.

3.4. International Union for the Conservation of Nature

"The IUCN Global Species Programme working with the IUCN Species Survival Commission (SSC) assesses the conservation status of species, subspecies, varieties, and even selected subpopulations on a global scale, in order to highlight taxa threatened with extinction. The IUCN Red List of Threatened Species™ provides taxonomic, conservation status and distribution information on plants, fungi and animals that have been globally evaluated using the IUCN Red List Categories and Criteria." (IUCN 2014). BHP Billiton's environmental management system, as it relates to conservation significant species, is informed by the IUCN's assessment of threatened species, and categorisation of these in the Red List of Threatened Species.

3.5. Conservation Codes and Categories

The conservation status of a species or community, informs the extent and type of management actions applied within this plan. Conservation significance is categorised through 'codes' or categories applied by relevant management agencies responsible for the conservation of flora and vegetation at a state, federal and global scale. The conservation codes for threatened and priority flora used by WAIO are as described by DPaW in *'Conservation Codes for Western Australian Flora and Fauna'*.

Species and communities of national environmental significance listed under the EPBC Act are categorised under Section 179 of the Act. Nominated additions to the list are assessed by the Threatened Species Scientific Committee annually and listed in the DoE's Species Profile and Threats Database.

Table 1: Conservation categories for flora described under the EPBC Act

CATEGORY	DESCRIPTION
Extinct	A species is extinct if there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A species is categorised as extinct in the wild if it is only known to survive in cultivations, in captivity, or as a naturalised population well outside its past range; or if it has not been recorded in its known/expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	The species is facing an extremely high risk of extinction in the wild and in the immediate future.
Endangered	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival, or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Conservation Dependent	The species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The IUCN has developed a framework for the classification of species according to their risk of extinction (Figure 2). The IUCN Red List Categories and Criteria, Version 3.1 was published in 2008, and informs decisions by the IUCN for the inclusion of species on the '*Red List*' and their appropriate classification. The WA Department of Parks and Wildlife have adopted this framework in the classification of species under the Wildlife Conservation Act.

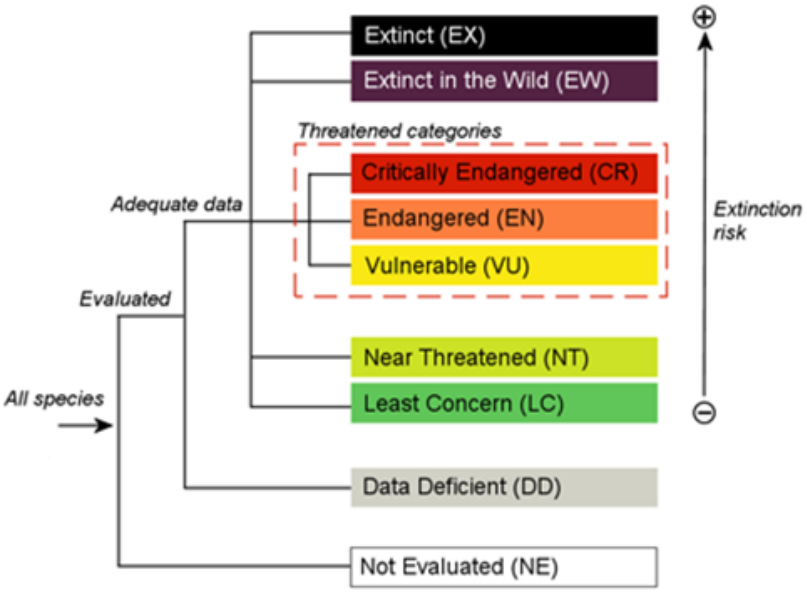


Figure 2: Structure of categories from IUCN Red List Categories and Criteria, Version 3 (2012)

The Department of Parks and Wildlife have developed priority codes for species that may be threatened or near threatened but for which there is little data to enable the species to be assessed for listing under the Rare Flora Notice. Flora listed on the Priority Flora List are categorised under a Priority1, 2 or 3 and are prioritised for evaluation of conservation status to enable their consideration for threatened flora listing. “Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4.” (DPaW 2014)

Threatened and priority ecological communities have been defined, categorised and listed by DPaW according to a set of established criteria. The DPaW paper titled Definitions, Categories and Criteria for Threatened and Priority Ecological Communities (DPaW 2010) provides guidance on the application of threats and conservation significance at a community level.

4. Conservation Significant Pilbara Flora and Vegetation.

The effective management of flora and vegetation on WAIO operational areas is dependent upon a comprehensive knowledge and understanding of the species and communities that occur within WAIO's area of influence.

BHP Billiton Iron Ore's operations in the Pilbara fall within Beard's Fortescue Botanical District. Beard mapped the vegetation of the Pilbara at a broad scale of 1:1,000,000. Beards mapping was assessed by Shepherd *et al.* (2001) who provided updated boundaries and split some vegetation units to account for clearing in the intensive land use zone. The vegetation of the district is heavily influenced by landform, geology and fire and has an added complexity with the influence of surface and ground water. Floristically the district is characterised by arid zone flora of Poaceae, Malvaceae, *Amaranthaceae and Fabaceae* including *Hibiscus*, *Senna*, *Sida*, *Ptilotus* and *Acacia* . The Pilbara is an important transition zone between the tropical grasslands of the north and the Acacia woodlands to the south, resulting in many range extensions and outlying populations of species.

The Department of Agriculture has conducted flora and vegetation inventory and condition surveys of the Pilbara (van Vreeswyk *et al.* 2004) using an integrated survey method involving the land system approach to rangeland description evaluation. A total of 102 land systems were defined in the Pilbara at scale of 1:250,000 (van Vreeswyk *et al.* 2004). Land systems are broadly used to provide context and to inform impact assessment and management. Vegetation condition within BHP Billiton Iron Ore's tenements is largely good to excellent, except where these co-occur with pastoral activity and associated high stock activity around water points, and dense introduced pastoral grasses i.e. Buffel Grass (*Cenchrus ciliaris*).

To date, in excess of 160 baseline flora and vegetation surveys have been commissioned by WAIO within its area of influence. The WAIO biodiversity geodatabase currently contains greater than 11,000 records for almost 200 significant plant species, including 3 Threatened Flora, 64 Priority 1, 32 Priority 2, 80 Priority 3 and eight Priority 4 flora. There are in excess of 7,200 records for close to 60 introduced weed species. Seven of these weed species are listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). The location of these records both on and off WAIO tenements in the Pilbara, inform the management of our operations.

'An ecological community is a naturally occurring group of plants, animals and other organisms interacting in a unique habitat' (DEC 2007). Distinct communities that are under threat from a range of processes and are limited in their distribution are assessed and listed by the State or Commonwealth. The DPaW maintain a register of Threatened and Priority Ecological Communities for WA. Registers are reviewed by the West Australian Threatened Species Scientific Committee and amendments made annually. There are presently no declared threatened vegetation communities within WAIO's area of influence. There are however 9 PEC's comprised of 7 Priority 1, and two Priority 3 communities.

Table 2: **Conservation significant vegetation communities within WAIO's area of influence** (derived from DPaW, 2014)

DPaW No/	Community	Priority
1	West Angelas Cracking-Clays Open tussock grasslands of *Astrebla pectinata, A. elymoides, Aristida latifolia*, in combination with *Astrebla squarrosa* and low scattered shrubs of *Sida fibulifera*, on basalt derived cracking-clay loam depressions and flowlines.	P1
2	Weeli Wolli Spring community. Weeli Wolli Spring's riparian woodland and forest associations are unusual as a consequence of the composition of the understorey. The sedge and herbfield communities that fringe many of the pools and associated water bodies along the main channels of Weeli Wolli Creek have not been recorded from any other wetland site in the Pilbara. The spring and creekline are also noted for their relatively high diversity of stygofauna and this is probably attributed to the large-scale calcrete and alluvial aquifer system associated with the creek. The valley of Weeli Wolli Spring also supports a very rich microbat assemblage including a threatened species	P1
12	Brockman Iron cracking clay communities of the Hamersley Range. Rare tussock grassland dominated by Astrebla lappacea (not every site has presence of Astrebla) in the Hamersley Range, on the Brockman land system. Tussock grassland on cracking clays- derived in valley floors and, depositional floors. This is a rare community and the landform is rare. Known from near West Angeles, Newman, Tom Price and boundary of Hamersley and Brockman Stations.	P1
17	Freshwater claypans of the Fortescue Valley. Freshwater claypans downstream of the Fortescue Marsh - Goodiadarrie Hills on Mulga Downs Station.	P1

DPaW No/	Community	Priority
18	Fortescue Marsh (Marsh Land System) Fortescue Marsh is an extensive, episodically inundated samphire marsh at the upper terminus of the Fortescue River and the western end of Goodiadarrie Hills. It is regarded as the largest ephemeral wetland in the Pilbara. It is a highly diverse ecosystem with fringing mulga woodlands (on the northern side), samphire shrublands and groundwater dependant riparian ecosystems. It is an arid wetland utilised by waterbirds and supports a rich diversity of restricted aquatic and terrestrial invertebrates. It is the recorded locality for night parrot and bilby and several other threatened vertebrate fauna. It also provides habitat for endemic Eremophila species, populations of priority flora and several near endemic and new to science' samphires.	P1
21	Coolibah-lignum flats: *Eucalyptus victrix* over Muehlenbeckia community. Woodland or forest of *Eucalyptus victrix* (coolibah) over thicket of *Muehlenbeckia florulenta* (lignum) on red clays in run-on zones. Associated species include *Eriachne benthamii*, *Themeda triandra, Aristida latifolia, Eulalia aurea and Acacia aneura.*	
	• Coolibah and mulga (*Acacia aneura*) woodland over lignum and tussock grasses on clay plains (Coondewanna Flats and Wanna Munna Flats)	P3
	• Coolibah woodlands over lignum (*Muehlenbeckia florulenta*) over swamp wandiree (Lake Robinson is the only known occurrence)	P1
	• Coolibah woodland over lignum and silky browntop (*Eulalia aurea*) (two occurrencesknown on Mt Bruce Flats)	P1
25	Vegetation of sand dunes of the Hamersley Range/Fortescue Valley (previously 'Fortescue Valley Sand Dunes'). These red linear iron-rich sand dunes lie on the Divide Land system at the junction of the Hamersley Range and Fortescue Valley, between Weeli Wolli Creek and the low hills to the west. A small number are vegetated with *Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii, Trichodesma zeylanicum var. grandiflorum* open shrubland. They are regionally rare, small and fragile and highly susceptible to threatening processes.	P3

Note: The Ethel Gorge TEC is not listed as this is a stygobiont community and outside the scope of this Plan.

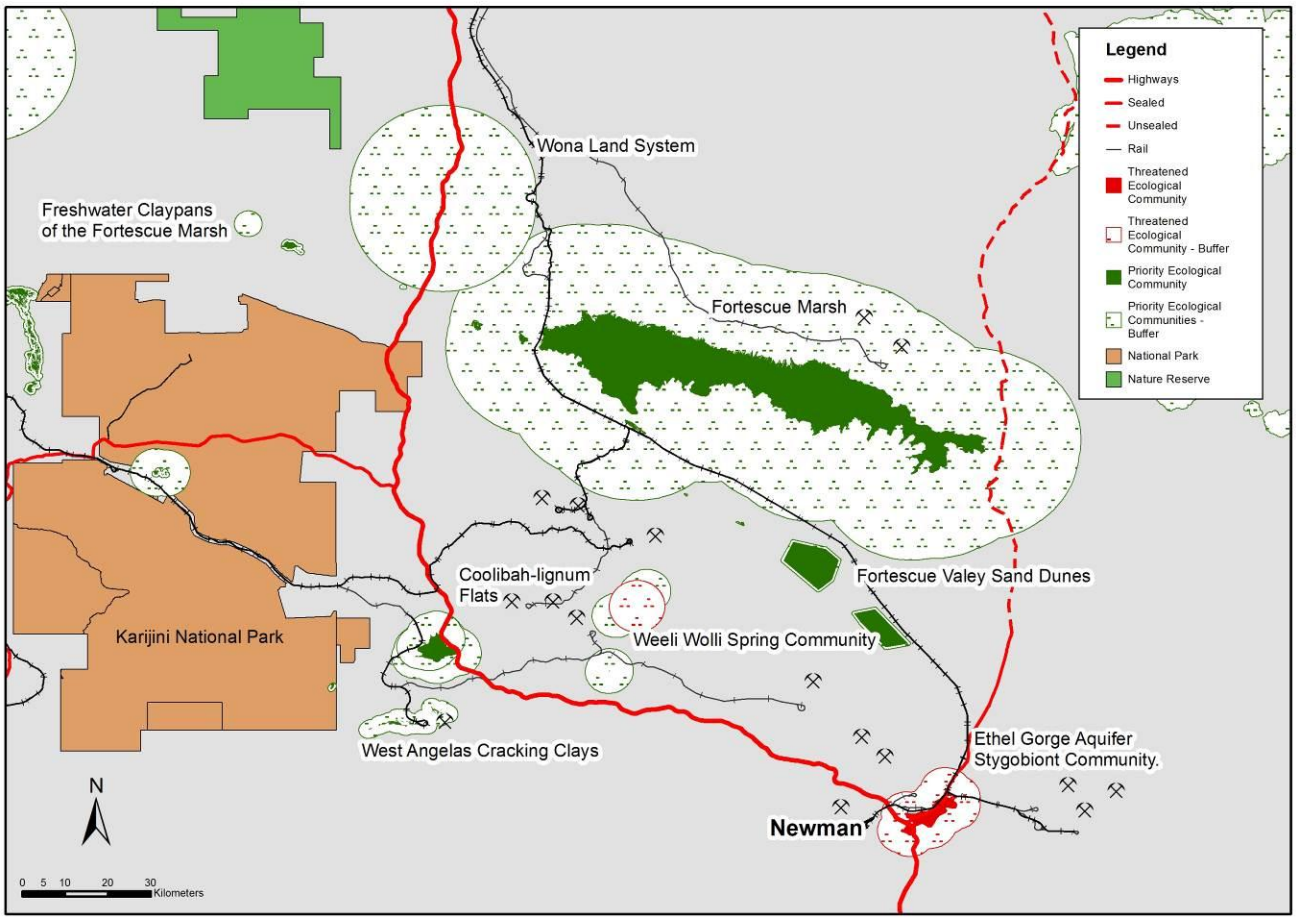


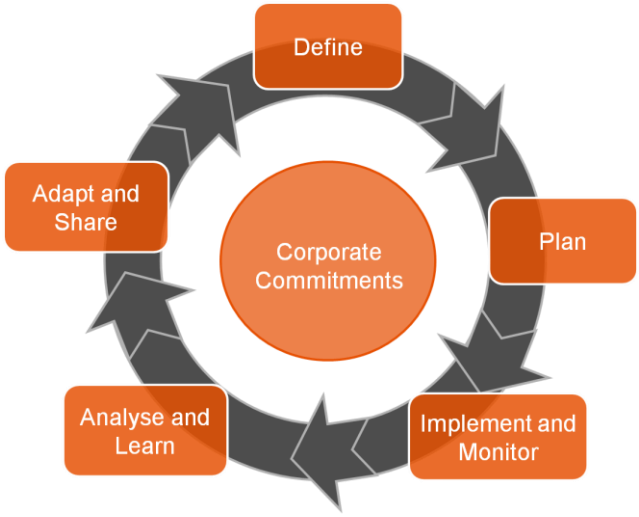
Figure 3: Location of conservation significant communities within WAIO's area of influence

5. Management

5.1. Adaptive Management Framework

WAIO applies an adaptive management framework to implementing management measures identified in this plan. Adaptive management is a structured, iterative process to decision making. An integral component is the application of the mitigation hierarchy (avoid, minimise and rehabilitate environmental impacts, prior to applying offsets).

The framework embeds a cycle of monitoring, reporting and implementing change where required. It allows an evaluation of the management controls so that they are progressively improved and refined, or alternative solutions adopted, to ensure the outcome-based objectives are achieved.



5.2. Assessing Threats to Conservation Significant Flora and Vegetation

BHP Billiton Iron Ore undertakes a risk management process, guided by GLD 17 (Risk Management) that defines the risks and threats to environmental factors and identifies management controls that can be applied to mitigate the risk of impacts to environmental factors.

The risk management process used for environmental risk is described below:

1. Establish Context:
    - Defines the parameters within which risks must be managed and sets the scope for the risk management process.
2. Risk Assessment:
    - Risk identification (comprehensive list of environment risks).
    - Risk analysis (determine cause and existing preventative and mitigating controls).
3. Risk Control:
    - Risk evaluation (select, implement and monitor the effectiveness of specific risk controls).
    - Risk treatment (assign, implement and monitor action plans for further mitigation of environment risks to as low as reasonably practicable).
4. Risk Monitoring and Review:
    - Monitor, review and update (review progress and developments, check actions effectiveness, identify new risks).
5. Risk Communication and Reporting.
    - Reviews of the Operation / Project Environment Risk Registers are communicated to any applicable Risk Owner(s).

'Conservation significant flora and vegetation' is an environmental factor considered in this process of environmental impact assessment, undertaken to support the referral of projects for state and Commonwealth environmental approval. Any potential threats to conservation significant species from a project are identified and considered during this process.

The potential threats to conservation significant flora and vegetation from mining activities in the Pilbara are relatively well understood. Potential cumulative impacts to conservation significant flora and vegetation as a result of non-mining factors i.e pastoralism, community infrastructure have been considered in the development of this plan.

The principal threats to conservation significant flora and vegetation, and the application of these in the context of WAIO's operations and area of influence are described in Table 3.

Table 3 : Potential threats to conservation significant flora and vegetation associated with WAIO activities

Identified Threat	Application to WAIO Operational Activities

Identified Threat	Application to WAIO Operational Activities
Weeds	• Mining activity across WAIO has the potential to introduce and spread invasive weed species by transporting contaminated soil and seeds, either directly or contained within dirt or soil on machinery. • Weeds alter the characteristics of TEC's, by out competing individual species, changing fire patterns and increasing erosion. • Weeds can directly compete with conservation significant species for environmental resources.
Altered water regimes	• Dewatering associated with mining below groundwater levels reduces the water table and potentially impacts on flora and vegetation that may be dependent on existing groundwater levels. • The discharge of water to ephemeral streams for extended periods, and in an arid climate can alter the composition of communities associated with these systems and create an unnatural dependency on the water being discharged. • The quality of water discharged into environments has the potential to impact directly on species and or communities. • The discharging of water to surface and through 'Managed Aquifer Recharge' (MAR) has the potential to water log soils and directly impact individuals and communities. • Increasing the availability of water in an arid climate can promote weed growth and encourage their competition with species and communities.
Fire	• Flora and vegetation in the Pilbara is adapted to natural fire regimes. Mining activities have the potential to change the frequency of fire by actively extinguishing fires and or by causing them. This may result in fire in certain parts of the landscape being too frequent or in other parts being not frequent enough and overly intense when they do occur. • Changed fire regimes can encourage weeds at a landscape level. • Altered fire regimes can change the ecological characteristics of communities.
Vegetation Clearing	• Mining operations can directly impact on flora and vegetation communities through the clearing of vegetation, including for; overburden storage areas, pits, transport, laydown and work areas etc.
Dust	• There may be a number of processes through which iron ore dust could impact the functioning of plants. The limited studies in this area from the Pilbara indicate that despite differing circumstance's and dust loads, there appears to be little physiological impact to plants. • Indirect physiological impacts to conservation significant flora and vegetation associated with vegetation dust loading are considered to be low.

5.3. Management Objectives

WAIO is focused on outcome based management objectives. In regards to conservation significant flora and vegetation, WAIO seeks to maintain representation, diversity, viability and ecological function at the species, population and community level.

To achieve this outcome we will apply a suit of management actions in an adaptive management framework to ensure that we:

- Avoid clearing conservation significant species and or communities within regulator approved clearing areas to the extent that it is reasonably practicable
- Ensure no unauthorised disturbance occurs
- Do not increase weed distribution as a result of our activities
- Protect the diversity and distribution of significant flora species and vegetation communities within our area of influence
- Limit the impact of fire to significant flora and vegetation
- Manage impacts to conservation significant flora and vegetation as a result of our changes to the hydrological regime

5.4. Management Actions

5.4.1. Project Environmental and Aboriginal Heritage Review (PEAHR)

The Project Environment and Aboriginal Heritage Review (PEAHR) is an internal procedure designed to identify the environmental, aboriginal heritage and land tenure legal requirements that are required, prior to any land disturbance. A PEAHR approval is required prior to any land clearing activity.

BHP Billiton Iron Ore project managers wishing to undertake land clearing activities must first lodge a PEAHR application via the web based PEHAR application system. Each application is assessed by Environment and Heritage Advisors responsible for the area in which the clearing is to be conducted. Assessors of each PEAHR ensure that the required approvals and licenses are in place and that the appropriate management measures and conditions are being applied. Assessors will also apply the management hierarchy and recommend conditions and limitations where appropriate and reasonable. The PEAHR application and the recommendations of the assessing environmental advisor are then reviewed by a Team Lead or Superintendent and a PEAHR permit is authorised.

In reviewing and approving PEHAR applications and applying management measures WAIO will apply the ALARP (As Low As Reasonably Practicable) principle, as discussed by Jones-Lee Aveen (2011). This includes the clearing of conservation significant flora and vegetation within approved clearing boundaries. The assessing environmental advisor will avoid clearing conservation significant flora and vegetation until it is no longer reasonably practicable to do so. Avoidance of removal of conservation significant flora species and vegetation will be achieved through the application of exclusion zones or buffers as detailed in Table 4. Approval will be sought for removal of conservation significant flora and vegetation species where avoidance is not possible.

Table 4: Buffers to be applied around flora within specific conservation categories

Conservation Category	Buffer	Rational
Threatened Flora (DRF)	50 m	Contemporary buffer applied by regulators for all threatened species under normal circumstances and for ESA's as recognised by the EP Act.
Newly Discovered Species	50 m	Until reviewed by scientific committees and taxonomists, take a precautionary approach and treat as for DRF
Priority 1	50 m	Accounting for the lack of knowledge of the species, treated as for DRF.
Priority 2	10 m	A 10 meter buffer provides sufficient safeguard to ensure clearing does not directly impact on the ecological resources required by individual plants.
Priority 3	10 m	
Priority 4	10 m	

5.4.2. Flora and Vegetation Survey

BHP Billiton Iron Ore has been undertaking baseline biological surveys on most of its Pilbara tenements since the 1990s. Comprehensive baseline and targeted flora and vegetation surveys are undertaken to support environmental impact assessment (EIA) and management. WAIO Guidelines for Vegetation and Flora Surveys WIN-ENV-LAND NW-008 have been developed to ensure compliance with the EPA's guidance statement 51 (Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA) and enable consistent and comparable results across its operations and between surveys.

Ordinarily, baseline surveys are conducted at a tenement scale. This ensures a regional understanding of flora and vegetation communities which enables informed management in a regional context and an assessment at a projects level of impact and area of influence beyond its direct footprint. Baseline surveys are reviewed on a 5 yearly basis to ensure they remain current and applicable for management. In these reviews, survey timing, methodology, and extent are considered against contemporary standards. The results of the survey are considered against taxonomic and conservation significance changes over the past 5 years and the potential for future operational activity in the area.

Targeted surveys may be undertaken to update baseline information or to resolve particular survey or study gaps. Targeted surveys may also be undertaken prior to approved land clearing if there is an identified risk of DRF, or Priority 1 species occurring in the impact area.

To provide a consistent vegetation map across our tenements at a 1:20,000 scale, WAIO periodically consolidates the vegetation mapping developed during baseline surveys (Figure 4). This has been enabled by the consistent methodology provided in the WAIO Guidelines. Consistent mapping of flora and vegetation across WAIO tenements provides a valuable tool to enable management decisions in a regional context and considering cumulative impacts to flora and vegetation communities. Targeted surveys are undertaken on a needs basis to clearly map and better understand threatened and priority ecological communities as defined by DPaW.

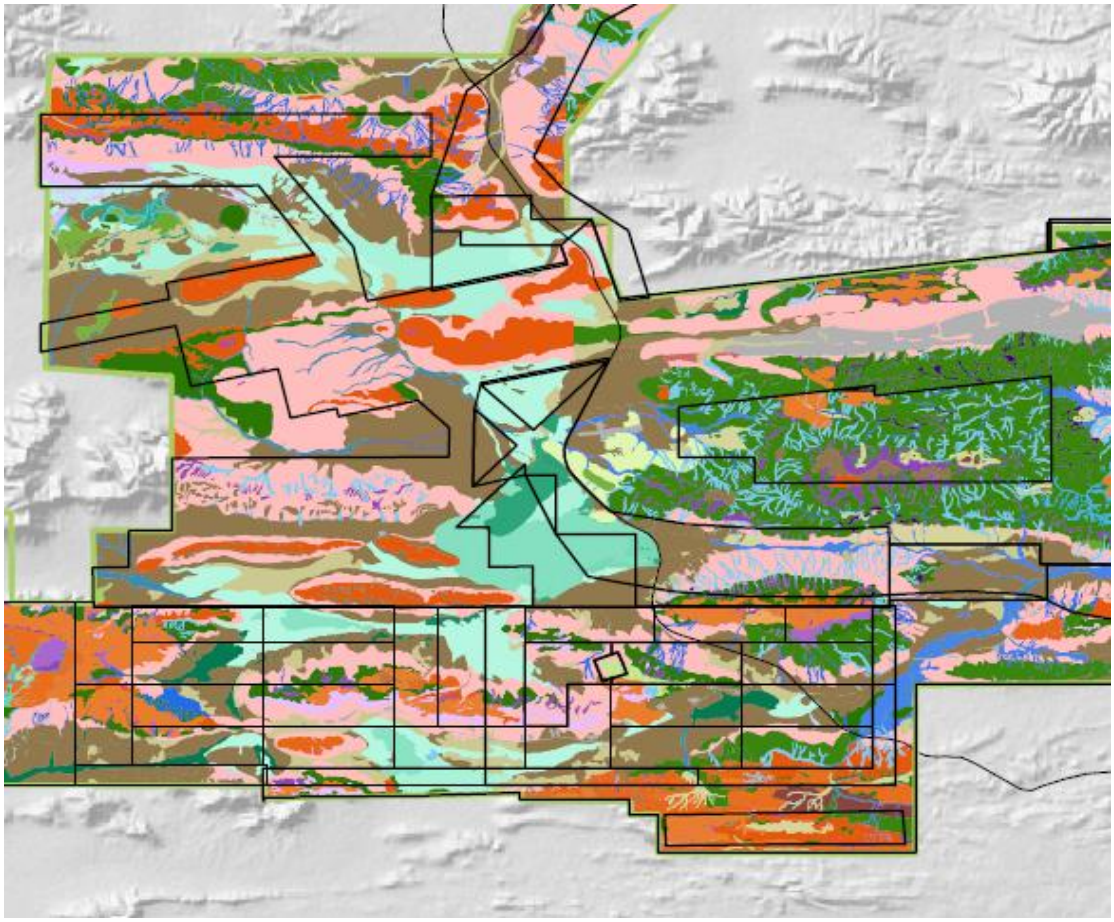


Figure 4: **Regional Vegetation Mapping – Central Pilbara (Onshore 2014)**

5.4.3. Data Capture and Management

Survey data is captured in a standard format (Biological Survey Spatial Data Requirements SPR-IEN-EMS-015) and using a prescribed template (FRM-IEN-EMS-002). The data is quality assured and checked by WAIO ecologists and loaded into a geodatabase where the data is published and made available for business systems and processes, including web based mapping (ioMaps), the PEAHR works approval system, and for environmental approvals.

Flora and vegetation datasets are updated as required following any notification of changes to taxonomy or significance classifications. Formal reviews of taxonomy and conservation significant status are undertaken six monthly. Taxonomy is maintained from data provided by the Western Australian Herbarium and includes only species appearing in the WA Herbarium Census of WA Plants Database. The conservation significant status for each recorded species or conservation significant community is maintained against published lists generated by the relevant scientific committees of the IUCN, DoE, and DPaW.

5.4.4. Conservation significant flora and vegetation Information for sites

Operational staff can access current information on the conservation significant flora occurring on their site by using the information tool in ArcGIS or ioMaps. These tools open attributes attached to each record which provides information about the conservation status of the species, its scientific name, when it was discovered, and some of the physical aspects of the location at which it occurs. A direct link to the report for the survey during which it was discovered is also provided and provides further information if needed.

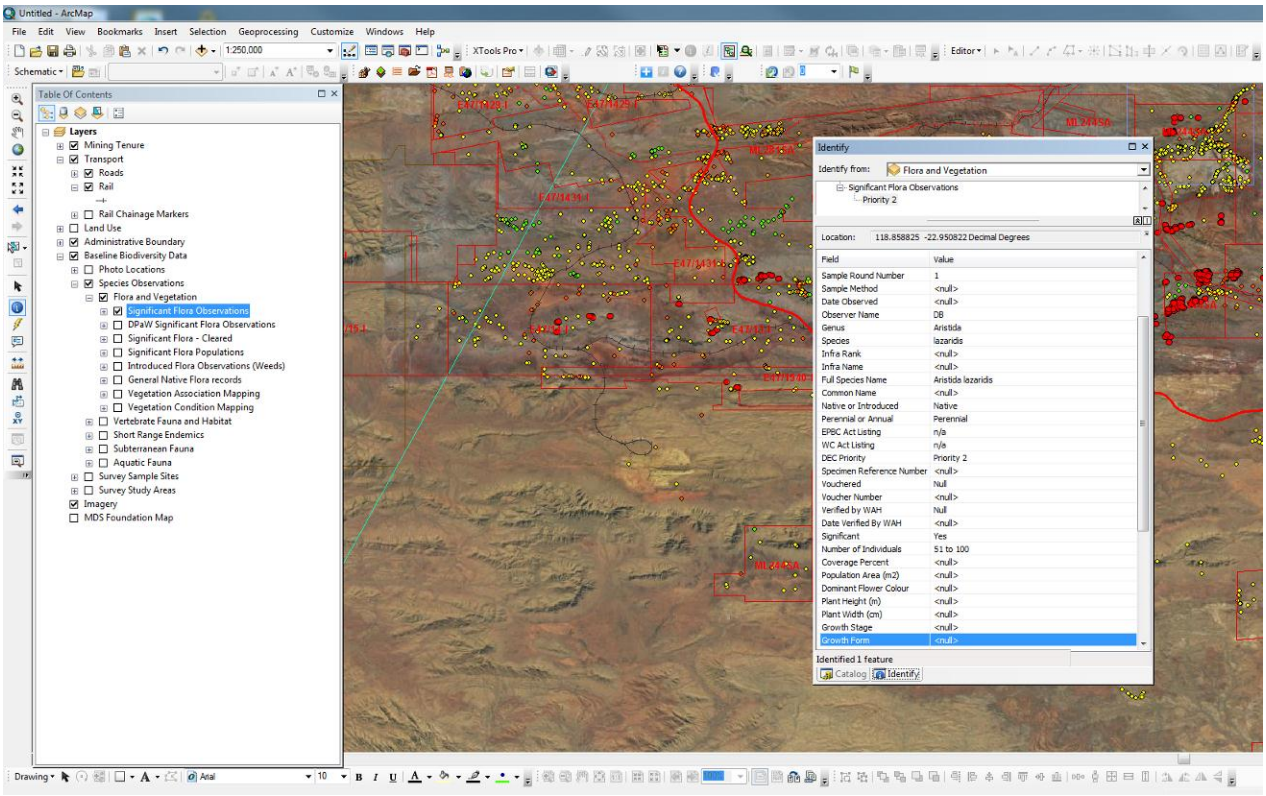


Figure 5: Example of records accessed via the BHP Billiton Iron Ore Biodiversity GIS Layer on ArcGIS providing site specific data to operational staff

Further information on specific conservation significant flora can be accessed through the WA Herbariums FloraBase website. This is the most current scientific information available on the taxonomy of WA's flora. The Department of Parks and Wildlife also provide recovery and interim recovery plans for certain threatened flora and vegetation communities. These plans are available from the DPaW website.

Vegetation communities are mapped as part of our baseline vegetation assessments and provided to operational staff via a specific ArcGIS layer. Conservation significant vegetation is mapped and provided to operational staff in the Key Assets layer. The community boundary is mapped and so too is a buffer as provided and maintained by DPaW. Details of each community can be found in the attributes by using the identify tool. Further information on conservation significant vegetation communities can be found on DPaWs Threatened Species and Communities Web page

5.4.5. Groundwater and Surface Water Management

Management requirements for water dependent ecosystems and communities are established within Regional Water Resource Management Plans (RWRMP). These plans incorporate the technical considerations, assumptions and adaptive management that underlie the broader Pilbara Water Resource Management Strategy (PWRMS). Plans are broadly catchment based and take into consideration hub and site specific water resource management requirements and the ecological requirements for identified ecological receptors.

Conservation significant vegetation communities that are dependent on a hydrological regime that may be impacted by WAIO operations will be considered within RWRMP's. Plans will assess all existing ecological information on the community and baseline flora data, current and future conditions of groundwater, soil moisture and surface water to develop 'eco-hydrological' models for the area. These models will inform the required adaptive management to enable the achievement of outcome-based objectives.

Regional Water Resource Management Plans consider the following aspects:

- Hydrological changes (baseline, current and future conditions of groundwater, soil moisture and surface water) resulting from WAIO groundwater abstraction and surface water diversion.
- The receiving conservation significant flora or vegetation communities, their identified value and hydrological dependency (groundwater, soil moisture and/or surface water).
- Potential impacts (predicted & actual) to conservation significant flora or vegetation communities.
- Required risk-based adaptive management techniques that are feasible (tested and practicable) to mitigate potential impacts to acceptable levels during operations and closure.

Hydrological conditions can be impacted by more than one mining operation, depending on the surface water and groundwater hydrological interconnectivity at the catchment scale. Regional Water Resource Management Plans and catchment scale eco-hydrological studies provide baseline assessments and predictive models, which will be updated iteratively to inform cumulative impact assessments and adaptive management within our area of influence.

5.4.6. Monitoring

WAIO operates in natural systems that are complex and poorly understood. The adaptive management approach provides a framework that enables the business to learn more about the response of these complex systems to our management actions and to minimise impact to conservation significant flora and vegetation through continuous improvement.

Where WAIO operations are likely to have an indirect impact on conservation significant flora or vegetation an integrated monitoring program may be required to meet the identified outcomes for the species or community. Monitoring programs will be developed where necessary, based on clear objectives. Objectives will be focused on achieving the outcomes identified and will then inform the design of the monitoring program.

Monitoring programs will be designed in consideration of the following:

- **The defined relationship with the identified impact**.
  A clear assessment of how our activity is likely to impact the species or community at the operation, including whether impacts are short-term or long-term, reversible or irreversible, and/or minor or major;

- **Cost effective and practical application in meeting the objectives of the program**.
  Only monitoring that will materially contribute to the adaptive management of the species or community, and enable an appropriate management response to identified change shall be implemented;

- **Have early warning capabilities.**
  An early warning indicator allows enough time to instigate an appropriate management response where required. A monitoring program that does not enable an effective response is only valuable in identifying or measuring the response to change and does not mitigate against the impact of this change;

- **Consider the 'lag' effects between changing physical factors and a species or community response.**
  Some indicators, such as vegetation responses to changed hydrology, may be slow, and limited in enabling an appropriate management response. In these instances predicted responses based on previous research or monitoring may need to be applied to known levels of change at the receptor. Management actions will need to be applied in response to trigger levels that limit the risk of impacting the species or community to ALARP;

- **Have multiple indicators.**
  Consider multiple indicators that, will reduce the likelihood of missing a critical link and an unacceptable impact occurring. An adaptive management framework enables the refining of triggers and indicators over time to best limit the risk of impacting the species or community to ALARP.

5.4.7. Reporting

BHP Billiton Iron Ore publicly reports its environmental compliance performance annually in accordance with standard approval conditions via an Annual Environment Report. BHP Billiton reports its Group-wide sustainability performance in the BHP Billiton Annual Sustainability Report.

5.4.8. Rehabilitation

Rehabilitation at sites is undertaken in accordance with the WAIO Rehabilitation Standard and site specific Mine Closure Plans (MCP). Conservation significant flora and vegetation is considered when developing mine closure plans and their related completion criteria.

The success of rehabilitation in the Pilbara is critically dependent on maintenance of the availability of scarce biophysical resources required for long-lived perennial plants. These resources, including topsoil and surface water drainage are given close consideration when developing mine closure plans and in rehabilitation planning.

The use of conservation significant flora in rehabilitation will be considered on a case by case basis, and identified as a management action in site based rehabilitation and closure plans. The principle objective of rehabilitation however is that it must be safe and stable, and, within the limits of the altered post-mining environment. Rehabilitation aims to establish a native Pilbara ecosystem that provides for low intensity grazing, protection of water quality and conservation.

Where possible WAIO undertakes progressive rehabilitation. Progressive rehabilitation involves planning the rehabilitation during the initial mine planning phase and ensuring that where possible, rehabilitation occurs concurrently with other operations as land becomes available for final landform; thereby reducing the total area open and increasing opportunities for ongoing learning and improvement.

5.5. Management Summary Table

Table 5: Summary of environmental management components

OEPA Objective	WAIO Management Objective	Management Action	Monitoring Requirements	Indicators and/or Trigger Criteria	Reporting Requirements	Potential Contingency Actions
To maintain representation, diversity, viability and ecological function at the species, population and community level.	• Avoid clearing conservation significant species and or communities within regulator approved clearing areas.	• Ensure comprehensive baseline and targeted surveys are current for each operational site. • Project review through PEAHR process (Section 6.5.1) considering alternatives to clearing. • Application of buffers where appropriate. • Apply conditions within permits to take. • Retain topsoil for redistribution in rehabilitation. • Pre-clearing PEAHR inspections. • Flagging of individuals where appropriate in field.	• Clearing commitments and conditions monitored within a management system. (CMO database) • Periodic, Group and WAIO GLD and process audits. • Rehabilitation monitoring.	• Known conservation significant species cleared under approval.	• Species cleared reported as per the requirements of regulators.	• Rehabilitation conducted in accordance with WAIO Rehabilitation Standard. • Local topsoil retained for use in rehabilitation. • All clearance of known occurrences of conservation significant species recorded in GIS. •
	• Ensure no increase in weed distribution attributable to BHP Billiton Iron Ore activities	• Weed hygiene inspections of ground-engaging equipment prior to arriving at site • Weed mapping as part of baseline assessments.	• Carry out weed inspections.	• An increase in weed distribution identified.	• Notification to regulatory authority upon identification of a new weed species on sites.	• Weed control programme implemented as required

OEPA Objective	WAIO Management Objective	Management Action	Monitoring Requirements	Indicatiors and/or Trigger Criteria	Reporting Requirements	Potential Contingency Actions
	• Protect the diversity and distribution of significant flora species and vegetation communities on our tenements	• PEAHR approval must be in place prior to land disturbance. • Operational personnel educated and aware of PEAHR requirements. • Maintenance of comprehensive GIS including data on; approval boundaries, identified conservation significant species, and communities.	• 5 - yearly review of baseline biodiversity surveys to determine if further surveys are required. • Capture of data on significant species/community cleared • Regional assessment indicating possible occurrence of species or communities.	• New significant species, or vegetation community found • Elevation of significant status of known occurrences of species or communities.	• notification to the regulatory authority upon identification of new significant species or vegetation community (Rare Flora Report Form) • Provide relevant new data to the regulatory authority on known species or communities. • Collaborate with the WA Herbarium on taxonomy of new species.	• Rehabilitation of impacted areas. • Local topsoil retained for use in rehabilitation. • Targeted Surveys. • Manage non- mining related impacts to reduce cumulative 'pressure' on ecosystem function

6. Research

WAIO will continue to undertake research into relevant significant species and communities as required. Research and Development (R and D) planning and budgeting will consider recommendations and priorities identified within the relevant species recovery plans or conservation advice in addition to business priorities and requirements. Specific research commitments are described in Appendix 1.

Support for the WA Herbarium in cataloguing and promoting Pilbara flora will continue to be a priority.

7. Audit and Review

BHP Billiton undertakes periodic audits of businesses management systems to ensure compliance with standards and the application of established systems and processes. This includes GLD 009 and the PEAHR system amongst others. WAIO undertake periodic internal audits as part of its drive for continual improvement. Internal audits are commonly subject focussed, narrow and dive deeply into particular management aspects. Layered audits are undertaken more regularly in the field by site environmental staff and are designed to review and set standards, reinforce positive performance and identify system issues and opportunities in environment management systems at a site level.

This multi layered approach assesses ongoing performance against established standards and systems, identifies and addresses management gaps, and drives continuous improvement. The established audit and review process will ensure the application of management procedures for the management of conservation significant flora and vegetation within WAIO's area of influence will be consistently and effectively applied.

This document will be reviewed when required for new developments. or following any significant change to BHPB Iron Ores' systems and or procedures, and then at a frequency of no more than 5 years from the previous revision.

8. Responsibilities

Position Title	Role	Description of Task
Environment Managers	Approval	• Approval of the Plan • Preparation and approval of any subsequent versions of the Plan that are required to support an environmental approval • Sign off of annual reporting
Environmental Superintendents/ Team Leads	Accountability	• Implementation of the management plan, including provision of funding • Preparation and approval of any subsequent versions of the Plan, not required to support an approval
Superintendent Ecology and/ or Principal Ecologists	Advice	• Technical review and development of the plan • Liaison with relevant stakeholders
Environmental Advisors	Implementation	• Implementation of the plan • Reporting against conditions, via the Annual Environment Report • Information dissemination to site personnel

9. Definitions and Abbreviations

Term	Description
ºC	degrees Celsius
ALARP	As Low As Reasonably Practicable. This principle involves effective recognition of the fact that, while in most circumstances risk can be reduced, beyond some point, the cost (in financial, time and effort) of further risk-reduction is grossly disproportional to the potential derived benefits. It is at this point that the level of potential impact for the given management response is considered to be ALARP (Lee and Aven, 2011).
ArcGIS	A comprehensive system that allows people to collect, organise, manage, analyse, communicate and distribute geographic information. This system is used by BHP Billiton Iron Ore using the ESRI ArcMAP platform.
BAM Act	Biosecurity and Agriculture Management Act 2007

Term	Description
BSL	Below Surface Level
BHPB	BHP Billiton Pty Ltd
CEO	Chief Executive Officer
DEC	Department of Environment and Conservation (WA)
DER	Department of Environment Regulation
DoE	Department of the Environment (Federal)
DPaW	Department of Parks and Wildlife WA (formally DEC)
DRF	Declared Rare Flora
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Federal)
EIA	Environmental impact assessment
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Clth)
ESA	Ecologically sensitive area
g	grams
GIS	Geographic information system
GLD	BHP Billiton Group level document
GPS	Global positioning system
ha	hectare
HSE	Health, Safety and Environment
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
km	kilometre
km/hr	kilometres per hour
m	metre
mm	millimetre
MAR	Managed Aquifer Recharge
MCP	Mine Closure Plan – Previously referred to as Rehabilitation and Closure Management Plans
NVCP	Native Vegetation Clearing Permit
OEPA	Office of the Environment Protection Authority.
PEAHR	Project Environment and Aboriginal Heritage Review
PEC	Priority Ecological Community
PWRMS	WAIO's - Pilbara Water Resource Management Strategy
R and D	Research and Development
RWRMP	WAIO – Regional Water Resource Management Plan.
SSC	Species Survival Commission
TEC	Threatened Ecological Community
VHA	Vegetation Health Assessment.
WA	Western Australia
WAIO	Western Australian Iron Ore – BHP Billiton Iron Ore operations in Western Australia.
WC Act	*Wildlife Conservation Act 1950* (WA)

10. References

The following guidelines developed by the State and Commonwealth environmental regulation departments are applicable to the management of Conservation Significant Flora and Vegetation in the Pilbara:

Department of Environment and Conservation (1995). *Department of Conservation and Land Management Policy Statement No. 29: Translocation of threatened flora and fauna*.

Department of Environment and Conservation (2007) *Conserving Threatened Ecological Communities,* Brochure: DEC Threatened Species and Communities Branch.

Department of Parks And Wildlife (2014) *Priority Ecological Communities for Western Australia Version 21*

Brearley, D (2014) *Consolidation of Regional Vegetation Mapping: BHP Billiton Iron Ore*.

Environmental Protection Authority (2002). *EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection*.

Jones-Lee M, Aven T, (2011) *ALARP – What Does it Really Mean*, Reliability Engineering and System Safety, Volume 96, Issue 8, August 2011

Carwardine J, Nicol S, van Leeuwen S, WaltersB, Firn J, Reeson A, Martin TG, Chades I (2014) *Priority threat management for Pilbara species of conservation significance*, CSIRO Ecosystems Sciences, Brisbane.

Shepherd, D., Beeston, G and Hopkins, A. (2001) Native Vegetation in Western Australia. Extent, Type and Status. *Resource Management Technical Report 249*. Department of Agriculture, South Perth.

Department of Environment and Conservation (1995). *Department of Conservation and Land Management Policy Statement No. 29: Translocation of threatened flora and fauna*.

van Vreeswyk, A.M.E, Payne, A.L, Leighton, K.A. and Hennig, P. (2004) An inventory and condition survey of the Pilbara region, Western Australia. Western Australian Department of Agriculture Technical Bulletin No. 92.

Western Australian Herbarium (1998–). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/.

Appendix 1 Site Specific Management Actions

Factor / Value Potentially Impacted	WAIO Management Objective	Management Action	Monitoring Requirements	Indicators and/or Trigger Criteria	Reporting Requirements	Potential Contingency Actions
Four conservation significant flora recorded from the study area; including two Priority flora, one taxon of interest, and one significant range extension. • *Triodia sp*. Mt Ella (M.E. Trudgen 12739) (Priority 3): seven plants from five point locations in the development area • *Goodenia nuda* (Priority 4): 63 plants from seven points on a floodplain within the Proposal Development Envelope • *Acacia clelandii* (significant range extension): recorded from 27 point locations, eight within	Avoid clearing conservation significant species and or communities within regulator approved clearing areas.	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				
	No unauthorised disturbance.	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				
	Ensure no increase in weed distribution attributable to BHP Billiton Iron Ore activities	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				
	Protect the diversity and distribution of significant flora species and vegetation communities on our tenements	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				
	Limit the impact of fire to Conservation significant flora and vegetation communities.	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				
	Avoid and manage the potential impact of dust on conservation significant flora and vegetation.	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				
	To manage to an acceptable level, the range of potential hydrological changes (groundwater, surface water and/or soil moisture) resulting from WAIO Pilbara operations that could impact conservation significant flora and vegetation.	• Managed in accordance with the WAIO Regional Land and Biodiversity Management Plan - Flora and Vegetation.				

Identified new species of Acacia (*Acacia sp.* East Fortescue).
• 86% of the known population excised from development envelope
• As of May 2015 no individuals of this species will be directly impacted.
• Approximately 219 plants may be exposed to indirect impacts.
	To maintain the, viability and ecological function of the population of the new species of Acacia (*Acacia* sp. East Fortescue) occurring on BHP Billiton Tenure at Ore Body 31	• Implement standard management actions in accordance with the WAIO Regional Land and Biodiversity Management Plan – Flora and Vegetation.
		• Apply a 50m buffer to all known individuals of the species.
		• Prior to commencement of the project, undertake a targeted survey off tenure within prospective geology and landforms to expand our knowledge and clarify the conservation status of *Acacia* sp. East Fortescue, including;
		  ○ Mapping the occurrence and distribution of the species regionally.
		  ○ Providing a population count of the individuals located during the survey.
		  ○ Providing an assessment of the habitat that supports the species
		• Support the WA Herbarium to have the species formerly described and added to the Census of WA Flora
		• During the life of the mine, collect seed from *Acacia* sp. East Fortescue and determine its seed ecology, suitability and efficacy for use in rehabilitation.
		• Ensure management of surface water such that water drains away from populations 1, 5 and 6 of this species.
		• Ensure surface water is not allowed to pool within populations 1, 5 and 6 of this species
			• During the operation of the mine, and using photo-point monitoring techniques, conduct quarterly monitoring of populations 1, 5 and 6.
			• During the operations of the mine, undertake quarterly monitoring to ensure management actions are being applied
				• Unexpected decline in the size or visual health of populations 1, 5, 6 beyond natural variation.	• Provide a report and associated data on the outcomes of the *Acacia* sp. East Fortescue, regional survey to the CEO and CEO of the DPaW.
					• Report annually on any impacts to the population of *Acacia* sp. East Fortescue on BHP Billiton tenure
						• Commence investigative study into the population decline and recommend management change in accordance with adaptive management principals
						• Apply new management actions in accordance with the findings of an investigative study and to the satisfaction of the CEO of the DPaW.
						• Increase monitoring intensity to the satisfaction of the CEO of the DPaW.
						• Restrict significant dust causing activity on the Western Side of the OSA during periods of dry South Easterly winds.

Note: Updates are highlighted in yellow.

5 REHABILITATION AND DECOMMISSIOING (INTEGRATING FACTOR)

Question 1: Identify the likely impacts to groundwater quality and nearby receptors from the mine void closure strategy, using approaches appropriate to this stage of the assessment process;

Question 2: Describe the preferred closure strategy based on the potential risks of the different approaches and explain how the strategy meets the EPA's objective for Rehabilitation and Decommissioning; and

Question 3: Describe and commit to monitoring and management requirements that would need to be undertaken to confirm that the risk of the preferred approach would be maintained during operations and decommissioning.

The management approach is described in the Draft Orebody 31 Mine Closure Plan, which was attached as Appendix P to the original Orebody 31 Iron Ore Project Referral Application.

Specifically, Acid Mine Drainage (AMD) risk will be managed according to BHP Billiton Iron Ore's Management Standard that includes requirements for material characterisation, risk assessment, planning, mine development, closure and monitoring. The AMD Management Standard and supporting procedures are consistent with the Global Acid Rock Drainage Guide published by the International Network for Acid Prevention (October, 2014). An AMD Risk Assessment (Earth Systems, 2014) was carried out and appended to the original Orebody 31 Iron Ore Project Referral Application. This assessment demonstrated that there is a low risk for AMD production and release within the Development Envelope. Management will focus on the identification, segregation and management of any PAF waste that is encountered. PAF material exposure on pit walls will be minimized and avoided if possible.

The management of the mine void closure risks will be informed by further hydrological and geochemical investigations undertaken in the early phases of the mine life, along with the development of an integrated waste strategy for adjacent Orebodies 17 and 18 and the Proposal. The mine void closure options of; no backfill, partial backfill or backfill to above the pre-mining water table could be implemented based on the current mine plan characteristics (i.e. adequate waste and ex-pit OSA storage availability).

However, based upon current understanding, the preferred mine void strategy is partial backfill.

5.1.1 Risk events

a) AMD seepage from ex-pit OSAs to groundwater or surface water
b) AMD seepage from in-pit OSAs to groundwater
c) AMD release from unsaturated pit wall rock
d) AMD release from saturated pit wall rock below water table following groundwater rebound

5.1.2 Controls assigned to the risk events

Preventative Controls will be implemented throughout the life of the mine, to manage mine void risks, PAF material with the potential to generate acidic conditions or material that may produce metals leaching or saline conditions. Mitigation Controls, possibly including treatment, will be implemented only if Preventative Controls are inadequate and AMD is released. Material characterisation during mine operation and post-closure monitoring (surface and groundwater) will indicate any failure of the Preventative Controls.

Risk Event	Preventative Controls	Control Activity	Application
AMD seepage from ex-pit OSAs to groundwater or surface water – During operations or post-closure	Waste rock characterisation, modelling and inclusion in mine planning designs and schedules Identification of PAF material in mined waste and pit walls and segregation of PAF overburden. Construction of PAF OSAs in accordance with leading practice to minimise AMD generation and discharge. Verification of OSA compliance to 'as dumped' design. Other management options may include blending PAF material with neutralising material prior to disposal, in order to neutralise the stored acidity upon rewetting.	During mine operation or post-closure: • Collect and treat AMD runoff or seepage from OSAs containing PAF material, if required (e.g., lime addition).	During mine operations, mitigation controls required if AMD (e.g., low pH water) is generated.
AMD seepage from in-pit OSAs to groundwater – During operations or post-closure	Waste rock characterisation, modelling and inclusion in mine planning designs and schedules Identification of PAF material in mined waste and pit walls and segregation of PAF overburden. Stockpile material within the pit and construction of PAF cells in accordance with leading practice to minimise AMD generation and discharge. Verification of OSA compliance to 'as dumped' design. Other management options may include blending PAF material with neutralising material prior to disposal, in order to neutralise the stored acidity upon rewetting.	During mine operation: • Collect and treat AMD runoff or seepage from OSAs containing PAF material, if required (e.g., lime addition). Post-closure: • Treat pit water, if required (e.g., lime addition)	During mine operations, mitigation controls required if AMD (e.g., low pH water) is generated. PAF material will be managed at elevations above the post-closure water table. It is expected that the pit will act as groundwater sink (under BHP Billiton Iron Ore's preferred closure strategy, partial backfill). Any post-closure AMD infiltrating into the base of pit will be captured in the pit without off site release.
AMD release from unsaturated pit wall rock. Seepage (percolation) to groundwater – During operations or post-closure Seepage as a result of rainfall infiltration	Optimise mine pit design including opportunities to minimise residual PAF material in pit walls. Other management options may include treating pit walls to prevent AMD, placement of neutralising backfill material against pit walls. Adopt and implement final mine void closure strategy that addresses residual AMD risk (based on outcomes of Hydro-geochemistry assessments).	During mine operation: • Reuse pit water on site. • Treat pit water during operations, if required (e.g., lime addition). Post closure: • Treat pit lake water following water table rebound	During mine operations, mitigation controls required if AMD (e.g., low pH water) is generated. For each mine void closure options; no backfill, partial backfill, backfill to above pre-mining water table the outlined control activities could be applied. BHP Billiton Iron Ore's preferred strategy is partial backfill. It is expected that the pit will act as groundwater sink under preferred strategy. Any post-closure AMD infiltrating into the
AMD release from saturated pit wall rock below water table following groundwater rebound. Seepage (percolation) to groundwater – Post-closure	Optimise mine pit design including opportunities to minimise residual PAF material in pit walls. Other management options may include treating pit walls to prevent AMD, placement of neutralising backfill material against pit walls. Adopt and implement final mine void closure strategy that addresses residual AMD risk (based on outcomes of Hydro-geochemistry assessment).	Post closure: • Treat pit lake water following water table rebound (e.g., lime addition).	Mine void closure options; no backfill, partial backfill, backfill to above pre-mining water table. BHP Billiton Iron Ore's preferred strategy is partial backfill. It is expected that the pit will act as groundwater sink under preferred strategy. Any post-closure AMD infiltrating into the base of pit will be captured in the pit without off site release.