



**Koolan Island Iron Ore
Mine and Port Facility
Project**

**Significant Flora Species
Management Plan**

2012



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Preliminary

This is the second edition of this document. This document was initially produced in 2006 for Aztec Resources by Ecologia. Mount Gibson Iron Limited acquired Aztec Resources in 2007 and has updated this plan as required by its commitments under the EPBC Act and Ministerial Statement 715.

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1.0 INTRODUCTION

The Koolan Island Iron Ore and Port Facility Significant Flora Species Management Plan is a requirement of Condition 9 of Ministerial Statement 715. This plan was first produced for Aztec Resources during 2006 by Ecologia Environment (Ecologia).

Mount Gibson Iron Limited (Mount Gibson) owns and operates the iron ore mine on Koolan Island in the Kimberley region of Western Australia. Koolan Island is located approximately one kilometre from the mainland and 130 kilometres north of Derby (Figure 1).



Figure 1: Location of Koolan Island in Western Australia

Construction for the operation began in June 2006, with mining commencing in 2007. The project operates under the conditions of Ministerial Statement 715, issued in February 2006, which gives project approval subject to a number of conditions, including Condition 9 which pertains to “Conservation of Significant Flora and Fauna”, relating directly to conservation-significant species surveyed to date on Koolan Island.

Condition 9-1 states “Prior to ground-disturbing activities, the proponent shall commence staged pre-land clearing surveys of the areas to be disturbed for conservation-significant flora species, particularly:

- *Eucalyptus kenneallyi*.
- *Brachychiton xanthophyllus*.

- *Phyllanthus aridus*.
- *Gymnanthera cunninghamii*.
- *Corymbia aff. cadophora*.

Condition 9-2 states “Prior to ground-disturbing activities in a particular staged area to be cleared, the proponent shall prepare a Significant Flora Species Management Plan for conservation-significant flora species recorded during the staged pre-land clearing surveys required by condition 9-1.”

In 2006 the Significant Flora Species Management Plan was prepared for species listed in the Ministerial Statement based on the results of the Priority Flora and Weed Assessment (Ecologia 2004) and the Flora and Vegetation Assessment (Ecologia 2005a).

The Significant Flora Species Management Plan is required to be reviewed and revised at intervals not exceeding four years (Condition 9-3). The Significant Flora Species Management Plan has been developed to comply with this condition. Since the development of the initial plan (Ecologia 2006a), several additional pre-land clearing flora surveys have been completed on Koolan Island. Information gathered from these surveys has been incorporated into the revised Significant Flora Species Management Plan.

2.0 OBJECTIVE

The objective of the Significant Flora Species Management Plan is to maintain the abundance, diversity, geographic distribution, conservation status and productivity of flora, at species and ecosystem levels, through the avoidance or management of adverse impacts and improvement in knowledge.

3.0 REGIONAL INFORMATION

Koolan Island is one of the largest of the many islands comprising the Buccaneer Archipelago located in the Kimberley region of Western Australia. The Buccaneer Archipelago consists of some 800 to 1, 000 rocky islands with small embayments and beaches and is extremely diverse, with coral reefs, algal flats and shallow sandy banks with extensive seagrasses. This area has a tropical, sub-humid climate with an annual rainfall of about 850 mm. The ‘wet’ season usually occurs between December and April.

Koolan Island lies on the coastal interzone of the Northern Kimberley and Dampierland biogeographic region as described in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell 1995).

4.0 HERITAGE STATUS

The Australian Heritage Council determined the West Kimberley be placed on the National Heritage List in August, 2011. The area was recognized for its rich living Aboriginal culture, pastoral and pearling traditions and its dramatic landscapes of great biological richness, with important geological and fossil evidence of Australia’s evolutionary history.

Koolan Island is located within the boundaries of the West Kimberley and has, therefore, been included in that heritage listing.

5.0 MINING HISTORY

Koolan Island was mined by BHP between 1965 and 1993. During this period approximately 68 million tonnes of high-grade haematite (67% Fe) ore was extracted from five pits, crushed and shipped from a wharf facility. Decommissioning of the mine in 1993 included removal (some *in situ* burial) of infrastructure associated with BHP's operations, rehabilitation of cleared areas by moonscaping, and the construction of a channel to allow sea water flooding of the Main Pit.

6.0 EXISTING ENVIRONMENT

6.1 CLIMATE

The Buccaneer Archipelago experiences a tropical, sub-humid climate with an annual rainfall of about 850 mm. The 'Wet' season usually extends from December to April, although most rain falls in January, February and March. Little or no rain falls between May and November. The annual mean daily maximum temperature is 31.1 °C, with an annual mean daily minimum of 26.0 °C. The hottest months are November and December, whilst the coolest is July (Bureau of Meteorology 2005; based on data 1974-1992). Evaporation is low, at a daily average of 7.5 mm per year (Ecologia 2005a).

6.2 TOPOGRAPHY AND LANDFORMS

Koolan Island has an area of 2, 580 hectares and is located one kilometre from the mainland. It has a Proterozoic sandstone lithology that is expressed in rugged slopes, ridges and uplands mantled with rock scree and shallow skeletal soils. The coast is steep with narrow gullies and frequent embayments, but few beaches (Ecologia 2005a).

6.3 GEOLOGY

Koolan Island consists of a series of Lower-Proterozoic sediments of the Kimberley Group. The sediments are characterized by tight, asymmetrical folds, striking northwest-southwest, broadly along the long-axis of the island. Sandstones, quartzite with lesser phyllites and schists are the dominant geology. The folding on Koolan Island results in three major structural elements: South Syncline, Central Anticline and North Syncline.

Pentecost Sandstone forms the majority of the outcrop on the island. This formation is a thinly bedded, intercalated sequence of sandstone and siltstone with minor phyllite. The Pentecost Sandstone is underlain by Elgee Siltstone, a sequence of predominantly mudstones and shales. The Elgee Siltstone is underlain by Warton Sandstone, a unit of interbedded quartzite and siltstone.

6.4 GROUNDWATER AND SURFACE WATER

There are three broad hydrogeological provinces, which correspond to the three main structural geological elements. The central anticline separates the two fresh groundwater regions on the island: the Southern Syncline and the Northern Syncline. Depth to groundwater aquifers is on average 200 m below ground level. These aquifers experience a recharge of approximately 100,000 (Northern Syncline) and 700,000 (Southern Syncline) kL/year.

The Southern Syncline aquifer can be subdivided into two zones: the interland zone (or water supply area) and the orebody zone. The orebody aquifer is on the southern limb of the Southern Syncline and has been exposed in the Main Pit. This aquifer was originally only in hydraulic connection with the sea along strike to the west, however, excavation and push-back of the hanging wall has resulted in hydraulic connection with the sea through the wall. The orebody aquifer remains hydraulically isolated from the water supply aquifer by a low permeability Pentecost Formation and an indurated zone at the base of the orebody.

There are no known permanent surface waterbodies on Koolan Island, although ephemeral pools and streams are present during and immediately after the wet season.

6.5 BIOLOGICAL ENVIRONMENT

Due to its mining history, Koolan Island is one of the most studied islands in the Buccaneer Archipelago.

In 1995 the Department of Conservation and Land Management (now DEC) undertook a biological inventory of Koolan Island. During this time a comprehensive list of flora and fauna was assembled (McKenzie *et al.* 1995). The purpose of this study was to establish a baseline data set for comparison to future survey work and to gauge the effectiveness of rehabilitation following the BHP mine closure in 1993.

Between October 2003 and July 2004 Ecologia conducted five vegetation and flora surveys and a terrestrial vertebrate fauna assessment on Koolan Island as part of a feasibility assessment of the viability of the proposed iron ore mining and processing operations. These surveys included detailed site/association assessments, broad-scale vegetation mapping and targeted surveys for Declared Rare Flora (DRF), Priority Flora, Declared Plants, vertebrate fauna, conservation-significant fauna species, communities and habitats. These studies were incorporated into the Environmental Referral Document (ERD) (Ecologia 2005b) for the project and the Significant Flora and Fauna Species Management Plans for Koolan Island.

Ministerial Statement 715 outlines the requirement to conduct surveys for conservation-significant flora and fauna prior to clearing on Koolan Island. Pre-land clearing surveys have been implemented by Ecologia in 2006 and 2007, and MBS Environmental in 2008 to 2012.

The results of all these studies have been combined to provide a single dataset of flora and fauna on Koolan Island and are summarised in Sections 6.6.

6.6 FLORA AND VEGETATION

6.6.1.1 Vegetation

Koolan Island is located in the Fitzgerald Botanical District of the Kimberley region of Western Australia (Beard 1979). The vegetation of Koolan Island has been classified into six broad community types (Ecologia 2005a):

- Open woodland of *Eucalyptus* species over *Corymbia* species over mixed herb/soft grass/*Triodia* cover accounts for most of the island. This unit is further divided into three sub units:
 - *Eucalyptus miniata* Woodland/Open Woodland along stony ridge crests.

- *Eucalyptus miniata/Corymbia cadophora* Woodland along moderate depth gullies.
- Very open woodland: scattered trees over sparse low shrubs, herbs and grasses on coastal slopes.
 - Rainforest/vine thicket is present in limited areas.
 - Woodland *Callitris extipulata* forest within deep gullies.
 - Mangroves extensively at the tidal zone in narrow strips.
 - Beaches.
 - Previously disturbed/rehabilitated vegetation.

6.6.1.1.1 Open Woodland of *Eucalyptus* Species Over *Corymbia* Species

The majority of the island is vegetated by open woodland in which *Eucalyptus miniata* occurs as a taller canopy, with the lower bloodwoods *Corymbia confertiflora* and *Corymbia cadophora* subsp. *cadophora* occurring at variable densities below with a mixed herb ground cover.

6.6.1.1.2 Rainforest/Vine Thicket

Very small areas of rainforest or vine thickets occur in limited locations. Rainforest and vine thickets intergrade into *Callitris columellaris*¹ forest described in Section 6.6.1.1.3.

6.6.1.1.3 Woodland *Callitris columellaris* Forest

The *Callitris columellaris*¹ forest is restricted to the more deeply incised gullies, occurs in sporadic stands. Hence the total area encompassed is relatively small (Ecologia 2005a).

6.6.1.1.4 Mangroves

Mangroves occur extensively at the intertidal zone but are largely restricted to narrow strips of vegetation, with only a few of the larger inlets supporting substantive areas.

6.6.1.1.5 Beaches

There are twelve small beaches that predominantly occur adjacent to mangrove communities but with some mobile sands. The overstorey consists of scattered shrubs and the rest of the complex is mainly comprised of grasses and creepers.

6.6.1.1.6 Previously Disturbed/Rehabilitated Vegetation

Areas previously disturbed during BHP's mining from 1965 until 1993 on the island consist of rehabilitated areas of open to moderately dense *Acacia* dominated shrublands and non-rehabilitated areas consisting of a variable overstorey with predominantly introduced shrubs, herbs and grasses. Ecologia (2005a) recorded that both disturbed vegetation types were atypical of the local provenance vegetation communities across the island and the Kimberley region.

¹ Foot note: * *Callitris intratropica* R.T.Baker & H.G.Sm. is now known as *Callitris columellaris* F.Muell.



6.6.1.2 Flora

A total of 629 flora taxa (including subspecies, variations, affinities and hybrids) have been recorded on Koolan Island during surveys conducted up until 2009 (Ecologia 2004, 2005a, 2006b, 2007a; MBS 2008a, 2009a). The most numerous represented families are:

- Poaceae (77 species).
- Fabaceae (105 species).
- Euphorbiaceae (32 species).

Twenty six families were represented by a single taxon. The most numerous represented genus is *Acacia*, with 33 species, many of which were recorded from areas of rehabilitation.

6.6.1.3 Flora and Vegetation Communities of Conservation Significance

No plant taxa gazetted as Declared Rare Flora pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950 Western Australia (WC Act)* have been recorded on Koolan Island. No plant taxa listed as "Threatened" pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) (EPBC Act)* have been recorded on Koolan Island.

Surveys conducted on Koolan Island to date (summarised in Section 6.5) have identified the presence of a variety of conservation-significant flora taxa, the locations of these are shown on

Figure 2.

Four taxa of Priority flora have been surveyed on Koolan Island including:

- *Gymnanthera cunninghamii* (P3).
- *Phyllanthus aridus* (P3).
- *Stackhousia clementii* (P3).
- *Brachychiton xanthophyllus* (P4).

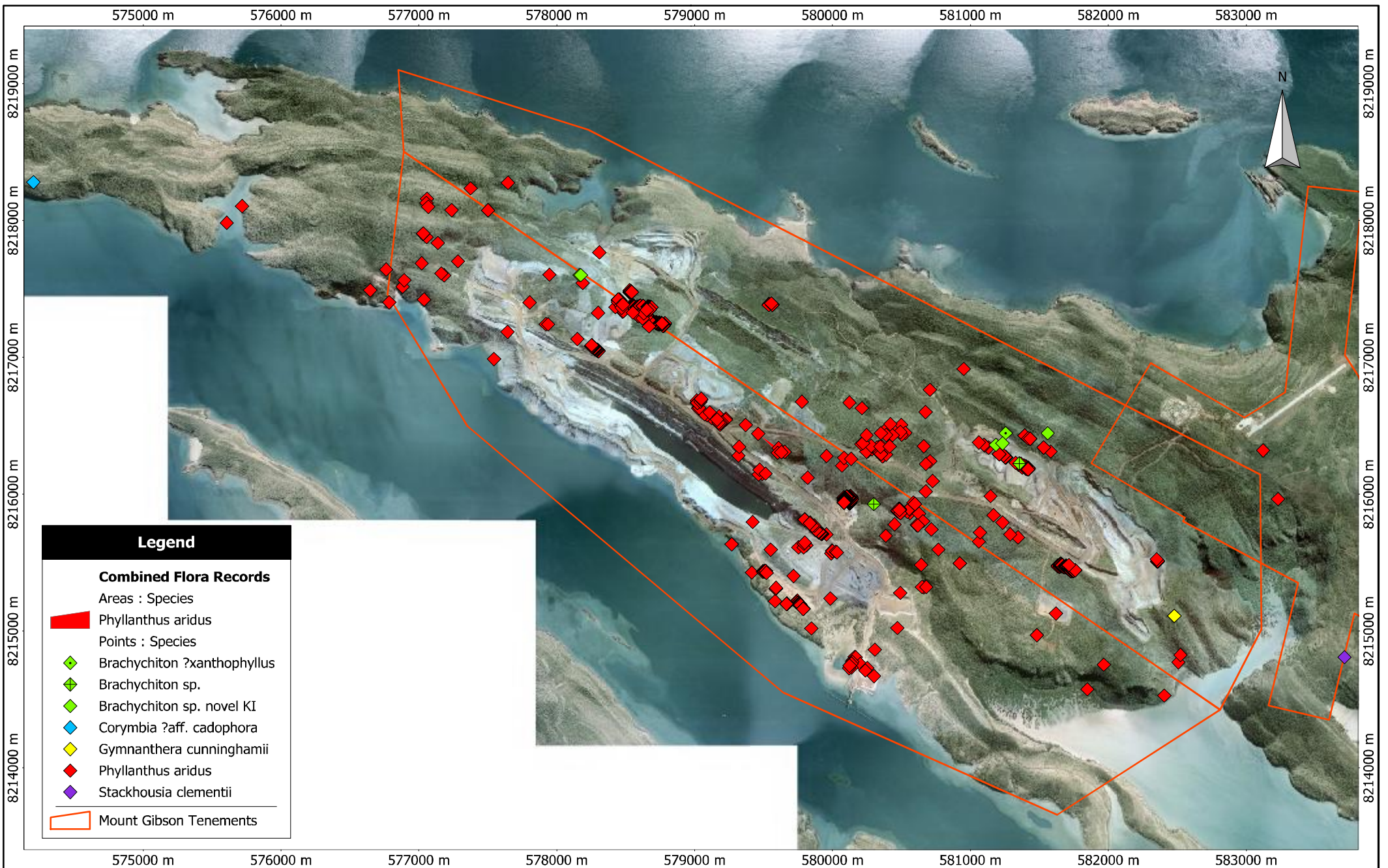
Three of these taxa are listed in the Ministerial Statement 715 requiring targeting during pre-land clearing surveys. These include:

- *Gymnanthera cunninghamii* (P3).
- *Phyllanthus aridus* (P3).
- *Brachychiton xanthophyllus* (P4).

Stackhousia clementii has been recently listed as a Priority 3 species (FloraBase 2012) and is described in the subsections below.

Other taxa of interest listed in Ministerial Statement 715 include *Eucalyptus kenneallyi* (P1) which has potential to occur and *Corymbia* aff. *cadophora* which may have been previously recorded on Koolan Island by Ecologia during 2003-2004 (Ecologia 2005a). Positive identification of *Corymbia* aff. *cadophora* was not achieved due to the lack of reproductive material at the time (Ecologia 2005a). Subsequent surveys have not recorded this taxon.

There are no vegetation communities that are considered Threatened Ecological Communities pursuant to Schedule 2 of the EPBC Act or according to the Department of Environment and Conservation (DEC).



6.6.1.3.1 *Eucalyptus kenneallyi*

Family: MYRTACEAE

Conservation Status: Priority 1 (DEC)

Description

Eucalyptus kenneallyi is one of a group of small, smooth, powdery-barked Eucalypts, and very little is known of its biology (Brooker and Kleinig 2004). *Eucalyptus kenneallyi* is a small tree reaching heights of up to eight metres, it has smooth bark varying from white to grey, brown or pink, which sheds in large flakes or plates and has scribble marks (FloraBase 2012; Ecologia 2005a). Its leaves are alternating and lanceolate, between six and 11 centimetres long, 0.7 to two centimetres wide and concolourous with acute side veins (Ecologia 2005a). Its mature flower buds are club shaped to obovoid and up to seven millimetres long; they occur in axillary clusters of up to seven buds and flowers are white and cream (FloraBase 2012; Ecologia 2005a). *Eucalyptus kenneallyi* is restricted to skeletal sandy soils on hard siliceous outcrops (Ecologia 2005a).

Previous Records from Koolan Island

Eucalyptus kenneallyi was recorded on Koolan Island in 1974 by JA Wannan, but no location was provided. This specimen is held by the National Herbarium of New South Wales (Specimen NSW300713), which was determined by KD Hill in 2000 (Ecologia 2005a). Since this recording, the species has not been identified on Koolan Island in baseline flora surveys or annual pre-land clearing flora surveys (Ecologia 2004, 2005a, 2006b, 2007a; MBS 2008a, 2009a, 2010a, 2011a, 2012a). Surveys undertaken in 2007 recorded the similar *Eucalyptus rupestris*, and suggest the original collection may have been a misidentification (Ecologia 2007a).

Distribution

Eucalyptus kenneallyi has only been surveyed in the Northern Botanical Province in the Interim Biogeographic Regionalisation for Australia (IBRA) region of Northern Kimberley as shown in Figure 3 (FloraBase 2012), and as such, is regarded as being endemic to the Kimberley region. It is described as only being known to occur on offshore islands between Doubtful Bay and George Water on the Kimberley coast (Hill and Johnson 1995) specifically Koolan and Storr Islands (Ecologia 2005a).

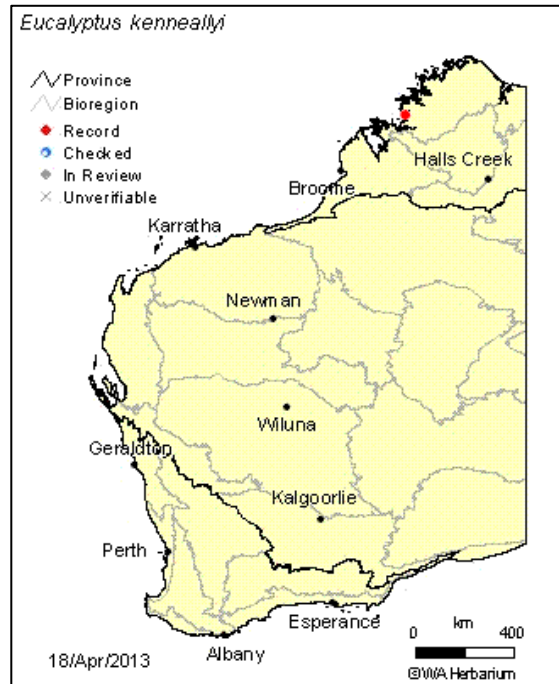


Figure 3: *Eucalyptus kenneallyi* Distribution
(Source: FloraBase 2012)

6.6.1.3.2 *Gymnanthera cunninghamii*

Family: ASCLEPIADACEAE

Conservation Status: Priority 3 (DEC)

Description

Gymnanthera cunninghamii is an erect shrub which grows between one and two metres high. It has tubular five part flowers between January and December which range in colour between cream, yellow and green. It is known to favour sandy soils (Packowska and Chapman 2000 in Ecologia 2005a; Wheeler *et al.* 1992 in Ecologia 2005a).

Previous Records from Koolan Island

Gymnanthera cunninghamii was collected opportunistically during the June 2004 priority flora survey, at a location described as north west of East Pit (Ecologia 2005a) (Figure 2).

Distribution

Gymnanthera cunninghamii has a broad distribution, with collections from Minilya, Dampier Archipelago, Boodarie, 80 Mile Beach, the Northern Territory and Queensland (Atkins 2003 cited in Ecologia 2005a). FloraBase records indicate its distribution as far south as inland from Carnarvon, as shown in Figure 4 (FloraBase 2012). The collection of this species from the Kimberley suggest either that it is present in the Kimberley, but has not been recorded due to the paucity of survey work in the region (Ecologia 2005a) or that the original record was a misidentification (Ecologia 2006b).

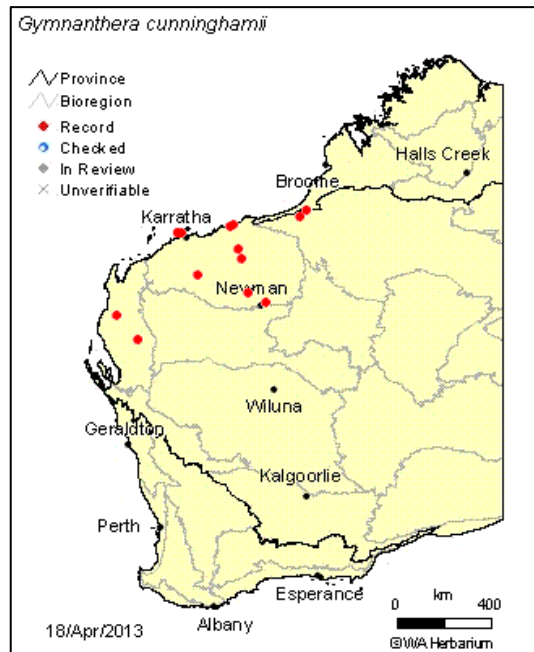


Figure 4: *Gymnanthera cunninghamii* Distribution
(Source: FloraBase 2012)

6.6.1.3.3 *Phyllanthus aridus*

Family: EUPHORBIACEAE

Conservation Status: Priority 3 (DEC)

Description

Phyllanthus aridus is an erect, many-branched shrub which grows to 25 centimetres (Plate 1) (FloraBase 2012). It has small, cream and green flowers which bloom in the wet season after the summer rains between March and August (FloraBase 2012). *Phyllanthus aridus* is very similar to *Phyllanthus exilis* which is not of conservation significance, but is also present on Koolan Island.

Its preferred soil type is typically brown to grey sandy clay, sandstone, gravel or red sand (FloraBase 2012). On Koolan Island, plants have been observed to occur between sandstone and in open areas where the post-fire colonisers are less dominant relative to other areas. They are more often surveyed in areas with a southern aspect which may be due to greater shade provision and moisture retention (Ecologia 2005a).

This taxon is currently under revision, which may result in the division of *Phyllanthus aridus* into two forms (MBS 2008a).



Plate 1: *Phyllanthus aridus*
(Source: MBS 2008a)

Previous Records from Koolan Island

On Koolan Island *Phyllanthus aridus* is considered widespread, having been recorded extensively during pre-land clearing surveys conducted since mining recommenced in 2006. Populations of this taxon ranged in size from single plants to populations of up to 200 individuals (Ecologia 2006b, 2007a; MBS 2008a, 2009a, 2010a, 2011a, 2012a). This species primarily occurs in areas undisturbed by previous mining activities or tracks with a southern aspect (Ecologia 2005a). The locations of all *Phyllanthus aridus* recorded on Koolan Island are shown on Figure 2.

Distribution

Whilst the majority of records are from the Northern Botanical Province, this species has also been recorded from locations in the Pilbara, as shown in Figure 5 (FloraBase 2012). Specimen notes for *Phyllanthus aridus* show that it has been collected in a range of habitats including “bouldery sandstone slopes”, “crest flat-bedded sandstone hills”, “sandstone rocks”, “edge of creek sandstone gorge”, “sandplain”, “by creek” and “sandy soil” (Ecologia 2004).

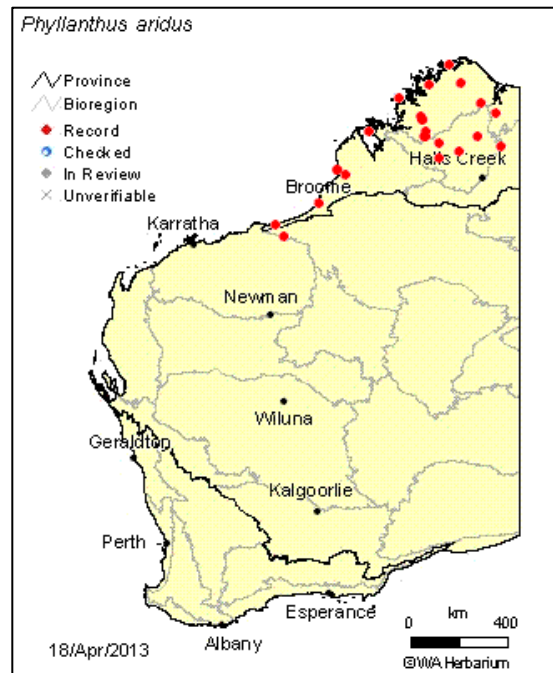


Figure 5: *Phyllanthus aridus* Distribution
(Source: FloraBase 2012)

6.6.1.3.4 *Stackhousia clementii*

Family: CELASTRACEAE

Conservation Status: Priority 3 (DEC)

Description

FloraBase describes *Stackhousia clementii* as a dense broom-like perennial herb, growing to 45 centimetres in height. It flowers green, yellow and brown (Plate 2). It is known from skeletal soils in sandstone hills (FloraBase 2012).



Plate 2: *Stackhousia clementii*
(Source: FloraBase 2012)

Previous Records from Koolan Island

This species was recorded during the Flora and Vegetation Assessment survey conducted by Ecologia in 2004 (location shown in Figure 2).

Distribution

This species has been recorded in the Northern and Eremaean Provinces, from the Carnarvon, Central Ranges, Dampierland, Little Sandy Desert, Murchison and Pilbara IBRA Regions (Figure 6). Due to the absence of additional recordings in the Kimberley region this sole recording at Koolan Island may have been a misidentification.

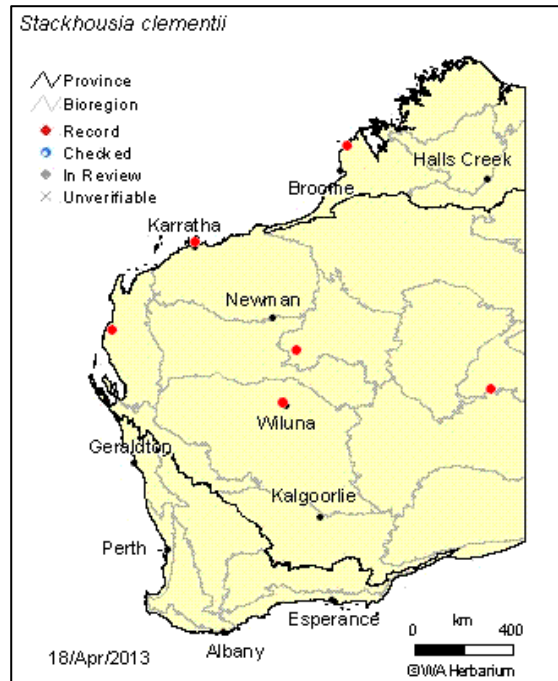


Figure 6: *Stackhousia clementii* Distribution
(Source: FloraBase 2012)

6.6.1.3.5 *Brachychiton xanthophyllus* and *B. sp. ?novel* - Koolan Island

Family: STERCULIACEAE

Conservation Status: Priority 4 (DEC)

Description

Brachychiton xanthophyllus is a tree that grows between three to 12 metres in height. The flowers are pink and bloom between May and December. It has very large, hairy leaves which are shallowly three lobed, slightly shiny and bright green above and paler below (Plate 3). It can be distinguished from *Brachychiton viscidulus*, which is also present on the island and has similarly sized leaves, by the absence of a viscid surface and by the bluntness of the leaf lobes (FloraBase 2012; Ecologia 2005a).



Plate 3: *Brachychiton xanthophyllus*
(Source: Ecologia 2007a)

Previous Records from Koolan Island

Brachychiton xanthophyllus was identified from two locations on Koolan Island during Priority flora surveys and pre-land clearing surveys up to 2006 (Ecologia 2004, 2006b). Initial collections were verified by Gordon Guymer from the Queensland Herbarium, a taxonomist specialising in the family Sterculiaceae (Ecologia 2004, 2006b). Pre-land clearing surveys in 2007 recorded *Brachychiton* specimens which were identified as a new taxon; *Brachychiton* sp. ?novel - Koolan Island, the report states this taxon has been previously mistaken for *Brachychiton xanthophyllus* (Ecologia 2007a). All recorded locations of conservation-significant *Brachychiton* taxa are shown in Figure 2 with the identification listed being that provided at the time of survey. Further taxonomic work is required to determine the Koolan Island *Brachychiton* taxa.

Four other taxa from the genus *Brachychiton* are present on Koolan Island, one of which (*Brachychiton viscidulus*) closely resembles the general leaf morphology of *Brachychiton xanthophyllus*. *Brachychiton viscidulus* is known to be widespread on the island (Ecologia 2006b, 2007a).

Distribution

Brachychiton xanthophyllus is endemic to the Kimberley region, having been recorded from areas further north of Koolan Island including the Bougainville Peninsula, Fenelon Island, Mitchell Plateau, Central Gardner district and Vansittart Bay (Figure 7), from habitats resembling that of Koolan Island including vine thickets, “soils over granite, limestone or basalt”, upper slopes, crests and rock outcrops”. The Koolan Island records represent a southern range extension of this taxon, or a new taxon as suggested above (Ecologia 2005a).

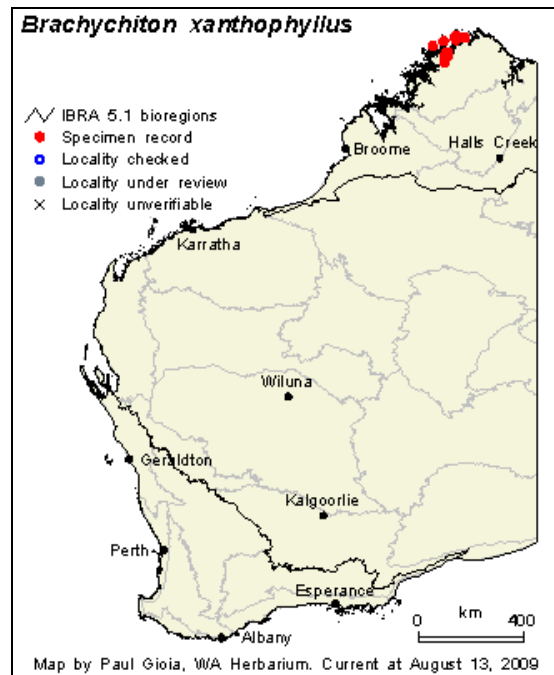


Figure 7: *Brachychiton xanthophyllus* Distribution
(Source: FloraBase 2012)

6.6.1.3.6 *Corymbia* aff. *cadophora*

Family: MYRTACEAE

Conservation Status: Flora of Interest

Description

Corymbia aff. *cadophora* is a conspicuous tree, distinguished from the typical *Corymbia cadophora* and *Corymbia cadophora* subsp. *cadophora*, which are widespread and common on Koolan Island, by a number of characteristics, mostly associated with its flowers and fruit structure (Ecologia 2007a). As there are a number of differences between *Corymbia* aff. *cadophora* and the two subspecies of *Corymbia cadophora* listed above, *Corymbia* aff. *cadophora* is considered a distinct taxon.

The two specimens identified as *Corymbia* aff. *cadophora* lodged at the WA Herbarium are distinguished from the commonly occurring *Corymbia cadophora* and *Corymbia cadophora* subsp. *cadophora* by the following characteristics:

- Bark white and smooth.
- Flowers cream coloured or white.
- Hypanthium (base of flower bud) narrowly obconical in buds.
- Hypanthium strongly ribbed in buds.
- Centre of the operculum a moderate sized obconical part flared at the base to a narrow margin.
- The leaves of *Corymbia* aff. *cadophora* differ in the spacing of the veins and the presence of an intramarginal vein.
- WA Herbarium specimens do not possess fruit so it is not possible to determine fruit characters.

Although not currently listed as Priority Flora, given that this taxon is restricted (on current knowledge) to Koolan Island, and there are only two specimens lodged at the herbarium, it is likely that this taxon will be listed under the *Western Australian Wildlife Conservation (Rare Flora) Notice 2003* of the *WC Act* (Malcolm Trudgen pers. comm. in Ecologia 2005a).

Previous Records from Koolan Island

There are only two specimens identified as *Corymbia* aff. *cadophora* lodged at the WA Herbarium (by Keighery and Gibson, specimen numbers 3704262 and 3704270) and as such it is considered to be endemic to Koolan Island. A single individual of this taxon was recorded at the old townsite and another specimen approximately 1.5 kilometres southwest of the old townsite (Keighery *et al.* 1995 in Ecologia 2007a).

Only one further collection of this taxon made by Ecologia (2004) appears to be *Corymbia* aff. *cadophora* however this cannot be confirmed based on the lack of material and observations of bark at the time of collection (Ecologia 2005a).

Distribution

Corymbia aff. *cadophora* is currently only known from Koolan Island, and is thus considered endemic to the island.

6.6.1.4 Weeds

Weed surveys have been conducted on Koolan Island during 1993, 2003-2004 and 2006 to 2012 (Keighery *et al.* 1995; Ecologia 2004, 2005a, 2006b, 2007a; MBS 2008a, 2009a, 2010a, 2011a, 2012a). From the surveys conducted up until 2009, 80 weed species have been recorded. Many of the introduced species occur in the old settlement where former gardens and ornamental plants that were planted prior to 1993. The weed species of greatest environmental concern identified during weed surveys include three Declared Plants listed by Department of Agriculture and Food Western Australia (DAFWA) (2011) under the *Agriculture and Related Resources Protection Act 1976* (ARRP Act):

- *Jatropha gossypifolia* (*Bellyache Bush*) (Declared).
- *Cryptostegia madagascariensis* (*Rubber Vine*) (Declared).
- *Senna alata* (*Candle Bush*) (Declared).

6.7 TERRESTRIAL FAUNA

6.7.1.1 Fauna Habitat

A variety of habitats exist on Koolan Island. Vegetation units described in Section 6.6.1.1. correspond to landscape features such as ridges, gullies and beaches and each supports a complex suite of fauna.

Across Koolan Island there are also a variety of critical habitats that are key resources for conservation-significant fauna. These are typically sparse or limited micro-habitats such as vine thickets, deep humid caves, water ways or tall woodlands with standing or fallen hollow timber. These habitats provide essential niche micro-environments that particular species may specifically require for survival or refuge, feeding or breeding.

6.7.1.2 Fauna

Surveys conducted on Koolan Island up to 2009 have recorded three amphibians, 24 mammals (including 17 bat species), 44 reptiles and 151 birds (Ecologia 2005c, 2006c, 2007b-c; MBS 2008b, 2009b). These surveys, and other historical surveys, have recorded a number of conservation-significant fauna species, including:

- Northern Quoll (*Dasyurus hallucatus*) Schedule 1 - Endangered (*WC Act* and *EPBC Act*).
- Gouldian Finch (*Erythrura gouldiae*) Schedule 1 - Endangered (*WC Act* and *EPBC Act*) and Priority 4 (DEC)..
- Red Goshawk (*Erythrotriorchis radiatus*) Schedule 1 - Vulnerable (*WC Act* and *EPBC Act*).
- Orange Leaf-nosed Bat (*Rhinonicteris aurantia*) Schedule 1 - Vulnerable (*WC Act*).
- Short range endemic land snail (*Amplirhagada astuta*) Schedule 1 - Vulnerable (*WC Act*).
- Short range endemic land snail (*Kimboraga koolanensis*) Vulnerable (IUCN)
- Northern Leaf-nosed Bat (*Hipposideros stenotis*) Priority 2 (DEC).
- Yampi Blind Snake (*Ramphotyphlops yampiensis*) Priority 2 (DEC).
- Eastern Curlew (*Numenius madagascarensis*) Schedule 1 - Vulnerable (DEC).
- Ghost Bat (*Macroderma gigas*) Priority 4 (DEC) and Vulnerable (IUCN).
- Grey Falcon (*Falco hypoleucos*) Schedule 1 - Vulnerable (DEC).
- Peregrine Falcon (*Falco peregrinus*) Schedule 4 - Other Specially Protected Fauna (DEC).
- Saltwater Crocodile (*Crocodylus porosus*) Schedule 4 - Other Specially Protected Fauna (DEC).
- Eastern Reef Egret (*Egretta sacra*) Schedule 3 - Migratory (*WC Act* and *EPBC Act*).

Eight of these are identified in Ministerial Statement 715.

6.7.1.3 Introduced Fauna

Four feral mammal species and six introduced invertebrate species have been recorded historically on Koolan Island (McKenzie *et al.* 1995):

- Dog (*Canis familiaris*) - a single animal in 1990.
- Goat (*Capra hircus*) - a feral population of approximately 120 in the mid-1980s.
- Guinea Pig (*Cavia porcellus*) - pets, no feral population recorded.
- European Rabbit (*Oryctolagus cuniculus*) - pets, no feral population recorded.
- Singapore Ant (*Monomorium destructor*) - believed to have been accidentally introduced in a cargo container, this species is considered to be well established on Koolan Island and is not regarded as a reportable species (G. Pratt and M. Widmer pers. comm.).
- Snail (*Prosopoeas achatinaceum*) - recorded during a snail survey in 2005 (Slack-Smith 2006). This snail had not previously been recorded in Australia and is known from the Indonesian Archipelago and numerous Pacific Islands. It has not been recorded during any subsequent pre-clearance fauna surveys or biennial snail surveys (Slack-Smith 2006, 2008; Slack-Smith and Whisson 2010; MBS 2012c).

- Earthworm (*Dichogaster bolau*).
- Centipede (*Scolopenda morsitans*) commonly recorded during fauna pre-land clearance surveys.
- Slug (*Laevicaulis alte*) recorded in waste water irrigation areas and the old townsite.

7.0 POTENTIAL AND KNOWN IMPACTS

7.1 LAND DISTURBANCE

Land disturbance is potentially the greatest impact from the Koolan Island project. The total amount to be cleared for the project was initially 540 hectares, of which 45 percent was previously disturbed land. Since recommencement of operations, the clearing footprint was authorised to increase by 50 hectares to 590 hectares via a Section 45C approval. The footprint was increased further by another Section 45C approval to 650 hectares.

Potential and realised impacts on conservation-significant flora species from land clearing include:

- Loss of individuals from cleared areas.
- Loss of habitat from large scale clearing.
- Loss of Koolan Island populations.
- Weed invasion and establishment *via*. out-competition with native flora.
- Soil erosion.
- Population fragmentation.

7.2 INTRODUCED FLORA

Weed species are introduced flora species that establish themselves in natural ecosystems and modify natural processes, often resulting in the decline of the invaded community (DEC 2012).

Weed surveys undertaken on Koolan Island up until 2009 have identified a total of 80 weed species including three Declared Plant species. Most weeds are present as a result of previous mining activities on the island, and are confined to the old BHP town site or settlement. Current mining activities have the potential to introduce new weeds to the island, however, weed management, quarantine and control are governed by the Quarantine Management Plan (MGI 2011) developed for Koolan Island that aims to reduce the spread of weeds and prevent the introduction of new weeds.

Known and potential impacts posed by introduced flora on conservation-significant fauna and flora species include:

- Dominance of the weed at the exclusion of native species, creating a monoculture leading to a loss of biodiversity.
- Reduction in habitat value (feeding and refuge resources for fauna) through a reduction of plant species richness and diversity.
- Alteration of fire regimes from introduced plants. For instance Mission Grass has been identified as having the potential to change fire regimes on Koolan Island.

7.3 INTRODUCED FAUNA

Current operations have the potential to introduce a range of fauna species from the mainland which could impact Koolan Island's populations of conservation-significant flora.

Fauna species with the potential to be introduced to Koolan Island include the Asian House Gecko (*Hemidactylus frenatus*), Brown Rat (*Rattus norvegicus*), Back Rat (*Rattus rattus*), Cane Toad (*Bufo marinus*), European Red Fox (*Vulpes vulpes*), European Rabbit (*Oryctolagus cuniculus*), Feral Cat (*Felis catus*), House Mouse (*Mus musculus*) and the Singapore Ant (*Monomorium destructor*) (Ecologia 2006d). Informal records suggest that a few of these species may be present on the island, but none have been captured/recorded to date during the baseline or pre-land clearing surveys (Ecologia 2005c, 2006c, 2007b-c; MBS 2008b, 2009b, 2010b, 2011b and 2012b).

Introduced herbivorous fauna species have the potential impact conservation-significant flora through the:

- Degradation of habitat through soil compaction and erosion.
- Alteration of vegetation structure and habitat through herbivory.
- Competition with local herbivorous species to increase overall demand for resources.

7.4 WATER

The mining operations have the potential to impact groundwater and surface water on Koolan Island, and subsequently any conservation-significant flora that is dependent on this water. As there are no sources of permanent fresh surface water on Koolan Island (Aquaterra 2006a-c), operations are not expected to have any impact on conservation-significant flora species that are dependent upon or influenced by surface water.

Mining operations may alter seasonal surface water flows by blocking gullies which may prevent water flow down valleys, or encourage water collection upstream of blockage points. Alteration of surface water flows may:

- Cause death to individuals through increase or decrease of required water availability.
- Alter floral community structure through changes to available water.

Dewatered groundwater will be used for dust suppression, with the remainder discharged to Acacia Sump which subsequently percolates back into the groundwater aquifer. Dewatering of groundwater to allow mining below the water table may impact conservation-significant flora in the following ways:

- Localised impacts to the vegetation of Acacia Sump.

7.5 DUST

The main sources of dust at the Koolan Island operation are excavation at the mine face, blasting, construction, roads, waste dumps, crushing and screening.

Dust settles on foliage, blocking stomata and preventing transpiration. Over time this leads to death of the plant, reducing habitat structure and diversity. Excessive dust can also prevent the recruitment of new plants into an area.

Following rain events surface flows of dust material leads to sedimentation in natural water ways, increasing turbidity and reducing habitat value.

Dust pollution has the potential to impact conservation-significant flora through:

- Deposition of dust on individuals potentially reducing their photosynthetic and transpiration rates
- Potential habitat modification where dust impacts the health of vegetation.

7.6 FIRE

Mining operations on Koolan Island have the potential to increase the frequency of fires through machinery causing sparks when working in dry vegetation and the general increased risk from increasing anthropogenic activities in an area.

In the tropical north, early Wet Season fires are frequently caused by lightning strikes.

A complete fire ban and strict commitments regarding fire on the island have resulted in no accidental fires on the island since operations began in 2006. Potential impacts of fire on conservation-significant species include:

- Loss of individuals and populations.
- Habitat alteration and/or loss.
- Increased risk of weed invasion.
- Increased soil erosion causing increased sediment down slope of burnt areas.

As there have not been any significant bush fires on Koolan Island for over a decade fuel loads are significant and could result in intense destructive fires. As a consequence, a request to commence prescribed fuel reduction burning has been developed in consultation with the DEC and will be submitted to the EPA and SEWPAC prior to any burning being undertaken.

7.7 HYDROCARBONS AND CHEMICALS

The Koolan Island operation has introduced hydrocarbons and other chemicals to the island; they are transported to, from and within the site, and are used and stored on site. The presence of hydrocarbons and other chemicals on site increases the risk of spills which can lead to the contamination of soil, groundwater, surface water and resultant impacts to vegetation.

7.8 WASTE

Mining operations and housing of approximately 320 mine workers has led to the creation of putrescible and inert waste on Koolan Island. A designated landfill site has been used since operations began in 2006. It is maintained regularly. Direct or indirect impacts from incorrect disposal of wastes on conservation-significant species include:

- Contamination of groundwater and surface water.
- Habitat degradation.
- Introduction of weed species.
- Increased populations of native and/or introduced animals supported by feeding on wastes.

7.9 KNOWLEDGE

Knowledge of conservation-significant flora species on Koolan Island has the potential to impact significant flora and management of this flora in the following ways:

- A paucity of knowledge of Koolan Island and Kimberley flora creates information gaps in the distribution of conservation-significant flora species on the island, a lack of regional context and can elevate the conservation category of a flora species to which it is assigned.
- Resolution of current taxonomic uncertainties about *Eucalyptus kenneallyi*, *Phyllanthus aridus* and *Brachychiton* spp. may influence their current known conservation status in the future.

8.0 ENVIRONMENTAL OBJECTIVE AND PERFORMANCE INDICATORS

Table 1: Environmental Objectives and Performance Indicator for Conservation-significant Flora Management (Ministerial Statement 715)

Environmental Objective	Performance Indicator
<p>Maintain the abundance, geographic distribution, conservation status and productivity of conservation-significant flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.</p>	<ul style="list-style-type: none"> • No significant long term change to the abundance of conservation-significant flora species. • No change to the geographic distribution of conservation-significant flora species. • No change to the conservation status of conservation-significant flora species on Koolan Island.

9.0 MANAGEMENT STRATEGY

Table 2: Management Strategies for Identified Environmental Objectives

Ministerial Condition	Impact	Management Strategy	Performance Indicator	Timeframe, Reporting
<p>9-1 Prior to ground-disturbing activities, the proponent shall commence staged pre-land clearing surveys of the areas to be disturbed for conservation-significant flora and fauna species.</p> <p>The summary report of the results of the staged pre-land clearing surveys shall be provided to the Environmental Protection Authority and the Department of Conservation and Land Management within two weeks of becoming available.</p>	Land disturbance	<ul style="list-style-type: none"> Disturbance to natural vegetation will be minimised. Conduct Pre-land clearing flora surveys prior to clearing to identify conservation-significant flora presence. Alter mine plans where possible to avoid populations of conservation-significant flora. Prior to disturbance of identified conservation-significant flora species DEC will be informed of the species and number to be cleared. A Clearing Permit will be completed and authorised prior to clearing activities. Topsoil stripped (where terrain permits). Avoid stripping during or immediately following heavy rains, or in very dry, windy conditions. Direct return of topsoil where possible. If topsoil stockpiling required stockpiles not to exceed heights of 2 metres to maintain aeration and biological activity, stock-piles clearly marked 'topsoil', with areas of known weed infestations stock-piled separately. Conservation management and weed hygiene zones will be clearly marked and sign posted. No unauthorised off-track driving or entry into conservation management and weed hygiene zones. Conduct progressive rehabilitation to minimise the time between disturbance and rehabilitation, use local provenance seed. Conduct rehabilitation trials for priority species. Rehabilitation monitoring in accordance with Mine Closure Plan. Land disturbance requirements will be included in contracts with all earthmoving and land clearing contractors. Training on land clearing procedures will be included in the environmental induction and environmental awareness 	<ul style="list-style-type: none"> No clearing outside of approved areas. Pre-land clearing surveys conducted prior to clearing. Pre-land clearing survey report produced. Clearing permits system implemented and evidence of forms completed and conditions of clearing permit assessed and complied with. Clearing Register maintained. Production of a Mine Closure Plan. Correspondence with DEC regarding notification of presence of conservation-significant flora. 	<ul style="list-style-type: none"> Clearing and rehabilitation to be reported annually in the Annual Environmental Report (AER). Pre-land clearing survey reports to be submitted as required.



Ministerial Condition	Impact	Management Strategy	Performance Indicator	Timeframe, Reporting
<p>9-2 Prior to ground-disturbing activities in a particular staged area to be cleared, the proponent shall prepare a Significant Species Management Plan for conservation-significant flora or fauna species recorded during the staged pre-land clearing surveys required by condition 9-1, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Department of Conservation and Land Management and the Western Australian Museum.</p>		<ul style="list-style-type: none"> This plan. 	<ul style="list-style-type: none"> Plan prepared. 	<ul style="list-style-type: none"> n/a
<p>The objective of this Plan is to maintain the abundance, diversity, geographic distribution, conservation status and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.</p>		<ul style="list-style-type: none"> This plan. 	<ul style="list-style-type: none"> Plan compliant with Ministerial Statement 715. 	<ul style="list-style-type: none"> n/a
<p>This Plan shall describe the significant, identified species of flora and fauna, and describe significant vegetation associations and habitat areas, and shall set out procedures to:</p> <p>1. demarcate identified populations and/or individuals of conservation-significant species of flora and fauna, vegetation associations and habitat areas;</p>		<ul style="list-style-type: none"> This plan – Section 6.5 and Figure 2. 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a



Ministerial Condition	Impact	Management Strategy	Performance Indicator	Timeframe, Reporting
2. modify land clearing plans and evaluate alternative mine plans, to minimise or avoid impacts on the conservation-significant, identified species of flora and fauna, vegetation associations and habitat areas;		<ul style="list-style-type: none"> Pre-land clearing flora survey reports. 	<ul style="list-style-type: none"> Reports. 	<ul style="list-style-type: none"> As required, within 2 weeks of becoming available.
3. minimise impacts where proposed mining activities are likely to impact on conservation-significant, identified species of flora and fauna, vegetation associations and habitat areas;	Introduced flora and fauna	<ul style="list-style-type: none"> Invasion prevention and control of introduced flora and fauna species will be managed as per the Quarantine Management Plan (MGI 2011). Weed monitoring to occur as per the Quarantine Management Plan (MGI 2011). Introduced fauna monitoring to occur as per the Quarantine Management Plan (MGI 2011). 	<ul style="list-style-type: none"> As per Management Strategy of the QMP (MGI 2011): Annual weed and introduced fauna monitoring conducted. Weed and introduced fauna maps and registers maintained. Clearing permits completed. 	<ul style="list-style-type: none"> Annual weed and introduced fauna monitoring reports. As per Ministerial Statement 715 and EPBC Act approvals.
	Water	<ul style="list-style-type: none"> Groundwater and Surface water will be managed as per the Water Management Plan (GHD 2010). 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">
	Dust	<ul style="list-style-type: none"> Dust generation from project activities will be minimised by engineering controls and use of dust suppression measures, such as water trucks, sprinklers and deluge sprays. Vehicle speed will be restricted on cleared tracks. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">
	Fire	<ul style="list-style-type: none"> Equip hydrocarbon and chemical storage facilities, light vehicles, mobile plant and fixed plant with approved fire extinguishers. Personnel will be trained in the use of fire extinguishing equipment and fire prevention measures in work areas. Obtain a hot works permit for work that has the potential to create ignition sources. Make available adequate fire suppression equipment for hot works within 3 m of vegetation. An emergency response team will be available. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">



Ministerial Condition	Impact	Management Strategy	Performance Indicator	Timeframe, Reporting
	Hydrocarbons and chemicals	<ul style="list-style-type: none"> Hydrocarbons and chemicals will be stored, used, transported and disposed of in accordance with Dangerous Goods Regulations, Australian Standards and DoCEP guidelines. Spills will be immediately cleaned up and contaminated material appropriately disposed of. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">
	Waste	<ul style="list-style-type: none"> Inert and putrescible waste will be disposed of in a licensed landfill facility on the island. Hazardous waste will be removed from the island and disposed of by a licensed contractor. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">
	Knowledge and Awareness	<ul style="list-style-type: none"> Pre-land clearing surveys conducted to identify conservation-significant flora presence/absence. Information on conservation-significant flora species provided to employees within the site induction and toolbox sessions. Compilation of an identification booklet for conservation-significant flora species for use at Koolan Island. Update information on species in this plan, registers, maps and identification booklet as it becomes available. Check regularly whether conservation status of relevant species has changed. Demarcate populations of identified conservation-significant flora located within and directly adjacent to the project area. 	<ul style="list-style-type: none"> Pre-land clearing surveys conducted Conservation-significant flora species register and maps maintained. Reports made to DEC when conservation-significant flora identified. Identification booklet produced and made available to mine site personnel. 	<ul style="list-style-type: none"> Pre-land clearing Survey Report. This plan updated with most recent information at timeframes not exceeding 4 years.
4. monitor and record impacts on conservation-significant, identified species of flora and fauna, vegetation associations and habitat areas; and		<ul style="list-style-type: none"> Section 10.0 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a
5. Implement appropriate contingency measures where impacts on conservation-significant, identified species of flora and fauna, vegetation associations and habitat areas are identified.		<ul style="list-style-type: none"> Section 11.0 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a
9-3 The proponent shall review and revise the Significant Species Management Plan required by condition 9-2 at intervals not exceeding four years.		<ul style="list-style-type: none"> Review and revise this plan every 4 years. 	<ul style="list-style-type: none"> Plan reviewed and revised. 	<ul style="list-style-type: none"> Review and revision occurs every 4 years.



**KOOLAN ISLAND IRON ORE MINE AND PORT FACILITY PROJECT
SIGNIFICANT FLORA SPECIES MANAGEMENT PLAN**

Ministerial Condition	Impact	Management Strategy	Performance Indicator	Timeframe, Reporting
9-4 The proponent shall implement the Significant Species Management Plan required by condition 9-2 and subsequent revisions required by condition 9-3.		<ul style="list-style-type: none"> Implement this plan. 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a
9-5 The proponent shall make the Significant Species Management Plan required by condition 9-2 and subsequent revisions required by condition 9-3 publicly available.		<ul style="list-style-type: none"> Ensure current Significant Flora Species Management Plan is uploaded onto the Mount Gibson website. 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a

10.0 DETAILS OF MONITORING PROGRAMMES

10.1 PRE-LAND CLEARING FLORA SURVEYS

Since 2006, Mount Gibson have been undertaking pre-land clearing surveys for six conservation-significant flora species identified as species of interest in Ministerial Statement 715.

The substantive effort invested has failed to reveal the presence of the following taxa anywhere on Koolan Island:

- *Eucalyptus kenneallyi* (P1)
- *Gymnanthera cunninghamii* (P3)
- *Stackhousia clementii* (P3)
- *Brachychiton xanthophyllus* (P4)
- *Corymbia aff. cadophora*

Therefore it can be stated with confidence that these taxa do not occur within any of the pre-land clearance survey areas surveyed to date. Nevertheless, Mount Gibson will continue to undertake pre-land clearing surveys in areas that have not been subjected to previous historical surveys and will target all taxa listed.

Surveys will occur with enough time prior to the scheduled clearing to ensure that they are undertaken within the appropriate seasons and management actions are included in the survey report and subsequently implemented.

Phyllanthus aridus (P3) has been located during every pre-land clearing survey undertaken since 2006 and is regarded as common on the island. Therefore, no further records of this species will be taken on future pre-land clearance surveys.

A summary report of the results of the staged pre-land clearing surveys shall be provided to the EPA and DEC within two weeks of becoming available.

10.2 PRE-LAND CLEARING WEED SURVEYS AND ANNUAL WEED MONITORING

The Quarantine Management Plan (MGI 2011) details requirements for pre-land clearing weed surveys, maintenance of a weed register, maintenance of maps showing weed distributions and annual weed monitoring. Pre-land clearing weed surveys and Annual weed monitoring shall be undertaken in compliance with the Quarantine Management Plan.

10.3 REHABILITATION

Monitoring of rehabilitation shall be completed in accordance with the Mine Closure Plan.

11.0 CONTINGENCIES

In the event that pre-land clearing flora surveys demonstrate the presence of any new conservation-significant flora species within the project area, DEC will be consulted and contingency measures determined and implemented, where required.

12.0 STAKEHOLDER CONSULTATION

Mount Gibson identified and engaged key stakeholders throughout the impact assessment and referral process. Stakeholders involved comprise of regulatory agencies, conservation groups and local interest groups (Table 3). The issues raised through consultations are addressed in the Environmental Referral Document (ERD) submitted to the EPA (Ecologia 2005b).

Table 3: Key stakeholder groups in the Koolan Island Iron Ore Mine and Port Facility Project.

Regulatory Stakeholders	Non-regulatory Stakeholders
SEWPAC	Conservation Council of Western Australia
DEC (Perth)	Kimberley Land Council
DEC (North West Region)	Environs Kimberley
DEC (EPA Service Unit)	Greens (MLC)
DEC (Land and Water Quality Branch)	Marine and Coastal Community Network
DIA (Perth)	Broome Botanical Society
DIA (North West Region)	Kimberley Environ Horticulture
Department of Fisheries	Wildflower Society
Shire of Derby and West Kimberley	
Western Australian Museum	

13.0 AUDITING

The proponent shall prepare an audit program within which all EMPs are included as per Condition 5-1 of the Ministerial Statement 715 and submit compliance reports to the Department of Environment which address:

1. The status of implementation of the proposal as defined in schedule 1 of this statement.
2. Evidence of compliance with the conditions and commitments.
3. The performance of the environmental management plans and programmes.

This management plan will be audited in accordance with the approved audit programme.

14.0 REVIEW AND REVISION

This Plan must be reviewed every four years as required by Ministerial Statement



715. The revision must be undertaken by a suitably qualified environmental professional. The revision will encompass the following aspects:

- Assessment of the management plan's relevance to the current operations.
- Effectiveness in meeting the environmental objective (Ministerial Statement 715).
- Incorporation of new information on conservation-significant flora.
- Review of conservation listings of Koolan Island flora species.

A review record including summary of changes must be incorporated into the management plan and updated with each review, as shown in Table 4.



Table 4: Revision Status Record for This Plan

Rev.	Year	Reviewer	Comments and Changes
1	2006	Ecologia	Original Management Plan
2	2010	MBS	Section 6.5: More detail provided on Koolan Island vegetation. More detail included on conservation-significant species including distribution and abundance data from pre-land clearing flora surveys 2006 to 2009. The inclusion of <i>Stackhousia clementii</i> after a change in conservation status to P3. The inclusion of <i>Brachychiton</i> sp. novel Koolan Island to reflect updated knowledge of Koolan Island <i>Brachychiton</i> species. Update of <i>Brachychiton</i> conservation status: P2 to P4. Section 6.5.1.2: Update number of flora and families. Figure 2: Updated to include new known locations from surveys. Section 6.5.1.4: Contains declared plants only. Section 6.5.1.6: Inclusion of conservation-significant and introduced fauna. Section 7.1: Update of approved area to be cleared from 540 to 590. Section 7.2: Update weeds information from annual weed monitoring surveys. Section 7.6: Update weeds information from annual weed monitoring surveys. Section 7.8: Update approved number of workers, landfill to be covered regularly instead of weekly, additional impacts. Section 7.9: New section. Table 2: Structure changed to align with Ministerial Statement and allow easier auditing. Inclusion of topsoil management requirements. Inclusion of rehabilitation requirements. Update QMP references from 2006 to 2011. Inclusion of introduced flora and fauna monitoring. Inclusion of requirement to update information on species in the plan. Review and revision required every four years as required in Ministerial Statement 715, rather than every two years as per previous SFSMP. Section 10.1: Pre-land clearance flora survey results to be valid for two years (previously one). Removal of requirement for annual monitoring of identified populations for three years.



Rev.	Year	Reviewer	Comments and Changes
			Reference to monitoring procedures, inclusion of Weed Monitoring and Rehabilitation Monitoring.
			Section 10.2: Inclusion of pre-land clearing weed surveys and weed monitoring.
			Section 10.3: Inclusion of rehabilitation.
			Section 11.0: Contingencies changed from notification of adverse impacts from monitoring to results of pre-land clearing surveys.
			Section 13.0: Auditing changed from annual internal audits to as per audit programme.
			Section 14.0: Review and revision changed to 4 years.
			Section 15.0: This management plan available on the website
3	2013	APM	Section 4.0: Heritage status update
			Section 6.5.1.2: Flora family update - Mimosaceae & Papilionaceae are now classed as Fabaceae.
			Section 6.5.1.3: Flora of Conservation Significance: Priority status review
			Figure 3: Updated version from FloraBase
			Figure 4: Updated version from FloraBase
			Figure 5: Updated version from FloraBase
			Figure 6: Updated version from FloraBase
			Figure 7: Updated version from FloraBase
			Section 6.5.2.2: Review and update of conservation status.
			Section 6.5.2.3: Review of introduced species - None have been captured during baseline or pre-clearance surveys to date. Singapore added to section.
			Section 7: Potential and known impact sections updated



15.0 REPORTING

The Annual Environmental Report (AER) will provide a detailed summary on the current status of conservation-significant flora species on Koolan Island. The AER will be submitted to DEC annually.

All revisions of the Significant Flora Species Management Plan will be made publicly available on the Mount Gibson website.



16.0 REFERENCES

- Aquaterra. (2006a). *Aztec Resources Koolan Island Iron Ore Project Water Management Plan*. Unpublished report commissioned by Aztec Resources Limited.
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