Mount Gibson Iron

Koolan Iron Ore

Quarantine Management Plan

2011

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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 Quarantine Management Plan (QMP) is a requirement of Condition 11 of Ministerial Statement 715 and Condition 3 of the *Environmental Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) approval 2006/2522. This plan was first produced for Aztec Resources during 2006 by Ecologia Environment (Ecologia 2006a). The 2006 version requires updating as per condition 11-2 of Ministerial Statement 715. The 2006 version of the QMP was updated in 2008 and 2010 though neither version was approved by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC). As a consequence the 2006 version is still in place on Koolan Island. A draft version of this plan was previously submitted to DSEWPC, DEC and EPA for review. This version of the plan now contains comments from those departments. Upon approval, this version of the QMP will become the superseded version of the 2006 QMP.

Koolan Island is located in the Buccaneer Archipelago, 130 km north of Derby, at the northern end of the Yampi Peninsula (Figure 1). Mount Gibson Iron Limited (MGI) expanded previously mined iron ore bodies on Koolan Island to access remnant ore reserves. Associated with the mining infrastructure, MGI has constructed a port facility through which the ore is exported.

Koolan Island has an assemblage of flora and fauna that could be adversely affected by the introduction of exotic plants and animals. A number of threatened species occur on the island including the Northern Quoll (*Dasyurus hallucatus)*.

Several introduced flora species exist on Koolan Island, the dispersal and spread of which may be compounded by mining activities. Introduced species of environmental significance include Wild Passionfruit (*Passiflora foetida* var. *hispida*), Bellyache Bush (*Jatropha gossypifolia*), Rubber Vine (*Cryptostegia madagascariensis*), Candle Bush (*Senna alata*), White Lead Tree (*Leucaena leucocephala*), Mexican Lilac (*Gliricidia sepium*), Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*), Giant Reed (*Arundo donax*), Hyptis (*Hyptis suaveolens*) and Buffel Grass (*Cenchrus ciliaris*).

Exotic mammal fauna, including the Goat (*Capra hircus*), Rabbit (*Oryctolagus cuniculus*), Dog (*Canis familiaris*) and Guinea Pig (*Cavia porcellus*) have been previously recorded on the island (McKenzie *et al*., 1995) although there are no recent records of introduced mammals despite extensive surveys (Ecologia, 2005a, 2006b, 2008; MBS 2008a, 2010a, 2011b). A number of introduced invertebrate species have also been previously recorded including Singapore Ant (*Monomorium destructor*), a centipede (*Scolopenda morsitans*), an earthworm (*Dichogaster bolaui*), an unidentified cockroach species, a slug (*Laevicaulis alte*) (Burbidge & Scott 2003) and snail species *Prosopeas achatinaceum* (Slack-Smith 2006).

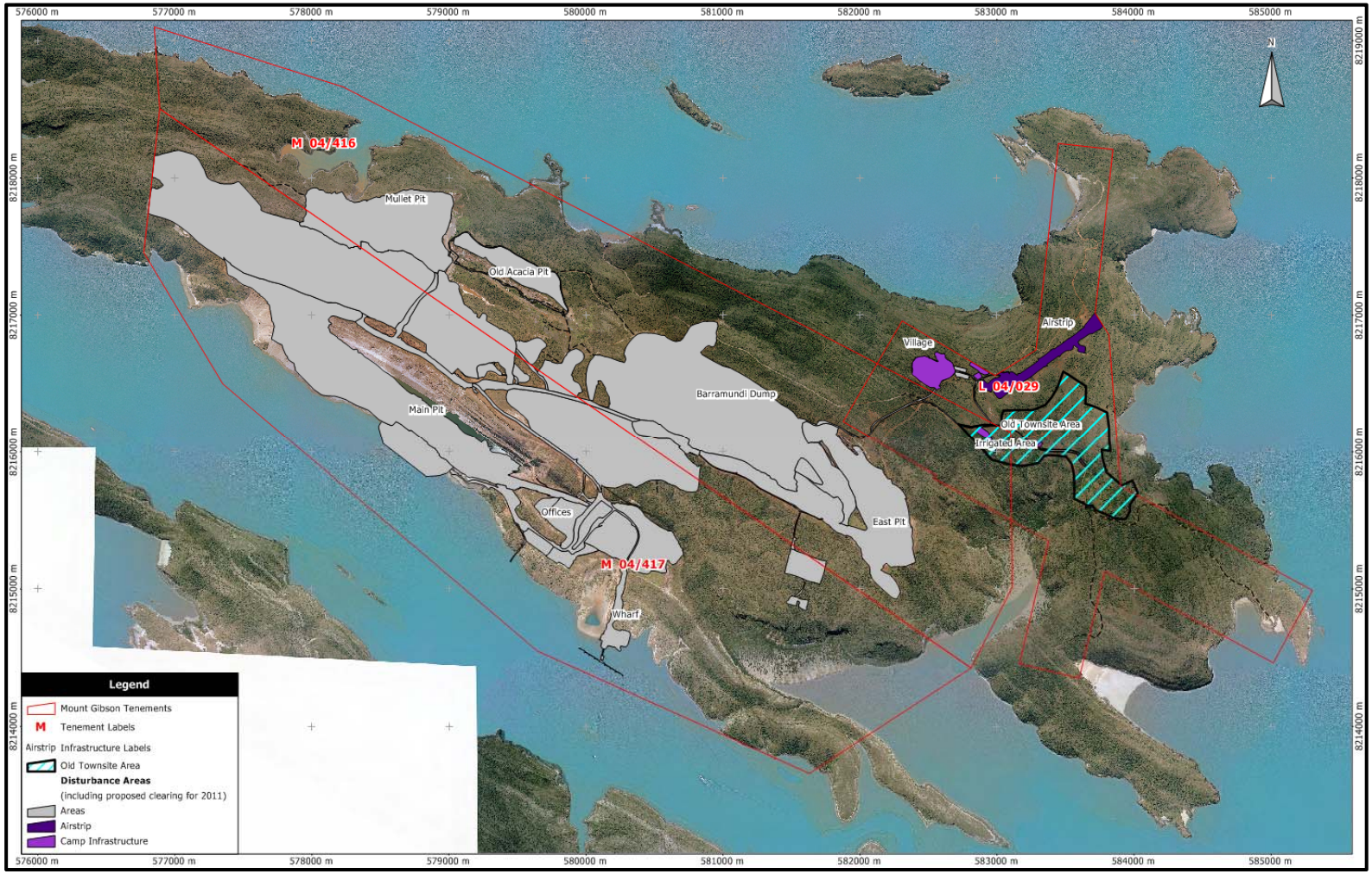
Transport activities have the potential to introduce additional exotic flora and fauna species to Koolan Island, such as the Cane Toad (*Bufo marinus*), Black Rat (*Rattus rattus*) and House Mouse (*Mus musculus*).

Introduced species have the potential to impact on existing flora and fauna of Koolan Island through competition and predation processes. These processes could result in the exclusion of native flora, impact upon rehabilitation success and could cause local extinction of flora and fauna species.

Implementation of quarantine measures as described in this management plan, are to ensure the impact of mining on the biodiversity of Koolan Island is minimised. The management of exotic marine species is addressed in the Marine Management Plan (MScience 2008). It is of note that the mining operation currently affects less than one fifth of the island and when all of the currently approved clearing has been conducted mining will affect less than one quarter of the island. The current site layout is shown in Figure 2

Figure 1: Koolan Island Location Plan

Figure 2: Aerial Photograph and Site Layout



2.0 OBJECTIVES

The purpose of this QMP is to outline management strategies, actions and procedures that will be used to manage quarantine issues and achieve quarantine objectives for the Koolan Island Iron Ore project. The objectives of the QMP as stipulated in Ministerial Statement 715 are to:

- Prevent the spread of existing introduced flora and fauna species within Koolan Island and between the island and the mainland;
- Prevent further establishment of existing introduced or new flora and fauna species on Koolan Island as a result of mining; and
- Control or eradicate introduced flora and fauna species on Koolan Island.

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 (WA). The Buccaneer Archipelago consists of some 800 to 1,000 rocky islands with small embayments and beaches, is extremely diverse with coral reefs, algal flats and shallow sandy banks (CALM 1994).

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 & Cresswell 1995).

4.0 HERITAGE STATUS

There are no World Heritage properties, National Heritage places, Ramsar wetlands, Commonwealth marine areas, Commonwealth land, Commonwealth Heritage places, conservation reserves or conservation parks on or immediately around Koolan Island. There are heritage sites on Koolan Island and these are managed through alternative processes.

5.0 MINING HISTORY

The first record of iron ore being removed from Koolan Island was in 1870's by pearlers operating their luggers in Yampi waters. They used the iron ore as ballast for their vessels during trade with Asia. In 1907 Mr Percy Kean of the Australian Prospecting Association investigated the export potential of iron ore from the Yampi Islands (of which Koolan Island is the largest island) and subsequently took up the mining leases. These items were noted in the 1908 Annual Progress Report of the Survey of Western Australia by W.D. Campbell and referred to in Keith Smith's book "The Great Challenge" (Smith 1979).

Mr A. Montgomery State Mining Engineer Western Australia visited Koolan Island in October 1919. It is of note that Mr Montgomery's trip from Perth to Koolan Island and return took fifty

one days which included six days spent on site. Mr Montgomery's report published in January 1920 specified many of the key characteristics of Koolan Island and the challenges

for mining to fully realise the export potential and benefit to Western Australia. Significant government embargoes were placed on export of the ore during the world wars.

Harold Buckley purchased the Koolan Island Leases in 1930 for £150 and subsequently sold them for £35,000 four years later to Sir James Connolly. Mr Buckley actively participated in promotion of the project and obtained interest in the project from Great Britain, America and Japan.

Due to the World Wars there was considerable media coverage and concern that the Iron Ore from Yampi would serve to assist the Japanese. "*Yampi Sound – Protest Against Japanese Interest*" (Sunday Times – 13th January 1935). Sir James Connelly was able to move the project forward in the intervening period and by 1936 there were 60 men working on Koolan Island for the Yampi Sound Mining Company.

In 1937 industrial relations became a focus for the men on Koolan Island who were demanding higher rates of pay, most of whom were on £5 per week and better accommodation as most were housed under canvas sheets. The Arbitration Court held proceedings aboard the vessel the Yampi Lass which was moored in a cove on the southern side of Koolan Island. The cove was subsequently named Arbitration Cove, a name it carries through to today.

Sir David Brand and Sir Charles Court drove the great mineral boom of the 1960's with Yampi being the first step for the North West of Western Australia. Australian Iron and Steel Pty Ltd a wholly owned subsidiary of the Broken Hill Proprietary Co. Ltd (BHP) then held the leases to Koolan and Cockatoo and were supplying high grade ore to the furnaces of Newcastle and Port Kembla in New South Wales.

Her Majesty the Queen and his Royal Highness the Duke of Edinburgh visited Koolan Island on March 20th, 1963 which was a fitting culmination to a phase in Western Australian history as "*the North of the State was now really on the move*".

The BHP venture on Koolan Island commenced in 1965 and existed through to 1993. During this period approximately 68 million tonnes of high-grade haematite (67 percent iron) ore was extracted from five pits, crushed and shipped from the sites 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 moon-scaping, and the construction of a channel to allow sea water flooding of the Main Pit. The leases were subsequently acquired by Aztec Resources in 2004 and then by Mount Gibson Iron in 2007.

As can be seen from the above brief précis (primarily from Smith 1979), Koolan Island has a colourful history with mining for Iron Ore on the Island for well over a hundred years and interest in the ore back to at least the 1870's.

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 during which time there is no surface water on the island. The annual mean daily maximum temperature is 34.5 °Celsius, with an annual mean daily minimum of 21.6. °Celsius. The hottest months are November and December, whilst the coolest is July (Bureau of Meteorology 2010; data 1972 to 2010). Evaporation is low, at a daily average of 9.2 millimetres per year over the last ten years (Bureau of Meteorology 2010).

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 and a few beaches (Ecologia 2005b). It is of note that the mining operation currently affects less than one fifth of the island and when all of the currently approved clearing has been conducted mining will affect less than one quarter of the island.

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 north-west to south-east, 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 other fresh groundwater regions on the island: the Southern Syncline and the Northern Syncline. These aquifers experience a recharge of approximately 100,000 (Northern Syncline) and 700,000 (Southern Syncline) kilolitres per year.

The Southern Syncline aquifer can be subdivided into two zones: the interland zone (or water supply area) and the orebody zone.

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

6.5 FLORA AND VEGETATION

6.5.1 Vegetation and Flora

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 units mapped by Ecologia (2004).

1. Open woodland of *Eucalyptus* species over *Corymbia* species over mixed herb/soft grass/*Triodia* cover, this vegetation covers most of the island. This unit is further divided into three sub units:
    i. *Eucalyptus miniata* woodland/open woodland along stony ridge crests.
    ii. *Eucalyptus miniata* / *Corymbia cadophora* woodland along moderate depth gullies.
    iii. Very open woodland: scattered trees over sparse low shrubs, herbs and grasses on coastal slopes.
2. Vine thicket, which is present in limited areas.
3. Mangroves which occur in areas such as in inlets at the tidal zone in narrow strips.
4. Beaches, there are a total of twelve small beaches on the island located mainly in the east and northeast.
5. Previously disturbed/rehabilitated vegetation.

- **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.
- **Vine thicket**
  Very small areas of vine thicket occur in limited locations. Vine thicket generally intergrades into *Callitris columellaris*[1] forest.
- **Woodland *Callitris columellaris* forest.**
  The *Callitris columellaris* forest is restricted to the more deeply incised gullies, occurs in sporadic stands. Hence the total area encompassed is relatively small (Ecologia 2004). Minor stands of *Callitris collumellaris* are also occasionally found in upland areas. *Callitris collumellaris* is fire sensitive and as there has not been a significant bush fire on Koolan Island for more than 10 years the fuel loading is high. Should a bushfire start particularly between October and December it is likely to be extremely hot and may cause significant damage to the environment. (Bush fires in the Kimberley's are most commonly started by lightning strikes in November and December). A hot bushfire at this time of year will have a significant impact on the Northern Quoll population and some flora species such as *Callitris collumellaris.* Mount Gibson Iron has submitted a Fire Management Plan to DSEWPC for approval.

[1] *Callitris intratropica* R.T.Baker & H.G.Sm. is now known as *Callitris columellaris* F.Muell.

- **Mangroves**
  Mangroves occur at the intertidal zone but are largely restricted to narrow strips of vegetation, with only a few of the larger inlets supporting substantive areas.
- **Beaches**
  There are twelve small beaches that predominantly occur adjacent to mangrove communities but with some mobile sands. The over storey consists of scattered shrubs and the rest of the complex is mainly comprised of grasses and creepers.
- **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 shrub lands and non-rehabilitated areas consisting of a variable over storey with predominantly introduced shrubs, herbs and grasses. Ecologia (2005b) recorded that both disturbed vegetation types were atypical of the local provenance vegetation communities across the island and the Kimberley region.

A total of 629 flora species (including subspecies, variations, affinities and hybrids) have been recorded on Koolan Island compiled from surveys dating back to 1995. The most represented families include:

- Papilionaceae (67 species).
- Poaceae (77 species).
- Mimosaceae (39 species).
- Euphorbiaceae (32 species).

The most abundant genus is Acacia, with 32 species recorded up until 2011 (MBS 2011c).

6.5.2 Vegetation and Flora of Conservation Significance

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

Four species of Priority flora have been surveyed on Koolan Island including *Gymnanthera cunninghamii* (P3), *Phyllanthus aridus* (P3), *Stackhousia clementii* (P3) and *Brachychiton xanthophyllus* (P4). Three of these species are listed in the Ministerial Statement 715 requiring targeting during pre-clearance surveys. These include *Gymnanthera cunninghamii* (P3), *Phyllanthus aridus* (P3) and *Brachychiton xanthophyllus* (P4).

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

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).

6.5.3 Weeds

Specific weed surveys were conducted on Koolan Island in 1993 (Keighery *et al*. 1995), 2004 (Ecologia 2004), 2009 (MBS 2009b), 2010 (MBS 2011a) and 2011 (MBS 2011c). Weed surveys were also conducted as part of the Pre clearance flora surveys in 2006 (Ecologia 2006c, 2006d), 2007 (Ecologia 2008) and 2008 (MBS 2008b) from which 86 weed species have been recorded (MBS 2011c). The majority of introduced species occur in the old BHP settlement where former gardens and ornamental plants that were planted prior to 1993. Some of these species include Century Plant (*Agave Americana*), Common Mango (*Mangifera indica*), Wild Tamarind (*Leucaena leucocephala* subsp. *leucocephala*), Mexican Lilac *(Gliricidia sepium*) and Royal Poinciana *(Delonix regia)*.

The most widespread and common introduced species observed during recent surveys were Buffel Grass (*Cenchrus ciliaris*), Natal Grass (*Melinis repens*) and Wild Passionfruit (*Passiflora foetida* var*. hispida*).

African Tulip Tree (*Spathodea campanulata*) was first recorded by Ecologia in 2007 and intensively searched for during the 2010 Annual Weed Monitoring survey. Through anecdotal evidence they were known to grow in gardens in the old BHP town site area, no trees of this species were found. It is likely that this species is no longer present on Koolan Island.

The weed species of greatest environmental concern identified during weed surveys include three Declared Plants listed by Department of Agriculture and Food WA (DAFWA) (2011) under the *Agriculture and Related Resources Protection Act 1976* (ARRP Act) and three Environmental Weeds, the target weed species are:

- Bellyache Bush (*Jatropha gossypiifolia)* (Declared).
- Rubber Vine (*Cryptostegia madagascariensis*) (Declared).
- Candle Bush (*Senna alata)* (Declared).
- Wild Passionfruit (*Passiflora foetida* var. *hispida*).
- White Lead Tree (*Leucaena leucocephala*).
- Mexican Lilac (*Gliricidia sepium*).

DSEWPC have requested additional species to be considered. These are:

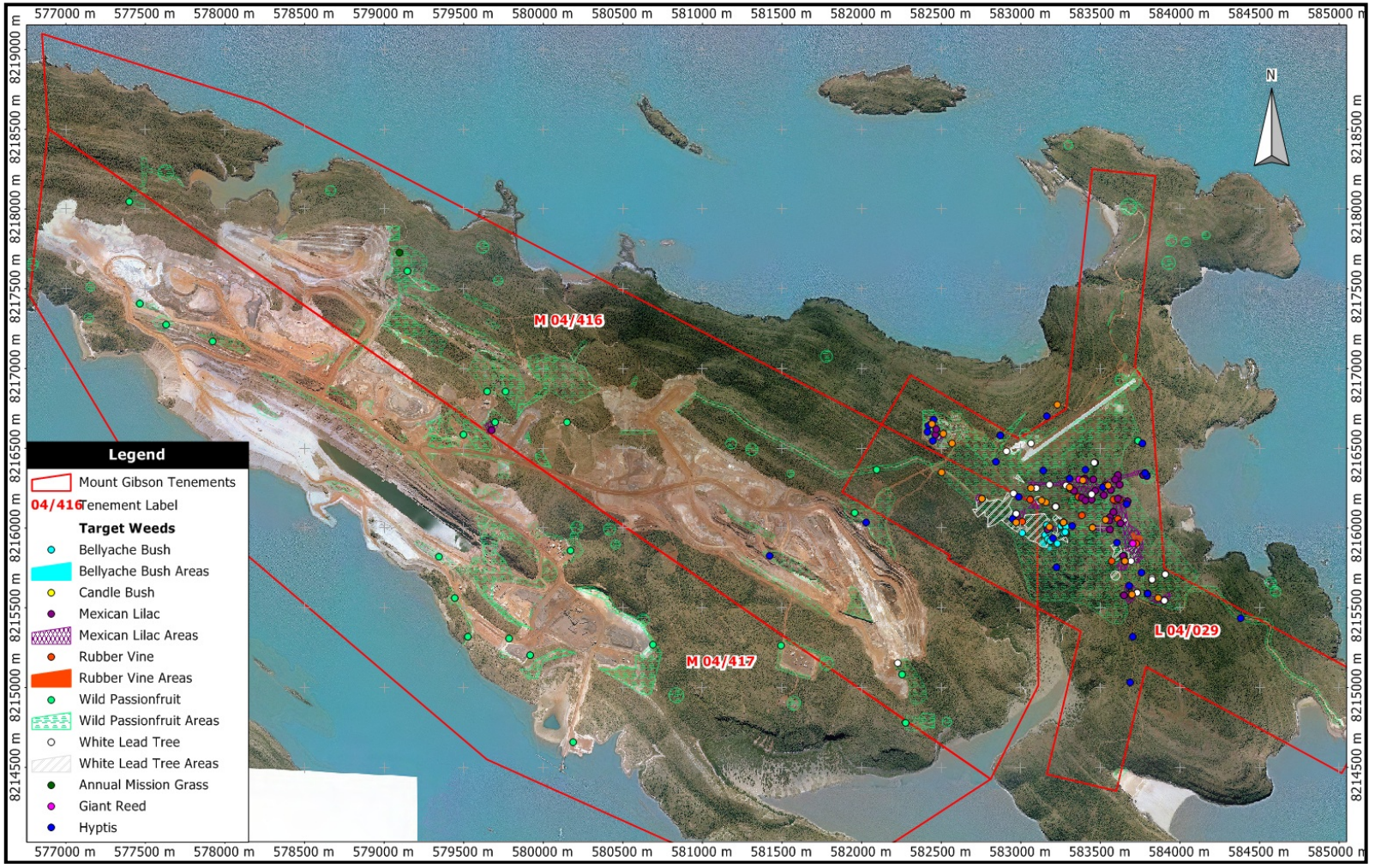
- Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*).
- Hyptis (*Hyptis suaveolens*).
- Giant Reed (*Arundo donax*).
- African Tulip Tree (*Spathodea campanulata*).

The current distribution of these weed species is shown in Figure 3. Specific locations of these weeds are reported annually in the Annual Weed Monitoring survey reports.

As can be seen from Figure 3 the majority of weeds on Koolan Island are in the old BHP town site. These were brought to Koolan Island for garden ornamentals by families of BHP employees living on Koolan Island between 1965 and 1993.

It is of note that the old BHP town site is outside of the project area and outside of the mining tenements. As Mount Gibson has not created any disturbance to the old BHP town site Mount Gibson has no legal responsibility to manage the land or the weeds within the old BHP town site. The monitoring and weed control within the old BHP town site has been done on a voluntary basis by Mount Gibson with the intent of preventing spread of invasive weeds into the mining tenements.

Figure 3: Location of Target Weed Species on Koolan Island (August 2011)



6.6 TERRESTRIAL FAUNA

Koolan Island is located within the Torresian zoogeographic region and the coastal interzone of the Northern Kimberley and Dampierland biogeographic regions (Thackway and Cresswell 1995). A total of 162 vertebrate fauna species (17 mammal, 104 bird, 3 amphibian and 38 reptile species) have been recorded on Koolan Island during fauna surveys by Ecologia (2006b, 2008) and MBS (2008a, 2010a, 2011b).

6.6.1 Fauna of Conservation Significance

Several fauna species of conservation significance have been recorded on Koolan Island including the Red Goshawk (*Erythrotriorchis radiatus*) (Ecologia 2005b), Ghost Bat (*Macroderma gigas*), Saltwater Crocodile (*Crocodylus porosus*), Northern Quoll (*Dasyurus hallucatus*), White-bellied Sea-eagle (*Haliaeetus leucogaster*) and the Eastern Reef Egret (*Egretta sacra*) (McKenzie *et al*. 1995, Ecologia 2005a, 2006b).

The Red Goshawk's habitat includes tall trees and permanent running water, neither of which occur on Koolan Island. This was supported by George Swann who undertook a targeted Red Goshawk survey on Koolan Island in response to two previous sightings of Red Goshawk. No sightings or evidence of Red Goshawk on the island were found during George Swann's targeted survey or in subsequent surveys. George Swann concluded that genuine observations of Red Goshawk on Koolan Island are likely to reflect opportunistic foraging behaviours rather than residential or breeding habits (Ecologia 2005c).

The Northern Quoll (*Dasyurus hallucatus*) is listed in Schedule 1 of the *WC Act*, Endangered under the *EPBC Act* and listed as Lower Risk/Near Threatened by the International Union for the Conservation of Nature (IUCN). Reference to the management and mitigation of impacts to this species are in the Northern Quoll Management Plan.

Short Range Endemic (SRE) fauna species that are known to occur on Koolan Island include land snails, earthworms, and the Yampi Blind Snake (*Ramphotyphlops yampiensis*). The Yampi Blind Snake is known from only one record taken from Koolan Island in 1963 and has not been recorded in subsequent extensive fauna surveys on the island or adjacent mainland. It is possible that this species no longer exists on Koolan Island.

Two species of land snail, *Amplirhagada astuta* and *Kimboraga koolanensis* are listed as Conservation Significant Flora and Fauna in Ministerial Statement 715, condition 9-1. One of these species, *Amplirhagada astuta* is in Schedule 1 of the *WC Act* and listed as Endangered by the IUCN, while *Kimboraga koolanensis* is listed as Vulnerable by the IUCN.

Other fauna groups, such as spiders and schizomid species, may occur as SRE species on the island however this is currently unknown. Many freshwater invertebrate groups are known to include short-range endemic species however, due to a lack of permanent freshwater none are found on Koolan Island.

Stygofauna sampling during 2006 identified a common Pilbara Copepod, *Mesocyclops brooksi*, an undescribed Syncarid, labelled Syncarid genus *Nov*. species *nov*. and an additional species of Isopod; *Crenisopus* sp. (MBS 2010b). The results from four subsequent rounds of sampling by Ecologia (September 2006, February 2007) and MBS (November 2008, September 2010) consisted entirely of the Syncarid, *Atopobathynella* sp. B2, previously reported as Syncarid genus *Nov.* species *nov*. It is of note that three rounds of sampling

were required to be undertaken. A fourth round was conducted voluntarily in an effort to confirm species type and distribution.

6.6.2 Introduced Fauna

Extensive fauna surveys have been conducted on Koolan Island (McKenzie *et al*. 1995; Ecologia 2005a, 2006b, 2007; MBS 2008a, 2009a, 2009b, 2009c, 2010a, 2010c). Introduced fauna species noted prior to 2006 include:

- Singapore Ant (*Monomorium destructor*) - believed to have been accidentally introduced in a cargo container (McKenzie et al. 1995) is considered to be well established on Koolan Island and is not regarded as a reportable species (G. Pratt and M. Widmer pers. comm.). The Singapore Ant is commonly misidentified with the more common *Pheidole* species.
- Snail (*Prosopeas achatinaceum*) - recorded by Slack-Smith 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 during the 2007 and 2010 biennial snail surveys (MBS 2007; Slack-Smith 2006; 2007 Slack-Smith and Whisson 2010).
- Centipede (*Scolopenda morsitans).*
- Earthworm (*Dichogaster bolaui*).
- Slug (*Laevicaulis alte)* (Burbidge & Scott 2003).

The only introduced fauna species that have been recorded on Koolan Island since operations recommenced in 2006 are shown on Figure 4. It is to be noted that these species were in existence on Koolan Island prior to commencement of operations in 2006.

Target species:

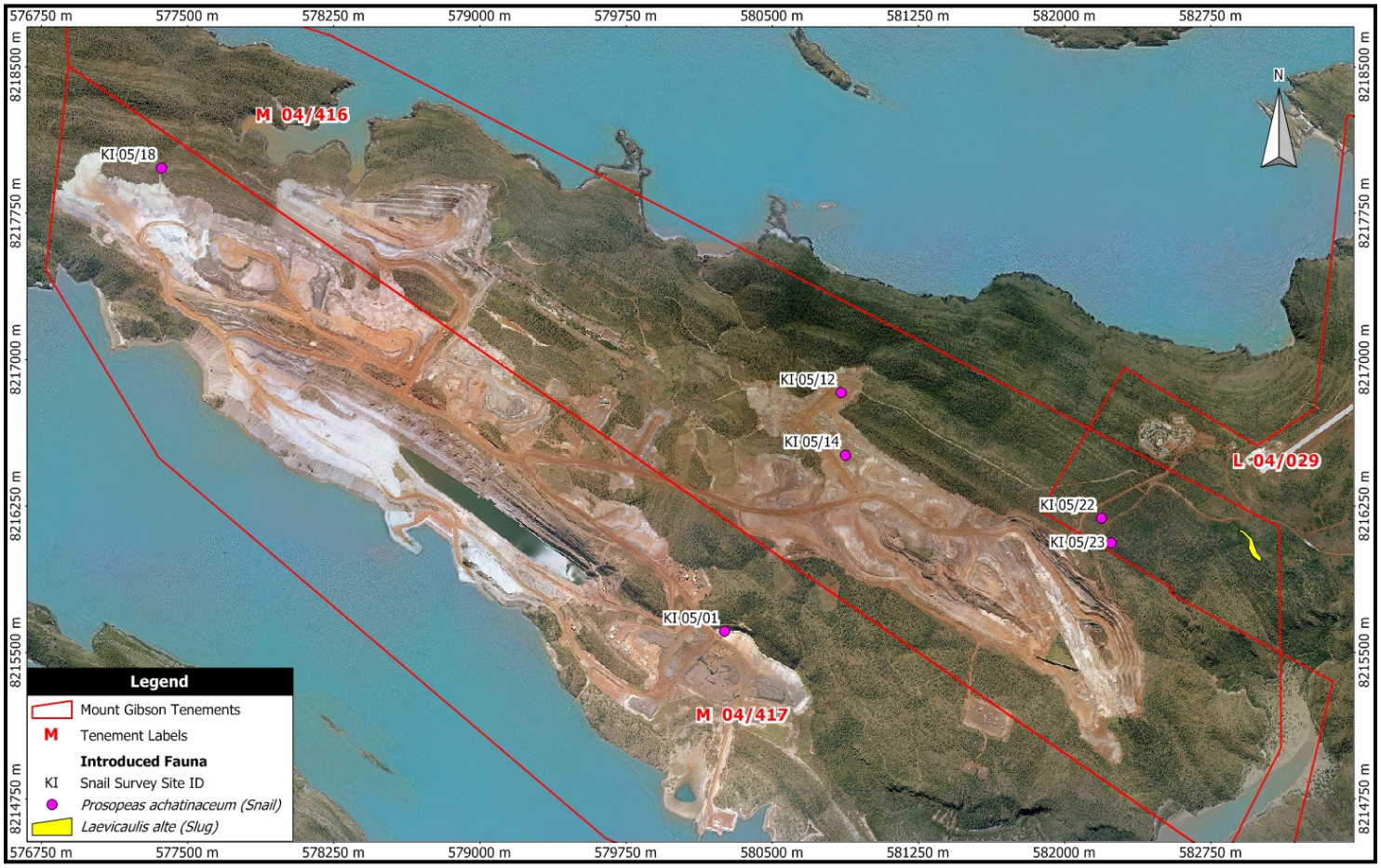
Introduced fauna species which are considered to be target species for quarantine are:

- Cane Toad (*Bufo marinus*) - not previously recorded on Koolan Island.
- Feral Cat (*Felis catus*) - not previously recorded on Koolan Island.
- Rat (*Rattus rattus*) - not previously recorded on Koolan Island.
- Mouse (*Mus muscalus*) - not previously recorded on Koolan Island.
- Asian House Gecko (*Hemidactylus frenatus*) - not previously recorded on KoolanIsland.
- European Rabbit (*Oryctolagus cuniculus*) - recorded historically on Koolan Island but not since recommencement of mining in 2006.

Introduced fauna species which have been historically recorded on Koolan Island, but are no longer considered to be present and are unlikely to be accidentally introduced include:

- Dog (*Canis familiaris*).
- Goat (*Capra hircus*).
- Guinea Pig (*Cavia porcellus*).

Figure 4: Location of Introduced Fauna Species Recorded on Koolan Island (August 2011)



7.0 POTENTIAL IMPACTS

7.1 TRANSPORT ACTIVITIES

Potential exists for introduction of new weed species, rats, mice, cane toads and invertebrates to the island from other places via numerous vectors including transportation and freight activity. Potential impacts are discussed in the Section 7.3 of this management plan. Potential impacts by exotic marine species via shipping and boating are addressed in a separate document, the Marine Management Plan prepared for MGI by Marine Science (MScience, 2008).

7.1.1 Internal

All transportation including earthmoving equipment, haul trucks, service vehicles, light vehicles, other vehicles and equipment have potential to spread extant weed species to new locations on the island. The potential impacts by weed species are discussed in Section 7.2.

7.1.2 External

Marine vessels and aeroplanes to the island have the potential to introduce and spread exotic terrestrial and marine species. Vectors within these modes of transport include freight, all supply materials, personal baggage and personnel.

7.1.2.1 Marine Transport

The different types of marine vessels operating to and from the island include:

Ore Carriers

All ore carriers from new destinations are inspected by the Australian Quarantine Inspection Service (AQIS) independently of MGI. Ore carriers to the Koolan Island Port Facility use rat guards do not remove waste materials and personnel do not disembark.

Landing Vessels

Inspection of all cargo going to the island occurs at the Koolan Island contractors transport yard in Perth and or at the transport depot in Derby prior to dispatch to the island on barges. Barges are routinely inspected for fauna. All vehicles boarding barges are also routinely inspected prior to departure from Derby.

7.1.2.2 Air Transport

Aircraft fly in and out of Koolan Island several times a week. Aircraft are rarely used for the transport of freight. They are primarily used to transport personnel to and from site.

Natural Transport Vectors

There are a number of natural vectors that can introduce new weeds to Koolan Island. These include wind, birds (particularly by seed transport) and floating marine debris. Spread of existing weed species on the island can occur through those vectors and animals such as the Northern Quoll, Rock Rat and various reptiles as well as spread by subsurface root systems etc.

7.2 INTRODUCED FLORA

Weed species are introduced flora species that establish themselves in alternate ecosystems and can modify natural processes. This can result in:

- Displaced native flora,
- Inhibition of regeneration,
- Altered fauna resources,
- Effects on nutrient cycling,
- Changed fire regimes, and
- Decline of the invaded community (CALM 1999).

A number of target weed species identified in Section 6.5.3 are established on Koolan Island. Several of these species are invasive species that may infest surrounding vegetation and colonise new areas. New weed species have the potential to be introduced to the island via various vectors such as birds and particularly via transport and freight activities.

7.3 INTRODUCED FAUNA

Introduced fauna species that establish themselves in natural ecosystems have the potential to impact on both flora and fauna species resulting in the decline of the invaded community through:

- Resource competition (i.e. space, water and food).
- Prevention of seedling recruitment.
- Alteration and damage to vegetation structure and composition.
- Soil erosion.
- Damage to watercourses.
- Genetic changes.
- Direct predation upon native fauna.
- Poisoning (i.e. ingestion of cane toads).
- Changes to the abundance of native fauna.
- Transmission of diseases.
- Genetic changes.

A number of introduced fauna species have previously been recorded and no longer occur on Koolan Island (Ecologia 2005a; McKenzie *et al*. 1995). This is discussed further in Section 6.6.2. The potential exists for the reintroduction of these species and others to the island unless vigilance is maintained.

8.0 TARGET WEED SPECIES

Target weed species refer to weed species occurring on mining tenements operated by MGI identified for inclusion into the QMP. Target weed species include two categories of weeds:

- **Declared Weed** species which landholders are obliged to control under Agriculture and ARRP Act.
- **Environmental Weed** species which are introduced plants that establish in a natural ecosystem and adversely modifying natural processes, resulting in a decline of invaded communities (EPA 2007).

Ministerial Statement 715, Condition 11 requires that the list of target weed species for inclusion into the QMP be developed in conjunction with DEC. The QMP produced during 2006 on behalf of Aztec Resources was submitted and approved by the DEC confirming agreement has been reached. The following revised list of target weed species is shown in Table 1.

Table 1: Target Weed Species 2011

Species	Status	Previously Included	Rationale for Inclusion
Bellyache Bush (*Jatropha gossypiifolia)*	Declared P1 P2 P4	Ecologia 2006	Landholders legally required to control (ARRP Act).
Rubber Vine (*Cryptostegia madagascariensis*)	Declared P1 P3	Ecologia 2006	Landholders legally required to control (ARRP Act).
Candle Bush (*Senna alata)*	Declared P1 P3	Ecologia 2006	Landholders legally required to control (ARRP Act).
White Lead Tree (*Leucaena leucocephala*)		Ecologia 2006	Environmental weed, included after discussion with DEC (2006). Included on International 100 Worst Invasive Species List (Lowe *et al*. 2000).
Mexican Lilac (*Gliricidia sepium*)		Ecologia 2006	Environmental weed, included after discussion with DEC (2006).

Species	Status	Previously Included	Rationale for Inclusion
Wild Passionfruit is prolific across Koolan Island and much of northern Australia. A research program to define potential control mechanisms is currently being considered.			
Wild Passionfruit (*Passiflora foetida* var. *hispida*)		Ecologia 2006	Environmental weed,
As a consequence of weed surveys and pre clearance flora surveys DSEWPC have requested four other target weeds to be included.			
Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum)*		No	Invasion of northern Australia by Annual Mission Grass is considered a Key Threatening Process under the EPBC Act.
Hyptis (*Hyptis suaveolens*)		No	Considered one of the top five worst terrestrial environmental weed species by geographic region for the Kimberley region (EPA 2007).
Giant Reed (*Arundo donax*)		No	Included on the International 100 Worst Invasive Species List (Lowe *et al.* 2000).
African Tulip Tree (*Spathodea campanulata*)		No	Included on the International 100 Worst Invasive Species List (Lowe *et al.* 2000).

MGI will continue to focus weed control priorities primarily on the declared weed species.

Although additional weeds have been identified on Koolan Island they are not considered to be target weed species as they are less aggressive and unlikely to pose significant environmental risk.

Annual weed monitoring is conducted on Koolan Island in areas where there are known infestations and areas that are likely to contain target weed species. Fifty metre transects are conducted where terrain and vegetation can be safely accessed. If the terrain prevents 50 meter transects multiples of shorter transects are used. Information comprising GPS location, representative photographs and population density are recorded for each new weed population to facilitate weed control. Although this methodology is the standard format for botanical monitoring it cannot guarantee to identify all weed species. As such should a

previously unrecorded weed species be identified in subsequent surveys it may not be a new introduction but rather the first time it has been recorded.

New species, identified as part of ongoing flora and fauna surveys conducted by MGI, are assessed for their potential to be a new introduction based initially on their location and also on the location of previous surveys. For example if a new species is found in a controlled quarantine area or non-operational area which has been subject to very little human influence, it is likely to have existed previously. Conversely if a newly identified species is found in an operational area that has not been previously surveyed it again may not be a new introduction. If a newly identified species is found in an operational area that has been previously surveyed there is a greater likelihood that it is a recent introduction.

It should also be noted that there are a number of natural vectors that could introduce new weeds or spread existing weeds on Koolan Island. These include wind and birds (particularly seed transport). Intra island movement may be caused by wind, birds and fauna such as the Northern Quoll.

9.0 ENVIRONMENTAL MANAGEMENT

The environmental management objectives defined in Ministerial Statement 715 for the QMP and corresponding management targets are described in Table 2.

Table 2: Environmental Objectives and Performance Indicators for Quarantine Management.

Number	Environmental Objective	Performance Indicators	Timeframe
1	Prevent the spread of existing introduced flora and fauna species within Koolan Island and between the island and the mainland.	• No new populations of existing introduced flora and fauna species to become established on the island (as a consequence of mining and with reference to Section 8.0 above). • Aim for containment of existing boundaries of target weeds species (with reference to Section 8.0 above).	• Assessed annually. • Assessed annually.
2	Prevent introduction of additional species of introduced flora and fauna on Koolan Island as a result of the implementation of the proposal.	• No new species of introduced flora or fauna species recorded on the island as a consequence of mining operations (with reference to Section 8.0 above).	• Assessed annually.
3	Control and eradicate introduced flora and fauna species on Koolan Island.	• Reduction of existing populations of introduced flora and fauna species on the island based on the priority system noted in section 6.4.3 and commencing with declared species.	• Assessed annually.

Table 3 describes the management strategies identified to meet environmental objectives.

Table 3: Management Strategies Identified to Meet Environmental Objectives.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	**Condition**				
11.1	Prior to ground disturbing activities, the proponent shall prepare a QMP to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority (EPA), the DEC and DAFWA. The objectives of the QMP are to manage the environmental impacts concerning introduced flora and fauna species that arise from the implementation of the proposal to:	Review and revision of the QMP will be in collaboration with DEC and DSEWPC.	1,2,3	Every four years.	Environment, Health and Safety Manager.
	• Prevent the spread of existing introduced flora and fauna species within Koolan Island and between the island and the mainland.	Prior to ground-disturbing activities pre-clearance surveys will be conducted as required for flora and fauna species encompassing: • Flora: Targeted conservation significant flora and weed species. • Fauna: Targeted conservation significant species and introduced species. Maps will be used to update locations of targeted flora and fauna species. Control of introduced fauna identified that pose a threat to conservation significant species on the island will be managed in consultation with DEC Kimberley Regional Office.	1, 3	As required.	Environmental Supervisor.
	• Prevent the further establishment of introduced flora and fauna species on Koolan Island as a result of the implementation of the proposal.	Implement QMP. Annual weed monitoring will be conducted at or near the end of the wet season.	1, 2, 3	Ongoing.	Environment, Health and Safety Manager, Environmental Supervisor,

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		Weed control will be occur at the optimum time in relation to the biology of the species			Environmental Officer.
		Progressive rehabilitation will be undertaken to minimise the time between disturbance and rehabilitation.	1	As required.	Environment, Health and Safety Manager.
		Local provenance, weed free seed will be used for rehabilitation.	2	Annual.	Environment, Health and Safety Manager.
	Control or eradicate introduced flora and fauna species on Koolan Island. This Plan shall set out procedures to:	Where required the Singapore Ant (*Monomorium destructor*) will be treated on an ad hoc basis with hydramethylnon (G. Pratt, pers. comm.) or other appropriate chemical according to recommendation by DAFWA.	1,3	As required.	Environment, Health and Safety Manager Environmental Supervisor, Environmental Officer.
		In the event that introduced fauna are recorded in the project area either opportunistically, during implementation of quarantine inspection procedures or during pre-clearance surveys, appropriate action to control and eradicate these species will be implemented.	1,2,3	As required.	Environment, Health and Safety Manager.
11.1.1	Identify the location, approximate number and type of each weed species recorded within the project area during previous vegetation surveys, while having regard for weed species outside the project area.	Continue to conduct Annual Weed Surveys for targeted species, including updated mapping and records of distribution of target species on the island. This includes consideration to target weed species outside of the project area.	1,2,3	Annual.	Environmental Supervisor.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
	(It is to be noted that the standard botanical methodology utilising transects and or quadrats is used to identify weed species and that this process cannot guarantee to identify every weed species within the project area.)	All sightings of suspected new or Declared Plant species will be reported and sent to the WA Herbarium for identification, a record of the submission will be recorded in the Weed Register (Appendix 1). DEC will be notified within 7 days of the presence of any additional confirmed Declared Plant Species.	1,2	Ongoing as required.	All staff and Environment, Health and Safety Manager.
11.1.2	Undertake ongoing surveys for introduced fauna.	The following surveys will be undertaken to determine the presence/absence of target introduced fauna species: Rats and mice - Annual Northern Quoll Monitoring; pre-clearance fauna surveys. Cats - Annual Northern Quoll Monitoring; pre-clearance fauna surveys. Cane toad - Annual Northern Quoll Monitoring; pre-clearance fauna surveys. European Rabbit - Annual Northern Quoll Monitoring; pre-clearance fauna surveys. Asian House Gecko - Inspections conducted at the village during the Annual Northern Quoll Monitoring period.	2,3	Annual	Environment, Health and Safety Manager.
		All sightings of introduced fauna will be reported and recorded in the Fauna Register. DEC will be notified within 7 days of confirmed species identification (Appendix 2).	1,2,3	As required.	All staff and Environment, Health and Safety Manager.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		Introduced fauna identified through monitoring (with reference to Section 8.0 above) will indicate a potential quarantine breach, and an investigation will be undertaken.	2, 3	Ongoing.	Environment, Health and Safety Manager.
		Maintain Fauna Register including a map that identifies the location of introduced fauna species on the island including the date, approximate number and species at each identified location.	1,2,3	Ongoing.	Environmental Supervisor.
11.1.3	Identify weeds of environmental significance in the project area as target weeds in collaboration with the DEC.	List of target weed species determined in collaboration with DEC for current and future QMPs.	1,2,3	Every four years.	Environment, Health and Safety Manager.
		Target weeds will be marked on the weed map updated from weed surveys.	1,2,3	Annual.	Environmental Supervisor.
		Maintain a weed register (Appendix 1).	1,3	Ongoing.	Environmental Supervisor.
11.1.4	Map the presence of target weeds.	Conduct Annual Weed Survey for targeted species as above.	1, 2, 3	Annual.	Environment, Health and Safety Manager.
11.1.5	Control or eradicate target weeds within the proposal area.	Determine annual weed control objectives. Record objectives and progress towards achieving them in the Weed Register, report progress in the AER.	1, 3	Annually.	Environment, Health and Safety Manager.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		Compare historical weed mapping with weed control efforts and report the results in the AER.	1, 3	Annually.	Environment, Health and Safety Manager.
11.1.6	Control or eradicate introduced fauna within the proposal area.	Refer to 11.1 at beginning of this table.	1, 2, 3	Ongoing.	Environment, Health and Safety Manager.
11.1.7	Identify performance indicators for quarantine management.	Identified in Table 2.	1,2,3	Every four years.	Environment, Health and Safety Manager.
11.1.8	Monitor the distribution and success of weed control.	Conduct Annual Weed Surveys.	1,2,3	Annual.	Environment, Health and Safety Manager.
11.1.9	Implement appropriate hygiene practices to prevent the establishment and spread of introduced flora and fauna.	Waste materials will not be removed from foreign marine vessels. Crew on ore carriers will not be permitted to leave the vessel. Use of rat guards will be enforced on ore vessels (i.e. on hawsers).	2	Ongoing.	AQIS.
		Cargo from suppliers, contractors and third parties will be managed in accordance with Quarantine Procedures.	2	Ongoing.	Environment, Health and Safety Manager.
		Barges will be baited (flour trays) and supplied with rodent traps. Captured rodents will be euthanized on board vessels.	2		Environmental Supervisor.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		Vehicle hygiene certificates will be issued for all vehicles entering the island via landing vessels. (Note: There is no risk to the environment from vehicles leaving the island as all of the weeds noted on Koolan are in existence on the mainland).	2	Ongoing.	Environment, Health and Safety Manager.
		Bulk aggregate and sand will be brought to the island for concrete and Spraycrete requirements. Bulk sand will be sterilised with fumigant bombs.	2	Construction.	Environment, Health and Safety Manager.
		No flora or fauna will be brought onto or off the island, with the exclusion of scientific specimens taken off the island for identification and vouchering.	2	Ongoing.	Environment, Health and Safety Manager and Environmental Supervisor.
		All vehicles, mobile plant, earthmoving and construction equipment will be certified clean prior to arrival on Koolan Island.	2	Ongoing.	Environment, Health and Safety Manager.
		All earthmoving, construction and fire fighting equipment will be cleaned prior to leaving quarantined areas.	2	Ongoing.	Environment, Health and Safety Manager and OHS Officer.
		Quarantine areas will be clearly marked and sign posted.	1	Ongoing.	Environment, Health and Safety Manager, Environmental Supervisor

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		Cleared vegetation and topsoil stockpiles from highly infested areas of weeds will be stockpiled, signposted and perimeter bunds or other measures, depending on the landscape, created to limit seed dispersal by stormwater.	1	Ongoing.	Environment, Health and Safety Manager, Environmental Supervisor
		No unauthorised vehicle entry will be allowed into quarantined areas.	1	Ongoing.	Environment, Health and Safety Manager.
		No unauthorised off-track driving is permitted.	1	Ongoing.	Environment, Health and Safety Manager.
		Disturbance to natural vegetation and soil will be minimised to limit invasion by introduced species.	1	Ongoing.	Environmental Supervisor.
		All clearing will require an authorised Koolan Clearing Permit (Appendix 3) which will be kept in a register.	1	Ongoing.	Environmental Supervisor.
		All refrigerated and frozen foodstuffs will travel in sealed refrigerated containers. Dry foodstuffs will be palletised, sealed in shrink wrap and then packed in cargo containers such as side curtain containers that protect the goods from dust and water ingress.	1	Ongoing.	Environment and Community Relations. Manager.
		Accommodation units will be inspected for flora and feral fauna. (Note: AQIS requirements in relation to Methyl Bromide only relate to accommodation units arriving in Australia from overseas).	1	As required.	Environment, Health and Safety Manager.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		Quarantine requirements will be made known to all contractors and suppliers providing materials and transport services to Koolan Island.	1	Ongoing.	Environment, Health and Safety Manager.
11.1.10	Monitor the success of quarantine management.	Regular internal audit of the QMP.	1,2,3	Annual.	Environment, Health and Safety Manager.
11.1.11	Report on the quarantine management actions and monitoring results.	Include quarantine management monitoring results into the AER.	1,2,3	Annual.	Environment, Health and Safety Manager.
11.2	The proponent shall review and revise the QMP required by condition 11-1 at intervals not exceeding four years.	As per 11.1 at beginning of this table	1,2,3	Every four years.	Environment, Health and Safety Manager.
11.3	The proponent shall implement the Quarantine Management Plan required by condition 11-1 and subsequent revisions required by condition 11-2.	Continue implementation of the approved QMP.	1,2,3	Ongoing.	Environment, Health and Safety Manager.
11.4	The proponent shall make the Quarantine Management Plan required by condition 11-1 and subsequent revisions required by condition 11-2 publicly available.	Ensure current QMP is available on the MGI website.	1,2,3	Ongoing.	Environment, Health and Safety Manager.
Other	Training.	Quarantine information included into environmental induction and awareness sessions (training presentations).	1,2,3	Ongoing.	Environmental Supervisor
		Personnel will be informed as required of quarantine management issues in site-wide memorandums.	1,2,3	As required.	Environmental Supervisor.

Ministerial Statement 715		Auditable Management Strategies	Env. Objective	Frequency	Responsibility
Number	Condition				
		A weed and introduced fauna identification guide will be made available to personnel (Appendix 4).	1,2,3	Ongoing.	Environmental Supervisor.

10.0 QUARANTINE DOCUMENTS AND SYSTEMS

The following documents comprise the Quarantine Management System and support this Management Plan:

- Weed Register (Appendix 1).
- Introduced Fauna Register (Appendix 2).
- Koolan Clearing Permit (Appendix 3).
- Weed and Introduced Fauna Identification Guide (Appendix 4).

11.0 CONTINGENCIES

In the event that new individuals or populations of introduced flora or fauna are identified on Koolan Island, DSEWPC and DEC will be informed within 7 days of confirmed species identification.

Any spread of existing introduced species found will be reported in the AER with details of management actions taken.

12.0 REPORTING

Condition 5-1 of the Ministerial Statement 715 states that the proponent shall prepare an audit program and submit compliance reports to the DEC which addresses:

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; and
3. The performance of the environmental management plans and programmes.

A summary of the quarantine related reporting requirements is provided in Table 4.

Table 4: Reporting Requirements and Timeframes

Reporting Component	Timeframe
Review and revise QMP, and submit to DEC, DSEWPC.	Four yearly with next review due in 2014.
Updated QMP submitted to and approved by DEC and DSEWPC for implementation in accordance with conditions of Statement 715.	Four yearly with next review due in 2014.
The revised QMP will be made publicly available on the MGI website after the revised plan has been approved by DEC and DSEWPC.	After approval.
AER to include a summary on the current status of introduced flora and fauna species on Koolan Island, quarantine management actions and monitoring results.	Annually, submitted in July of each year.
Certificate of Compliance stating that the conditions of EPBC approval have been met submitted to the Commonwealth Minister for the Environment.	Annually on 1 July.
Non-compliances determined by monitoring will trigger an investigation to determine cause and implement preventative actions.	As required.
In the event that new individuals or populations of introduced flora or fauna are identified on Koolan Island, DEC and DSEWPC will be informed within 7 days of confirmed species identification.	As required.

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APPENDICES

Appendix 1: Weed Register

Village Spraying & Weeding 200

Date	Time	Block	Date Sprayed	Check Date	Cutting	Weeding
12/08/2007	4.40pm	C			Y	Y
12/08/2007	11.00am	WWTP				Y
13/08/2007	1.20pm	C			Y	Y
13/08/2007	9.00am	WWTP				Y
13/08/2007	1.20am	C			Y	Y
14/08/2007	9.45am	WWTP	14/08/2007	24/08/2007		
14/08/2007	9.50am	C	14/08/2007	24/08/2007	Y	Y
15/08/2007	10.00am	WWTP				Y
15/08/2007	4.00pm	G			Y	Y
16/08/2007	4.30pm	G				Y
17/08/2007						

7

Success Rate	Comment
	No spraying
	Weeding around Tanks
	Need to collect and spray cut weeds
	Pulled weeds around Tanks
	Weeding and Whipper Snipping Weeds
	Sprayed around Tanks
	Spaying, Weeding, Cutting
	Pulled weeds around Tanks
	Pulled weeds/ Whipper Snipping

1/04/2008	8.30 - 9.30	Bores	
19/04/2008	14.00-18.00	Village	
20/04/2008	16.0 -18.00	Village	
24/04/2008	16.00-1800	Village	
1/05/2008	3 days	Village	
20/06/2008	12.00 - 16.00	Main Pit	20/06/2008
30/06/2008	12.00-1800	Radio Hill	
25/10/2008	14.00-16.00	Waste water treatment	
26/10/2008	8.00-12.00	Waste water treatment	
28/10/2008	2:30 -16:00	Village	
10/11/2008	3.00 -16.30	Village	
20/11/2008	10.00-12.00	Cyclone Shelter	
6/12/2008	7:30-8:00	Waste water treatment	
6/12/2008	9:30-12:00	Village Block B1-B14, CI - C16, Laundry near A1 Block	
19/12/2008	17:00-18:00	Laundry behine H Block	
20/12/2008	9:30-10:47	IO1 bore	
20/12/2008	11:00-12:00	Radio Hill	
31/12/2008			

Indicates action on Declared

Date	Location	Poison/Cut /Weed	Weed ID	Weeds Removed	Operative/s
1/01/2009	Around VOI & VO2	Cut, Weed	Rubber Vine		IJ
2/01/2009	VO1		Rubber Vine	Yes	IJ
5/01/2009	Near VO1	Cut	Rubber Vine		EN
13/01/2009	MGI Office	Poison	Passiflora		PR
27/01/2009	WwTP	Weed	Pass/Annual		IJ
29/01/2009	Village	Weed	Pass/Annual		IJ
30/01/2009	Village	Weed	Pass/Annual		IJ & DW
31/01/2009	Village	Weed	Pass/Annual		IJ
31/01/2009	Village	Weed	Pass/Annual	Yes	IJ
31/01/2009	Village	Weed	Pass/Annual	Yes	IJ, DW & VW
1/02/2009	Village	Weed, poison	Pass/Annual		IJ
1/02/2009	Village	Weed, poison	Pass/Annual		IJ
1/02/2009	Village	Weed, poison	Pass/Annual		IJ
12/02/2009	Acacia Crib/R	Weed	Pass/Annual		IJ
15/02/2009	Acacia Crib/R	Weed	Pass/Annual		IJ & DW
23/02/2009	Village	Cut, Weed	Pass/Annual	Yes	VW, WD & BC
25/02/2009	Acacia Crib/R	Poison	Mission/G		IJ
25/02/2009	Village	Poison	Pass/Annual		WD
25/02/2009	Village	Poison	Pass/Annual		IJ
27/02/2009	Village	Weed	Pass/Annual	Yes	VW, WD & BC
1/03/2009	Village	Cut, Weed	Pass/Annual		VW, WD & BC
9/03/2009	VO2	Cut		Yes	IJ
10/03/2009	VO2	Cut		Yes	VW, WD & IJ
10/03/2009	VO2 , VO1 & Arport	Cut		Yes	VW, WD & IJ
11/03/2009	Acacia Crib/R	Cut		Yes	IJ
11/03/2009	Village	Cut	Pass/Annual		VW, WD & IJ
12/03/2009	Village		Pass/Annual	Yes	IJ
12/03/2009	Village		Pass/Annual	Yes	WD & IJ
12/03/2009	Village	Cut	Pass/Annual		IJ
13/03/2009	Village	Cut	Pass/Annual		IJ
14/03/2009	Village	Cut	Pass/Annual	Yes	WD & IJ
26/03/2009	Water Tank	Cut	Pass/Annual	Yes	WD & IJ
27/03/2009	Water Tank	Cut	Pass/Annual	Yes	WD & IJ
9-14/4/09	Village	Weed	Pass/Annual	Yes	WG, KK, GE, BC, WE, IJ
7-12/5/09	Village	Weed	Pass/Annual	Yes	LG, AM, GM, KK, DG, EN
10/05/2009	Radio Hill	Cut	Pass/Annual	Yes	WD
12/05/2010	Village Bores	cut and poison	Rubber Vine	No	AR, IJ, LG
14/05/2009	Generator at bottom radio tower road	Weed	Pass/Annual	Yes	OM
22/05/2008	Village Bores	Poison	Rubber Vine	No	IJ

22/05/2009	Acacia Crib/R	Poison	Pass/Annual	No	IJ
23/05/2009	BGC Workshop	Weed	Pass/Annual	Yes	IJ & PR
24/05/2009	Village Bores	Cut	Rubber Vine & Mexican Lilac	No	IJ
26/05/2009	Village Bores	Poison	Rubber Vine & Mexican Lilac	No	IJ
27/05/2009	Village Bores	Poison	Rubber Vine	No	IJ
27/05/2009	WTP	Poison	Pass/Annual	No	IJ
27/05/2009	VO1	Poison		No	IJ
6/06/2009	Village	Poison	Pass/Annual	No	IJ
6/06/2009	Village	Poison	Pass/Annual	No	IJ
6/06/2009	Village	Poison	Pass/Annual	No	IJ
7/06/2009	Village	Poison	Pass/Annual	No	IJ
7/06/2009	Village	Poison	Pass/Annual	No	IJ
9/06/2009	Village		Pass/Annual	Yes	IJ
10/06/2009	Village	Poison		No	IJ
11/06/2009	Village	Weed		Yes	WD, BC
20/06/2009	V01/V02	Cut, Poison	Rubber Vine	No	AR, IJ, LG
2/07/2009	Radio Hill	Weed	Pass/Annual	Yes	AR, IJ, LG
15/07/2009	Generators	Weed	Pass/Annual	Yes	WD, BC
26/07/2009	MGI Offices	poison	Pass/Annual	Yes	GS/CO/BM
10/08/2009	Cyclone Shelter	Cut, Poison	Pass/Annual	Yes	WD, BC
14/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	GS/CO/BM
14/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	GS/CO/BM
15/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	GS/CO/BM
16/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	GS/CO/BM
17/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	ZBB/JR/AR
20/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	ZBB/JR/AR
22/08/2009	Water Bore Gully	Cut, Poison	Mexican Lilac	No	ZBB/JR/AR
12/09/2009	Village	Cut, Poison		Yes	ZBB/JR/AR
22/09/2009	Village	Poison	Pass/Annual	No	WD, BC

17/10/2009	Village	Poison	Pass/Annual	No	WD, BC
22/10/2009	Village	Poison	Pass/Annual	No	BM/RG/CO
1/11/2009	Village	Poison	Pass/Annual	No	ZBB/AR
7/11/2009	Village	Poison	Pass/Annual	No	DG/CO
10/11/2009	Village	Poison	Pass/Annual	No	DG/CO
30/11/2009	Village	Pull	Pass/Annual	Yes	BM/RG/CO
11/12/2009	Village	Pull	Pass/Annual	Yes	BM/RG/CO
17/12/2009	Village	cleanup	branches	Yes	PR
18/12/2009	Village	cleanup	branches	Yes	PR

weeds

Comment
Weeding around VO2 and cutting rubber vines.
Bagged rubber vines to be taken to the tip.
Cutting stacked on road
sprayed with Roundup
Hand weed around B33 - 40 Block
Hand weed around B41 - B52 Block & A21 - A26 Block
Hand weed around B53 - B56 Block
Hand weed around E1 - E16 Block
Hand weed around H1 - H12
Hand weed & sprayed around E17 - E40 Block
In front of H12 - H28
In front of D5 - D23 & around the back of D13 - D23
Around Dry Mess area
Sprayed with Roundup
Around B Block
Around A1 - A36 B1 - B6 Block, behind C Block & E1 - E16
Around the tanks near Dry Mass area
Along walk way from E & D block and cutting trees along the walkway of D block
From the dry mas walk way.
Along the board walk of A block & back of C block.
Along H1 - H19 block including Block E1-E16, D1 -D23
All around the village board walk
All around the waste treatment plant
All around the waste treatment plant
Stump cut and Access/diesel poison Rubbervine. Most of Village Bore area completed
Wiped Rubber vine with diesel & access on the stem's along the base line.

sprayed with Roundup
Weed around Boilermarker's work area
Trial for Access
Sprayed with diesel & access along the stems of rubber vines & Mexican Lilac
Sprayed with diesel & access along the stems of rubber vines down the creek bed to VO2
Sprayed behind cardboard crusher plant along side positron workshop too. And around WTP
Sprayed Roundup along the side of VOI & VO2 road (on right hand side road coming from VO1)
Sprayed along the front of 1-12D block, 1-16E front block, 1-16H front block
Sprayed around the side of dry mess area & front & back of 12-23D block.
Sprayed front & back of 16-28H block & in front of 1:12G block (to many empty sprite cans in front of 1_12 G block)
Sprayed all around X block including picking up empty alcohol cans & bottles. Sprayed in front of E17-39 block. And near Dry mess walk way to E & X blocks
Sprayed in front of C1-30 block including picking up empty cans & bottles.
Packed died grass from behine A1 - A36 block into 4 x white plastic bags
Sprayed in front of A22 - A36 block.
Weeding spear grass at the village
Stump cut Rubber Vine and painted stumps with Access herbicide
Pull weeds and Spray
Pull weeds and Spray
Pull weeds and Spray
Pull weeds and Spray
Stump cut Mexican Lilac and painted stumps with Access herbicide
Stump cut Mexican Lilac and painted stumps with Access herbicide
Stump cut Mexican Lilac and painted stumps with Access herbicide
Stump cut Mexican Lilac and painted stumps with Access herbicide
Stump cut Mexican Lilac and painted stumps with Access herbicide
Stump cut Mexican Lilac and painted stumps with Access herbicide
Stump cut Mexican Lilac and painted stumps with Access herbicide
Pull and wipper snip weeds, spray large areas
Sprayed front & back of 16-28H block & in front of 1:12G block (to many empty sprite cans in front of 1_12 G block)

Sprayed all around X block including picking up empty alcohol cans & bottles. Sprayed in front of E17-39 block. And near Dry mess walk way to E & X blocks
Spray village perimeter
Spray weeds in Village
Spray weeds in Village
Spray weeds in Village
Spray weeds in Village
Spray weeds in Village
Clean up after Cyclone Lawrence
Clean up after Cyclone Lawrence

Date	Location	Poison/Cut/Weed	Weed ID	Weeds Removed	Operative/s
7/01/2010	Village	Poison	Passion/Annual	No	BM/RG/CO
8/01/2010	Village	Poison	Passion/Annual	No	BM/RG/CO
4/02/2010	WWTP	Pull and poison	Passion/Annual	Yes	ZBB/CO/AF/EN
23/04/2010	Village	Pull and poison	Passion/Annual	Yes	DD and team
24/04/2010	Village	Pull and poison	Passion/Annual	Yes	DD and team
25/04/2010	Village	Pull and poison	Passion/Annual	Yes	DD and team
26/04/2010	Village	Pull and poison	Passion/Annual	Yes	DD and team
20/05/2010	Village	Pull and poison	Passion/Annual	Yes	DD and team
5/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
6/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
7/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
8/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
9/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
10/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
11/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
12/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
13/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
14/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
15/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
16/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
17/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
18/07/2010	Village	Pull and poison	Passion/Annual	Yes	ESS Gardeners
19/07/2010	Village	Cut and poison	Mexican Lilac	No	ALR/PR/AR
8/08/2010	Village Bores	Cut and poison	Rubber Vine and Candle bush	No	ALR/ARR/CH
14/08/2010	Boat Club Road	Cut and poison	Bellyache Bush and Rubber Vine	No	EJ/TA/Am
15/08/2010	Boat Club Road	Cut and poison	Bellyache Bush and Rubber Vine	No	EJ/TA/AM
27/08/2010	Boat Club Road	Cut and poison	Bellyache Bush and Rubber Vine	No	EJ/TA/AM
28/08/2010	Boat Club Road	Cut and poison	Bellyache Bush and Rubber Vine	No	EJ/TA/AM
29/08/2010	Boat Club Road	Cut and poison	Bellyache Bush and Rubber Vine	No	EJ/TA/AM
5/09/2010	Off Boat Club Road	Cut and poison	Rubber Vine	No	EJ/TA/AM
6/09/2010	Off Boat Club Road	Cut and poison	Rubber Vine	No	EJ/TA/AM
10/09/2010	Radio Hill	poison	Passion/Annual	No	TA/AM/EJ/GS

14/09/2010	V01 bore	poison	Passion/Annual	No	TA/AM/EJ/GS
18/09/2010	Off Boat Club Road	Cut and poison	Rubber Vine	No	EJ/TA/RM/RK
19/09/2010	Off Boat Club Road	Cut and poison	Rubber Vine	No	EJ/TA/RM/RK
27/10/2010	Heritage Rd washdown area	poison	Passion/Annual	no	MR/EJ
8/10/2010	Boat Club Road	Cut and poison	Bellyache Bush and Rubber Vine	No	EJ/TA/AM/GS/DM
8/10/2010	Cyclone Shelter	poison	Passion/Annual	No	TA/AM/EJ/GS
9/02/2010	Waste Treatment	poison & Whipper snip	Passion/Annual	No	TA/AM/EJ/GS
12/10/2010	MGI Offices	poison	Passion/Annual	No	EJ/IH
12/10/2010	Central Store	poison	Passion/Annual	No	EJ/IH
12/10/2010	Workshop	poison	Passion/Annual	No	EJ/IH/GS
12/10/2010	Powerwest	poison	Passion/Annual	No	EJ/IH/GS
15/10/2010	Barra Limb rehab area	poison	Passion/Annual	No	MR/EJ
16/10/2010	Cultural Centre Radio Hill I01 & V01 Cyclone Shelter	poison	Passion/Annual	No	AM/MR/RK
3/11/2010	Cultural Centre Radio Hill I01 & V01 Cyclone Shelter	poison	Passion/Annual	No	AM/MR/RK
8/11/2010	MGI admin	poison	Passion/Annual	No	IH
12/11/2010	Acacia Cribhut	poison	Passion/Annual	No	AM/IH
14/12/2010	V01 bore	Poison/Cut	Passion/Annual	yes	ARR/GJ/SW/NS
15/12/2010	V01 bore	Poison/Cut	Passion/Annual	yes	GJ/SL/NS
16/12/2010	V01 bore	Poison/Cut	Passion/Annual	yes	GJ/SL/NS
16/12/2010	Backbeach Rd	Poison/Cut	Passion/Annual	yes	GJ/ARR/SL/NS
17/12/2010	heritage rd	Poison/Cut	Passion/Annual	yes	GJ/ARR/SL/NS

Time	Comment
	Spray village perimeter
	Spray village perimeter
	Pull and sparayed weeds aound WWTP
	Hand weed Village perimeter
	Hand weed Village perimeter
	Hand weed Village perimeter
	Hand weed Village perimeter
	Hand weed Village perimeter
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
	Hand weed around Village
20min	Stump cut and "Access" poison 30 plants
4hrs	Stump cut & "Access" poison about 300 Rubber vine and 3 Candle bush plants
2hrs	Bellyach bush has leaves just emerging. Rubber vine has yellowing leaves and flowers just coming on.
2hrs	Bellyach bush has leaves just emerging. Rubber vine has yellowing leaves and flowers just coming on.
2hrs	Bellyach bush has leaves just emerging. Rubber vine has yellowing leaves and flowers just coming on.
2hrs	Bellyach bush has leaves just emerging. Rubber vine has yellowing leaves and flowers just coming on.
2hrs	Bellyach bush has leaves just emerging. Rubber vine has yellowing leaves and flowers just coming on.
2hrs	Rubber vine in this new area has yellowing leaves and flowers just coming on.
2hrs	
1hr	

1hr	
2hrs	
2hrs	
1hr	
2hrs	
1hr	
1	
1	Around Leach drain
0.5	Around parking area
0.5	Around main off and toilets
0.5	Through power plant
1hr	
3hrs	
3hrs	
0.5	
0.5	
2	Cut & paint poisoned Rubbervine weed
1.5	Cut & paint poisoned Rubbervine weed
2	Cut & paint poisoned Rubbervine weed
3	Cut & paint poisoned Rubbervine weed & Bellache Bush
4	Cut & paint poisoned Rubbervine weed & Bellache Bush

	Species	Declared Plant Control Category	Conservation Code	Keighery *et al.* 1995	Ecologia 2004	Ecologia 2005	Ecologia 2006a	Ecologia 2006b	Ecologia 2008a	Ecologia 2008b	MBS 2008	MBS 2009a	MBS 2009b	MBS 2010a	MBS 2009b
ACANTHACEAE	**Ruellia tuberosa*			X											
AGAPANTHACEAE	**?Agapanthus* sp.								X						
	**Agave americana*				X	X									X
AGAVACEAE	**Agave* sp.				X	X									
AMARANTHACEAE	**Amaranthus viridis*			X											
ANACARDIACEAE	**Mangifera indica*				X	X			X				X		X
	**Allamanda cathartica*			X											
	**Cascabela thevetia*			X							X		X		X
	**Catharanthus roseus*			X											
APOCYNACEAE	**Nerium oleander*														X
ASCLEPIADACEAE	**Cryptostegia madagascariensis*	P1 P3		X			X				X		X		X
	**Bidens bipinnata*			X											
	**Sonchus* sp.				X	X							X		
ASTERACEAE	**Tridax procumbens*			X		X					X				
	**Kigelia pinnata*	PL											X		
	**Spathodea campanulata*	PL								X					
BIGNONIACEAE	**Tecoma stans*			X		X					X		X		X
BRASSICACEAE	**Raphanus* sp.				X	X									
	**Bauhinia corymbosa*	PL											X		X
	**Bauhinia* sp.				X	X					X				
	**Delonix regia*			X	X	X	X	X	X		X		X		X
	**Peltophorum pterocarpum*			X					X						
	**Senna alata*	P1 P3		X	X	X	X						X		X
	**Senna fistula* (formerly **Cassia fistula*)	PL		X	X	X			X		X		X		X

	Species	Declared Plant Control Category	Conservation Code	Keighery *et al.* 1995	Ecologia 2004	Ecologia 2005	Ecologia 2006a	Ecologia 2006b	Ecologia 2008a	Ecologia 2008b	MBS 2008	MBS 2009a	MBS 2009b	MBS 2010a	MBS 2009b
	**Schizolobium parahybum*	PL											X		
CAESALPINIACEAE	**Tamarindus indica*												X		X
	**Ipomoea quamoclit*			X					X						
CONVOLVULACEAE	**Merremia dissecta*			X	X	X					X				
CUCURBITACEAE	**Cucumis melo* subsp. *agrestis*			X											
	**Euphorbia cyathophora*			X					X		X				
	**Euphorbia hirta*			X		X									
	**Jatropha gossypiifolia*	P1 P2 P4		X	X	X	X						X		X
EUPHORBIACEAE	**Phyllanthus amarus*			X											
	**Hyptis suaveolens*			X	X	X					X		X	X	X
LAMIACEAE	**Stachytarpheta cayennensis*			X											
LILIACEAE	**Aloe sp.*														X
	**Gossypium hirsutum*			X					X		X				
MALVACEAE	**Malvastrum americanum*				X	X									
	**Acacia auriculiformis*	PL			X	X				X	X				
	**Acacia saligna*										X				
	**Albizia lebbeck*												X		X
	**Leucaena leucocephala*			X	X	X	X				X		X	X	X
MIMOSACEAE	**Leucaena leucocephala* subsp. *leucocephala*					X			X						
MORINGACEAE	**Moringa oleifera*			X					X						
NYCTAGINACEAE	**Bougainvillea spectabilis/glabra*	PL			X	X							X		X
	**Alysicarpus vaginalis*			X		X									
	**Canavalia ensiformis*					X					X				

	Species	Declared Plant Control Category	Conservation Code	Keighery *et al.* 1995	Ecologia 2004	Ecologia 2005	Ecologia 2006a	Ecologia 2006b	Ecologia 2008a	Ecologia 2008b	MBS 2008	MBS 2009a	MBS 2009b	MBS 2010a	MBS 2009b
	**Clitoria ternatea*			X		X			X		X				
	**Desmodium tortuosum*			X											
	**Gliricidia sepium*			X			X	X					X		X
	**Macroptilium lathyroides*			X		X					X				
	**Robinia pseudoacacia*					X					X				
	**Stylosanthes guianensis*			X											
	**Stylosanthes hamata*										X				
	**Stylosanthes scabra*					X									
PAPILIONACEAE	**Trifolium micranthum*								X						
PASSIFLORACEAE	**Passiflora foetida* var. *hispida*			X	X	X	X	X	X	X	X	X	X	X	X
	**Passiflora foetida*				X										
POACEAE	**Arundo donax*												X		X
	**Bothriochloa pertusa*			X		X									
	**Cenchrus ?biflorus*				X	X									
	**Cenchrus ciliaris*			X	X	X	X				X		X	X	
	**Cenchrus echinatus*			X		X									
	**Cenchrus setigerus*			X	X	X					X				
	**Cenchrus* sp.				X	X									
	**Chloris barbata*			X							X			X	
	**Chloris gayana*			X											
	**Chloris virgata*					X									
	**Cynodon dactylon*			X	X	X									
	**Dactyloctenium aegyptium*			X											
	**Echinochloa colona*			X											
	**Eleusine indica*			X											
	**Eragrostis amabilis*			X											

	Species	Declared Plant Control Category	Conservation Code	Keighery *et al.* 1995	Ecologia 2004	Ecologia 2005	Ecologia 2006a	Ecologia 2006b	Ecologia 2008a	Ecologia 2008b	MBS 2008	MBS 2009a	MBS 2009b	MBS 2010a	MBS 2009b
	**Melinis repens*			X	X	X					X		X		X
	**Panicum coloratum*					X									
	**Paspalum ?urvillei*										X				
	**Pennisetum purpureum*										X				
	**Pennisetum pedicellatum*												X		X
	**Setaria pumila*			X											
	**Urochloa mosambicensis*			X											
POLYGONACEAE	**Antigonon leptopus*			X					X		X		X		X
PORTULACACEAE	**Portulaca oleracea*			X											
SAPINDACEAE	**Koelreuteria ?paniculata*	PL									X				
SOLANACEAE	**Physalis angulata*			X											
TURNERACEAE	**Turnera ulmifolia*			X					X						

Date of Weed Control	Waypoint No.	Operative/s	Location	Approximate Area of Control (m2)	Weed ID
########		G.J, C.H & Kira	Barra Limb		Mexican Lilac (Gliricidia sepium)
5/01/2011		CH, GJ, KD	Barra Limb		*Acacia pyrifolia*
8/01/2011		GJ/CH/ARR	Barra Limb adjacent to rehab area (large patch of Mexican Lilic, Lead Tree, Clitoria, passion		Large Mexican Lilac
########		GJ/CH/KD/CL	Heritage Rd washdown area		Bellyache Bush and Rubber Vine
########		GJ/CH/KD/CL	V01 bore		Rubber Vine
########		gj/nelson	screw pile gully		hyptis/ovrgrowth
########		gj kiera chris cody	screw pile gully		hyptis/ovrgrowth
########		GJ/CH/KD/CL	Heritage Rd washdown area		Bellyache Bush and Rubber Vine
########		GJ/CH/KD/CL	V01 bore		Rubber Vine
########		GJ/CH/KD/CL	Heritage Rd washdown area		Bellyache Bush and Rubber Vine
########		GJ/CH/KD/CL	Barra Limb		Natal Grass
########		CH, IP, NS	WD4 Topsoil store		Stinking Passionfruit
########		gj/nelson	screw pile gully		hyptis/ovrgrowth
########		gj kiera chris cody	screw pile gully		hyptis/ovrgrowth
########		CL, CS	Barra Limb		Stinking Passionfruit
########		CH, GJ	Barra Limb		Natal Grass
########		CH, CL, CS	Cultural Centre		Natal grass, *Chloris* & other grasses.
########		CH, KD, CS	Cultural Centre		Natal grass, *Chloris*
6/03/2011		CH, KD, CS, CL	Barra Limb		Natal grass
6/03/2011		CH, CL, CS, KD	Cultural Centre		Natal grass, *Chloris* & other grasses.
7/03/2011		CH	Village		*Clitorea ternata*
########		CH, CL, CS, KD	Cultural Centre		grasses
########			WD4 topsoil store		Natal grass
########		CH, KD, CL,CS	WD4 topsoil store		Natal grass
########		CS, KD, CL	WD4 topsoil store		Natal grass, passionfruit
########		CS, KD, CL	Radio Hill		Weeds
########		CS, KD, CL	VO1 bore		Weeds
2/04/2011		CH, KD, CL	M1/Camp rd rehab		Natal, Buffel, Chloris grasses
########		GJ CS KD	nursery		
########		GJ CS KD	bay 4 rehab		Natal grass, *Chloris* & other grasses.
########		GJ CS KD	ɔck Engineeringspray		Natal grass, *Chloris* & other grasses.
########		CL, CS	Acacia		Natal grass, *Chloris* & other grasses.
8/05/2011		DG, IP	Around Top Tank		Vegetation

9/05/2011		CL, CS, CH	Screw Pile Gully Rd & Camp Rd		Tecoma stans
9/05/2011		CL, CS, CH	of Screw Pile Gully Rd & Camp Rd		Royal Poinciana
9/05/2011		CL, CS, CH	terfall at end of helipad track		Candle bush
########		IP DG TB	Heritage Rd washdown area		Natal grass, *Chloris* & other grasses.
########		GJ DG TB	village		Natal grass, *Chloris* & other grasses.
21-May		GJ DG TB	V01 bore		Rubber Vine
########		GJ DG TB	VO1 bore		Rubber Vine
########		CH, CL	Bay 4 topsoil		All grasses
########		DG TB	V01 bore		Rubber Vine
1/06/2011		CH, DG, TB	Mullet top soil, Acacia Crib Hut, Track from Scree rd to WD4 topsoil		Mission Grass
2/06/2011		DG, DMc	Acacia Crib Hut		Mission Grass
2/06/2011		DG, IP, TB	LV fuel farm		All weeds
########		CL	Workshop behind toilet block		Natal grass
########		CL	WD4 topsoil store		Passionfruit, Natal grass
########		CL	Washdown ramp Heritage Rd		Grasses
########		CL, TK	Site wide		All weeds
########		CL	Airstrip topsoil		Lead tree
########		CL, CS	VO1-VO2 bores		Rubber Vine
########		CL, CS	Screw Pile Gully		All
########		CL, CS	Site wide		All
1/08/2011		SM, CS, CL	Memorial		Lead tree
2/08/2011		SM, CS, CL	Memorial		Lead tree
2/08/2011		SM, CS, CL	VO1-VO2 bores		Rubber Vine
3/08/2011		SM, CS, CL, CH	WD4 Topsoil store		Passionfruit

Suspected Cause of Weed Occurrence Unsure/vehicle/bird/ water/wind	**Weed Control Method** Handpull/whipper snip/cut stump /spray/paint/poison	**Herbicide** Concentration & rate	**Weather Conditions** (only relevant if herbicide used)	**Weeds Removed**	**Time**
	cut & poison			yes	1.5 hrs
	Cut/dab			no	1
	Poison			No	0.5
	poison			yes	1.5
	poison			Yes	1
	poison			yes	1.5
	poison			no	1.5
	poison			yes	1.5
	poison			Yes	1
	Hand pull/ poison			No	2
	Hand pull			Yes	1.5
	handpull			yes	2
	poison			yes	1.5
	poison			no	1.5
	poison			no	1.5
	Hand pull			Yes	1.5
	Whipper snip & hand pull			Yes	1.5
	hand pull			Yes	1.5
	hand pull			yes	2
	Whipper snip & hand pull			Yes	1.5
	hand pull			no	0.5
	Hand pull			no	1
	Hand pull			yes	1.5
	Hand pull			yes	3
	Hand pull, spray			yes	2.5
	Spray			no	1
	Spray			no	1
	Hand pull, spray			some	2
	Cut/dab			yes	1.5
	Spray			yes	1.5
	Spray				1.5
	spray				2
	Cut back			Yes	1

	Cut & dab			Yes	0.5
	Cut & dab			Yes	1
	Cut & dab			Yes	2.5
	Whipper snip & hand pull			yes	4
	Whipper snip & hand pull			yes	5
	Cut & Dab			yes	3
	Cut & dab			yes	3
	Spray			no	3
	Cut & Dab			yes	2
	Cut, bag and spray			yes	6
	Cut and bag			yes	1
	Cut, dig and remove			yes	1
	Sprayed weeds			no	1.5
	Sprayed weeds			no	2
	Sprayed weeds			no	0.5
	Sprayed weeds			no	4
	Cut & dab			yes	2
	Cut & dab			no	4
	Sprayed weeds			no	2
	Sprayed weeds			no	5
	Cut & dab			no	5
	Cut & dab			no	3
	Cut & dab			no	3
	Cut & dab			yes	6

Comment
hand weeding
Cut and paint *Acacia pyrifolia* (Pilbara sp. Wattle)
Poisoned trunk to first branches with Diesel/Access (no red eye)
Cut & paint poisoned Rubbervine weed & Bellache Bush
Cut & paint poisoned Rubbervine weed
spraying roundup and whipper snipping
spraying roundup and whipper snipping
Cut & paint poisoned Rubbervine weed & Bellache Bush
Cut & paint poisoned Rubbervine weed
Cut & paint poisoned Rubbervine weed & Bellache Bush
Hand pull & bag up grass & take to the tip
Hand pull & bag up & take to the tip
spraying roundup and whipper snipping
spraying roundup and whipper snipping
spraying roundup
Hand pull, bag up and take to tip
Hand pull, bag up and take to tip any flowering weeds, whippersnip rest close to building
Hand pull, bag up and take to tip any flowering weeds, whippersnip rest close to building
Hand pull, bag up and take to tip
Hand pull, bag up and take to tip any flowering weeds, whippersnip rest close to building
Removed infestation below mess deck
pull out dead grass from windrow that was sprayed 2 weeks ago
from 1st big pile on RHS
from 1st & 2nd big piles on RHS, flat area on LHS
from 1st & 2nd big piles on RHS, 1st pile on LHS
Infrastructure maintenance
Infrastructure maintenance
all flowering/seeding material removed from both sides of road
cut and paint, handweeding
spraying roundup
Grass overgrowth around the Lay down area
Grasses overgrowth around offices and crib room
Remove weeds and other plants from infrastructure at Top Tank

Point ID 4 on Tecoma weed map (Figure 12)
Point ID 3 on Royal Poinciana weed map (Figure 10
Point ID 19 on Declared Plants weed map (Figure 3)
grass overgrowth
Hand pull, bag up and take to tip
cut and paint, handweeding
cut and paint, handweeding
Topsoil store on RHS at bottom of road down to Bay 4
cut and paint, handweeding
Hand pulled, cut and bagged all plants then sprayed around area.
Hand pulled, cut and bagged all plants, to landfill
For fire compliance
Hazob response
Around edges
Tidy up around washdown ramp
Infrastructure maintenance program
Clean up topsoil store
Declared Plant control
Weed control in whole yard
Infrastructure maintenance program
Tidy up area
Tidy up area
Declared Plant control
Top soil store maintenance

Table A3-1: Weed Register (Showing Examples of What Will be Included)

Date of Weed Control	Waypoint No.	Operative/s	Location	Approximate Area of Control (m2)	Weed ID	Suspected Cause of Weed Occurrence	Weed Control Method	Herbicide Concentration & rate	Weather Conditions (only relevant if herbicide used)	Weeds Removed	Time	Comments
Date of weed control	As indicated in Figures of the Annual Weed Monitoring Report	Name of person undertaking the control	Description of location weed	Estimate of area controled	Bellyache Bush (*Jatropha gossypiifolia*)	Unsure	Hand pull	Access® 1:60 with Diesel Distillate.	Dry	Yes	00:00	Comments added if "Other" is selected in one of the previous columns or further information is available
					Rubber Vine (*Cryptostegia madagascariensis*)	Vehicle Movement	Whipper snip	Glyphosphate (Round-up®).	Rained within 24 hrs	Yes but requires monitoring		
					Candle Bush (*Senna alata*)	Birds	Cut stump	Other (see comments)		No		
					Wild Passionfruit (*Passiflora foetida* var. *hispida*)	Water	Spray					
					White Lead Tree (*Leucaena leucocephala*)	Wind	Paint					
					Mexican Lilac (*Gliricidia sepium*)	Road Maintenance	Poison					
					Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*)	Old BHP town garden Other (see comments)	Other (see comments)					
					Hyptis (*Hyptis suaveolens*)							
					Giant Reed (*Arundo donax*)							
					African Tulip Tree (*Spathodea campanulata*)							
					Other (see comments)							

Weed ID	Suspected Cause of Weed Occurrence	Weed Control Method
Bellyache Bush (*Jatropha gossypiifolia*)	Unsure	Hand pull
Rubber Vine (*Cryptostegia madagascariensis*)	Vehicle Movement	Whipper snip
Candle Bush (*Senna alata*)	Birds	Cut stump
Wild Passionfruit (*Passiflora foetida* var. *hispida*)	Water	Spray
White Lead Tree (*Leucaena leucocephala*)	Wind	Paint
Mexican Lilac (*Gliricidia sepium*)	Road Maintenance	Poison
Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*)	Old BHP town garden	Other (see comments)
Hyptis (*Hyptis suaveolens*)	Other (see comments)	
Giant Reed (*Arundo donax*)		
African Tulip Tree (*Spathodea campanulata*)		
Other (see comments)		

Weather Conditions	Weeds Removed	Herbicide
Dry	Yes	Access® 1:60 with Diesel Distillate.
Rained within 24 hrs	Yes but requires monitoring	Glyphosphate (Round-up®).
	No	Round-up Biactive®
		Other (see comments)

Appendix 2: Introduced Fauna Register

Date	Sighted	Introduced Species	Number Observed	Location mE mN		Potential Introduction from	Other Evidence	DEC Notified within 72 hrs	Reference (if applicable)	Full Reference (if applicable)
	Yes	Rat				Unsure	Skats	Yes	Annual Northern Quoll Monitoring	
	No	Mouse				Barge	Tracks	No	Annual Weed Monitoring	
	NA	Cat				Aeroplane	Dead/Carcass		Pre-Land Clearance Survey	
		Cane Toad				Personal Luggage	Trap			
		European Rabbit				Equipment	Flour Tray			
		Asian House Gecko					Bait Station			
		Snail					Other (see comments)			
		Slug								
		Other (see commence)								

Fauna Register (showing examples of what will be included)

Appendix 3: Koolan Clearing Permit

Mount Gibson Iron

KOOLAN CLEARING PERMIT

Registration No……

Fill in form in accordance with WIN-ENV-KCP-001

DATE:_____

PROPOSED PROJECT START DATE and DURATION:_____

PROJECT TITLE:

DESIGNATED PROJECT OWNER: (include contact details)

PROJECT DESCRIPTION: (detailed description)

PROJECT LOCATION: (include mine lease details)

Provide coordinates and mining lease information. Attach authorised map/drawing/ortho photograph giving the details of the project location and area of impact.

PROJECT AREA OF DISTURBANCE (Ha)

PROJECT TOPSOIL (Volume of topsoil to be recovered m^3)

LIST OF ATTACHMENTS:

Note: Project Field Activities must not commence until the signatures of the Environment & Community Department, The Project Owner and the Project Responsible Person have been obtained on this form.

.

Mount Gibson Iron

KOOLAN CLEARING PERMIT

Registration No……

Fill in form in accordance with WIN-ENV-KCP-001

Section 1 Project Owner to complete

PROJECT ACTIVITIES:

Will any of the following occur during the project?

PROJECT ACTIVITY	NO	YES	IF YES, describe the activity & proposed management (*or attach summary on more complex projects)*
LAND DISTURBANCE			
BLASTING			
VEGETATION CLEARING			
IS VEGETATION REHAB OR NATIVE			
HAS A FIRE RISK ASSESMENT BEEN DONE			
BORROWING OF MATERIAL **			
DISCHARGE TO AIR eg dust **			
DISCHARGES TO LAND**			
DISCHARGES TO WATER**			
INCREASE IN NOISE			
WASTE GENERATED			
MARINE ENVIRONMENT			
MACHINERY AND EQUIPMENT FROM THE MAINLAND			
OTHER			

**** Note:** Discharges maybe generated from many sources and may include earthworks, trucking of materials, sandblasting. Discharges to land and water may include pumping of sumps, disposal of solid or liquid wastes etc.

Mount Gibson Iron

KOOLAN CLEARING PERMIT

Registration No……

Fill in form in accordance with WIN-ENV-KCP-001

Section 2 – Environment & Community Department Use Only

TENURE CONDITIONS

APPROVALS REQUIRED	NO	YES	IF YES, DESCRIPTION
Is it within a current Mining Tenement or Lease?			
Is it an approved purpose for the use of this land?			
Are any State Government or other external approvals required (e.g. Minister or DoIR etc)?			

ABORIGINAL HERITAGE CONDITIONS

APPROVALS REQUIRED	NO	YES	IF YES, DESCRIPTION
Are barriers required?			
Are signs required?			
Aboriginal site(s) with **No** consent to disturb			
Aboriginal site(s) with consent to disturb			
Are there any other significant Aboriginal heritage constraints?			

ENVIRONMENTAL CONDITIONS:

PERMITS and CONDITIONS	NO	YES	PROVIDE DETAILS (mandatory)
Is this activity covered by the EP Act Pt 5 (Environmental licence)?			
Is a Native Vegetation Clearing permit required?			
Are there requirements under EP Act Pt 4 (Ministerial conditions)?			
Does this comply with the current EMP?			
Are there any priority or declared rare flora or fauna species affected?			
Is an application to CALM to take “Priority” flora species required?			
Will this project require relocation of native fauna?			
What pollution prevention safe-guards need to be put in place?			
Are there any other environmental permitting requirements?			
Do any contaminated sites occur within the project boundary?			

QUARANTINE COMMITTMENTS:

COMMITTMENTS	NO	YES	PROVIDE DETAILS (mandatory)
Are there any Declared Weed Species present (QMP)?			
Are there any other target weed species?			
Does area require specific vegetation and topsoil stock pile management to limit spread?			
Does area require treatment with a knockdown herbicide prior to clearing?			
Does this comply with the QMP?			

Mount Gibson Iron

KOOLAN CLEARING PERMIT

Registration No……

Fill in form in accordance with WIN-ENV-KCP-001

Note: Where signatures cannot be obtained attach supporting email correspondence.

ENVIRONMENT & COMMUNITY MANAGER or ENVIRONMENTAL OFFICER

This permit is granted under the following conditions

Name:_____

Contact Details:_____

Signature:_____ Date:_____

The conditions outlined in the above KCP have been understood and accepted by the Project Owner and the Project Responsible Person

Name of Designated Project Owner

_____ _____

Designated Project Owner Signature **Date:**

Name of Project Responsible Person

_____ _____

Project Responsible Person Signature **Date:**

Please sign and return to Environment & Community Department for final release of KCP

Appendix 4: Weed and Introduced Fauna Identification Guide

Mount Gibson Iron

Koolan Island Operations

Priority Flora & Declared Weed Handbook

- ***Declared Rare and Priority Flora*** There are a number of plants on Koolan Island that have been given ”conservation status.” They are called Declared Rare Flora or Priority Flora and are given a priority number from one to four. Priority one flora is in danger of extinction whereas priority four flora is rare but not considered threatened. Three priority species and a Species of Interest are provided in this booklet for your information.

- ***Weed Species*** Introduced weed species are an environmental problem throughout Western Australia because of their tendency to spread rapidly and displace native vegetation. Weed infestation can lead to loss of habitat for native animals and birds and degradation of ecosystems. Declared weed species occur on Koolan Island and careful management is required to ensure that these species are kept under control.

  Seven of these weed species are contained in this handbook. If you see any of these species, (other than passionfruit vine), which is widespread, please **contact the Environmental Department**. The plant will then be sprayed or removed.

Phyllanthus aridus

Priority 3 Conservation Species

Phyllanthus aridus is an upright, many-branched shrub that grows to 0.5 m tall. It has small, cream-coloured or green flowers that bloom in winter and following summer rains.

This species belongs to the same family as the famous Poinsettia, and has milky sap which is characteristic to all plants in this family.

Phyllanthus aridus

Phyllanthus aridus was first found growing on Koolan Island on an upper ridge slope amongst sandstone outcropping at the western end of the current mining development. At this location the species was sparse and grew to a height of 0.5m. There are other populations of *Phyllanthus aridus* on Koolan Island, particularly on sandstone ridge areas, rocky slopes, or on red sandy soil.

Solanum leopoldense

Priority 3 Conservation Species

Solanum leopoldense is a small, spreading shrub that grows to between 0.5 and 1.0 m tall. It has tangled-looking stems and leaves and its blue or purple flowers bloom from May to August.

Solanum leopoldense **flowers on Koolan Island are likely to be similar in appearance to this closely-related Solanum flower**

Solanum leopoldense **flowers and foliage on Koolan Island are likely to be similar to this closely-related Solanum species**

Specimens of *Solanum leopoldense* have been recorded on the Kimberley mainland and islands near Koolan. There may be populations of *Solanum leopoldense* on Koolan Island, particularly in sandstone areas and in rocky gullies.

Brachychiton xanthophyllus

Priority 4 Conservation Species

Brachychiton xanthophyllus is a tree that grows to between 3m and 12m tall. It has a pink flowers with a green base, which bloom between May and December.

Brachychiton xanthophyllus **on Koolan Island is likely to have flowers similar in appearance to these red/pink flowers, with a form similar to that of the right-hand photo**

Brachychiton xanthophyllus **on Koolan Island may be found supporting a variety of climbing plants, but can be distinguished by its bright flowers**

Brachychiton xanthophyllus is typically found growing in soils over granite, limestone or basalt substrates. But, it prefers sites such as upper slopes, crests and rock outcrops. The common name for this plant is the Kimberley Rose.

Corymbia cadophora

Species of Interest

Corymbia cadophora is a straggly tree that grows to between 2 and 8 m tall. Its bark is rough, thick, flaky and has a mosaic pattern with deep grooves. Its flowers are white, cream, red, or pink, and bloom between January and October.

Corymbia species

This plant is known to occur on Koolan Island. While not yet listed as a priority / Declared Rare Flora, the Minister of Environment has committed Mount Gibson to seeking approval from DEC prior to impacting on these plants

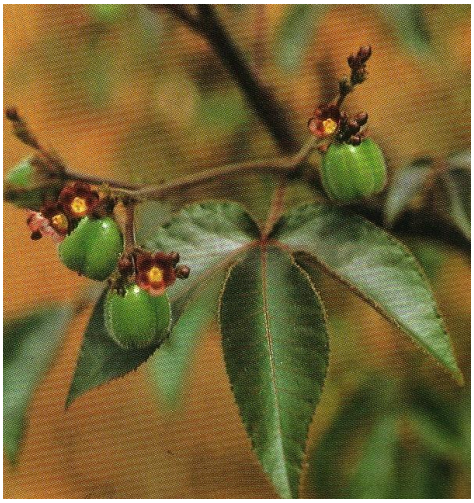
Populations of *Corymbia cadophora* are most likely to occur in sandy soils, clayey loam or loamy soils, basalt, dolerite, sandstone or quartzite areas and prefers to grow on rocky slopes, hills, floodplains and dunes.

Bellyache Bush (*Jatropha gossypiifolia)

Declared Weed Species

Bellyache Bush *(*Jatropha gossypiifolia)* is a noxious shrub that grows up to 2 m tall, has hairy stalks and leaves that are splayed into 3 to 5 fingers. Small clusters of red or brown flowers appear from stalks in the upper leaves from February through to May. Its fruits are poisonous to humans and animals and have be known to cause stock deaths in time of drought when stock have resorted to eating Bellyache Bush.

*(*Jatropha gossypiifolia)* leaves & flowers
(Photo: Hussey et. All Western Weeds)



*(*Jatropha gossypiifolia)* flowers and fruit
(Photo: Kenneally et al Broome & Beyond)

This weed has been found within a depression that used to be the sewerage pond for the Old Townsite on Koolan Island. It tends to scatter through grazed woodlands, wastelands and along creek lines.

Candle Bush *(*Senna alata)*

Declared Weed Species

Candle Bush or **Ringworm Shrub** ***(*Senna alata)*** is a large, evergreen shrub that grows up to 4 m tall with leaves that are divided into 8-12 pairs of large, oblong leaf-fronds. It has tall yellow flowers that stick up like a candle (hence the name Candle Bush). It flowers from May to July.

The leaves are thought to be poisonous to stock but have been used as a natural medicine to treat ringworm (hence the alternative name Ringworm Bush) and ulcers in the South Pacific. Overuse of this plant as a medicine has been known to cause chronic diarrhoea in patients.

*(*Senna alata)* showing leaf fronds and flowers

Close-up of (**Senna alata)* flower

Candle Bush has been found within the Old Townsite on Koolan Island. It is a common weed of creekline areas and prefers to grow in black, peaty sand, although it has also been found in steep rocky valleys and the Northern Pilbara coastal plains

Madagascar Rubber Vine (*Cryptostegia madagascariensis)

Environmental Weed Species

Madagascar Rubber Vine (*_Cryptostegia madagascariensis_*) is a vine that can climb to 4 m. It has shiny dark green leaves and leaks milky sap from its leaves, stems and pods when cut. It has large pink, purple or red flowers from October through to May.

This species is a problem because it smothers native trees and spreads rapidly and can produce up to 1 billion seeds per hectare each year. On the mainland it has been known to poison stock and to grow in thick tangles preventing stock from accessing water and being mustered.

(*Cryptostegia madagascariensis) **flower**

Madagascar Rubber Vine is a native of Madagascar and was originally brought to Broome as a garden plant because of its pretty flowers and lush foliage. However, it is turned out to also be an aggressive weed that managed to escape from gardens to invade disturbed areas.

On Koolan Island Madagascar Rubber Vine has been found within the Old Townsite.

Mission Grass (*Pennisetum pedicellatum)

Environmental Weed Species

Mission Grass *(*Pennisetum pedicellatum)* has a reasonably thick and woody stem and grows to about one metre tall. It grows in clumps and can be recognised by a soft fluffy head that can be up to 8cm in length and has a slightly mauve tinge.

***(*Pennisetum Pedicellatum)* stems and flowers**

The problem with this grass is that it constitutes a significant fuel load, which in the event of a fire has the capacity to intensify the heat to the detriment of native species, property and mining infrastructure.

White Leadtree (*Leucaena leucocephala)

Environmental Weed Species

White Leadtree (*_Leucaena leucocephala_*) is a small tree of the Fabaceae family. It is a plant that can invade forests with a partially open canopy and become a pure stand within five years (Walton, 2003). A cut stump can grow up to 20 shoots and regain its previous height within a few years and will be thicker than the stand previously present (Walton, 2003) White Leadtree is a weed species that is hard to control or remove and is a fierce competitor with other plants. A stand of White Leadtree used to occur around the shade hut at the airstrip

Leadtree *(*Leucaena leucocephala*).
Image sourced from Shelton (2006).

Mexican Lilac (*Gliricidia sepium)

Environmental Weed Species

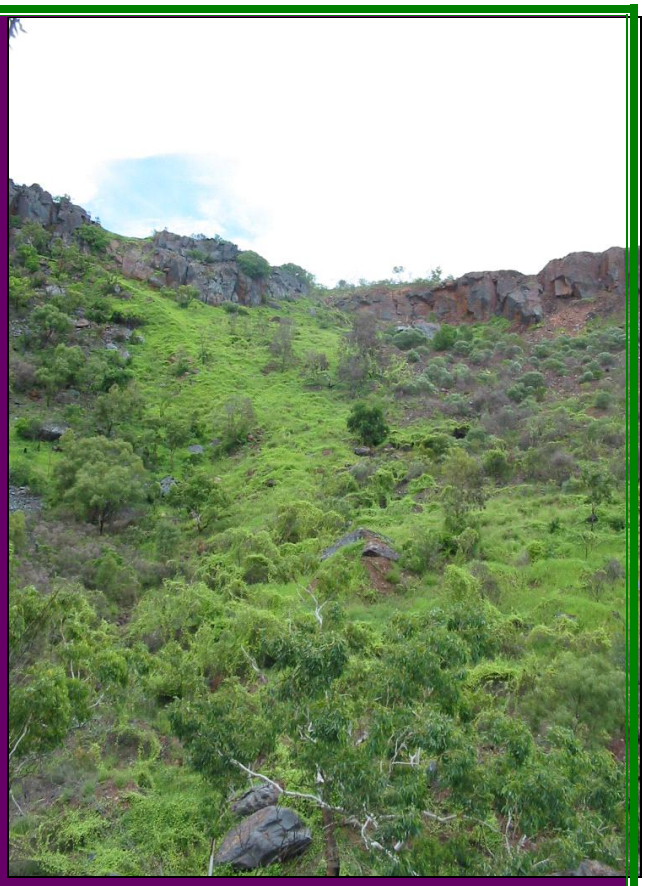
Mexican Lilac (*_Gliricidia sepium_*) is a toxic tree of the Fabaceae family native to South America and can grow to 12 m high (Suttie, 2006). It has composite leaves and smooth bark that varies from whitish grey to red/brown (Suttie, 2006). The flowers are red to lilac in colour and florescence occurs terminally on branches with no leaves. The standard petal often has a yellow spot at the base. Mexican Lilac produces fruit as a pod which are 10 – 15 cm long.

Mexican Lilac (*_Gliricidia sepium_*). Image sourced from Rinehart (2006).

Wild Passionfruit Vine
*(*Passiflora foetida var. hispida)*
Environmental Weed Species

The weed species Wild Passionfruit (**Passiflora foetida* var. *hispida*) is a woody vine that can grow up to 9 m and has an unpleasant smell. The flowers are 5 cm across and usually white with a blue central area. The orange to yellow edible fruits occur throughout the year.

Although not a declared weed species, it poses an environmental threat on Koolan Island due to the density and coverage it has achieved in many areas. It has been observed to be widespread across Koolan Island. The vine forms dense sheets of cover which exclude other vegetation.



***(*Passiflora foetida var. hispida*) vines on slopes.**

Appendix 5: Control of Quarantine SOP

Mount Gibson Mining

KOOLAN ISLAND OPERATION
HEALTH AND SAFETY STANDARD

Element – 08-15-02
Control of Quarantine
SOP

DOCUMENT OWNER: Simon Sandover PREPARED BY: Andrew Robinson					
APPROVED BY: KI Environment Manager Signature: Date:20/10/2010					
Title: 08-15-02 SOP - Control of Quarantine	date effective 20/10/2010	revision status Issue Final 2.0	set review 3 yearly	planned review 1.12.14	page 1 of 23

TABLE OF CONTENTS

1 INTRODUCTION

1.1 PURPOSE

Quarantine is an integral part of biodiversity management at a field operations level and is driven by environmental legislation applicable to the Koolan Island operations and the Koolan Island Quarantine Management Plan.

Quarantine is important because the introduction of species has the potential to impact on existing flora and fauna of Koolan Island through competition and predation processes. These processes could result in the exclusion of native flora, impact upon rehabilitation success and cause local extinction of flora and fauna species, especially those with conservation value.

Species can be introduced through transport activities such as on flights, ships, the barge, in transport containers, soil under vehicles or on work boots, personnel luggage and clothing.

The purpose of this document is to detail the standard procedures that shall be applied to prevent the introduction of foreign species to Koolan Island. The implementation of this process will assist in ensuring the objective of preventing introduction of foreign species shall be met.

Quarantine aims to prevent introductions of all alien flora and fauna species, this includes:

- Cane Toad (*Bufo marinus*);
- Brown Rat (*Rattus norvegicus*);
- Black Rat (*Rattus rattus*);
- European Rabbit (*Oryctolagus cuniculus*);
- Feral Cat (*Felis catus*);
- House Mouse (*Mus musculus*); and
- Singapore Ant (*Monomorium destructor*).
- All introduced flora but particularly Double-gee (*Emex australis*), Kapok (*Aerva javanica*), Buffel grass (*Cenchrus ciliaris*), Noogoora burr (*Xanthium occidentale*), Mesquite (*Prosopis* spp.), Caribbean Stylo (*Stylosanthes hamata*) and Mexican Poppy (*Eschscholzia californica*);
- Snails, spiders, wasps, etc.;
- Eggs and seeds (including the various life cycle stages);
- Soil borne pests and other plant and animal diseases.

It is of note that the most significant threat to the ecosystem on Koolan Island is the Cane Toad (*Bufo marinus*). Specific requirements are included in these procedures regarding freight from areas where Cane Toad infestations are known to occur, in particular, northern and eastern Australian States and Territories.

1.2 SCOPE

This process shall apply to the transport of all freight and personnel, handled by Koolan Island, Contractor or Third Party, by road, air, or sea, to and from Perth Supply Base or Derby Supply Base when mobilising to or from Koolan Island.

Any proposals for movements of freight or personnel outside of the listed locations are considered non-routine and will require 'exceptional' changes in process. The outlined approval process in Section 1.4, below, must be undertaken.

1.3 Responsibilities

All suppliers, contractors and third parties are responsible for presenting their transportable freight in an uncontaminated state to one of the two Koolan Island Operations (KIO) Logistics Provider's Supply Bases. If this does not occur the freight will be rejected at no cost to KIO (unless otherwise stated within contractual agreements). This principle is to be reflected in all KIO contracts.

The KIO Supply Chain Management Team, through its contracted Logistics Service providers, shall provide the processes, procedures, support and enforcement to meet the standards documented in this Procedure.

KIO Contract Owners and Project Managers are responsible for quarantine compliance from their contractors or associated with their projects.

Individuals travelling to Koolan Island are also responsible for ensuring their person and personal items are quarantine compliant.

The following table outlines the roles and responsibilities of KIO and its Logistics Providers.

Roles and Responsibilities

Role	Responsibilities
KIO Management	• Providing the resources necessary to support and implement this quarantine process • Monitoring the compliance with relevant legislation for quarantine management and company policies • Ensure all supply contracts contain requirements to inspect goods before delivery • Ensure standard supply "terms and conditions" outline the requirement to inspect before supply
KIO Environmental Department	• Provide information and training to suppliers and individuals travelling to the island about quarantine management process and the environmental vulnerabilities • Provide support to management when quarantine standards are non compliant
Supervisors, Contract Owners and Project Managers	• Supervision and instruction to Suppliers, Contractors, Personnel and third parties in the application of these quarantine procedures • Ensuring that all consignments are in compliance with this Procedure • Forward planning to minimise freight holding times and delays due to non-compliance • Early engagement with the KIO Logistics Team to enable mobilisation of freight through the Perth or Derby Supply Base • Notification and reporting to line supervisors as required by this Procedure
Goods Suppliers	• Comply with contracts and / or 'KIO terms and conditions' to inspect before supplying
Services & Equipment Suppliers	• Comply with contracts and / or 'KIO terms and conditions' to inspect before supplying • Provide Chain of Custody and inspection documentation to confirm compliance with Quarantine Procedure
Barge Operators	• Maintain a KIO-approved detection, baiting and trapping program • Maintain a log of maintenance on detection, baiting and trapping activities and any captures or sightings • Visually monitor the loading ramp at the time of docking at Koolan Island to observe any pest movements from the vessel • Maintain the deck of the vessel free from vegetation or soil that might carry organisms that contravene the KIO quarantine standards • Ensure that all cargo has a green KIO Quarantine Clearance Label

Role	Responsibilities
	• Reject cargo that does not have the appropriate KIO Quarantine Clearance Label and inform relevant persons
Consolidator / Perth Supply Base	• Aggregate Chain of Custody and inspection documentation for shipment • Inspect goods being shipped before loading in compliance with the KIO Quarantine Procedure • Remove goods that breach the KIO quarantine standards from the shipment and advise suppliers • Maintain a KIO-approved detection, baiting and trapping program in accordance with Quarantine Procedure
Airports	• Inspect goods being shipped before loading in compliance with the KIO Quarantine Procedure • Advise KIO Logistics where goods are found to contravene KIO Quarantine standards • Refuse to carry personnel that do not apply comply with KIO Quarantine standards
Airline Carriers	• Undertake KIO Quarantine inspections of planes and loads before landing at Koolan Island • Provide annual report of Quarantine inspections undertaken
Derby Supply Base	• Inspect goods being shipped before loading in compliance with the KIO Quarantine Procedure • Advise KIO Logistics where goods are found to contravene KIO Quarantine standards • Maintain a KIO-approved detection, baiting and trapping program
Employees, Contractors & Third Parties	• Understand their obligations under this KIO Procedure and seek clarification from Supervisors and/or KIO if required • Undertake 'weed and seed' personal inspection of the clothing, footwear and luggage before landing on Koolan Island • Working in accordance with this Procedure • Notify and/or report to line supervisors when a KIO Quarantine breach is identified

If quarantine compliance is questionable or has not been met, all personnel are empowered and expected to STOP the movement of goods. The situation must immediately be brought to the attention of the Responsible Operational Supervisor.

1.4 Process for Exceptional Freight Movements

Exceptions to this standard supply process require documented approval and will not be addressed further in this standard. Approval for an exceptional freight movement requires the following:

- A brief summary outlining the proposed supply path and freight handling processes;
- A Risk Assessment completed in consultation with the Supply Chain Management Team and Environmental Team; and
- A written approval from the Mount Gibson Iron KIO Environmental Manager.

The agreed management process must be documented and communicated to all relevant stakeholders.

1.5 Definitions

Containers - Containers shall include tool boxes, Sea-Tainers, 20' Containers, 40' Containers and Mini/Maxi Containers and crates. Additionally, vehicle cabs that are "sealable" will be treated as containers

Core Contractors - Contractors performing significant ongoing work on KIO sites as part of the routine operations

DEC - Department of Environment and Conservation (formerly Departments of Environment (DoE) and Conservation and Land Management (CALM))

Logistics Providers - Logistics Providers includes: All Transport Providers

Procedure – Koolan Island Operation Quarantine Procedure

Supply Base - Includes Perth and Derby Supply bases

Third Parties - Parties undertaking KIO activities at or for Koolan Island not directly related to KIO's business

2 QUARANTINE MANAGEMENT PROCESS

2.1 Aircraft Movements

2.1.1 Personnel (including luggage)

Individuals are responsible for ensuring no seeds, plant material or contaminated soil is brought to Koolan Island. Individuals are expected to check their footwear, clothing and luggage prior to boarding the aircraft to Koolan Island.

2.1.2 Aircraft Inspection

Carriers who fly to Koolan Island will be requested to conduct a regular (minimum monthly) quarantine inspection of their aircraft to ensure soil, seeds, plants or animals are not brought to Koolan Island. Carriers are also requested to ensure all doors and hatches are closed when the aircraft is not in use on the mainland. Records of those inspections will be maintained by the carrier and a summary report provided to KIO environmental and logistics teams on an annual basis.

2.2 Freight Movements

KIO has a multi-tiered inspection process for all goods and equipment moving through the supply chain. This involves inspections at the following locations (dependent on the point of mobilisation and method of transport):

- Supplier Facility;
- Perth Supply Base;
- Derby Supply Base;
- Derby Wharf prior to barge loading;
- Supply Barge prior to unloading; and
- Koolan Island Airport, Curtin Airport, Derby Airport and Broome Airport.

Initial mobilisation of all goods, excepting mobile plant and equipment (Section 2.2.3.1), is through the Logistics Provider's Perth Supply Base. Contract Owners must consult with the KIO Logistic Coordinator in advance to allow for any variation on this order.

The following sections of this procedure are concerned with the quarantine of road, sea and air freight.

2.2.1 General Supplier Delivery and Supply Base Requirements

All goods including vehicles, mobile and stationary plant, equipment, transportable units, containers, pipes, etc shall be delivered to the Supply Base compliant with these procedures i.e. free of earth/soil, seeds, webs, eggs, vegetation, fauna, etc.

The supplier and KIO's Integrated Logistics will ensure documentation is provided for:

- Identification of all freight items in this category;
- Identification and authorisation (Chain of Custody including name of custodian and date, time, and location); and
- Appropriate hygiene certificates and/or KIO Inspection sheets.

This information should be recorded (from initial receipt of goods from the supplier) to receipt of goods on Koolan Island.

Records are to be maintained for 24 months.

When the goods are clean and all other necessary quarantine has been completed, a KIO Quarantine Clearance Label (see Appendix 1) shall be placed in a prominent position prior to loading.

Goods that do not meet the inspection standards will be removed from the transport pathway and the Supplier, Environment and Logistics teams informed.

2.2.2 General Quarantine Cleaning and Inspection

This section on general quarantine and cleaning requirements is relevant to all types of freight listed in Section 2.

Where cleaning is required, water wash down shall be used as the primary method of removing any contamination. The water shall be delivered at a pressure sufficient to ensure penetration through any encrusting earth. Where it is unsafe to use water (E.g. electrical circuitry) or where the nature of the contamination is such that it can be easily removed with a brush for example, then this is acceptable providing no contaminant material, eg seeds, vegetation, eggs, etc remain after cleaning.

Specific light vehicle washdown bays are located at the workshop and on the boundary of the quarantine area. The heavy vehicle washdown bay is located at the workshop.

Following cleaning, inspection of goods must be conducted in accordance with the relevant checklist specific to the goods being inspected. These checklists form part of the KIO Chain of Custody Form (Appendix 3 Quarantine Checklist). Common areas of concern include, but are not limited to the following:

- Chassis and underside of machinery (including belly covers);
- Radiator cores and their immediate surrounds;
- The underside and rear surfaces of mudguards and fenders fitted to vehicles (anti-splatter brush-type mud guards will not be accepted);
- The top and underneath of track carriages on tracked vehicles;
- Air filters;
- Internal areas of all mobile plant or containers, including any compartments;
- Skids and fork carriages;
- Inside uncapped pipes;
- Air spaces between bundled goods (such as pipe);
- Crevasses and holes on any freight; and
- Areas exposed during transportation.

The objective is to ensure contaminants such as seeds, eggs or plant parts, etc are not transported to or from Koolan Island. As such a smear of dirt does not pose a threat, where as small clumps of mud are a threat and must be removed.

2.2.3 Specific Quarantine Requirements for All Freight

In addition to the general requirements outlined in Sections 2.2.1 and 2.2.2, above, this section outlines specific quarantine compliance requirements for all freight (road, sea and air) destined for Koolan Island.

All goods from Cane Toad infested States and in particular Queensland and Northern Territory will undergo specific quarantine checks at point of departure from those areas and at Derby Supply base. A final comprehensive check will be conducted by Logistics personnel on the barge prior to the barge offloading that equipment.

Large equipment will be left adjacent to free standing water such as a small pond for a minimum of 12 hours to encourage Cane Toads to leave the equipment. In addition a detailed and extensive search will be conducted through the equipment specifically for Cane Toads.

If a Cane Toad is found at the Derby supply base it must be immediately captured and the Department of Environment and Conservation (DEC) informed. Personnel undertaking the inspection and subsequent toad capture need to strictly adhere to the appropriate Work Instruction and specifically to the use of the appropriate Personal Protective Equipment.

2.2.3.1 Quarantine of Mobile Plant, Equipment

General Suppliers that are involved in supplying mobile equipment/plant will be issued the KI Quarantine Supply 'Terms and Conditions' outlining the KIO Quarantine Standards required. The suppliers are expected to supply their equipment/plant cleaned and free of contaminants such as weeds, seeds, eggs and vegetable matter, etc before shipping. When the equipment/plant arrives at either Perth or Derby supply bases the equipment will again be inspected, but this time by either the Consolidator in Perth or the Logistics Coordinator in Derby. In both cases equipment/plant that does not meet the standards for cleanliness will be 'rejected' and the Supplier, Environment and Logistics teams advised that the equipment will not be transported to site.

At this point the supplier has the option to supply a different (clean) item of equipment, and recover the contaminated equipment, or to arrange cleaning of the original equipment supplied.

KIO Quarantine Supply 'Terms and Conditions' are available to 'Equipment and Services' Suppliers as well as the contractual conditions outlined the KIO Quarantine Inspection standards. These Suppliers will have 'KIO Chain of Custody' forms and 'Quarantine Checklists' that must be completed and accompany the equipment/plant being supplied. Suppliers will be contacted if their equipment/plant is presented and fails the inspection process.

Contract Owners and Project Managers are responsible for ensuring that Suppliers are aware of their responsibility to confirm that all consignments of mobile and stationary plant (including light vehicles, earthmoving machinery, generators, pumps etc) are clean and inspected prior to dispatch from the mobilisation point.

These inspections are to occur prior to dispatch to KIO's Supply Bases. KIO Supply contracts will reflect this responsibility and onus upon the Supplier.

After wash down, mobile equipment shall not be driven, other than loading for transportation to the Supply Base. Where it is necessary to drive vehicles or equipment off a sealed road after the inspection/wash down is complete, equipment shall be completely re-inspected and treated as necessary prior to loading.

2.2.3.2 Quarantine of Palletised, Boxed, Bundled & Loose Goods

To mitigate the quarantine risks that may exist in transporting these types of equipment, the goods shall be subjected to an appropriate cleaning method prior to transportation. Specific attention should be paid to items such as:

- Drill tubing without end-caps;
- In spaces between bundled pipes;
- Under strapping of bundled goods; and
- Undersides of pallets.

Where such goods remain in place overnight or for extended periods, prior to loading, the treatment shall be repeated.

Where vermin are observed or suspected in consignments of multiple pallets or boxes, the consignment shall be isolated in a sealed container then baited overnight and subjected to the Flour Tray Test.

Small goods (palletised, boxed, bundled and loose) may be packed into containers for transport. The container must then meet quarantine requirements (see Section 2.2.3.3 Quarantine of Containerised Goods in this Procedure).

2.2.3.3 Quarantine of Containerised Goods

Only containers that are sealable, structurally sound, free from holes and have close-sealing doors shall be used. Containers shall include tool boxes, Sea-tainers, 20' Containers, 40' Containers and Mini/Maxi Containers. Additionally, vehicle cabs that are "sealable" will be treated as containers.

Suppliers shall ensure all containers are presented to the Supply Bases unlocked for inspection by Supply Base personnel.

2.2.3.4 Quarantine of Large Transportable Units

All transportable offices, accommodation units, tool sheds, food storage units, mobile messes and kitchens, caravans, etc. will be fumigated with methyl bromide by a licensed pest controller at an appropriate location before dispatch to Koolan Island. Supporting fumigation documentation must accompany the fumigated equipment.

All goods that have been successfully fumigated shall have a Quarantine Label affixed to them. The word "FUMIGATED" shall be stamped onto the Quarantine label in waterproof ink.

2.2.3.5 Airfreight

All consignments of airfreight (not including personal luggage items) will be managed by the designated Warehouse or Supply Base personnel. All consignments will be subject to quarantine treatment to meet the strict quarantine standards outlined in this process. This treatment will include:

- Inspection;
- Remedial actions, if required;
- Quarantine Clearance Label to be affixed to indicate compliance; and
- Consignments will be recorded onto a manifest.

2.2.3.6 From Koolan Island

Containers shall be visually inspected and washed down or otherwise cleaned prior to transport. Containers shall be free of earth, insects, seeds, eggs, vegetation and native animals.

Demobilisation Certificates will be issued upon completion of a Quarantine inspection and sent with the demobilised containers or equipment leaving Koolan Island.

2.3 Pests and Weeds

All materials shall be trans-shipped as quickly as possible through Supply Bases to prevent contamination of consignments. Operating Supply Base facilities shall preferably be hardstand and be maintained clean and weed free.

2.3.1 Pest and Vermin Control

Regular KIO-approved pest and vermin inspection and control checks are to be undertaken at KIO's Logistics Provider's Perth and Derby Supply Bases and on landing vessels coming to Koolan Island.

The KIO Quarantine Standard Operating Procedure aims to prevent unauthorised species coming to or from Koolan Island. At present however there are a limited number of animals that are most likely to challenge those aims and would have significant impacts to the endemic populations of Koolan Island were they to get onto the Island. These are:

- Cane toad (*Bufo marinus*);
- House mouse (*Mus musculus*);
- Black rat (*Rattus rattus*);
- Brown rat (*Rattus noevegicus*);
- Singapore ant (*Monomorium destructor*); and
- Cat (*Felis catus*).

The single greatest threat to the Island endemic animal population is the cane toad. The key process for preventing the introduction of the cane toad is the KIO Quarantine Clearance Procedure and the vigilance of our personnel.

Of the above list there are a number of animals that can be targeted by a baiting and trapping program. They are:

- House mouse (*Mus musculus*);
- Black rat (*Rattus rattus*);
- Brown rat (*Rattus noevegicus*); and
- Cat (*Felis catus*).

See 2.3.2 "KIO-Approved Detection, Trapping and Baiting program".

2.3.1.1 From Perth Supply Base

The Flour Tray Test shall be applied to containers at Perth Supply Base, prior to transport to Koolan Island, in the following circumstances:

- Where a container has not been packed by the KIO's Consolidators; or
- Once packed, containers are to remain closed unless in use. Where a container has been packed by KIO's Logistics Providers, but the container has remained open overnight, flour tray testing must occur;
- If flour tray testing is required a strip of Tangle-Trap paste (approximately 5 cms wide by 10 cms long) is to be smeared on the wall inside of the container
- After the Flour Tray Test has been successfully completed the containers shall be marked with a KIO Quarantine Clearance Label prior to transport to the Derby Supply Base. Action following detection of animal activity in the flour tray is discussed in Section 2.3.2 "KIO-Approved detection, baiting and trapping Program".

The treatment applied to each container shall be recorded in KIO Cargo Manifest or on the KIO Chain of Custody document (see Appendix 3 - Quarantine Checklist).

2.3.1.2 At Derby Supply Base

All containers arriving with the KIO Quarantine Clearance Label shall be externally inspected, to ensure their integrity. Any container that is "holed" or not completely sealed will not be loaded.

All containers arriving without KIO Quarantine Clearance Label shall be opened and inspected and subjected to a Flour Tray Test overnight; where there are no signs of vermin or other pests they shall be immediately sealed, KIO Quarantine Clearance Label shall be placed on the door seal and containers may then be transported to Koolan Island.

If flour tray testing is required a strip of Tangle-Trap paste (approximately 5cms wide by 10 cms long) is to be smeared on the wall inside of the container.

The treatment applied to each container shall be recorded on the Cargo Manifest or on the KIO Chain of Custody document.

2.3.1.3 Landing Vessels

- Companies operating landing vessels shall develop and ensure their crews maintain a KIO-approved detection, baiting and trapping program.

The program should stipulate:

- Type, number and inspection regime for bait stations, traps and other detection methods;
- Frequency of replenishment of baits, etc; and
- KIO contact details in the case of suspected or confirmed presence.

The Master shall ensure that the deck of the Landing Barge is free of any contamination prior to accepting and loading any goods onto or off the vessel. Contaminants must be removed prior to loading or off loading.

The Master shall ensure that all cargo has a KIO Quarantine Clearance Label attached and that the Cargo Manifest or Chain of Custody Checklist is properly completed to indicate that it has undergone proper inspections.

The Master shall reject shipment of cargo without a KIO Quarantine Clearance Label or where the Cargo Manifest indicates incomplete quarantine.

If vermin are sighted OR suspected on the barge when it is on the way to Koolan the Barge Master shall immediately contact the Koolan Island Environmental Manager to determine the appropriate response plan and initiate the following treatment.

2.3.2 KIO-Approved Detection, Baiting and Trapping Program.

The Landing Barge KIO-approved detection, baiting and trapping program includes a number of baits and traps to address the presence of the 'target' listed animals. The detection and baiting program will include:

- Talon rodent baits replaced;
- All flour trays checked and re deployed;
- A number of Elliot Traps to be deployed around the barge. The number will depend upon the relevant vessel and covered in a separate work instruction for each vessel;
- At first light the following day all baits, flour trays and traps are checked for signs of vermin. If no signs then the proceed to Koolan Island;
- If after morning checks there are no signs of vermin the barge is deemed Quarantine compliant and normal barge operations can resume;
- If after the first inspection there are signs of vermin either because baits have been disturbed or gnawed upon, flour trays are disturbed and there has been a trapping then contact the KIO Environment Manager immediately.

In addition the barge is to be rebaited in a similar process to that described above and searched to ensure no vermin remain aboard

Companies operating landing vessels and providing supply services to KIO facilities shall ensure that the vessels are free of pests and appropriate detection, baiting and trapping stations are in place. Elliot traps will be used for all trapping. Each bait station shall be baited with single 20gm waxed-Talon bait. Flour trays are one suitable detection method in enclosed areas.

The vessel Master shall ensure that they hold a copy of the Material Safety Data Sheet (MSDS) for the type of bait used. Bait stations shall be constructed from plastic containers accessible by mice and rats. Bait stations shall be positioned around the deck and in the accommodation in such a manner that, in the opinion of the Master, they will be secure and effective in eradicating any vermin that may board the vessel and will not present an unacceptable risk to human health.

Where the Master of the vessel has doubts about the positioning or number of bait, detection or trapping stations required, they shall seek advice from the KIO Environmental Team.

Activities completed and the results of the detection, baiting and trapping program shall be entered in the deck log and communicated to the Environment team monthly.

Upon arrival at Koolan Island, a nominated crew member shall observe the lowering of the bow or stern door to determine if vermin leave the vessel. If vermin are observed, then:

- The bow or stern door shall be raised immediately;
- KIO Logistics Manager and the Manager Environment shall be advised immediately; and
- All unloading and loading will be placed on hold until an appropriate response is agreed.

2.3.2.1 Approved Bait Types, Insect Traps and Safe Handling

Talon Rodenticide Wax blocks shall be used as the bait in bait stations. The following safe practices shall be applied when handling, using or disposing of baits:

- Obtain the MSDS for Talon Rodenticide Wax blocks prior to purchase;
- Avoid contact with skin and eyes - wear elbow length gloves when handling;
- Do not place where other animals can access e.g. birds, lizards, native animals, etc; and
- Dispose of disused Talon appropriately on the mainland.

All poison baits shall be disposed of appropriately on the mainland. A formal record of bait movements and disposal shall be maintained.

2.3.2.2 Flour Tray Test – Vermin Detection

When checking goods for vermin infestation using the Flour Tray Test, the required resources are:

- One tray approximately 30cm x 30cm x 1cm;
- One kg of flour; and
- Spatula or ruler.

The following steps shall apply to the Flour Tray Test:

1. The flour shall be placed into a tray and spread evenly across the tray using a spatula or ruler so that the base of the tray is completely and smoothly covered. Several trays may be required depending on the size and design of the unit.
2. Open the unit that is to be inspected and place the tray(s) of flour inside. The unit shall then be sealed and left undisturbed overnight.
3. Open the container the following morning and check for signs of vermin tracks in the flour.

Where the flour tray is not disturbed, the unit shall be closed and then labelled using a KIO Quarantine Clearance Label and can be transported to Koolan Island.

Where vermin disturb the tray of flour:

- Food and dry-goods containers shall be treated with baits or traps. After treatment the food and dry goods containers are to be checked again for vermin using the Flour Tray Test and the process repeated until no disturbance is observed. If vermin are noted after 3 baiting nights the container is to be returned to the Supplier at no cost to MGI. Once cleared, the unit is sealed and KIO Quarantine Clearance Label is placed over the door or lid seals; and
- Other containers and units shall be unpacked and re-tested/baited until no evidence of vermin is found. The containers shall then be issued with a KIO Quarantine Clearance Label and can be transported to Koolan Island.

Bait treatment (following disturbed flour trays) must only be used for quarantine checks on the mainland. Where the flour tray test is used on Koolan Island and evidence of activity is identified

in the flour, trapping alone (not baits) should be the treatment method to ensure no impact to native animals.

2.3.3 Weed Control

Regular KIO-approved weed inspection and control checks are to be undertaken at KIO's Logistics Provider's Perth and Derby Supply Bases. Records of such checks are to be maintained for a period of 24 months from completion of the inspection and/or treatment. Audits of these records are to be checked as part of the KIO EMS Audit Process.

Weed control takes the form of detection in the case of plants and plant material by inspection and removal of seeds and weeds by means of cleaning prior to shipment. The most likely location for viable seed is sequestered within soil and clay so external wash-down (or pressure clean) is the primary form of defence.

2.4 Clearance & Unloading Koolan Island

KIO's Logistics Providers are delegated the responsibility of conducting inspections of the barge and barge freight on arrival at Perth, Derby and Koolan Island Supply Bases.

2.4.1 Barge and Barge Freight Inspection

The following inspection requirements are to be undertaken on arrival of the barge:

- The Island Logistics Coordinator is to be present at the Landing Site and complete the appropriate checks before any goods are unloaded.
- Confirm with the barge master or mate that the detection, bait and trapping stations were checked for signs of vermin on the passage from Derby. Physically re-check these stations. If signs of any vermin are present then ensure that the barge gate is immediately raised and notify the KIO Environmental Team. In this case the Environmental Manager will be informed and a response determined.
- Check that all items are present in accordance with the manifest and that they are appropriately marked with a KIO Quarantine Clearance Label signifying that they have been cleared through the Derby quarantine inspection point. If KIO Quarantine Labels are not present, check Chain of Custody paperwork and manifest to ensure that these items have the appropriate supporting documentation to prove that they have passed the Derby KIO Quarantine Clearance process.
- Check all goods for signs of soil, vegetation, seeds, insects and vermin. If signs of vermin are found during goods inspection, the barge gate is to be immediately raised on the barge and the KIO Logistics and Environment Managers contacted for further actions. If signs of weeds, seeds, insects or soil are present then immediately notify the KIO Environmental Team to seek further guidance.
- Check the seal and integrity of all containers. If an item has lost its integrity (e.g. has been damaged in transport and may allow vermin, insects or plant matter to enter) then such an item should not be unloaded. In such an instance, the Logistics Provider's inspector is to notify the KIO Environment Team and identify the issue to seek further guidance.
- Where the quarantine treatment for any item cannot be established the item shall be returned to Derby. If there is a risk of cross contamination from any such item then consideration should be given to not offloading any items from the barge. If any such items are identified, the Logistics Provider's inspector is to identify the issue to the KIO Environmental Team for further guidance prior to commencing the offload of the barge.

In the case of a recommendation being made by the KIO Environmental Team to return partial or full barge loads to Derby, the KIO Logistics Manager must provide approval for this to occur.

Any non-compliance and the resultant remediation actions are to be notated by the Logistics Provider's.

3 ACTIONS AND REPORTING OF NON-CONFORMANCES

3.1 Actions when Non-Conformance Identified

Perth Consolidator:

1. Remove the goods from the loading bay.
2. Inform Supplier of the discovery and advise them to collect the goods from the Consolidators premises as soon as possible.
3. Make necessary changes to the manifest and Chain of Custody.

Derby Supply base:

1. Inform KIO Logistics
2. Apply standard clean down and/or implement flour tray test, fauna traps and fauna baits
3. Goods are to remain in that location for a minimum of 12 hours or until the clean down is complete
4. After a minimum of 12 hours the flour trays, fauna traps and fauna baits are to be checked
5. If there is no indication of foreign species the goods are to be resealed, new quarantine approved tape placed on the goods and the goods allowed to continue on to Koolan
6. If there is an indication of foreign species present in the goods contact the supplier and establish a plan for replacement of goods and the return of failed goods to the supplier. Goods will not be transported to Koolan Island if the cargo is not fully compliant with this procedure.

On the Barge:

1. Inform KIO Logistic and the KIO Environmental Manager
2. Goods are to remain on the barge until fully compliant with this Quarantine Procedure (and therefore may be offloaded on Koolan Island) or shall return to Derby for off loading depending upon the response by the Environment Manager and Logistics.

On Koolan Island

1. Inform KIO logistics and the KIO Environmental Manager
2. Immediately reseal the goods that the foreign species was noted in.
   2.1. Eg if a food container has insects in it, immediately reseal and wrap in 3 layers of plastic. Those goods are then to be sent back to the supplier as soon as practically possible.
   2.2. If animal droppings are noted in a container the immediate area is to have fauna traps deployed immediately. If any foreign species are captured the Environmental Manager will determine the relevant course of action.

The KIO Manager Environment shall take appropriate action that may include notifying the DEC Regional Manager to plan any contingency action.

3.2 Notifications Associated with Non-Conformance

Notice of non-conformances must occur through Supervisors to the KIO Manager Environment and KIO Manager Logistics. These persons will then determine the appropriate next steps.

Actions will vary depending upon the nature and extent of the non-conformance, but the most likely solution will be the return of the item to Derby where Quarantine Inspections will re-commence until compliance is re-established or the freight returned to the Supplier.

Contracted logistics providers shall document significant non-conformances experienced while processing freight and passengers at their facilities or during transportation, up to and including the point of departure from the mainland.

This notification is required for any non-conformances with this Procedure.

Notification and reporting is required for:

- Observation of "new" weed species growing on Koolan Island;
- Nest, eggs or pupae within freight;
- Vegetation, insects, eggs, webs or earth within freight;
- Non-quarantined soil or aggregate arrives on Island;
- Unauthorized landing of non-KIO controlled vessel at Koolan Island
- Holed or unsealed containers on barge or arrives at Koolan Island;
- Incoming personnel to island with plant or soil matter on their clothing or luggage or any plants or animals in their possession;
- Omitted KIO Quarantine Clearance labels or ambiguous clearance labels observed at Derby Supply Base or on the barge or on arrival/departure at Koolan Island;
- Movement of goods not covered on the Cargo Manifest or significant errors on the Manifest;
- Company/Contractor/Supplier/Third Party personnel who do not comply with this procedure.

4 MEASUREMENT AND VERIFICATION

4.1 Measurement

The effectiveness of this Procedure is measured by:

- Number and severity of reported quarantine non-conformances; and
- Compliance of quarantine aspects of the KIO EMS Audit of Contracted Logistics Provider.

4.2 Verification

Audit of the implementation of this Procedure shall be carried out at least annually. KIO Staff (Environmental and Supply Chain) and external parties conduct formal audits and opportunistic inspections of supplier facilities, mainland supply bases, vessels and island landing and storage facilities.

4.2.1 Koolan Island

Annual fauna monitoring shall include the designated entrance points to Koolan Island (barge landing and airport facility) as part of the Koolan Island Quarantine Management Plan. The monitoring program includes positive animal identification through trapping and observation of tracks and scats.

Monitoring for the presence of weed species is conducted at both designated entrance points under the Weed Management Plan.

On Koolan Island, quarterly monitoring, including trapping and the Flour Tray Test shall be undertaken within the Warehouse, kitchen and Mess Facilities. Monitoring will be conducted by the Environment Team in cooperation with the Logistics and Catering Service Providers.

4.2.2 Supply Bases, Landing Barges and Airports

Compliance of Supply Bases, Landing Barges and Airports are monitored through the KIO EMS Audit Process.

5 COMMUNICATION / TRAINING

Equipment and Services Suppliers will receive written instruction on completing Chain of Custody Checklists and their responsibilities in relation to Quarantine inspections for KIO.

General Suppliers will receive the updated "Terms and Conditions" containing information on KIO expectations from its suppliers.

Personnel in Perth and Derby Supply bases will receive training in their quarantine responsibilities.

Landing vessels operators will receive written instructions concerning their KIO Quarantine responsibilities and the vessels will be regularly inspected with an aim to improving the baiting and trapping program.

All suppliers will receive some advice on the reasons for the KIO Quarantine procedures being employed.

Mine workers will receive training and assessment against relevant requirements of this Standard Operating Procedure as part of their site induction process.

ESS will receive specific training with regard to identification of contaminants in received freight and the process to follow.

6 RECORDS

A record shall be maintained of:

- All Inspections and baiting and trapping program activity - 24 months;
- All instructions to suppliers and supply base personnel – life of mine;
- Chain of Custody checklists – 24 months.

7 RECORD OF REVIEW

Rev	Date	Revision description	By	Check	Approved
1.0	2/8/2009	First full draft	A Robinson	S Sandover K O'Brien	
	4/8/2009	Edits	S. Sandover		
2.0	21/10/2010	Final Review	S. Sandover	S. Sandover	

APPENDIX 1 - KIO QUARANTINE CLEARANCE LABEL

KIO Quarantine Clearance Label

All KIO Quarantine Clearance labels shall be placed on the access points of units so that the seal is broken when the unit is opened or on the inside windscreen of vehicle cabs.

This Label shall be placed on all:

- Machinery, mobile plant and equipment when the Wash-down procedure is completed – an additional Label should be affixed to the inside windscreen of mobile plant/vehicles;
- Individual palletised, boxed, bundled and loose goods when cleared for trans-shipment; and
- Large transportable units after fumigation (supporting fumigation certificates shall be held together with the Manifest/Chain of Custody).

Fumigated units shall have the word "FUMIGATED" written on the KIO Quarantine Clearance label using a waterproof ink to alert personnel that these units must be aerated for safety reasons before release from quarantine.

Labels should be used in all cases except explosive containers. Dangerous Goods legislation dictates that these explosives containers are sealed by the supplier and will not be opened, or the seal broken, until the receiving destination is reached.

Figure 1 – KIO Quarantine Clearance Label

APPENDIX 2 - KIO CHAIN OF CUSTODY – QUARANTINE INSPECTION CHECKLIST

Mount Gibson Iron	**CHAIN OF CUSTODY DOCUMENT**	**VERSION**
		V 2.1
		DATE
		02/08/09

QUARANTINE INSPECTION CHECKLIST

Description of freight					
Checkpoint	**Location**	**Date**	**Company/Operator**	**Name**	**Signature**
1	Supplier				
2	Perth				
3	Derby				
4	Derby Wharf				
5	Koolan				

Checkpoint	**Remediation Notes**
1	
2	
3	
4	
5	

IMPORTANT NOTES FOR INSPECTIONS

IF THE CONSIGNMENT OR EQUIPMENT IS BEING DIRECT SHIPPED FROM INTERSTATE TO DERBY FOR KOOLAN ISLAND NOTIFY THE ENVIRONMENTAL DEPARTMENT VIA kienviro@mtgibsoniron.com.au AND KOOLAN ISLAND LOGISTICS DEPARTMENT VIA kilogistics@mtgibsoniron.com.au

DURING ALL INSPECTIONS BE ESPECIALLY ALERT FOR SIGNS OF RODENTS, CANE TOADS, INSECT NESTS, WEEDS & SEEDS

INSPECTION CHECKLIST	**Inspection Point**				
	1	**2**	**3**	**4**	**5**
Mobile Plant –Trailers - Vehicles	**Initial or N/A**				
Chassis and underside of machinery (including belly covers)					
Radiator cores and their immediate surrounds, air filters;					
Underside and rear surfaces of mudguards and fenders fitted to vehicles					
The underside and rear surfaces of mudguards and fenders fitted to vehicles					
The top and underneath of track carriages on tracked vehicles					
Internal areas of all mobile plant or containers, including any compartments					
Buckets, blades, skids and fork carriages					
Tool boxes & mounts					
Cutting blades, teeth & shrouds, wear plates, cutting buckets & blades, retaining pins & bolts					
Tyres, wheel arches, dual wheel gaps & wheel rims					
Note: Anti-splatter brush-type mud guards will not be accepted					
Containers – Curtain Siders – ISO tanks – IBC's	**Initial or N/A**				
Where security seals are not used open container doors and curtain siders & inspect internally					
Twist lock pockets					
Door seals & locking devices					
All gaps i.e. corners, crevices, joints & holes					
Fork lift pockets and slots					
Ventilation outlets					
Valves, lids & caps					
Break bulk – Miscellaneous Cargo	**Initial or N/A**				
Inside uncapped pipes					
Air spaces between bundled goods (such as pipe)					
Crevasses and holes on any freight					
Areas exposed during transportation.					

Appendix 6: Weed Identification and Management Strategy

WEED IDENTIFICATION AND MANAGEMENT STRATEGY FOR TARGET WEED SPECIES ON KOOLAN ISLAND

SEPTEMBER 2011

PREPARED FOR

MOUNT GIBSON IRON LIMITED

BY

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1. BACKGROUND

Mount Gibson Iron Limited (Mount Gibson) is required to control or eradicate target weeds on Koolan Island according to Ministerial Statement 715, Condition 11 Quarantine. Details of target species and control measures are provided in the Quarantine Management Plan (Mount Gibson 2011). Objective 3 of the Quarantine Management Plan is to:

"*Control and eradicate introduced flora and fauna species on Koolan Island*"
(page 19 Mount Gibson 2011).

In July 2011, Mount Gibson commissioned MBS Environmental to compile a review of target weed species on Koolan Island. The specific objectives of this study were to:

- Provide identification tools for targeted weed species.
- Provide management recommendations for the control and eradication of target weed species.
- Prepare a report summarising the findings.

This document has been prepared with the intention of being used in conjunction with the control methods in Appendix 1 and Declared Species Fact Sheets (Appendix 2). This report is to assist management staff with weed management strategies.

2. WEED CLASSIFICATION

Identification of target weed species at Koolan Island uses the Department of Environment and Conservation (DEC) Florabase website (1998) and Hussey *et al.* (2007). Management suggestions for Declared Plants are summarised in Appendix 2 from the Department of Agriculture and Food (2011) online database. Further management recommendations were sourced from Cook *et al.* (2005), Queensland Department of Primary Industries and Fisheries (2007) and the Northern Territory Government (Miller 2006).

2.1 WEEDS

Weeds are plant species growing outside their natural range. Plant species are defined as Declared Plant species pursuant to section 37 of the *Agricultural and Related Resources Protection Act 1976* (ARRP Act) by Department of Agriculture and Food Western Australia (DAFWA 2011) according to their threat to agriculture and the environment (Table 1). Weeds are also classified as Weeds of National Significance if they pose a significant agricultural, forestry or environmental threat (Australian Weed Committee 1998).

Classification categories for Declared Plants and associated legislative conditions prescribed by the *ARRP Act* (APB 2009) for their control are defined in Table 1.

Table 1: Declared Plant Species Standard Control Codes Summary in Western Australia

Control Code Requirements	Conditions
P1 **REGUIREMENTS** Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2 **REGUIREMENTS** Aim is to eradicate infestation	Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3 **REGUIREMENTS** Aims to control infestation by reducing area and/or density of infestation	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants: • Within 100 metres inside of the boundaries of the infestation. • Within 50 metres of roads and high water mark on

Control Code Requirements	Conditions
	waterways.
	• Within 50 metres of sheds, stock yards and houses. Treatment must be done prior to seed set each year of the infested area: Where plant density is 1 to 10 per hectare treat 100 percent of infestation. Where plant density is 11 to 100 per hectare treat 50 percent of infestation. Where plant density is 101 to 1000 per hectare treat 10 percent of infestation. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
P4 **REGUIREMENTS** Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants: • Within 100 metres inside of the boundaries of the infested property. • Within 50 metres of roads and high water mark on waterways. • Within 50 metres of sheds, stock yards and houses. Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
Special considerations	In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.
P5 **REGUIREMENTS**	Infestations on public lands must be controlled.

2.2 TARGET WEED SPECIES

Six target weed species were listed in the Quarantine Management Plan for Koolan Island (Ecologia 2006).

- Candle Bush (*Senna alata*) - P1, P2 Declared Plant.
- Rubber Vine (*Cryptostegia madagascariensis*) - P1, P2 Declared Plant.
- Bellyache Bush (*Jatropha gossypiifolia*) - P1, P4 Declared Plant.
- Wild Passionfruit (*Passiflora foetida* var. *hispida*) - invasive environmental weed and colonises a wide variety of habitats on Koolan Island.
- White Lead Tree (*Leucaena leucocephala* subsp. *leucocephala*) - outcompete natives, aggressive environmental weed.
- Mexican Lilac (*Gliricidia sepium*) - outcompete natives, aggressive environmental weed.

Review of the Quarantine Management Plan in 2010/2011 identified additional weed species which had been surveyed during annual weed monitoring and were considered to pose an environmental threat to Koolan Island biodiversity. These species have been included in the revised Quarantine Management Plan and this strategy:

- Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*) - Invasion of northern Australia by Mission Grass (and three other grasses) is considered a Key Threatening Process under the *EPBC Act*. The subspecies, Annual Mission Grass, is included as it is considered likely to pose similar threats (Australian Government 2009).
- Hyptis (*Hyptis suaveolens*) - Considered one of the top five worst terrestrial environmental weed species by geographic region for the Kimberley region (WA Government 2007).
- Giant Reed (*Arundo donax*) - Included on the International 100 Worst Invasive Species List (WA Government 2000).
- African Tulip Tree (*Spathodea campanulata*) - Included on the International 100 Worst Invasive Species List (WA Government 2000).

3. IDENTIFICATION AND DISTRIBUTION OF TARGET WEED SPECIES

The following sections provide information to assist in the identification of target weed species on Koolan Island. This should be used in conjunction with the most recent weed mapping, provided in the Koolan Island Annual Weed Monitoring Report which is produced annually. The most recent distributions of target weed species are shown on Figure 1.

3.1 DECLARED PLANTS

3.1.1 Candlebush (*Senna alata*)

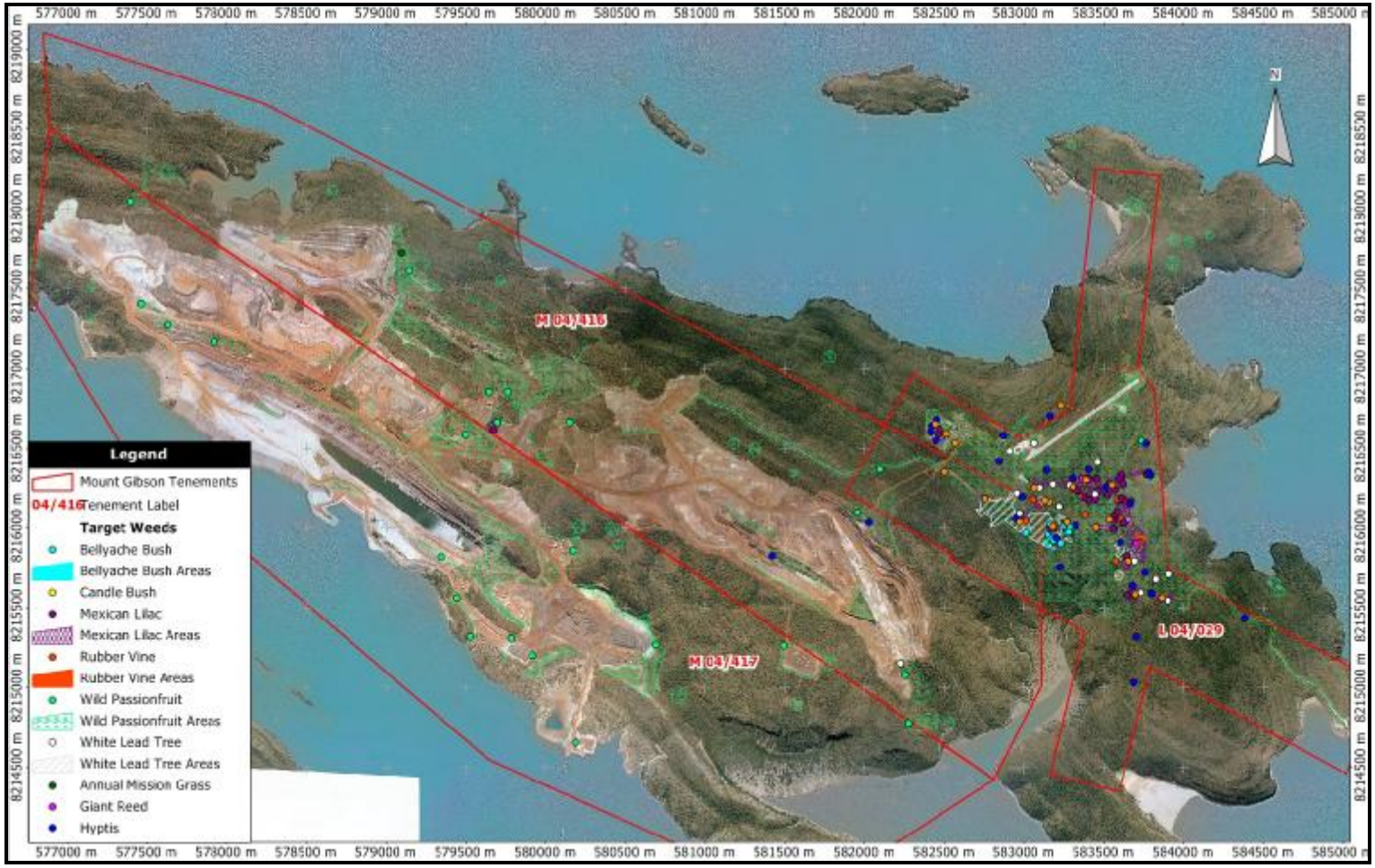
Declared Plant: P1 and P2 for whole of the State.

References: DAFWA (2011), Hussey *et al*. (2007), DEC (1998).

Common name: Candlebush, Ringworm shrub.

Brief Description: Perennial shrub three to four metres tall, prefers open areas and sunlight and often forms thickets. Leaves are alternate with compound (with eight to 12 pairs of leaflets). Predominantly yellow or orange flowers from May to July in racemes (unbranched) (150 to 300 millimetres long with 20 to 40 flowers, closely spaced). Fruit pods are straight 125 to 160 millimetres long, eight to 15 millimetres wide and ripen black with numerous seeds (up to 60 per pod). Candle Bush (*Senna alata*) is native to South America and was introduced to Australia as an ornamental plant which is now naturalised in creeklines on Koolan Island, Kununurra and around Lake Argyle (Hussey *et al*. 2007). A photograph of the plant is illustrated in Plate 1.

Figure 1: Location of Target Weed Species on Koolan Island



Distribution: Water course vicinity of the old settlement area. Refer to Figure 3 in the report.

Plate 1: Candle Bush (*Senna alata*)

Image source: Lee Fontanini, 2009 Weed Survey Koolan Island

3.1.2 Bellyache Bush (*Jatropha gossypifolia*)

Declared Plant: P1 for whole of the State and P4 for the municipal district of Derby - West Kimberley.

References: DAFWA (2011), Hussey *et al*. (2007), DEC (1998).

Brief Description: Perennial erect shrub or small tree to four metres high. Deciduous in dry conditions. Commonly growing amongst tall trees in sand, loam, clay, occupying river edges and along creeks and gullies and bases of coastal dunes. Leaves are alternate 53 to 95 millimetres long, 73 to 140 millimetres wide, palmately lobed (three or five lobed, each lobe elliptic), initially purplish but green and sticky when mature. A photograph of the plant is illustrated in Plate 2. Flowers are predominately red, occurring from February to May. Fruit is an oblong lobed capsule 10.5 to 12 millimetres long, initially green, ripening dark brown with brown, slightly mottled seeds to 0.8 centimetres long. A photograph of the flowers and fruit is illustrated in Plate 3. Bellyache Bush (*Jatropha gossypiifolia*) is native to South America and is a scattered weed of grazed woodlands, creeklines and wasteland in the Kimberley and areas of Port Hedland and Geraldton (Hussey *et al*. 2007).

Distribution: Located in the old settlement area. Refer to Figure 3 in the Quarantine Management Plan**.**

Warning: All parts of the plant, especially the seeds, are toxic. Prevent skin contact. The sap may cause contact dermatitis and eye inflammation. Symptoms may be delayed an hour or longer, and include abdominal pain, a burning sensation in the

throat, nausea, vomiting and profuse diarrhoea. Dehydration and bleeding from the gut may follow. Flushed skin, dilated pupils, dry skin and mouth and increased heart rate may occur. For all ingestions seek urgent medical assistance (Queensland Health 2011).

Plate 2: Bellyache Bush (*Jatropha gossypiifolia*) Plant

Image source: Lee Fontanini, 2009 Weed Survey Koolan Island

Plate 3: Bellyache Bush (*Jatropha gossypiifolia*) Flower and Fruit

Image source: Lee Fontanini, 2009 Weed Survey Koolan Island

3.1.3 Rubber Vine (*Cryptostegia madagascariensis*)

Declared Plant: P1 and P2 for whole of the State.

References: DAFWA (2011), Hussey *et al*. (2007), DEC (1998).

Brief Description: Perennial shrub to three metres high if unsupported. Woody climber with vine like stems climbing to 10 metres. Found amongst medium trees, tall (sclerophyll) shrubland, grassland; in rocky or stony soil, loam, clay, wet soil; occupying flood plains; dry creek beds. Leaves are opposite 45 to 88 millimetres long, 24 to 52 millimetres wide, elliptic. Predominately white or pink or purple flowers in February, March, April, May, October, December (fruiting April to May). Flowers in cymes or in umbels (terminal, with one to four clusters). Fruit dehiscent (spontaneous opening at maturity) 82 to 96 millimetres long, 17 to 40 millimetres wide. Rubber Vine (*Cryptostegia madagascariensis*) is native to Madagascar and introduced to Australia as a garden plant which now occurs throughout the Kimberley (Hussey *et al*. 2007). A photograph of the plant and flower is illustrated in Plate 4 and Plate 5.

Distribution: Located in the old settlement area. Refer to Figure 3 in the Quarantine Management Plan**.**

Note: Closely related and often confused with the toxic weedy *Cryptostegia grandiflora* (rubbervine). *C. grandiflora* has a much longer corolla tube (27 to 45 millimetres) compared to *C. madagascariensis* (12 to 13 millimetres) and the former has bilobed corolline corona filaments whereas those of the latter are unlobed.

Warning: Plant is poisonous. Contact with the milky sap should be avoided (DAFWA 2011).

Plate 4: Rubber Vine (*Cryptostegia madagascariensis*) Plant

Image source: Lee Fontanini, 2009 Weed Survey Koolan Island

Plate 5: Rubber Vine (*Cryptostegia madagascariensis*) Flower

Image source: Lee Fontanini, 2009 Weed Survey Koolan Island

3.2 OTHER TARGET WEED SPECIES

3.2.1 White Lead Tree (*Leucaena leucocephala* subsp. *leucocephala*)

References: Hussey et al. (2007), Australian Weed Committee (1998), DEC (1998).

Brief Description: Erect or spreading trees or shrubs, up to four metres high found growing amongst low trees in sand, loam, clay (calcareous); occupying foreshores, creek lines, roadsides, drains; growing on irrigated land. Leaves are alternate, spiral, compound, bipinnate (pinnae in three to 10 pairs, leaflets in 5 to 20 pairs), 11 to 21 millimetres long, two to five millimetres wide. Flowers arranged in heads (dense, globular, pedunculate, 12 to 20 millimetres in diameter; one to three peduncles in leaf axils; sometimes in terminal racemes); predominately white in May and June, however flowers have been recorded throughout the year. A photograph of the flowering plant is illustrated in Plate 6. Fruit dehiscent (spontaneous opening at maturity) 90 to 225 millimetres long, 4.5 to 20 millimetres wide. A photograph of the pods are illustrated in Plate 6. White Lead Tree (*Leucaena leucocephala* subsp. *leucocephala*) is native to tropical America and was deliberately introduced to Australia as cattle fodder. It has become a common weed of wetlands and riverine sites in the Kimberly and extends down into the Pilbara (Hussey et al. 2007).

Distribution: Located in the old settlement area and along the airstrip. Refer to Figure 3 in the Quarantine Management Plan**.**

Plate 6: White Lead Tree (*Leucaena leucocephala*) Flower and Pods

Image source: Mount Gibson Iron Limited

Image source: Lee Fontanini, 2009 Weed Survey Koolan Island

3.2.2 Wild Passionfruit (*Passiflora foetida* var. *hispida*)

References: Hussey et al. (2007), Australian Weed Committee (1998), DEC (1998).

Brief Description: Climber, vigorous lianas with tendrils, up to nine metres high, growing amongst medium trees (and in herblands, vine thickets). Leaves alternate, spiral, 47 to 105 millimetres long, 43 to 100 millimetres wide, dissected, palmately lobed (three lobed, with the central lobe longest). Flowers solitary, predominantly green or white or cream or purple in February, March, April, May, June, August and November. Fruit indehiscent (not splitting open spontaneously when mature), a yellow or orange, berry (globular to ovoid), 19 to 40 millimetres wide (diameter). Wild

Passionfruit (*Passiflora foetida* var. *hispida*) is native to South America and is now commonly found in disturbed areas on river and creek banks from the Kimberley to Carnarvon (Hussey *et al*. 2007). A photograph of the plant in typical habitat on Koolan Island is illustrated in Plate 7.

Distribution: Widely distributed across disturbed areas on the island. Refer to Figure 3 in the Quarantine Management Plan**.**

Plate 7: Wild Passionfruit (Passiflora foetida var. hispida) Infestation

Image source: Lee Fontanini, 2011 Weed Survey Koolan Island

3.2.3 Mexican Lilac (*Gliricidia sepium*)

References: Hussey *et al*. (2007), DEC (1998).

Brief Description: Deciduous trees, up to 10 metres high, found growing amongst medium trees; occurring in aquatic sites; in wet soil; occupying creeks in woodland areas; growing in disturbed natural vegetation. Leaves alternate (or sub-opposite), spiral, compound (with seven to 17 leaflets), pinnate, leaflet blade 45 to 62 millimetres long, 20 to 30 millimetres wide. Flowers arranged in inflorescences, in racemes; predominantly pink or purple, in July and November. Fruit is dehiscent (spontaneous opening at maturity) 150 to 230 millimetres long, 12 to 20 millimetres wide. Mexican Lilac (*Gliricidia sepium*) is native to the Americas and the West Indies and is a garden escapee, naturalised in the town site creek on Koolan Island (Hussey *et al*. 2007). Photographs of the flower and plant are illustrated in Plate 8.

Distribution: Occurs in the old settlement area, at the airstrip, village and near the stores building. Refer to Figure 3 in the Quarantine Management Plan**.**

Plate 8: Mexican Lilac (*Gliricidia sepium*) Flowers and Leaves

Image source: Cook *et al*. (2005)

Image source: Forest and Kim Starr (2007b)

3.2.4 Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*)

References: DEC (1998), Queensland Government (2011a).

Brief Description: A tufted annual or perennial (rarely) grass 0.4 to 1.5 metres tall, occurring on valley floors, creeks and disturbed habitats. The woolly-hairy, cylindrical, red, brown or white inflorescences are produced in winter from May to July. Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*) is native to Africa and is known to occur at Alligator Creek, south of Townsville, Atherton Tablelands, Cape York Peninsula, Koolan Island and in the Northern Territory is impossible to eradicate due to its spread (Queensland Government 2011a). A photograph of the flower and plant is illustrated in Plate 9.

Distribution: Occurs at five locations, on the edge of the Mullet Bay soil stockpile, down a watercourse below VO1, beside the Acacia Crib Hut, on Heritage Rd and the track between Scree Rd and WD4 topsoil store. Refer to Figure 3 in the Quarantine Management Plan**.**

Plate 9: Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*) Plant

Image source: Lee Fontanini, 2011 Weed Survey Koolan Island

3.2.5 Hyptis (*Hyptis suaveolens*)

References: Hussey *et al*. (2007), DEC (1998).

Brief Description: An upright strongly aromatic annual or perennial herb, up to three metres high, is occurring in disturbed sites such as creeks, river banks, campsites, abandoned minesites, roadsides or bare areas. The broad leaves are in opposite pairs up the stem with a petiole 10 - 70 millimetres long and a leaf blade 23 to 60 (up to 106) millimetres long and 18 to 45 (up to 75) millimetres wide. Small mauve flowers develop from March to August in clusters in the upper leaf axils (Hussey *et al* 2007, DEC 1998). The persistent spiny calyx enclosing the seeds assists with their dispersal by adhering to clothing, fur and wool. Hyptis (*Hyptis suaveolens*) is native to the Philippines and is found along Heritage Road, in the new sprinkler field and along several watercourses extending from the old town site on Koolan Island (MBS Environmental 2011). A photograph of the flower and plant are illustrated in Plate 10.

Distribution: Occurs predominantly in the old settlement area, along Heritage Road and at the village. Refer to Figure 3 in the Quarantine Management Plan (Mount Gibson 2011)**.**

Plate 10: Hyptis (*Hyptis suaveolens*) Infestation

Image source: Lee Fontanini, 2011 Weed Survey Koolan Island

3.2.6 Giant Reed (*Arundo donax*)

References: Hussey *et al*. (2007), DEC (1998)

Brief Description: Robust perennial grass often incorrectly called bamboo. It has woody stems and grows to six metres in height from a stout, creeping, woody rhizome.

Occurs in moist areas and along watercourses where it can spread quickly forming thick homogenous stands, however, Koolan Island populations are found on drier rocky slopes and upland areas. This distribution in dry areas may have resulted in the low spread of the weed. Leaves are evenly spaced in two rows along the stem. The inflorescence is a large, fluffy panicle, dense and erect to 60 centimetres long produced from April to June (Hussey *et al*. 2007, DEC 1998). Giant Reed (*Arundo donax*) is native to southern Europe and Asia and is found at the old town site on Koolan Island. A photograph of the flower and plant are illustrated in Plate 11.

Distribution: Occurs in the old settlement area. Refer to Figure 3 in the Quarantine Management Plan**.**

Plate 11: Giant Reed (*Aurndo donax*) Plant

Image source: DEC (1998).

3.2.7 African Tulip Tree (*Spathodea campanulata*)

References: Queensland Government (2007)

Brief Description: A fast growing evergreen tree that can grow up to 24 metres in height. It has broadly oval shaped leaves which are strongly veined, bronze when young and a deep glossy green when mature. Large orange-red flowers with yellow frilly edges are produced in clusters from December to May. Fruits are large, elongated capsules containing many wind-dispersed seeds (Queensland Government. 2007). African Tulip Tree (*Spathodea campanulata*) is native to the tropical Africa and was known to grow in gardens at the old BHP town site on Koolan Island. An extensive search for the African Tulip Tree was conducted in 2010 around the old town site, no trees of this species were found. A photograph of the flower and plant are illustrated in Plate 12.

Distribution: Invasive in Northern Territory, Queensland, Christmas Island and many islands and other areas of the Pacific Ocean region.

Plate 12: African Tulip Tree (*Spathodea campanulata*) Flower and Plant

Image Source: Queensland Government (2011b).

Image Source: It's Life (2011).

4. OPERATIONAL STRATEGIES FOR TARGET WEED SPECIES

The control methods and weed management strategies described herein are to be used in conjunction with control methods described in Appendix 1 and Department of Agriculture and Food Western Australia (DAFWA) Declared Plant Control Handbook provided in Appendix 2.

Recommendations for management include:

- Awareness and training of personnel about the toxicity and handling of Rubber Vine (*Cryptostegia madagascariensis*) and Bellyache Bush (*Jatropha gossypiifolia*).
- Chemical handling procedures and training for personnel involved in weed management.

4.1 MANUAL REMOVAL

Manual removal is for use on specific species occurring in small localised infestations. When using this method, consideration should be given to the effects of disturbance to topsoil by uprooting plants, seed dispersal and stimulation of germination of weed seeds present in the topsoil seed bank.

Ideally manual removal should occur prior to seed set. Appropriate disposal is important to reduce spread. The plant material should be placed within a landfill facility that is adequately covered with clean fill. The landfill facility area should be monitored and treated for weeds as required.

4.2 SLASHING

Slashing used in conjunction with herbicides is a useful tool for control of Bellyache Bush (*Jatropha gossypifolia*) and Rubber Vine (*Cryptostegia madagascariensis*). This can be done using a brush cutter or other suitable tools to reduce the vegetative cover. Slashing particularly in the dry season, weakens the roots of Bellyache Bush (*Jatropha gossypifolia*) and reduces the density of stands of this species enabling effective use of herbicides. Slashing used in isolation to control either of these species is rarely effective. Continuous follow-up treatments by slashing and herbicide are essential. Caution is recommended for use of slashing on other weed species without prior investigation.

4.3 CHEMICAL CONTROL

Chemical control methods need to consider target species, native species, issues associated with environmentally sensitive areas, seasonal applications, follow-up treatments, withholding periods, weather conditions, equipment available and costs. Knowledge and consideration of all these factors are pre-requisite to development of a weed management program.

The chemical control methods listed in Appendix 1 prescribe basic treatments for Declared Weeds species (Candlebush *Senna alata*, Bellyache Bush *Jatropha gossypifolia*, and Rubber Vine *Cryptostegia madagascariensis*) and for three other targeted weed species (Wild Passionfruit *Passiflora foetida* var. *hispida*, White Lead Tree (*Leucaena leucocephala* subsp. *leucocephala*) and Mexican Lilac (*Gliricidia sepium*). Chemicals recommended for use, their application method and rate, timing and the source of the information are provided in Appendix 1. Declared weed facts sheets are included in Appendix 2 and contain similar or alternative recommendations for control. This information may be used as a basis for routine operational weed management.

Glysophate resistance is known to occur in agricultural crops in Western Australia specifically for the control of ryegrass and is associated with intensive use, when no other herbicides and weed control methods are used. Although this situation is unlikely to occur, this aspect of repeated historic use of glysophate on Koolan Island requires consideration.

Land managers and users will be responsible for compliance with the handling and application of chemicals which also needs to include consideration of the downstream impact of chemicals in runoff. Handling of the products should comply with manufacturer's instructions and warnings including the correct dilution ratios and application rates, routine maintenance and calibration of equipment.

Management guidelines for effective application of chemical control methods are discussed below.

4.3.1 Basal Bark Application Method

This method is suitable only for low numbers of plants that have a basal stem diameter of five centimetres or less. The bark around the stem from ground level up to 30 centimetres should be sprayed or wiped liberally, wetting thoroughly to the point of runoff.

The recommended chemical applications are presented in Appendix 1.

4.3.2 Cut Stump Application Method

This method is labour intensive and may only be suitable for low numbers. Basal diameter of the plant is not important. The stem of the target plant should be cut to less than 15 centimetres above ground level and the herbicide mixture applied liberally to the cut surface and sides of the stem immediately. A delay of more than one minute between cutting and applying the chemical will give poor results.

This method is recommended for use on Rubber Vine (*Cryptostegia madagascariensis*) stems that are multi-stemmed at the base with a diameter in excess of 90 millimetres (Australian Weed Committee 1998). This method is also recommended for use on African Tulip Tree where stumps are cut to less than ten centimetres above the ground and herbicide applied immediately thereafter (Queensland Government 2007).

The recommended chemical applications are presented in Appendix 1.

4.3.3 Foliar Spray Application Method

Foliar spraying is suitable for large infestations. Application of foliar sprays is most effective during the growing season. Volumes and rates of application are product and species specific. General instructions regarding concentrations, rates of application, weather conditions and environmental factors are available on product labels. Material data safety sheets (MSDS) should be consulted.

5. WEED CONTROL OPERATIONS

5.1 TARGET SPECIES

There are 10 target weed species for Koolan Island, as outlined in Section 3:

- Candle Bush (*Senna alata*).
- Rubber Vine (*Cryptostegia madagascariensis*).
- Bellyache Bush (*Jatropha gossypiifolia*).
- Wild Passionfruit (*Passiflora foetida* var. *hispida*).
- White Lead Tree (*Leucaena leucocephala* subsp. *leucocephala*).
- Mexican Lilac (*Gliricidia sepium*).
- Annual Mission Grass (*Pennisetum pedicellatum* subsp. *unispiculum*).
- Hyptis (*Hyptis suaveolens*).
- Giant Reed (*Arundo donax*).
- African Tulip Tree (*Spathodea campanulata*).

5.2 PRIORITY WEED CONTROL TARGET AREAS

Annual weed monitoring has outlined several areas which are considered to be priorities for weed control:

- Old town site (Quarantine Area).
- Village.
- Airstrip.
- Port.
- Outlying populations.
- Roads and tracks, especially those passing through or past the areas listed above.

5.3 WEED CONTROL TIMETABLE

A timetable for weed control is provided in Table 2

Table 2: History of Weed Control and Recommended Target Areas

Target Species	Historic Target Area(s)	Status 2009	Status 2010	Status 2011
Candle Bush	Old town site – just outside the north-eastern boundary (only one small isolated population remains).	Three mature plants covering a 15 square metre area (WP19).	One mature plant and 51 seedlings over a 200 by 50 metre area (WP19). Mature plant cut and stump painted with Access® and seedlings pulled up. A second location with three seedlings (WP36).	Over five seedlings on steep water course ledges leading to the sea (WP19). At the second location three seedlings found were manually removed (WP36). All seedlings & plants at (WP19) controlled by manual removal May 2011.
Bellyache Bush	Old town site – in the south, extending to the just outside of the southern boundary (single population).	Species was recorded at six locations, WP10-15. No control noted.	Control evident at two locations (WP13 and WP 14). A further seven locations were recorded.	Density reduced to 1 at most locations (WP11-15, WP29-31). Controlled by slashing and herbicide application and manual removal of seedlings.

Target Species	Historic Target Area(s)	Status 2009	Status 2010	Status 2011
Rubber Vine	Old town site.	All locations occur within the old town site area, no control evident.	Control evident at two locations (WP3 and WP8) and eradicated at WP8.	Single plant found at village in 2010 has been eradicated (WP20). Density reduced to 1 at most locations. Single plant at (WP 39) has been manually removed. Population at (WP 27) have been eradicated through a combination of manual removal and cut stump methods.
White Lead Tree	Airstrip outliers.	Chemical control evident at WP2 near airstrip.	Chemical control evident at WP2 near airstrip. Single plant at WP3 eradicated.	Two plants at WP1 eradicated. Density reduced to 1 at airstrip (WP2). All plants at (WP24) on topsoil mound at airstrip have been controlled by cut stumps covered with Access in June 2011.
Wild Passionfruit	Outlying populations.	Widespread across the island.	Widespread across the island.	Plants at WP1, east of the old town site, eradicated.
Mexican Lilac	Village, airstrip (outlying populations).	Chemical control evident at WP1 near airstrip.	Chemical control evident at WP1 near airstrip and at the village (WP2-4 eradicated).	Airstrip population (WP1) eradicated.

Target Species	Historic Target Area(s)	Status 2009	Status 2010	Status 2011
Annual Mission Grass	First identified in 2011, no historical control has occurred.	N/A	N/A	First identification for the island. WP1, at the old town site down water course from VO1 and WP2, at Mullet Pit on the edge on a top soil dump. Since the annual weed survey further populations were located beside the Acacia Crib Hut, Heritage Rd, track between Scree Rd and WD4 topsoil store. All plants (apart from the infestation in the watercourse WP1) were hand pulled, bagged and buried in the landfill trench in June 2011.

Target Species	Historic Target Area(s)	Status 2009	Status 2010	Status 2011
Hyptis	Along roads, village, airstrip.	Predominantly located within the old town site area, village and along tracks south-east of the old town site. Some outlying populations occur near Barra West Pit (WP11) and East Pit (WP7).	No control evident, seven new locations recorded.	Control evident at the village with some locations eradicated (WP33 and WP35) and a general reduction in density (WP9 and WP30). Control along track running south from the old town site also evident, with plants at WP12 eradicated.
Giant Reed	No record of historical control.	Recorded at three locations within the old town site.	Recorded at four locations within the old town site.	Recorded at the same four locations.
African Tulip Tree	N/A	N/A	N/A	N/A

Note: Way points (WP) are only mentioned if control was undertaken. Some WPs no longer exist due to clearing for mining purposes and are not detailed in this table.
*Recommendations are detailed for 2012 only. Annual control and monitoring of previous years success will continue for all target weeds until review of the QMP in 2014.
Status = Status of weed control based on the Annual Weed Report for that year. 2011 Status includes control efforts up to August 2011.

6. CONCLUSION

Weed management strategies described in this report are based on existing knowledge and current environmental practices on site.

Further to this report it is recommended that:

- Weed identification be included into the Mount Gibson Koolan Island Environmental Department's staff induction program.
- General awareness of toxic, declared and target weeds are included in the Koolan Island site induction program.
- Mount Gibson continues to implement weed management hygiene procedures for staff, mechanical plant and equipment as per the Quarantine Management Plan to limit spread.

7. REFERENCES

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APPENDICES

APPENDIX 1:
WEED CONTROL METHODS

APPENDIX 2:
DECLARED PLANT CONTROL HANDBOOK