



1. Application details

1.1. Permit application details

Permit application No.: 3071/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Robe River Pty Ltd

1.3. Property details

Property: Iron Ore (Cleveland-Cliffs) Agreement Act 1964, Mineral Lease 248SA (AML 70/248)
Local Government Area: Shire of Ashburton
Colloquial name: Bungaroo Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
36.9		Mechanical Removal	Establishing an access track and hydrogeological drilling

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description Beard Vegetation Associations have been mapped at a 1:250,000 scale for the whole of Western Australia. One Beard Vegetation Association has been mapped within the application area (GIS Database; Shepherd et al., 2001).

609: Mosaic: Hummock grasslands, open low tree steppe; bloodwood with sparse kanji shrubs over soft spinifex / Hummock grasslands, open low tree steppe; snappy gum over *Triodia wiseana* on a lateritic crust.

The application area was surveyed by Biota Environmental Sciences Pty Ltd staff between 8 - 20 March 2005, 19 - 21 July 2006 and 7 - 16 August 2006 (Biota Environmental Sciences Pty Ltd, 2007). The following vegetation types were identified within the application area:

Vegetation of Plains and Low Rises:

- 1. ChAbTw:** *Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* open shrubland to open heath over *Triodia wiseana* hummock grassland;
- 2. ChAbTe:** *Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* open shrubland over *Triodia epactia* hummock grassland;
- 3. ChAiTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over mixed scattered shrubs over *Triodia wiseana* open hummock grassland;
- 4. ChAiApyTe:** *Corymbia hamersleyana* low open woodland over *Acacia inaequilatera*, *A. pyrifolia* tall open shrubland over *Triodia epactia* hummock grassland;

Vegetation of Tall Stony Hills and Breakaways:

- 5. AiTw:** *Acacia inaequilatera* tall open shrubland over *Triodia wiseana* hummock grassland;
- 6. EIAiAprTw:** *Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia inaequilatera*, *A. pruinosarpa* scattered tall shrubs over *Triodia wiseana* (*Triodia* sp. Nov. open hummock grassland);

Vegetation of Drainage Areas:

- 7. EcCv:** *Eucalyptus camaldulensis* open forest over *Cyperus vaginatus* sedgeland;
- 8. ChAtuTwTe:** *Corymbia hamersleyana* low open woodland over *Acacia tumida* var. *pilbarensis* tall open scrub over *Triodia wiseana*, *T. epactia* very open hummock grassland;
- 9. ApyGOaGpyTeTw:** *Acacia pyrifolia*, *Gossypium australe* (Burrup form), *Grevillea pyramidalis* shrubland to tall shrubland over *Tephrosia rosea* var. *glabrior* low open shrubland over tall open shrubland over, *T. wiseana* open hummock grassland.

Thirteen alien weed species were recorded within the application area (Biota Environmental Sciences Pty Ltd, 2007). These were: Kapok Bush (*Aerva javanica*), Date Palm (*Phoenix dactylifera*), Wild Lettuce (*Lactuca saligna*), Prickly Lettuce (*Lactuca serriola*), Common Sowthistle (*Sonchus oleraceus*), Ulcardo Melon (*Cucumis melo* subsp. *agrestis*), Spiked Malvastrum (*Malvastrum americanum*), Mexican Poppy (*Argemone ochroleuca* subsp. *ochroleuca*), Buffel Grass (*Cenchrus ciliaris*), Birdwood Grass (*Cenchrus setiger*), Awnless Barnyard Grass (*Echinochloa colona*), Whorled Pigeon Grass (*Setaria verticillata*) and Ruby Dock (*Acetosa vesicaria*) (Biota

Environmental Sciences Pty Ltd, 2007).

Clearing Description Robe River Pty Ltd (Robe River Iron) intend to clear up to 36.9 hectares of native vegetation within a boundary of approximately 304.3 hectares for the purposes of creating an access track and hydrogeological drilling works.

Vegetation Condition Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).

Comment The application area is located in the Pilbara region, approximately 18 kilometres south of Pannawonica.

The vegetation of the application area is classified as degraded due to severe damage from grazing cattle, recent fires and weed infestation. Previous exploration activities have also contributed to the degraded nature of the vegetation (Pilbara Iron Pty Ltd, 2007).

The vegetation condition was derived from a vegetation survey conducted by Biota Environmental Sciences Pty Ltd (2007a).

3. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments **Proposal is not likely to be at variance to this Principle**

The application area occurs within the Hamersley (PIL3) subregion of the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). This subregion is characterised by Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Tridodia brizoides* on skeletal soils on the ranges (CALM, 2001).

A vegetation survey of the application area and surrounding vegetation identified 351 native flora species belonging to 151 genera from 57 families (Biota Environmental Sciences Pty Ltd, 2007a). This high species diversity could be attributed to the diversity of landforms within the survey area which consists of valley, drainage lines; permanent and non-permanent waterbodies, ridges and relatively flat plain areas (Biota Environmental Sciences Pty Ltd, 2007a). Poaceae (58), Malvaceae (57), Papilionaceae (45), Mimosaceae (32) and Amaranthaceae (31) families are particularly diverse within the survey area (Biota Environmental Sciences Pty Ltd, 2007a).

Thirteen alien weed species were recorded within the vegetation survey area (Biota Environmental Sciences Pty Ltd, 2007a). Weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. This in turn can lead to greater rates of infestation and further loss of biodiversity if the area is subject to repeated fires. None of these species are listed as 'Declared Plant' species under the *Agriculture and Related Resources Protection Act 1976* by the Department of Agriculture and Food (DAFWA), however Date Palm (*Phoenix dactylifera*), Kapok Bush (*Aerva javanica*), Buffel Grass (*Cenchrus ciliaris*), Birdwood Grass (*Cenchrus setiger*) and Ruby Dock (*Acetosa vesicaria*) are all considered to be serious environmental weeds (Biota Environmental Sciences Pty Ltd, 2007a). It is not expected that the clearing of vegetation will exacerbate the infestation of Buffel Grass within the application area or surrounding vegetation, but should a clearing permit be granted, it is recommended that a condition be imposed for the purposes of weed management.

Biota Environmental Sciences Pty Ltd conducted two fauna surveys of the application area and adjacent areas. These surveys recorded a total of 147 vertebrate species from 56 families including 81 bird species, 13 mammal species, 47 reptile species and 3 amphibian species (Biota Environmental Sciences Pty Ltd, 2007b). This suggests the area is potentially diverse in bird and reptile species.

Biota Environmental Sciences Pty Ltd (2007a) report that the Bungaroo area appears to be relatively more diverse than other nearby areas. This is thought to be due to the drainage line and floodplain associated with the Bungaroo creek system (Biota Environmental Sciences Pty Ltd, 2007a). However, despite this the application area would be expected to have suffered from previous disturbance as it intersects the Yalleen pastoral lease and has suffered some previous disturbance from grazing and exploration activities (Pilbara Iron Pty Ltd, 2007; GIS Database).

The landforms, vegetation and habitat types occurring within the application area are well represented within the surrounding region (Biota Environmental Sciences Pty Ltd, 2007a; Shepherd et al, 2001). Given the past disturbances within the application area such as grazing and mining, it is not likely to have greater diversity than similar areas within the region.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Biota Environmental Sciences Pty Ltd (2007a)
Biota Environmental Sciences Pty Ltd (2007b)
CALM (2001)

Pilbara Iron Pty Ltd (2007)
GIS Database
- Interim Biogeographic Regionalisation of Australia
- Pastoral Leases

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments Proposal is not likely to be at variance to this Principle

The assessing officer has conducted a search of the Department of Environment and Conservation's online fauna database between the coordinates 116.7073°E, 22.1564°S and 116.0962°E, 21.6256°S, representing a 20 kilometre radius around the application area.

This search identified 2 Amphibian, 3 Invertebrate, 5 Avian, 14 Mammalian and 69 Reptilian species that may occur within the application area (DEC, 2009). Of these, the following species of conservation significance has previously been recorded within the search area: Middle Robe *Draculooides* (*Draculooides* Middle Robe (WAM T63329)), Mesa K *Paradraculooides* (*Paradraculooides* Mesa K (WAM T65801)), Mesa G *Paradraculooides* (*Paradraculooides* Mesa G (WAM T65763)), *Ramphotyphlops ganei*, *Notoscincus butleri*, *Liasis olivaceus* subsp. *barroni*, Australian Bustard (*Ardeotis australis*), Western Pebble-mound Mouse (*Pseudomys chapmani*) and the Northern Quoll (*Dasyurus hallucatus*).

Biota Environmental Sciences Pty Ltd (2007b) conducted fauna surveys of the Bungaroo Valley, which included the current application area between the 10 - 21 March 2005 and between the 5 - 16 June 2006. These surveys consisted of trapping grids at 14 sites, comprising 10 pit fall traps spaced at 10 metre intervals and two further sampling sites exclusively comprised of 50 - 75 Elliott traps (Biota Environmental Sciences Pty Ltd, 2007b). Invertebrate groups were also sampled both systematically and opportunistically during the survey periods. These surveys identified 147 vertebrate species from 56 families, as well as one taxon that may represent a Short Range Endemic (SRE) (Biota Environmental Sciences Pty Ltd, 2007b).

Biota Environmental Sciences Pty Ltd (2007b) recorded two habitat types as occurring within the survey area:

- **Major Creeklines** - comprising a major drainage line vegetated with open Eucalypt woodland over tall *Acacia* shrubland over *Triodia epactia* hummock grassland; and
- **Stony Plains and Low Rises** - vegetated with scattered to open *Corymbia* woodland with understories comprised of scattered to open shrubland *Acacia* spp. and *Grevillea pyramidalis* over *Triodia* hummock grassland (Biota Environmental Sciences Pty Ltd, 2007b).

In addition to those species listed above, the following fauna species of conservation significance were identified through the fauna surveys: Bush Stone-curlew (*Burhinus grallarius*) and Wood Sandpiper (*Tringa glareola*) (Biota Environmental Sciences Pty Ltd, 2007b).

The vegetation type (EcCv) associated with the Major Creeklines habitat type is considered to have a high conservation value as they are restricted to the permanently wet areas of the Boolgeeda Creek and fringing habitat and are likely to be restricted in distribution in the region (Biota Environmental Sciences Pty Ltd, 2007b). However, this vegetation type is found to occur within the Urandy Land System. This Land system occurs widely throughout the region and the proposed clearing will impact only 6% of the larger 304.3 hectare area and therefore is not likely to significantly impact upon this habitat type (Biota Environmental Sciences Pty Ltd, 2007).

The habitat types found within the application area are well represented locally and within the Pilbara region generally. Therefore, the vegetation within the application area is not likely to represent significant habitat for the fauna species found within the Bungaroo Valley.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Biota Environmental Sciences Pty Ltd (2007b)
DEC (2009)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments Proposal is not likely to be at variance to this Principle

According to available databases, no Declared Rare Flora (DRF) or Priority Flora species occur within the application area (GIS Database). The nearest known Priority flora is a population of *Terminalia supranitfolia* (Priority 1), located approximately 1.3 kilometres north-west of the application area (GIS Database).

A flora survey was conducted over the broader Bungaroo Valley including the application area by staff from Biota Environmental Sciences Pty Ltd between the 8 - 20 March 2005, between the 19 - 21 July 2006 and between the 7 - 16 August 2006 (Biota Environmental Sciences Pty Ltd, 2007a). The flora survey included intensive searches for rare flora.

No DRF were recorded during the survey. Five species of Priority flora were recorded in the broader survey

area (Biota Environmental Sciences Pty Ltd, 2007a).

P2 - *Stylidium weeliwollii*;

P3 - *Abutilon trudgenii* ms; *Sida* sp. Wittenoom; *Rhynchosia bungarensis* and *Cynanchum* sp. Hamersley (Biota Environmental Sciences Pty Ltd, 2007a).

One of these species, *Rhynchosia bungarensis* (P3) was recorded within the application area (Biota Environmental Sciences Pty Ltd, 2007a).

Biota Environmental Sciences Pty Ltd (2007a) recorded a population of 14 as occurring within the application area. This species is recorded throughout the Bungaroo Valley and Pannawonica locality (Robe River Pty Ltd, 2009). Given its wide distribution outside of the application area, the proposed clearing is unlikely to affect the conservation status of this species.

Three of these species (*Abutilon trudgenii* ms; *Sida* sp. Wittenoom and *Cynanchum* sp. Hamersley) have since been removed from the Priority flora list (Western Australian Herbarium, 2009).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Biota Environmental Sciences Pty Ltd (2007a)
Robe River Pty Ltd (2009)
Western Australian Herbarium (2009)
GIS Database
- Declared Rare and Priority Flora List

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments **Proposal is not likely to be at variance to this Principle**

A search of available databases reveals that there are no Threatened Ecological Communities (TEC's) within the application area (GIS Database).

The nearest TEC occurs approximately 88 kilometres south-east of the application area (Themeda Grasslands). The nearest ecosystem of conservation significance is located approximately 72.5 kilometres north-east of the application area (Millstream Stygofauna Community). It is not expected that the proposed clearing will impact the conservation of this TEC.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology GIS Database
- Threatened Ecological Communities

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments **Proposal is not at variance to this Principle**

The application area falls within the IBRA Pilbara Bioregion (GIS Database). Shepherd et al. (2001) report that approximately 99.9% of the pre-European vegetation still exists in this Bioregion.

The vegetation in the application area is recorded as Beard Vegetation Association 609: Mosaic: Hummock grasslands, open low tree steppe; bloodwood with sparse kanji shrubs over soft spinifex/Hummock grasslands, open low tree steppe; snappy gum over *Triodia wiseana* on a lateritic crust (GIS Database; Shepherd et al., 2001).

According to Shepherd et al., (2001) approximately 100% of Beard Vegetation Association 609 remains within the Pilbara Bioregion (see table below).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,164	17,794,651	~99.9%	Least Concern	6.3%
Beard veg assoc. – State					
609	74,188	74,188	~100%	Least Concern	0.0%
Beard veg assoc. – Bioregion					
609	74,188	74,188	~100%	Least Concern	0.0%

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology Department of Natural Resources and Environment (2002)
Shepherd et al. (2001) updated 2005
GIS Database
- Pre-European Vegetation
- Interim Biogeographic Regionalisation for Australia

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments Proposal is at variance to this Principle

According to available GIS Databases, there are no permanent watercourses within the application area, however, there are several minor, non-perennial watercourses within the application area (GIS Database). Three of the nine vegetation associations found within the application area are associated with drainage areas (Biota Environmental Sciences Pty Ltd, 2007a).

Based on the above, the watercourses present are expected to be dry except following heavy rainfall which is usually associated with tropical cyclone events (CALM, 2001). The access track within the application area will intersect a few minor ephemeral drainage lines and minor creek beds (Biota Environmental Sciences Pty Ltd, 2007a). To minimise the impact to surface water regimes and ensure the nature surface water flow is maintained it is recommended that culverts and floodways be installed where haul roads intersect drainage lines.

The application area is located in a semi-desert-tropical region (CALM, 2001). This region has an average annual rainfall of approximately 408 millimetres falling mainly during the summer months, and an average annual evaporation rate of approximately 3,200 millimetres (BoM, 2009). Hence, the presence of surface water resulting from significant rain events is relatively short-lived.

Based on the above, the proposed clearing is at variance to this Principle. However, as the minor drainage lines located within the application area are only likely to flow following significant rainfall, the proposed clearing is unlikely to result in any significant impact to any watercourse or wetland provided natural surface water flow patterns are not disturbed.

Methodology Biota Environmental Sciences Pty Ltd (2007a)
BoM (2009)
CALM (2001)
GIS Database
- Hydrography - Linear

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments Proposal is not likely to be at variance to this Principle

The application area has been surveyed by the Department of Agriculture and Food (Van Vreeswyk et al., 2004). The application area is composed of the following land systems (GIS Database);

- Urandy Land System
- Boolgeeda Land System

The Urandy Land System is described as stony plains, alluvial plains and drainage lines supporting shrubby soft

spinifex grasslands (Van Vreeswyk et al., 2004). Most of this system is not susceptible to erosion or vegetation degradation (Van Vreeswyk et al., 2004). An analysis of aerial photography for the application area reveals the application area is most likely to fall within the 'Stony plains' and 'alluvial plains' land units. The soils of these land units (red loamy earths) are not susceptible to erosion due to a surface mantle of pebbles of ironstone and other rocks. The vegetation described by Van Vreeswyk et al. (2004) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Biota Environmental Sciences Pty Ltd, 2007a).

The Boolgeeda Land System is described as stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands (Van Vreeswyk et al., 2004). The vegetation of this land system is generally not prone to degradation and the system is not susceptible to erosion (Van Vreeswyk et al., 2004). An analysis of aerial photography for the application area reveals the application area is most likely to fall within the 'Stony slopes and upper plains' and 'stony lower plains' land units. The soils of these land units (red loamy earths) are not susceptible to erosion due to surface mantle of very abundant pebbles of ironstone and other rocks. The vegetation described by Van Vreeswyk et al. (2004) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Biota Environmental Sciences Pty Ltd, 2007a).

Based on the above, the proposed clearing is not likely to be at variance to this Principle. It is recommended that should a permit be granted, a condition be imposed on the permit with regard to stockpiling of all cleared topsoil and vegetation for use in rehabilitation.

Methodology Biota Environmental Sciences Pty Ltd (2007a)
Van Vreeswyk et al. (2004)
GIS Database
- Rangeland Land System Mapping

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments Proposal is not at variance to this Principle

The application area is located approximately 71.5 kilometres to the south-west of Millstream-Chichester National Park (GIS Database). At this distance it is not likely that the vegetation within the application area provides a buffer to a conservation area, or is important as an ecological linkage to a conservation area.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology GIS Database
- CALM Managed Lands and Waters

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments Proposal is not likely to be at variance to this Principle

According to available databases, the application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database).

The application area is located within a *Rights in Water Irrigation Act, 1914* (RIWI Act) Groundwater Area (DoW, 2008; GIS Database). The proponent is required to obtain permits to abstract groundwater in this area.

The application area is located within the Pilbara Groundwater Area (DoW, 2008). Any extraction of groundwater in this area will require a groundwater license. The groundwater salinity within the application area is approximately 500 - 1000 milligrams/Litre Total Dissolved Solids (TDS) (GIS Database). This is considered to be potable water. Given the size of the area to be cleared (36.9 hectares) compared to the size of the Hamersley Groundwater Province (10,166,832 hectares) (GIS Database), the proposed clearing is not likely to cause salinity levels within the application area to alter significantly.

There are no known groundwater dependent ecosystems within the application area (GIS Database).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology DoW (2008)
GIS Database
- Public Drinking Water Source Area
- Groundwater Salinity, Statewide
- RIWI Act, Groundwater Areas
- Groundwater Provinces
- Potential Groundwater Dependent Ecosystems

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments Proposal is not likely to be at variance to this Principle

The application area experiences a semi-desert, tropical climate with an average annual rainfall of 408 millimetres (CALM, 2001; BoM, 2009). Rainfall is usually experienced during summer months and can be either cyclonic or thunderstorm events (CALM, 2001). It is likely that during times of intense rainfall there may be some localised flooding in adjacent areas.

The application area is located within the Robe River catchment area (GIS Database). However, the small area to be cleared (36.9 hectares) in relation to the size of the Robe River Catchment area (757,138 hectares) (GIS Database) is not likely to increase the potential for flooding within the application area (GIS Database).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology BoM (2009)
CALM (2001)
GIS Database
- Hydrographic Catchments - Catchments

Planning instrument, Native Title, Previous EPA decision or other matter.

Comments

There is one Native Title Claim (WC99-012) over the area under application. This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the tenement has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are no known Aboriginal sites of significance within the application area, however there are numerous sites within close proximity (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal sites of significance are damaged through the clearing process.

The application area is located within a *Rights in Water Irrigation Act, 1914* (RIWI Act) Groundwater Area (DoW, 2008; GIS Database). The proponent is required to obtain permits to abstract groundwater in this area.

The application area partly overlaps with the area currently under assessment by the Environmental Protection Authority (EPA) for the proposed Bungaroo trial mine pit development. The EPA has advised that the proposed access track and hydrogeological drilling works can proceed prior to the completion of the assessment of the mine development.

It is the proponent's responsibility to liaise with the Department of Environment and Conservation and the Department of Water, to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

One direct interest submission was received stating no objection to the proposal.

Methodology DoW (2008)
GIS Database
- Aboriginal Sites of Significance
- Native Title Claims
- RIWI - Groundwater Areas

4. Assessor's comments

Comment

The proposal has been assessed against the Clearing Principles, and the proposal is at variance to Principle (f), is not likely to be at variance to Principles (a), (b), (c), (d), (g), (i) and (j) and is not at variance to Principles (e) and (h).

It is recommended that should a permit be granted, conditions be imposed on the permit for the purpose of weed management, stockpiling and spreading of all cleared topsoil and vegetation, record keeping and permit reporting.

5. References

- Biota Environmental Sciences Pty Ltd (2007a) A Vegetation and Seasonal Flora Survey of the Bungaroo Trial Pit and Transport Corridor to Mesa J, near Pannawonica, and Sampling of the Broader Bungaroo Valley. Unpublished report prepared for Robe River Iron Associates, March 2007
- Biota Environmental Sciences Pty Ltd (2007b) Bungaroo Trial Pit and Transport Corridor to Mesa J, near Pannawonica - Fauna Assemblage Seasonal Survey. Unpublished report prepared for Pilbara Iron Company, April 2007

- BoM (2009) Bureau of Meteorology Website - Climate Averages by Number, Averages for PANNAWONICA. www.bom.gov.au/climate/averages/tables/cw_005069.shtml (Accessed 2 June 2009)
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- DoW (2008) Water Quality Advice. Advice to assessing officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR), received (18 June). Department of Water, Western Australia
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
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- Robe River Pty Ltd (2009) Application for a Clearing Permit (Purpose Permit) Access Track and Hydrogeological Drilling - Bungaroo (ML248SA). March 2009. Robe River Mining Company Pty Ltd, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001a) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia (updated 2005).
- Van Vreeswyk, A.M.E., Payne, A.L., Hennig, P., and Leighton, K.A. (2004) An Inventory and Condition Survey of the Pilbara Region, Western Australia, Department of Agriculture, Western Australia
- Western Australian Herbarium (2008) - FloraBase - The Western Australian Flora. Department of Environment and Conservation. <http://florabase.calm.wa.gov.au/> (Accessed 2 June 2009)

6. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government.
CALM	Department of Conservation and Land Management, Western Australia.
DAFWA	Department of Agriculture and Food, Western Australia.
DA	Department of Agriculture, Western Australia.
DEC	Department of Environment and Conservation
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DoE), Western Australia.
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia.
DMP	Department of Mines and Petroleum
DoE	Department of Environment, Western Australia.
DoIR	Department of Industry and Resources, Western Australia.
DOLA	Department of Land Administration, Western Australia.
DoW	Department of Water
EP Act	Environment Protection Act 1986, Western Australia.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System.
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
RIWI	Rights in Water and Irrigation Act 1914, Western Australia.
s.17	Section 17 of the Environment Protection Act 1986, Western Australia.
TECs	Threatened Ecological Communities.

Definitions:

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1** **Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2** **Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3** **Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which

are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.

- P4** **Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R** **Declared Rare Flora – Extant taxa** (= *Threatened Flora = Endangered + Vulnerable*): taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X** **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-

- Schedule 1** **Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
- Schedule 2** **Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
- Schedule 3** **Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.
- Schedule 4** **Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

{CALM (2005). *Priority Codes for Fauna*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1** **Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P2** **Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P3** **Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P4** **Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- P5** **Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of threatened species (*Environment Protection and Biodiversity Conservation Act 1999*)

- EX** **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.
- EX(W)** **Extinct in the wild:** A native species which:
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- CR** **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- EN** **Endangered:** A native species which:
(a) is not critically endangered; and
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- VU** **Vulnerable:** A native species which:
(a) is not critically endangered or endangered; and
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

CD

Conservation Dependent: A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.