



1. Application details

1.1. Permit application details

Permit application No.: 2344/1

Permit type: Area Permit

1.2. Proponent details

Proponent's name: JSW Holdings Pty Ltd

1.3. Property details

Property: Mining Lease 80/417

Local Government Area: Shire Of Wyndham-East Kimberley

Colloquial name:

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
14		Mechanical Removal	Mineral Production

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description

Vegetation within the application area has been mapped at a 1:250,000 scale as the following Beard vegetation associations (Shepherd et al., 2001; GIS Database):

59: Grasslands, high grass savanna sparse tree; bauhinia & coolabah over mitchell, blue & tall upland grasses

Brolga's Environment Pty Ltd undertook a flora and vegetation assessment of the application area on 17 January 2008. One vegetation community was identified and described for the application area (Brolga's Environment, 2008);

1) Open woodland consisting of an upper-storey comprised of *Sesbania formosa* and the non-native *Acacia farnesiana* with isolated patches of *Eucalyptus camaldulensis*, *Nauclea orientalis*, *Terminalia platyphylla*, *T. bursarina*, *Cathormion umbellatum* and *Melaleuca nervosa* and with an understorey that comprised of *Eriachne obtusa* and the non-native species *Urochloa mosambicensis*, *Cenchrus ciliaris*, *Parkinsonia aculeata* and *Passiflora foetida* (Brolga's Environment, 2008).

Clearing Description

JSW Holdings Pty Ltd have applied to clear up to 14 hectares of native vegetation for the purpose of mining the underlying soil and rock material.

The native vegetation and topsoil will be cleared and stored for use in rehabilitation once mining has ceased (JSW Holdings, 2008).

Vegetation Condition

Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery 1994).

To

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

Comment

The application area has been significantly disturbed as a result of historic mining activities that have occurred across Mining Lease 80/417 (Brolga's Environment, 2008; JSW Holdings, 2008). The majority of the application area appears to be un-vegetated or covered by non-native species except for a small, relatively dense area of approximately 2.76 hectares of riparian in the north-west of the application area and several isolated stands that are scattered throughout the application area.

The Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of maintaining the riparian vegetation.

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 is located within the Victoria Bonaparte Interim Biogeographic Regionalisation for Australia (IBRA) region which encompasses an area of 1,871,372 hectares (Shepherd et al., 2001; GIS Database). Approximately 98.8% of the pre-European vegetation remains within the Victoria Bonaparte IBRA region (GIS database; Shepherd et al. 2001). The Victoria Bonaparte IBRA region comprises of a diverse range of landform features which include:

- Extensive mangrove communities of the False Mouths of the Ord;
- Ramsar listed wetlands of the Ord Floodplain and Lake Kununurra;
- Cambridge Gulf and associated river systems;
- Man-made wetlands of Lake Kununurra;
- Alluvial plain systems of the Ord and Weaber Plains;
- Devonian reef system of the Ningbing Range; and
- Coastal plains heading from Cape Domett to the Northern Territory border (Graham, 2001).

A number of rainforest patches exist within the Victoria Bonaparte region and these have been identified to comprise of high species and ecosystem diversity (Graham, 2001). Rainforests provide habitat for a high diversity of faunal species that are either directly linked to rainforests or are more widely ranging species that are dependent on them (Graham, 2001).

The application area is located approximately 4.5 kilometres north-west of Kununurra and is situated on an eroded river terrace on the eastern meander of the Ord River (GIS Database; Brolga's Environment, 2008; DAFWA, 2008). This section of the Ord River forms part of the Lake Kununurra system that is listed on the Directory of Important Wetlands in Australia as it meets the following required inclusion criteria (Environment Australia, 2001);

- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail;
- The wetland supports 1% or more of the national populations of any native plant or animal taxa; and
- The wetland is of outstanding historical or cultural significance.

The application area is located on Mining Lease 80/417 and aerial imagery and photographs indicate that the majority of the application area has previously been cleared as a result of historic mining activities (Brolga's Environment, 2008; JSW Holdings, 2008). As a result, the area remains largely un-vegetated except for a small, relatively dense area of approximately 2.76 hectares of vegetation in the north-west of the application area and several isolated stands that are scattered throughout the application area (Brolga's Environment, 2008; GIS Database).

Brolga's Environment have surveyed the remaining vegetation within the application area and recorded that the upper-storey species comprised of *Sesbania formosa* and the non-native *Acacia farnesiana* with isolated patches of *Eucalyptus camaldulensis*, *Nauclea orientalis*, *Terminalia platyphylla*, *T. bursarina*, *Cathormion umbellatum* and *Melaleuca nervosa* and with an understorey that comprised of *Eriachne obtusa* and the non-native species *Urochloa mosambicensis*, *Cenchrus ciliaris*, *Parkinsonia aculeata* and *Passiflora foetida* (Brolga's Environment, 2008). The vegetation of the application area is considered to be moderately disturbed due to the dominant presence of non-native weed species (Brolga's Environment, 2008).

The previous disturbances that have occurred within the application area are likely to have impacted on the biodiversity of the area, which would otherwise be considered quite high. The remaining vegetation within the application area is unlikely to be considered an area of outstanding biodiversity.

The Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of weed management.

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

Methodology

Brolga's Environment (2008)
DAFWA (2008)
Environment Australia (2001)
Graham (2001)
JSW Holdings (2008)
Shepherd et al. (2001)
GIS Database:
- Interim Biogeographic Regionalisation of Australia
- Towns
- Kununurra 50cm Orthomosaic

(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

Aerial imagery and photographs indicate that the majority of the application area remains largely un-vegetated except for a small, relatively dense area of approximately 2.76 hectares of vegetation in the north-west of the application area and several isolated stands that are scattered throughout the application area (Brolga's Environment, 2008; GIS Database). The condition of the remaining vegetation within the application area ranges from good to degraded due to the dominant presence of non-native weed species (Brolga's Environment, 2008).

If native vegetation, the dense area of vegetation in the north-west of the application area may represent suitable habitat for fauna species which inhabit the banks of the Ord River. To ensure that this potentially high quality area of vegetation is not adversely impacted on by the proposed clearing activities, the Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of maintaining the riparian vegetation.

The remaining vegetation within the application area has been disturbed by historic mining activities which are likely to have impacted on the habitat value for the area (JSW Holdings, 2008). No significant habitat was identified during the site assessment (Brolga's Environment, 2008), and it appears evident that the diversity of landforms within the application area is low in terms of ranges, ridges, outcrops or caves suitable to provide habitat for fauna.

Given that the application area has been disturbed by historic mining activities and that larger areas of higher quality vegetation exist along the banks of the Ord River and throughout the Victoria Bonaparte region, it is unlikely that the vegetation within the application area would be considered as significant habitat for fauna.

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

Methodology Brolga's Environment (2008)
JSW Holdings (2008)
GIS Database:
- Kununurra 50cm Orthomosaic

(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 datasets there are no known records of Declared Rare Flora (DRF) or Priority flora species within the clearing application area (GIS database). A population of the Priority one species *Echinochloa kimberleyensis* has been recorded approximately 51 kilometres north-west of the application area within the Parry Lagoons Nature Reserve (GIS Database).

A flora and vegetation survey of the application area was undertaken by Brolga's Environment on 17 January 2008. Brolga's Environment (2008) has advised that due to occupational safety limitations (crocodiles), the dense vegetation in the north-west of the application area (approximately 2.76 hectares) was subject to a visual survey from distance, therefore, the species composition has not been accurately described for the area. Aerial imagery and site photographs provided with the clearing permit application indicate that this vegetation is in good condition and growing in association with the Ord River and Lake Kununurra system which is listed in the Directory of Important Wetlands in Australia (Environment Australia, 2001). As the vegetation has not been extensively surveyed and may contain high quality native vegetation, the Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of maintaining the riparian vegetation.

The remaining vegetation within the application area was traversed and transects were used to determine the species composition (Brolga's Environment, 2008).

No DRF or Priority flora species were recorded or visually observed within the application area (Brolga's Environment, 2008).

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

Methodology Brolga's Environment (2008)
Environment Australia (2001)
GIS Database:
- Declared Rare and Priority Flora List
- CALM Managed Lands and Waters

(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

There are no known Threatened Ecological Communities (TEC's) within the application area (Brolga's Environment, 2008; GIS database). The nearest known TEC is located approximately 44 kilometres north-east of the application area (GIS database). Given the distance between the proposal and the nearest known TEC, the proposed clearing is not likely to impact on the conservation of that TEC.

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

Methodology Brolga's Environment (2008)
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 clearing application area falls within the Victoria Bonaparte Interim Biogeographic Regionalisation for Australia (IBRA) region in which approximately 99.8% of the pre-European vegetation remains (GIS database; Shepherd et al. 2001) (see table).

The vegetation of the clearing application area has been mapped as Beard vegetation association 59: Grasslands, high grass savanna sparse tree; bauhinia & coolabah over mitchell, blue & tall upland grasses. According to Shepherd et al., (2001) approximately 88.4% of Beard vegetation association 59 remains within the Victoria Bonaparte Bioregion.

According to the Bioregional Conservation Status of Ecological Vegetation Classes the conservation status for the Victoria Bonaparte Bioregion and Beard vegetation association 59 is of 'Least Concern'.

Approximately 8.7% of Beard vegetation association 59 is protected within conservation reserves (Shepherd et al., 2001). The conservation of vegetation associations 59 within the Victoria Bonaparte Bioregion is unlikely to be impacted on by this proposal.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european % in IUCN Class I-IV Reserves
IBRA Bioregion – Victoria Bonaparte	1,871,371	1,848,368	~99.8	Least Concern	5.6
Beard veg assoc. – State					
59	139,451	122,936	~88.2	Least Concern	8.6
Beard veg assoc. – Bioregion					
59	138,822	122,653	~88.4	Least Concern	8.7

* Shepherd et al. (2001)

** Department of Natural Resources and Environment (2002)

The vegetation within the application area is not a remnant of vegetation in an area that has been extensively cleared.

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

Methodology Shepherd et al. (2001)
Department of Natural Resources and Environment (2002)
GIS Database:
- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00
- Pre-European Vegetation - DA 01/01

(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

The application area is located on the banks of the Ord River (GIS Database). The Ord River forms part of the Lake Kununurra system and is classified as the following types of wetland under the wetland classification system (Environment Australia, 2001).

- B1: Permanent rivers and streams; includes waterfalls;
- B9: Permanent freshwater ponds (<8 hectares), marshes and swamps on inorganic soils; with emergent vegetation waterlogged for at least most of the growing season; and
- C1: Water storage areas; reservoirs, barrages, hydro-electric dams, impoundments (generally <8 hectares).

The Lake Kununurra system is listed on the Directory of Important Wetlands in Australia, as the wetland meets the following required inclusion criteria (Environment Australia, 2001);

- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail;
- The wetland supports 1% or more of the national populations of any native plant or animal taxa; and
- The wetland is of outstanding historical or cultural significance.

Aerial imagery and photographs submitted with the clearing application indicate that the vast majority of the application area has been previously cleared as a result of historic mining activities that have occurred throughout the application area (Brolga's Environment, 2008; JSW Holdings, 2008; GIS Database). A significant patch of approximately 2.76 hectares of dense vegetation exists in the north-west of the application area and this vegetation is located within the buffer area of the Lake Kununurra environmentally sensitive area (Brolga's Environment, 2008; GIS Database). Brolga's Environment (2008) has advised that due to occupational safety limitations (crocodiles), the dense vegetation in the north-west of the application area was subject to a visual survey from distance, and not a thorough survey as with the remaining vegetation on Mining Lease 80/417. As a result, the species composition list has not been described for the area. If the vegetation is predominately native vegetation, aerial imagery and site photographs provided with the clearing permit application indicate that the vegetation is in good condition and growing in association with the Ord River and Lake Kununurra system (GIS Database; Brolga's Environment, 2008). In order to maintain the integrity of the Lake Kununurra system, the Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of maintaining the riparian vegetation.

Based on the above, the proposal is at variance to this Principle.

Methodology Brolga's Environment (2008)
Environment Australia (2001)
JSW Holdings (2008)
GIS Database:
- Hydrography, linear_1
- ANCA, Wetlands
- Kununurra 50cm Orthomosaic

(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 is located on the eastern bank of the Ord River on an eroded lower river terrace (DAFWA, 2008; GIS Database). Soils within the application area are likely to comprise mainly of river shingle (small to medium size gravels) interspersed with alluvial fines that have been deposited by previous flood events (Brolga's Environment, 2008).

The area under application is situated downstream from Lake Kununurra (GIS Database). Prior to the construction of Lake Kununurra and the Ord River Dam, wet season floods would inundate these areas and sweep away any vegetation and soil (DAFWA, 2008). Since the development of the Ord River Dam, the area under application would now only be subject to inundation very occasionally, and as a result the riparian vegetation along the Ord River has established itself at a typical dry season water level (DAFWA, 2008).

Due to the stony nature of the soils within the application area and the altered flooding regime caused by the Ord River Dam, the proposed clearing is unlikely to cause additional erosion concerns. The Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of retention of topsoil for use in rehabilitation.

It is evident from aerial imagery that the area remains largely un-vegetated except for a small, relatively dense area of approximately 2.76 hectares of vegetation in the north-west of the application area and several isolated stands that are scattered throughout the application area (Brolga's Environment, 2008; GIS Database). The application area has been significantly disturbed by historic mining activities and as a result, remains largely un-vegetated (JSW Holdings, 2008; Brolga's Environment, 2008; GIS Database). Considering that the Ord River would now only be subject to inundation very occasionally (DAFWA, 2008), the proposed clearing is unlikely to increase the incidence of water logging occurring within or adjacent to the application area.

DAFWA (2008) advises that the clearing of vegetation within the application area is unlikely to constitute a land degradation hazard.

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

Methodology Brolga's Environment (2008)
DAFWA (2008)
JSW Holdings (2008)
GIS Database:
- Kununurra 50cm Orthomosaic

(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 may be at variance to this Principle

The application area is not located within a Department of Environment and Conservation managed conservation area (GIS Database). The nearest conservation area is Mirima National Park which is situated approximately 5 kilometres south-east of the application area (GIS database). Based on the distance between the proposal and the nearest conservation area, the proposed clearing is not likely to impact on the conservation values of Mirima National Park.

The application area is located within the buffer area of Lake Kununurra which is listed on the Directory of Important Wetlands in Australia's the wetland meets the following required inclusion criteria (Environment Australia, 2001):

- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail; and
- The wetland supports 1% or more of the national populations of any native plant or animal taxa; and
- The wetland is of outstanding historical or cultural significance.

The vast majority of the area under application appears to have undergone a significant degree of disturbance as a result of historic mining activities (Brolga's Environment, 2008; JSW Holdings, 2008; GIS Database), except for a small, relatively dense area of approximately 2.76 hectares in the north-west of the application area and several isolated stands that are scattered throughout the application area (Brolga's Environment, 2008; GIS Database). Brolga's Environment (2008) has advised that due to occupational safety limitations (crocodiles), the dense vegetation in the north-west of the application area was subject to a visual survey from distance, and not a thorough survey as with the remaining vegetation on Mining Lease 80/417. As a result, the species composition has not been described for this area.

Information provided by Brolga's Environment (2008) indicates that the application area is considered to be moderately disturbed due to the dominant presence of non-native weed species across the application area. If the dense riparian vegetation comprises of native vegetation, the vegetation would be considered to be in good condition and growing in association with the Lake Kununurra system. As a result, the proposed clearing may have a localised adverse impact on the conservation value of the Lake Kununurra wetland area.

Based on the above, the proposal may be at variance to this Principle. In order to maintain the integrity of the Lake Kununurra system, the Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of maintaining the riparian vegetation within the Lake Kununurra wetland area.

Methodology Brolga's Environment (2008)
Environment Australia (2001)
JSW Holdings (2008)
GIS Database:
- CALM Managed Lands and Waters
- Kununurra 50cm Orthomosaic

(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

The application area is not located within a Public Drinking Water Supply Area (PDWSA) (GIS Database). The nearest PDWSA is the Kununurra Water Reserve that is situated approximately 3.5 kilometres south-east and upstream of the application area (GIS Database). The application area has been subject to a degree of disturbance as a result of historic clearing activities with the vegetation cover within the application area relatively sparse (JSW Holdings, 2008; GIS Database). Given the location of the application area in relation to the Kununurra Water Reserve, the proposed clearing is unlikely to reduce the quality of groundwater in the PDWSA.

The soil of the application area comprises of river shingle (small to large gravels) interspersed with alluvial fines (Brolga's Environment; 2008). Prior to the construction of Lake Kununurra and the Ord River Dam, wet season floods would inundate the area under application and sweep away any vegetation and soil (DAFWA, 2008). Due to altered flow regimes since the advent of the Ord River Dam, the application area is now less likely to be subject to seasonal flood events during the wet season (DAFWA, 2008; GIS Database). Given the stony nature of the soils within the application area and altered flow regimes of the Ord River, the proposed clearing is unlikely to cause additional erosion, sedimentation or turbidity concerns.

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

Methodology Brolga's Environment (2008)
DAFWA (2008)
JSW Holdings (2008)
GIS Database:
- Public Drinking Water Source Areas (PDWSAs)
- Kununurra 50cm Orthomosaic

(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 is located approximately 4.5 kilometres north-west of Kununurra which experiences mean annual rainfall of 798.3 millimetres and mean annual evaporation of 2810 millimetres (BoM, 2008; CSIRO, 2002). The area under application is located on the eastern flood bank of the Ord River which may infrequently be inundated by high flow events during the wet season (GIS Database; Brolga's Environment, 2008). The vast majority of the application area is un-vegetated except for a small, relatively dense area of approximately 2.76 hectares in the north-west of the application area (Brolga's Environment, 2008; GIS Database). The size of the area proposed to be cleared is unlikely to alter the drainage characteristics of the Ord River catchment.

The proposed clearing is unlikely to cause an increase in peak flood height or duration (Brolga's Environment, 2008; GIS Database).

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

Methodology BoM (2008)
Brolga's Environment (2008)
CSIRO (2002)
GIS Database:
- ANCA, Wetlands
- Hydrography, linear (hierarchy)
- Kununurra 50cm Orthomosaic

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

Comments

JSW Holdings Pty Ltd has applied to clear up to 14 hectares of native vegetation on Mining Lease 80/417 for the purpose of mineral production. The vast majority of the area under application appears to have undergone a significant degree of disturbance as a result of historic mining activities (Brolga's Environment, 2008; JSW Holdings, 2008; GIS Database), except for a small, relatively dense area of riparian vegetation totalling approximately 2.76 hectares in the north-west of the application area. This area was not subject to a vegetation survey due to occupational safety limitations (crocodiles). In order to protect this vegetation, the Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of maintaining the riparian vegetation within the Lake Kununurra wetland area.

There is one native title claim over the area under application; (WC94/0002) (GIS Database). The claim has been registered with the National Native Title Tribunal on behalf of the claimant group (GIS Database).

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 5 registered Sites of Aboriginal Significance (Site ID: 12578, 12798, 13124, 15152 and 15153) within the area applied to clear (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

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.

Methodology Brolga's Environment (2008)
JSW Holdings (2008)
GIS Database:
- Native Title Claims - DLI 7/11/05
- Sites of Aboriginal Significance DIA

4. Assessor's comments

Comment

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

It is recommended that should a permit be granted, conditions be endorsed on the permit with regards to weed management, maintaining riparian vegetation, retaining and stockpiling topsoil for use in rehabilitation, recording areas cleared and reporting against the permit conditions.

5. References

- BoM (2008). Climate Statistics for Australian Locations. A Search for Climate Statistics for Kununurra, Australian Government Bureau of Meteorology, viewed 16 May 2008. <http://www.bom.gov.au/climate/averages/tables/cw_002038.shtml>
- Brolga's Environment (2008). Additional Documentation for Clearing Permit Application for M80/77, Submitted to the Department of Industry and Resources, Prepared for JSW Holding Pty Ltd, Prepared by Brolga's Environment, January 2008.
- CSIRO (2002). Preliminary Surface Water - Groundwater Interaction Modelling: Water Balances, Technical Report No 22/02, Prepared by Barr, A., D. and Salama, R., B. CSIRO Land and Water, Perth, May 2002.
- DAFWA (2008). Land Degradation Assessment Report. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR), received 10 June 2008. Office of the Commissioner of Soil and Land Conservation, Department of Agriculture and Food Western Australia.
- Department of Natural Resources and Environment (2002) Biodiversity Action Planning. Action planning for native biodiversity at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.
- Environment Australia (2001). A Directory of Important Wetlands in Australia, Third Edition. Environment Australia, Canberra.
- Graham, G. (2001). Victoria Bonaparte 1 (VB1 - Victoria Bonaparte 1 subregion). In a Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management, pp 629-636.
- JSW Holdings (2008). Documentation for Clearing Permit Application for M80/417, Submitted to the Department of Industry and Resources, Prepared for JSW Holding Pty Ltd, January 2008.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.

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.
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.