



## 1. Application details

### 1.1. Permit application details

Permit application No.: 2028/1  
Permit type: Purpose Permit

### 1.2. Proponent details

Proponent's name: BHP Billiton Nickel West

### 1.3. Property details

Property: M69/72  
M69/73  
M69/74  
M69/75  
E69/2201  
Local Government Area: Shire Of Ngaanyatjarraku  
Colloquial name: West Musgrave Project

### 1.4. Application

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

## 2. Site Information

### 2.1. Existing environment and information

#### 2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
<p>Beard vegetation associations have been mapped at a 1:250,000 scale for the whole of Western Australia, and are a useful tool to examine the vegetation extent in a regional context. Two Beard vegetation associations are located within the area proposed to be cleared (GIS Database, Shepherd <i>et al.</i>, 2001). These are:</p> <p>18: Low woodland; mulga between sandridges; and</p> <p>19: Low woodland; mulga (<i>Acacia aneura</i>) (GIS Database, Shepherd <i>et al.</i>, 2001).</p> <p>The vegetation of the proposed clearing area has been surveyed by Western Botanical (2005; 2007). The survey report broadly characterised the vegetation by:</p> <ul style="list-style-type: none"> <li>- Mulga woodlands with ephemeral and perennial grass understorey on lower lying hardpan plains;</li> <li>- Spinifex hummock grasslands on sandy substrates either with or without a substantial shrub stratum; and</li> <li>- Shrub dominated vegetation lacking substantial grass component on low sand dunes (Western Botanical, 2005; 2007).</li> </ul> <p>Within these vegetation groupings, six habitats were recognised (Western Botanical, 2005). These were:</p> <ul style="list-style-type: none"> <li>- Dune shrublands;</li> <li>- Low dune mallee shrubland;</li> <li>- Sand sheet spinifex grasslands;</li> <li>- Wanderrie grassland;</li> <li>- Mulga - Wanderrie woodlands; and</li> <li>- Calcrete platform shrublands (Western Botanical, 2005).</li> </ul>	<p>BHP Billiton Nickel West Pty Ltd (from this point forward referred to as BHPBNW) has applied to clear up to 19.5 hectares of native vegetation, within a total application area of approximately 3981.9 hectares. The proposed clearing is for the purpose of mineral exploration.</p> <p>The proposed clearing areas are located approximately 580 kilometres north-west of Laverton town site (GIS Database).</p> <p>BHPBNW has developed an Environmental Management System (EMS), based on the AS/NZS ISO14001:1996 EMS standard, and the BHP Billiton EMS guidelines (BHPBNW - EMP, 2007). This EMP will be used to minimise environmental impacts of the proposed exploration works.</p> <p>The BHPBNW EMP outlines the techniques which will be employed during clearing. These include:</p> <ul style="list-style-type: none"> <li>• where possible, existing track will be utilised;</li> <li>• ground disturbance will be kept to a minimum;</li> <li>• drill pads will be designed so that disturbances to landforms and vegetation will be minimised, especially to declared rare and priority flora that have been mapped;</li> <li>• pads will be positioned to avoid the need for clearing substantial stands of trees and large shrubs</li> <li>• where earthmoving machinery is required, vegetation should be rolled with a blade to preserve root stock and encourage regrowth (BHPBNW-EMP, 2007).</li> </ul>	<p>Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994)</p> <p>To</p> <p>Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994)</p>	<p>The vegetation condition is derived from the vegetation description provided in Western Botanical (2005; 2007).</p>

### 3. Assessment of application against clearing principles

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

<b>Comments</b>	<p><b>Proposal is not likely to be at variance to this Principle</b></p> <p>The proposed clearing is located within the Central Ranges Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, and the Central Ranges - Mann-Musgrave Block IBRA subregion (GIS Database).</p> <p>Graham and Cowan (2001) assessed the biodiversity of the Mann-Musgrave Block IBRA subregion, finding that the subregion is rich and diverse in both its flora and fauna. However, most species are wide ranging and usually occur in at least one, and often several adjoining subregions (Graham and Cowan, 2001).</p> <p>One species of flora of conservation significance (<i>Microcorys macredieana</i> (Priority 3)) was recorded during the Western Botanical (2005; 2007) surveys. However, BHPBNW has committed to avoiding this species.</p> <p>The Western Botanical (2005) survey identified 98 species from 26 families within the proposed clearing envelope.</p> <p>The vegetation and habitat types occurring within the application area are well represented in the region (GIS Database), and the application area is unlikely to be of higher biodiversity value than the surrounding areas.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this Principle.</p>
<b>Methodology</b>	<p>Graham and Cowan (2001). GIS Database:</p> <ul style="list-style-type: none"><li>- Interim Biogeographic Regionalisation of Australia - EA 18/10/00.</li><li>- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00.</li><li>- Pre-European Vegetation - DA 01/01.</li></ul>

#### (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.

<b>Comments</b>	<p><b>Proposal is not likely to be at variance to this Principle</b></p> <p>There are no records of fauna of conservation significance occurring within the area applied to clear (GIS Database).</p> <p>A search of the Department of Environment and Conservation (DEC) databases conducted by DEC on behalf of the proponent, revealed ten species of conservation significance previously recorded within a 100 kilometre radius of the application area. These are:</p> <ul style="list-style-type: none"><li>- <i>Isoodon auratus auratus</i> (Golden Bandicoot - Wintarru) - Vulnerable;</li><li>- <i>Macrotis lagotis</i> (Bilby) - Vulnerable;</li><li>- <i>Mymecobius fasciatus</i> (Numbat) - Vulnerable;</li><li>- <i>Notoryctes sp</i> (Marsupial Mole) - Endangered;</li><li>- <i>Petrogale lateralis ssp.</i> (McDonnell Range Rock-wallaby) - Vulnerable;</li><li>- <i>Leporillus conditor</i> (Greater Stick-nest rat (Wopilkara) - Extinct;</li><li>- <i>Lepioa ocellata</i> (Maleefowl) - Vulnerable;</li><li>- <i>Egernia kintorei</i> (Giant Desert Skink) - Vulnerable;</li><li>- <i>Onychogalea lunata</i> (Crescent Nailtail Wallaby) - Extinct; and</li><li>- <i>Sminthopsis longicaudatus</i> (Long-tailed Dunnart) - Priority 3 (BHPBNW, 2007).</li></ul> <p>The Golden Bandicoot is restricted to the west Kimberley coastal area and a few offshore islands (WA Museum, 2007). It is unlikely that the Golden Bandicoot would occur within the areas proposed to be cleared, or that the proposed small area of clearing would provide significant habitat for this species.</p> <p>The Bilby formerly occurred across the arid and semi-arid zones of the 70% of the continental Australia, however, the species is now restricted to 20% of its former range (Naturebase, 2007). The species is now confined to sparse desert populations in the eastern Pilbara and south to Warburton (WA Museum, 2007). It is unlikely that the proposed clearing would provide significant habitat for the bilby.</p> <p>Numbats were once spread across southern semi-arid and arid Australia (Naturebase, 2007). They are currently only known from a few populations in the south-west of Western Australia (Naturebase, 2007). It is unlikely that the Numbat would be found within the areas proposed to be cleared.</p> <p>The Marsupial Mole is an enigmatic species, rarely observed or recorded (Naturebase, 2007). The species is an inhabitant of sandy desert areas (DEC, 2007), and in WA inhabits sandy areas from the Pilbara, south to Warburton (WA Museum, 2007). It is possible that the marsupial mole would be present within the clearing envelope, however, it is unlikely that the vegetation within the application area would provide significant habitat for this species.</p>
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The habitat of the McDonnell Range Rock-wallaby is granite outcrops, sandstone cliffs and scree slopes in ranges with hummock grassland and occasional fig trees and low shrubs, caves and coastal limestone cliffs (Naturebase, 2007). As these habitats do not occur within the application area, it is unlikely that the proposed clearing will have a significant impact on these species.

The Greater Stick-nest Rat is presumed extinct in the wild on the mainland (DEC, 2007), but translocated species from South Australia have been introduced to islands off Shark Bay (Naturebase, 2007; WA Herbarium, 2007). It is unlikely that this species would be found within the areas proposed to be cleared.

Malleefowl are large ground dwelling birds, that rarely fly unless alarmed (Naturebase, 2007). Found across most of southern Australia, however, the range is highly fragmented (Naturebase, 2007). The species prefers woodland or shrubland habitats, with an abundant litter layer, that provides essential material for the construction of its nest mounds (DEC, 2007). It is unlikely that the proposed clearing area would provide significant habitat for the Malleefowl.

The Giant Desert Skink is a burrowing species of skink, found in a variety of desert habitats, on sandy, clay and loamy soils (DEC, 2007). It is currently sparsely distributed in the Greater Sandy Desert, Gibson Desert, the Great Victoria Desert, and Northern Territory (WA Museum, 2007). It is possible that the species would occur within the areas proposed to be cleared, however, it is unlikely that the proposed clearing areas would represent significant habitat for this species.

The Long-tailed Dunnart lives in rugged rocky areas (DEC, 2007). As these types of habitats are unlikely to be impacted by the proposed clearing, the species is unlikely to be impacted upon as a part of this clearing permit.

The surveys of the area have confirmed that the habitats found within the areas proposed to be cleared are not unique (Mattiske, 2001; Western Botanical, 2005; 2007). Based on this information, and relatively small amount of clearing proposed (19.5 hectares) It is unlikely that the proposed clearing would represent significant habitat for fauna indigenous to Western Australia.

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

**Methodology** DEC (2007).  
Department of the Environment and Water Resources (2007).  
Mattiske (2001).  
Naturebase (2007).  
WA Museum (2007).  
Western Botanical (2005).  
Western Botanical (2007).  
GIS Database:  
- Threatened Fauna - CALM 30/9/05.

**(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**

GIS Databases have no records of threatened flora species within a 50 kilometre radius of the application area (GIS Database). The nearest recorded threatened flora is *Isotropis winneckeii* (P1), located approximately 125 kilometres north of the proposed clearing area (GIS Database).

A desktop survey of Department of Environment and Conservation (DEC) and Western Australian Herbarium rare flora databases conducted on behalf of the proponent yielded 18 priority flora species (Mattiske, 2001). These are:

- *Daviesia arthropoda* (P1);
- *Fuirena nudiflora* (P1);
- *Goodenia gibbosa* (P1);
- *Goodenia gradniflora* (P1);
- *Grevillea aspera* (P1);
- *Isotropis winneckeii* (P1);
- *Menkea lutea* (P1);
- *Neurachne lanigera* (P1);
- *Schoenus centralis* (P1);
- *Comesperma viscidulum* (P2);
- *Acacia auricoma* (P3);
- *Calotis latiuscula* (P3);
- *Eucalyptus sparsa* (P3);
- *Goodenia modesta* (P3);
- *Goodenia schwerinensis* (P3);
- *Lythrum paradoxum* (P3); and

- *Prostanthera centralis* (P3) (Mattiske, 2001).

Three vegetation surveys have been conducted over the area (Mattiske, 2001; Western Botanical, 2005; 2007). During the Western Botanical (2005; 2007) survey, a priority 3 species (*Microcorys macrediana*) was recorded within the proposed areas to be cleared. BHPBNW has committed to avoiding the species during the exploration programme. The Project Manager for the drilling program accompanied Western Botanical during the flora survey, and is consequently able to identify the species in the field, and will ensure the drilling activity disturbance avoids this species (BHPBNW, 2007). The BHPBNW EMP also outlines a number of commitment to protect flora, including:

- advising field personnel of the locations of these species, so exploration activities will not clear within 20 metres of threatened species;
- where possible, existing track will be utilised;
- ground disturbance will be kept to a minimum;
- drill pads will be designed so that disturbances to landforms and vegetation will be minimised, especially to declared rare and priority flora that have been mapped;
- pads will be positioned to avoid the need for clearing substantial strands of trees and large shrubs
- where earthmoving machinery is required, vegetation should be rolled with a blade to preserve root stock and encourage regrowth (BHPBNW-EMP, 2007).

Considering BHPBNW's commitment not to clear within 20 metres of threatened species, the vegetation to be removed is not necessary for the continued in-situ existence of this species.

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

**Methodology** BHPBNW-EMP (2007).  
Mattiske (2001).  
Western Botanical (2005).  
Western Botanical (2007).  
GIS Database:  
- Declared Rare and Priority Flora List - CALM 01/07/05.

**(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 (TECs) within the proposed clearing area (GIS Database). The nearest Ministerially endorsed TECs are located approximately 780 kilometres south west of the proposed clearing area (GIS Database).

The surveys conducted over the area (Mattiske, 2001; Western Botanical, 2005; 2007) did not identify any threatened communities.

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

**Methodology** Mattiske (2001).  
Western Botanical (2005).  
Western Botanical (2007).  
GIS Database:  
- Threatened Ecological Communities - CALM.

**(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**

Approximately 100% of the Pre-European vegetation remains in the IBRA Central Ranges bioregion, and the Mann-Musgrave Block IBRA sub-region, within which this proposal is located (GIS Database, Shepherd *et al.*, 2001). Available aerial photography (BHPBNW, 2007), and information from the surveys (Mattiske, 2001; Western Botanical, 2005; 2007) indicate that the areas surrounding this clearing permit application have not been cleared extensively, as can be seen from the table below.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european % in IUCN Class I-IV Reserves
IBRA Bioregion – Central Ranges	4,701,518	4,700,202	100.0	Least concern	0.0
IBRA Subregion – Mann-Musgrave Block	4,701,518	4,700,202	100.0	Least concern	0.0
Beard veg assoc. – State					
18	19,890,795	19,890,029	100.0	Least concern	5.7
19	4,384,476	4,384,097	100.0	Least concern	0.5
Beard veg assoc. – Bioregion					
18	1,075,927	1,075,161	99.9	Least concern	0.0
19	902,251	902,170	100	Least concern	0.0

\* Shepherd *et al.* (2001) updated 2005

\*\* Department of Natural Resources and Environment (2002)

Whilst there is no representation of Beard Vegetation Association 18 and 19 in conservation estates within the Bioregion, the representation of these two vegetation associations is not considered to be at threat.

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

**Methodology** BHPBNW (2007).  
Mattsike (2001).  
Shepherd *et al.* (2001).  
Western Botanical (2005).  
Western Botanical (2007).  
GIS Database:  
- Interim Biogeographic Regionalisation of Australia (subregions) - EA.  
- Interim Biogeographic Regionalisation of Australia - 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 not likely to be at variance to this Principle**

Except for a few gnamma, rockhole and other short lived soaks, no permanent surface water exists in the area (BHPB-EMP, 2007). There are no watercourses or waterbodies within the proposed clearing application area (GIS database).

The drainage patterns are well defined near the main ranges, but become diffuse and rapidly lost on the plains, within which this application is located (BHPB-EMP, 2007).

The closest non-perennial watercourse is located approximately 10 kilometres west of the proposed clearing envelope.

It is not anticipated that clearing access tracks and drill sites will have a significant impact on the regional hydrology of the area.

None of the flora taxa listed in Mattsike (2001) and Western Botanical (2005; 2007) or observed in the application area during the flora surveys is distinctive of watercourses or wetlands, so is not defined as riparian vegetation.

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

**Methodology** BHPBNW (2007).  
BHPBNW-EMP (2007).  
Mattsike (2001).  
Western Botanical (2005).  
Western Botanical (2007).  
GIS Database:  
- Hydrography, linear - DOE 1/2/04.  
- Hydrography, linear (medium scale, 250k GA).  
- Hydrography, linear (hierarchy) - DOW.  
- Hydrography, linear (course scale, 1M GA).

- Hydrography, linear - DOE 1/2/04.

**(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**

Given that land disturbance will be limited to a series of small drill pads, sumps and connecting tracks, which will be rehabilitated within six months of the drilling program's completion (including replacement of topsoil where available), it is unlikely that the vegetation clearance will result in land degradation (BHPBNW, 2007). With regard to soil erosion subsequent to the clearing of vegetation, the average annual rainfall is 300 millimetres (GIS Database) and usually sporadic. Rainfall in single events can be high, but as the landscape has a low relief (GIS Database; Western Botanical, 2005), with sand dunes and calcrete rises constituting the raised areas, the potential for erosion is very low and the soils in the more undulating areas are sandy in the majority, so there is a high potential for infiltration as opposed to generation of runoff, and subsequently, erosion.

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

**Methodology** BHPBNW (2007).  
Western Botanical (2005).  
GIS Database:  
- Evaporation Isopleths - BOM 09/98.  
- Rainfall, Mean Annual - BOM 30/09/01.  
- Topographic Contours, Statewide - DOLA 12/09/02.

**(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 likely to be at variance to this Principle**

The proposed clearing is within an area of the 'Ranges of the Western Desert', which is listed on the Register for National Estate (GIS Database; BHPBNW, 2007) for its unique aboriginal heritage, landscape and endemic flora values (DEH, 2005). This area is also recognised as Red Book Area 12.19, Ranges of the Western Desert (Conservation through Reserves Committee, 1974) for the same reasons.

The proposed disturbance is small in comparison to the total area listed within the Ranges of the Western Desert. Furthermore, the applicant has an agreement with the Ngaanyatjarra Land Council to gain access to Aboriginal Reserve 17614 for the purposes of mineral exploration and mining (BHP Billiton Nickel West, 2005).

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

**Methodology** BHPBNW (2007).  
Conservation through Reserves Committee (1974).  
DEH (2005).  
Western Botanical (2005).  
Western Botanical (2007).  
GIS Database:  
- Register of National Estate - EA 28/01/03.  
- System 1 to 5 and 7 to 12 Areas - DEP 06/95.

**(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 proposed clearing is not located within a Public Drinking Water Source Area (PDSWA) (GIS Database).

Groundwater within the area under application is fresh to brackish, at between 1,000 - 3,000 milligrams per litre of Total Dissolved Solids (TDS) (GIS Database). Given the small size of the proposed clearing, the quality of the groundwater is unlikely to be impacted by the proposed clearing activity.

The proposed clearing area is relatively flat, and is not associated with any permanent watercourses or waterbodies (GIS Database).

There are no Groundwater Dependent Ecosystems known in the area (GIS Database).

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

**Methodology** GIS Database:  
- Groundwater Salinity, Statewide - DOW.  
- Hydrography, linear - DOE 1/2/04.

- Hydrography, linear (medium scale, 250k GA).
- Hydrography, linear (hierarchy) - DOW.
- Hydrography, linear (course scale, 1M GA).
- Hydrography, linear - DOE 1/2/04.
- Potential Groundwater Dependant Ecosystems - DOE 2004.
- Public Drinking Water Source Areas (PDWSAs) - DOW.
- Topographic Contours, Statewide - DOLA 12/09/02.

**(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 limited amount of clearing proposed (19.5 hectares) in comparison with the extent of the Warburton Basin catchment area (which is approximately 17,195,989 hectares) (GIS Database), is unlikely to result in an increase in peak flood height or flood peak duration.

The mean annual rainfall for the area is approximately 300 millimetres per year, while the evaporation of the area is at around 3400 millimetres per year (GIS Database). Therefore, it is unlikely that the proposed clearing will cause or exacerbate the incidence or intensity of flooding.

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

- Methodology** GIS Database:
- Evaporation Isopleths - BOM 09/98.
  - Hydrographic Catchments - Catchments - DOW.
  - Rainfall, Mean Annual - BOM 30/09/01.

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

**Comments**

The exploration activities will take place within the Aboriginal Reserve 17614. BHPBNW has a current entry permit granted by the Minister for Indigenous Affairs under section 31 of the *Aboriginal Affairs Planning Authority Act 1972* (BHPBNW, 2007).

There is a native title claim over the area under application (WC04\_003). This claim has been registered with the National Native Title Tribunal. However, the mining tenements have been granted in accordance with the future act regime of the *Native Title Act 1993*, and the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are no recorded Aboriginal Sites of Significance within the areas proposed to be cleared (GIS Database). To ensure that there is no disturbance to archaeological heritage or ethnographic sites, BHPBNW EMP employs heritage assessments or surveys under the supervision of a properly qualified anthropologist (or archaeologist), who is acceptable to the Ngaanyatjarra (BHPBNW-EMP, 2007). Usually this involves both a female and male Ngaanyatjarra Council employee or consultant (BHPBNW-EMP, 2007). 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** BHPBNW (2007).  
BHPBNW-EMP (2007).  
GIS Database:
- Aboriginal Sites of Significance - DIA.
  - Native Title Claims - DLI.

**4. Assessor's comments**

Purpose	Method	Applied area (ha)/ trees	Comment
Mineral Exploration	Mechanical Removal	19.5	The proposal has been assessed against the Clearing Principles, and is considered to be not at variance to Principle (e) and not likely to be at variance to Principles (a), (b), (c), (d), (f), (g), (h), (i) and (j).  It is recommended that conditions be imposed on the permit in relation to avoiding the species <i>Microcorys macrediana</i> , rehabilitation of areas cleared for exploration, as well as reporting on any clearing undertaken during the life of the permit.

## 5. References

- BHPBNW (BHP Billiton Nickel West) (2007) *Additional information provided in support of clearing permit*, Perth, Western Australia.
- BHPBNW-EMP (BHP Billiton Nickel West- Environmental Management Plan) (2007) *Minerals Exploration - Exploration Environmental Management Plan - West Musgrave Project draft*, BHPBNW, Western Australia.
- Conservation through Reserves Committee (1974) *Conservation Reserves in Western Australia: Report of the Conservation through Reserves Committee to the Environmental Protection Authority 1974*, Section 2 - Systems 8-12. Conservation through Reserves Committee, Perth, Western Australia.
- DEH (2005). *Australian Heritage Database: Place Details - Ranges of the Western Desert - Warburton Rd, Warburton via Laverton, WA*. DEH, Canberra. Report prepared 29 November 2005. [<http://www.deh.gov.au/cgi-bin/ahdb/search.pl>]
- Department of Environment and Conservation (DEC) (2007) *Threatened and Priority Fauna Database - search results*, DEC, 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.
- Department of the Environment and Water Resources (2007) *EPBC Act List of Threatened Fauna* [online] <http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna> [Last accessed 29/10/2007]
- Graham, D. and Cowan, M. (2001) *Central Ranges 1 (CR1 - Mann-Musgrave Block subregion)*, in A *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*, 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.
- Mattiske Consulting Pty Ltd (2001) *Declared rare and priority flora search at the West Musgraves Project - Warburton*, Report prepared for Western Mining Corporation Ltd, May 2001, Western Australia.
- NatureBase - insert when site working
- 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 (updated 2005).
- WA Museum (2007) *Collections databases* [online <http://www.museum.wa.gov.au/faunabase/prod/index.htm> ] Last accessed 29/10/2007.
- Western Botanical (2005). *Flora and Vegetation of the Babel, Nebo and East Chamber Prospects*, West Musgrave, Western Australia. August 2005. Western Botanical, Mundaring, Western Australia.
- Western Botanical (2007) *Supplementary Drill Hole Vegetation Assessments, Neebo & Babel tenements WB439*, Western Botanical, Midland, Western Australia.

## 6. Glossary

### Acronyms:

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

<b>P1</b>	<b>Priority One - Poorly Known taxa:</b> 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.
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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.