



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 5889/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

1.3. Property details

Property: General Purpose Lease 47/12
General Purpose Lease 47/13
General Purpose Lease 47/14
General Purpose Lease 47/15
General Purpose Lease 47/16
General Purpose Lease 47/17
General Purpose Lease 47/18
General Purpose Lease 47/19
Miscellaneous Licence 47/118

Local Government Area: Shire of East Pilbara

Colloquial name: Barimunya Airport Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
120		Mechanical Removal	Maintenance and upgrade of airport infrastructure, accommodation, and associated works

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 19 December 2013

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 for the whole of Western Australia and are useful to look at vegetation in a regional context. The following Beard vegetation associations are located within the application area (GIS Database):

18: Low woodland; mulga (*Acacia aneura*) and
82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*

The application area contains 18 vegetation associations, as described by ENV (2009):

YFA01: *Corymbia hamersleyana* open woodland over *Acacia tumida* var. *pilbarensis* open shrubland over *Corchorus lasiocarpus* subsp. *lasiocarpus*, *Dicrastylis cordifolia* and *Hybanthus aurantiacus* low open shrubland over *Triodia* sp. Shovelanna Hill very open hummock grassland;

YFA02: *Corymbia deserticola* subsp. *deserticola* and *Corymbia hamersleyana* low open woodland over *Acacia adoxa* var. *adoxo* and *Acacia hilliana* scattered shrubs over *Triodia* sp. Shovelanna Hill scattered hummock grasses;

YFA03: *Corymbia hamersleyana* scattered low trees over *Petalostylis labicheoides* and *Grevillea wickhamii* subsp. *hispidula* low open shrubland over scattered low shrubs over *Triodia epactia* very open hummock grassland;

YFA04: *Corymbia hamersleyana* low open woodland over *Petalostylis labicheoides*, *Acacia tumida* var. *pilbarensis* and *Rulingia luteiflora* low open shrubland over *Triodia epactia* and *Triodia* sp. Shovelanna Hill very open hummock grassland;

YFD04: *Corymbia hamersleyana* scattered low trees over *Gompholobium karjini* low open shrubland over *Triodia* sp. Shovelanna Hill scattered hummock grasses;

YFB02: *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Petalostylis labicheoides* open shrubland over *Acacia tumida* var. *pilbarensis*, *Rulingia luteiflora*, *Grevillea*

wickhamii subsp. *hispidula* and *Dicrasyllis cordifolia* low open shrubland over scattered tussock grasses over scattered herbs;

YFA02: *Corymbia hamersleyana* scattered trees over *Grevillea wickhamii* subsp. *hispidula* scattered tall shrubs over *Acacia hilliana* and *Acacia adoxa* var. *adoxa* low open shrubland over *Triodia* sp. Shovelanna Hill hummock grassland;

YFA03: *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* low open woodland over *Acacia inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* open shrubland over *Triodia* sp. Shovelanna Hill very open hummock grassland over scattered herbs;

YFA04: *Grevillea wickhamii* subsp. *hispidula* and *Acacia tenuissima* scattered tall shrubs over *Acacia hilliana* and *Acacia adoxa* var. *adoxa* open shrubland over *Triodia* sp. Shovelanna Hill very open hummock Grassland;

YFB01: *Corymbia deserticola* subsp. *deserticola* scattered low trees over *Grevillea wickhamii* subsp. *hispidula*, *Solanum phlomoides* and *Goodenia stobbsiana* low open shrubland over *Triodia* sp. Shovelanna Hill very open hummock grassland;

YFB03: *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over scattered low shrubs over *Triodia* sp. Shovelanna Hill very open hummock grassland;

YFB04: Scattered low shrubs over *Triodia* sp. Shovelanna Hill very open hummock grassland over scattered herbs;

YFB05: *Corymbia deserticola* subsp. *deserticola* and *Corymbia hamersleyana* low open woodland over *Hakea chordophylla* scattered tall shrubs over scattered low shrubs;

YFC01: *Eucalyptus gamophylla* low open woodland over *Hakea chordophylla* and *Grevillea wickhamii* subsp. *hispidula* high open shrubland over *Triodia* sp. Shovelanna Hill hummock grassland;

YFC03: *Corymbia deserticola* subsp. *deserticola* low open woodland over *Hakea chordophylla* scattered shrubs over *Triodia* sp. Shovelanna Hill scattered grasses over scattered herbs;

YFD01: *Corymbia deserticola* subsp. *deserticola* low open woodland over scattered low shrubs over *Aristida holathera* var. *holathera* and *Paraneurachne muelleri* very open tussock grassland;

YFD02: *Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Hakea chordophylla* scattered tall shrubs over *Acacia pruinocarpa* scattered shrubs over scattered low shrubs over *Aristida holathera* var. *holathera* very open tussock grassland over *Triodia* sp. Shovelanna Hill scattered hummock grassland;

YFD03: *Corymbia deserticola* subsp. *deserticola* scattered low trees over scattered low shrubs over *Aristida holathera* var. *holathera* scattered tussock grasses.

Ecologia (2008) also described two vegetation types within the application area:

- a) Isolated to open *Acacia inaequilatera* over open to moderately dense *Triodia wiseana*. and
- b) *Eucalyptus camaldulensis* /*E. victrix* +/- *Melaleuca leucadendra* over open to moderately dense tall shrubland over moderately dense soft grasses.

Clearing Description	Barimunya Airport Project. BHP Billiton Iron Ore Pty Ltd has applied to clear up to 120 hectares of native vegetation within a total application area of approximately 213 hectares, for the purpose of maintenance and upgrade of airport infrastructure, accommodation, and associated works. The proposed clearing is located approximately 94.4 kilometres north west of Newman, in the Shire of East Pilbara.
Vegetation Condition	Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994) to Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994).
Comment	Vegetation condition has been determined by BHP (2013) based on flora and vegetation assessments conducted by Ecologia (2008) and ENV (2009). Vegetation within drainage lines and floodplains has been subjected to grazing, but is in Very Good condition. There are small areas within the application area that are considered to be completely degraded, where pre-existing infrastructure occurs or land has been previously cleared. Clearing will be by mechanical means.

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 Flora and vegetation assessments over the application area have been conducted by Ecologia (2008) and ENV (2009). The assessment conducted by Ecologia (2008) from 13 - 19 November 2007 and 10 - 17 March 2008 surveyed the area now covered by the accommodation village. The remaining vegetation within the application boundary was surveyed by ENV (2009) from 24 - 26 November 2008. A fauna assessment was also conducted over this area by Biologic on 29 April 2011 (Biologic, 2011).
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The application is located within the Pilbara (PIL) Interim Biogeographic Regionalisation of Australia (IBRA) region and the Hamersley (PIL3) subregion (GIS Database). The Pilbara region represents a transitional zone between semi-arid and tropical climates (Kendrick, 2001). The Hamersley IBRA subregion comprises Proterozoic ranges, plateaus, and gorges of basalt, shale and dolerite (Kendrick, 2001).

The vegetation within the application area is mapped as belonging to Beard associations 18 and 82 (GIS Database). Together, Ecologia (2008) and ENV (2009) described a total of 19 vegetation associations within the application area, which ranged from Good to Excellent condition (Keighery, 1994; BHP, 2013). Where pre-existing infrastructure occurs, vegetation condition is Completely Degraded (BHP, 2013). One introduced flora species has been recorded as present within the application area (*Bidens bipinnata*), and two introduced species (Buffel Grass; *Cenchrus ciliaris* and Spiked Malvastrum; *Malvastrum americanum*) have been recorded directly adjacent to the application area (Ecologia, 2008). An additional four unconfirmed introduced flora species were also recorded within the Yandi Camp area, including *Ficus benjamina* (Ficus), *Jacaranda mimosifolia* (Jacaranda), *Phoenix dactylifera* (Date Palm) and *Washingtonia filifera* (Cotton Palm), which are considered to be plants that were used for landscaping (BHP, 2013). BHP have advised that weed control will be carried out according to the *BHP Billiton Iron Ore Weed Control and Management Procedure* (BHP, 2010; BHP, 2013). Invasive flora species can decrease the biodiversity value of an area, as they out-compete native vegetation for available resources, contribute to land degradation and increase the frequency and intensity of fires (DEC, 2011). Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

No vegetation associations belonging to a Threatened Ecological Community (TEC) were identified within the survey area during flora and vegetation assessments (Ecologia, 2008; ENV, 2009; BHP, 2013). These findings concur with available databases (GIS Database). The proposed clearing lies within the buffer boundary of the Fortescue Marsh Priority Ecological Community (PEC). This Priority 1 PEC is situated on the Fortescue River, associated with endemic *Eremophila* species and several near endemic and new to science samphires (DEC, 2013b). Threats to this PEC include altered hydrology, grazing pressure, weed invasion and mining activity (DEC, 2013b). However, the vegetation within the application boundary is not considered to be representative of the Fortescue Marsh PEC, and much of the application area has been previously disturbed (ENV, 2009; BHP, 2013).

Seventy-nine flora taxa, representing 24 families and 44 genera, were recorded within the Barimunya Airport survey area (ENV, 2009). One Priority 2 species, *Isotropis parviflora*, occurs within the application boundary but has been excluded from the application area using 10 metre buffers (BHP, 2013).

Biologic (2011) undertook opportunistic fauna surveys within the Barimunya airport project area. This survey recorded one mammal, 17 avian, and three reptile species to be present within the application boundary (Biologic, 2011). Within the vicinity of the study area, Biologic (2011) advise that a total of 23 native mammals, 98 birds, 53 reptiles and three amphibian species have been recorded by previous surveys. This is consistent with records within the Naturemap database using a 10 kilometre buffer around the application area (DEC, 2013).

Biologic (2011) identified three fauna habitat types, including a) drainage line, b) alluvial and c) rocky hillslopes. Two Conservation significant species have been recorded to be present within the application area, including the Rainbow Bee-eater (*Merops ornatus*; Migratory) and the Western Pebble-mound Mouse (*Pseudomys chapmani*; Priority 4). Based on the types of fauna habitat present, and conservation significant fauna previously recorded within the vicinity of the application area, an additional 10 conservation significant fauna species are considered to potentially occur within the application area. However, the potential impact on each of these 10 species is considered by Biologic (2011) to be low, due to the absence of breeding or critical foraging habitat.

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

Methodology BHP (2010)
BHP (2013)
Biologic (2011)
DEC (2011)
DEC (2013a)
DEC (2013b)
Ecologia (2008)
ENV (2009)
Keighery (1994)
Kendrick (2001)

(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**

A fauna survey conducted by Biologic (2011) identified three fauna habitat types within the application area. These included:

- a) Drainage Line
- b) Alluvial habitat, and
- c) Rocky Hillslopes.

Two conservation significant fauna were noted to inhabit the application area, including the Rainbow Bee-eater (*Merops ornatus*; Migratory) and the Western Pebble-mound mouse (*Psuedomys chapmani*; Priority 4) (Biologic, 2011). However, the habitat types recorded within the application area were not considered to represent critical habitat for these or any other fauna species, due to their availability outside the application boundary (BHP, 2013; GIS Database).

The application area also includes 3 small rehabilitated areas, which are considered to have low value as a fauna habitat (Biologic, 2011).

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

Methodology BHP (2013)
Biologic (2011)
GIS Database:
- Weeli Wolli 50cm Orthomosaic – Landgate 2004

(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**
The flora and vegetation surveys conducted by Ecologia (2008) and ENV (2009) did not identify any Threatened flora within the application area. Similarly, no Threatened flora were reported by available databases within a 10 kilometre radius of the proposed clearing (DEC, 2013a; GIS Database).

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

Methodology DEC (2013a)
Ecologia (2008)
ENV (2009)
GIS Database:
- Threatened and Priority Flora

(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**
No TECs were identified within the application area by the flora and vegetation survey conducted by Ecologia (2008) or ENV (2009). These findings are consistent with available databases (GIS Database). The nearest TEC is the Ethel Gorge TEC, 93.1 kilometres south east of the application area (GIS Database).

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

Methodology Ecologia (2008)
ENV (2009)
GIS Database:
- Threatened Ecological Sites Buffered

(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 Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, in which approximately 99.6% of the pre-European vegetation remains (see table) (Government of Western Australia, 2013; GIS Database).

The vegetation within the application area has been mapped as Beard vegetation associations 18 and 82 (GIS Database). Over 90% of these Beard vegetation associations remain at both a state and bioregional level (Government of Western Australia, 2013). Based on aerial imagery, the vegetation within the application area is neither a remnant itself nor does it form part of any remnants within the local area (GIS Database).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DEC Managed Lands

IBRA Bioregion – Pilbara	17,808,657	17,733,584	~99.6	Least Concern	8.4
Beard veg assoc. – State					
18	19,892,305	19,843,727	~99.8	Least Concern	6.29
82	2,565,901	2,553,217	~99.5	Least Concern	10.51
Beard veg assoc. – Bioregion					
18	676,557	672,424	~99.39	Least Concern	17.16
82	2,563,583	2,550,899	~99.5	Least Concern	10.52

* Government of Western Australia (2013)

** 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)
Government of Western Australia (2013)
GIS Database:
- Pre-European Vegetation
- Weeli Wolli 50cm Orthomosaic – Landgate 2004

(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

BHP proposed to clear native vegetation within a boundary encompassing three non-perennial watercourses (BHP, 2013; GIS Database). Aerial imagery indicates that the vegetation growing along these watercourses is riparian in nature (GIS Database).

The flora and vegetation survey completed by ENV (2009) over the Barimunya airport area identified five vegetation associations which occur in association with the minor drainage lines and gullies. These were YFA01, YFC02, YFC04, YFB06 and YFB02.

BHP have advised that any clearing associated with watercourses will be restricted to maintenance purposes only (BHP, 2013). Potential impacts to riparian vegetation as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition.

Based on the above, the proposed clearing is at variance to this principle.

Methodology BHP (2013)
ENV (2009)
GIS Database
- Hydrography, linear
- Weeli Wolli 50cm Orthomosaic – Landgate 2004

(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 encompasses three land systems (GIS Database). Approximately two thirds of the proposed clearing lies within the McKay land system and the Platform land system (GIS Database). The Mackay land system is comprised of hard spinifex vegetation upon hill tracts, ridges, plateaus, stony plains and interfluves, dissected by moderately spaced drainage patterns within narrow valleys (Van Vreeswyk et al., 2004). The Platform land system consists of plains dissected by steep slopes and closely spaced drainage patterns (Van Vreeswyk et al., 2004). Neither of these land systems are considered to be susceptible to erosion.

The remainder of the application area falls within the Newman land system, which consists of mountains, ridges and plateaus (Van Vreeswyk et al., 2004). This land system is the second largest within the Pilbara, and is especially common within the Hamersley Range (Van Vreeswyk et al., 2004). A very small proportion of this land system has been affected by erosion.

Given that a majority of the land within the application boundary is not considered to be susceptible to erosion, and that a majority of the proposed works under this permit will be for maintenance purposes only, it is unlikely that a high level of land degradation will occur as a result of the proposed clearing.

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

Methodology 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 likely to be at variance to this Principle**
The application area does not lie within any conservation areas managed by the Department of Parks and Wildlife (GIS Database). The nearest conservation area is the Karijini National Park, which is an A Class Nature Reserve (GIS Database). It is located approximately 55 kilometres west of the application area (GIS Database). From this distance, the proposed clearing is not likely to impact the environmental values of the Karijini National Park.

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

Methodology GIS Database:
- DEC Tenure

(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 does not occur within a Public Drinking Water Source Area (PDWSA), however it is located within the proclaimed Pilbara groundwater area under the *Rights in Water and Irrigation Act 1914* (GIS Database). Any groundwater extraction and/or taking or diversion of surface water for the purposes other than domestic and/or stock watering is subject to licence by the Department of Water. The application area covers one minor, non-perennial watercourse near the Yandi accommodation village, and two larger non-perennial watercourses west of the airport strip (GIS Database).

The clearing of native vegetation has the potential to destabilise soils and cause temporary sedimentation to watercourses. However, clearing within creeks and drainage lines will be avoided, and any clearing near these areas will be for maintenance purposes only (BHP, 2013). Furthermore, annual evaporation rates exceed rainfall in this region (BoM, 2013), and the hydroperiod of ephemeral watercourses within the application area is likely to be restricted, thus limiting the scope for surface water deterioration. BHP have committed to the implementation of measures to minimise erosion along watercourses and the degradation of surface water quality. Potential impacts to surface water as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition.

Groundwater salinity in the local area is estimated to be between 500 - 1,000 milligrams/Litre Total Dissolved Solids (TDS), which is considered marginal (GIS Database). The proposed clearing activity is not likely to significantly alter salinity levels within the application area.

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

Methodology BHP (2013)
BoM (2013)
GIS Database:
- Groundwater Salinity, Statewide
- Hydrography, linear
- Public Drinking Water Source Areas (PDWSAs)

(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**
Mean annual rainfall in Newman is approximately 318 millimetres (BoM, 2013). The Pilbara region represents a transitional zone between semi-arid and tropical climates, and receives a majority of its rainfall during the summer months (Kendrick, 2001; CALM, 2002). It is likely that during times of intense rainfall there may be some localised flooding. The proposed clearing is unlikely to significantly alter the intensity of flooding within the application area or surrounding areas.

The application area is located within the Fortescue River Upper catchment area (GIS Database). However, given the size of the area to be cleared (120 hectares) in relation to the size of the catchment area (2,975,192 hectares), the proposed clearing is not likely to increase the potential for flooding in this region (GIS Database).

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

Methodology BoM (2013)
CALM (2002)
Kendrick (2001)

GIS Database:
- Hydrographic Catchments - Catchments

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

Comments

There is one native title claim over the area under application (GIS Database). This claim (WC2011/006) has been registered with the Native Title Tribunal on behalf of the claimant group (GIS Database). However, tenure 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*.

According to available databases, there are six registered Aboriginal Sites of Significance within the application area (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.

It is the proponent's responsibility to liaise with the Department of Environment Regulation (formerly 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.

The clearing permit application was advertised on 25 November 2013 by the Department of Mines and Petroleum inviting submissions from the public. There were no submissions received.

Methodology GIS Database:
- Aboriginal Sites of Significance
- Native Title Claims – Registered with the NNTT

4. References

- BHP (2010) BHP Billiton Iron Ore Weed Control and Management Procedure. SPR-IEN-LAND-003.
- BHP (2013) Barimunya Airport: Native Vegetation Clearing Permit Application Supporting Document for Maintenance and Upgrades for Airport, Accommodation Camp and Associated Infrastructure. BHP Billiton Iron Ore, Western Australia.
- Biologic (2011) Barimunya Camp Vertebrate Fauna Survey. Consultants Report for BHP Billiton Iron Ore.
- BoM (2013) Climate Statistics for Australian Locations. Climate Statistics for Australian Locations. A Search for Climate Statistics for Newman, Australian Government Bureau of Meteorology, http://www.bom.gov.au/climate/averages/tables/cw_007176.shtml, viewed December 2013.
- CALM (2002) Bioregional Summary of the 2002 Biodiversity Audit for Western Australia. Department of Conservation and Land Management, 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.
- DEC (2011) Invasive Plant Prioritisation, Department of Environment and Conservation, Perth.
- DEC (2013a) NatureMap: Mapping Western Australia's Biodiversity, DEC, <http://naturemap.dec.wa.gov.au/default.aspx>, viewed November 2013.
- DEC (2013b) Priority Ecological Communities for Western Australia. Species and Communities Branch, Department of Environment and Conservation, Perth.
- Ecologia (2008) Marillana Creek (Yandi) Mining Operations – Two Phase Assessment of the Flora and Vegetation of the Proposed Marillana Creek (Yandi) Mine Extension Area RGP5 – KBR. Consultants Report for BHP Billiton Iron Ore.
- ENV (2009) Rapid Growth Project 5: Yandi Flora Survey and Assessment of Barimunya Airport and a Potential Borrow Area. Consultants Report for BHP Billiton Iron Ore.
- Government of Western Australia (2013) 2012 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of October 2012. WA Department of Environment and Conservation, Perth.
- Keighery, B.J (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Kendrick, P. (2001) Pilbara 3 (PIL3 – Hamersley Subregion). In A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002 (eds J. E. May & N. L. McKenzie). Department of Conservation and Land Management, WA.
- Van Vreeswyk, A.M.E., Payne, A.L., Leighton, K.A., Hennig, P (2004) An inventory and condition survey of the Pilbara Region, Western Australia, Technical Bulletin No. 92 Department of Agriculture Western Australia, South Perth.

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
CALM	Department of Conservation and Land Management (now DEC), Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DEC), Western Australia
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DoE	Department of Environment (now DEC), Western Australia
DoIR	Department of Industry and Resources (now DMP), Western Australia
DOLA	Department of Land Administration, Western Australia
DoW	Department of Water
EP Act	Environmental Protection Act 1986, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
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 Act	Rights in Water and Irrigation Act 1914, Western Australia
s.17	Section 17 of the Environment Protection Act 1986, Western Australia
TEC	Threatened Ecological Community

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.