Government of Western Australia
Department of Mines and Petroleum

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4025/2
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **BHP Billiton Iron Ore Pty Ltd**

1.3. Property details

Property: *Iron Ore (Mt Newman) Agreement Act 1964*, Mineral Lease 244SA (AML 70/244)
Local Government Area: Shire of East Pilbara
Colloquial name: Newman Hub Expansion Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
46.79		Mechanical Removal	Mineral Production and Associated Activities

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 29 September 2011

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
Beard vegetation associations have been mapped for the whole of Western Australia. One Beard vegetation association has been mapped within the application area (GIS Database). **82:** Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*. The vegetation associations of the areas surrounding the Mount Whaleback and Orebody 29 minesites were mapped by Halpern Glick Maunsell in 1997. ENV Australia conducted a vegetation survey of the area in August 2006 and confirmed the following nine vegetation associations: 1) Dense *Acacia citronoviridis* woodland; 2) Dense *Acacia aneura* woodland; 3) Open *Acacia aneura* woodland / tall shrubland; 4) Tree steppe of *Eucalyptus leucophloia* over *Triodia basedowii*; 5) Tree steppe of *Eucalyptus* species over *Triodia wiseana*; 6) Shrub steppe of *Acacia inaequilatera* over *Triodia basedowii*; 7) Shrub steppe of *Acacia inaequilatera* over *Triodia wiseana*: 8) Shrub steppe of *Acacia bivenosa* over *Triodia pungens*; 9) Shrub steppe of *Acacia inaequilatera*, *Eremophila fraseri* over *Triodia pungens* (ENV, 2006b).	BHP Billiton Iron Ore Pty Ltd (BHP Billiton) has applied to clear up to 46.79 hectares, within a total application area of approximately 261 hectares. Clearing will be for stockpiling of ore, overburden and topsoil, and warehouse construction. The application area is made up of three separate defined areas. The three areas are located, respectively: 1. to the south of the Mount Whaleback minesite, near the Orebody 30 minesite; 2. north of the existing tailings dam; and 3. outside of the Mount Whaleback security gate, to the east of Orebody 29 (ENV, 2006c). The application areas are located immediately adjacent to the existing Mount Whaleback and Orebody 29 opencut iron ore mines, which are located approximately 5 kilometres west of the town of Newman, in the Pilbara region. The topsoil, vegetation and litter layer of all areas to be disturbed will be stockpiled	Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994); To Pristine: No obvious signs of disturbance (Keighery, 1994).	Clearing permit CPS 4025/1 was granted by the Department of Mines and Petroleum on 23 December 2010 and was valid from 15 January 2011 to 31 December 2015. The clearing permit authorised the clearing of up to 28.19 hectares of native vegetation. An application to amend this permit was received by the Department of Mines and Petroleum on 8 August 2011. The application requested an increase of 18.6 hectares to the amount of clearing permitted and an increase of approximately 13 hectares to the permit boundary. The purpose of the permit has also been changed from 'stockpiling of ore, overburden and topsoil' to 'mineral production and associated activities' to allow for the proposed warehouse construction. It is considered unlikely that

ENV conducted a vegetation survey of the three application areas in October 2006. ENV (2006c) reported that although some pockets of vegetation were considered to be in good to excellent condition, much of the application area was degraded due to a long history of disturbance from human activity associated with the adjacent mine sites.

for later use in rehabilitation. Topsoil from weed-infested areas (particularly Mexican Poppy) will be separated, and will not be reused (BHP Billiton, 2006).

the proposed amendment will cause any significant additional environmental impacts.

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

The application area occurs within the Hamersley (PIL3) Interim Biogeographic Regionalisation for Australia (IBRA) subregion (GIS Database). This subregion is generally described as Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (CALM, 2002).

A flora and vegetation survey was undertaken over the application area in October 2006 (ENV, 2006c). Much of the application area was degraded by anthropogenic activity, either directly through clearing or indirectly through the introduction of weeds (ENV, 2006c). ENV Australia delineated the vegetation into seven broad major habitats based predominantly on landforms. The vegetation condition was described as poor for all the sites in the floodplain vegetation mapping unit, mainly due to the presence of weeds. The vegetation was in better condition on hill slopes due to a lower occurrence of weeds (ENV, 2006c).

A total of 285 plant taxa were recorded from the application area (ENV, 2006c). This is slightly higher than the 240 taxa that were recorded from the larger 1700 hectare survey of the adjacent Mount Whaleback area (ENV, 2006c). This higher species richness can be explained by the variety of landform units that were within the three sections of the application area. A further flora survey was conducted by ENV (2011) in January 2011 as a supporting document for an amendment to Clearing Permit CPS 4025/1. This survey recorded a total of 127 plant taxa over a 703 hectare study area (ENV, 2011). The application area contained small hills, rocky and sandy plains, and significant drainage corridors (Whaleback Creek) (ENV, 2006c). These provide heterogeneous flora habitats as there may be a diversity of soil type, soil depth, slope and aspect (ENV, 2006c).

Sixteen weed species were recorded during the survey, within the application area and its surrounds: *Acetosa vesicaria,* Ruby Dock; *Argemone ochroleuca* subsp. *ochroleuca,* Mexican Poppy; *Bidens bipinnata,* Bipinnate Beggartick; *Cenchrus ciliaris,* Buffel Grass; *Malvastrum americanum,* Spike Malvastrum; *Sonchus oleraceus,* Common Sowthistle; *Solanum nigrum,* Black Berry Nightshade; *Conyza bonariensis,* Flaxleaf Fleabane; *Sisymbrium orientale,* Indian Hedge Mustard; *Euphorbia hirta,* Asthma Plant; *Pseudognaphalium luteoalbum,* Jersey Cudweed; *Rumex crispus,* Curled Dock; *Washingtonia filifera; Agave americaca,* Century Plant*; Tamarindus indica,* Tamarind; and *Schinus molle,* Pepper Tree (ENV, 2006c). One of these species, the Mexican Poppy, is listed as a Declared Weed by the Department of Agriculture and Food (DAFWA) (ENV, 2006c; ENV, 2011). The Mexican Poppy is known to occur around creek edges, riverbanks and roadsides, and BHP Billiton has adopted a weed management plan to control infestations (BHP Billiton 2006; ENV, 2006c). The high number of introduced plant taxa is an indication of the high level of disturbance of the application area (ENV, 2006c). Weed management will reduce the risk of the spread or introduction of weed species into non-infested areas.

No Declared Rare Flora, Threatened Ecological Communities or Priority Ecological Communities were recorded within the application area, during both the desktop survey and the field surveys (ENV, 2006c; ENV, 2011; GIS Database). The Priority flora species *Acacia kenneallyi* (P3) was recorded within the application area during the October 2006 survey (ENV, 2006c), however, the current species distribution does not reflect this (Western Australian Herbarium, 2011).

A total of 255 fauna species, comprised of seven amphibian, 89 reptile, 119 bird and 40 mammal species, have previously been recorded within the vicinity of the application area (ENV, 2011). The majority of these species are unlikely to occur within the application area on a regular basis as the records encompass a large area and a wide range of habitats (ENV, 2011). The fauna habitats within the Mount Whaleback project area are well surveyed and well represented within the Ophthalmia Ranges of the Pilbara region (ENV, 2006a). A low number of fauna species of conservation significance have been recorded in the Mount Whaleback project area (ENV, 2006a).

The clearing permit application areas are situated immediately adjacent to a large operational minesite and associated roads and infrastructure. ENV (2006c) report that much of the application area is degraded due to longterm disturbance associated with the adjacent minesite.

Numerous biological surveys have been conducted over the Mount Whaleback area, over a number of years. The Department of Environment and Conservation (DEC) considers that the flora and fauna assessments have demonstrated adequately that the vegetation proposed to be cleared is representative of other areas in the region and is not restricted in nature, or of significant biodiversity value (DEC, 2007). DEC also notes that

provided BHP Billiton undertakes mining activites in adherence to their Significant Species Management Plan the proposal is unlikely to be variance to this Principle.

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

Methodology BHP Billiton (2006)
CALM (2002)
DEC (2007)
ENV (2006a)
ENV (2006c)
ENV (2011)
Western Australian Herbarium (2011)
GIS Database:
- Declared Rare and Priority Flora List
- IBRA WA (Regions - Sub Regions)
- Threatened Ecological Sites Buffered

(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

Many biological surveys have been conducted in the Pilbara bioregion, over several years, mainly on behalf of the mining industry. Approximately 10 terrestrial fauna surveys have been undertaken in the vicinity of the Ophthalmia Ranges, which are located approximately 5 kilometres to the north of the Mount Whaleback mine site, and extend to the east of Newman (ENV, 2006a). Two previous fauna surveys were conducted within the Mount Whaleback mine project area in 1997 and 1998 (BHP Billiton, 2006).

A fauna survey covering a large area surrounding the Mount Whaleback and Orebody 29 mine sites was conducted by ENV Australia environmental consultants in September 2006 (ENV, 2006a). This survey included parts of the current clearing permit application. All of the habitat types within the survey areas are well represented within the wider Pilbara region (ENV, 2006a). ENV (2006c) report that much of the current clearing permit application area is degraded due to weed invasion and long term disturbance associated with the adjacent mine site.

The most recent desktop and reconnaissance fauna survey of the application area and its surrounds was conducted by ENV (2011) in January 2011. This survey identified a total of 255 fauna species, comprised of seven amphibian, 89 reptile, 119 bird and 40 mammal species, that have previously been recorded within the vicinity of the application area (ENV, 2011). The majority of these species are unlikely to occur within the application area on a regular basis as the records encompass a large area and a wide range of habitats (ENV, 2011). The 2006 survey also identified a number of species which were not recorded in the previous surveys. DEC (2007) considers that the results of the fauna assessment surveys of the Mount Whaleback area have enabled a comprehensive characterisation of the Mount Whaleback area from a faunal perspective. DEC is confident that the fauna habitat present at Mount Whaleback has now been adequately surveyed to ascertain the conservation significance of the Mount Whaleback mine project area, and it would appear that it does not contain habitat which is restricted to the project area. The surveys have adequately demonstrated that the vegetation and fauna habitats proposed to be cleared in the Mount Whaleback project area are adequately represented in a broader context in the Ophthalmia Range (DEC, 2007).

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

Methodology BHP Billiton (2006)
DEC (2007)
ENV (2006a)
ENV (2006c)

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

Comments

Proposal is not likely to be at variance to this Principle

According to available databases there are no known records of Declared Rare Flora (DRF) within the application area (GIS Database). The nearest known DRF are six populations of *Lepidium catapycnon*, approximately 3-5 kilometres north-west of the western-most section of the application area (GIS Database). DEC has advised that the proposed clearing is unlikely to have any impact on these populations (DEC, 2007).

The area surrounding the Mount Whaleback mine site has been the subject of numerous surveys. In August 2006, ENV conducted a flora and vegetation survey covering approximately 1700 hectares surrounding the Mount Whaleback and Orebody 29 mine sites (ENV, 2006b). This survey included parts of the current clearing permit application area and included a targeted search for DRF and Priority flora, particularly focusing on habitat suitable for *Lepidium catapycnon*. Two populations of *Lepidium catapycnon* were recorded, totalling 33 individual plants. Both of these populations were located to the west of the Mount Whaleback mine pit, approximately 5 kilometres west of the current clearing permit application area. No other DRF or Priority Flora

species were recorded during the August 2006 survey (ENV, 2006b).

A specific survey of the current clearing permit application area was conducted by ENV between the 16th and 20th October 2006. The survey was conducted in accordance with EPA Guidance Statement 51, and included a total of 41 quadrats, representing all the vegetation types occurring within the three defined application areas (ENV, 2006c). No DRF species were recorded within the current clearing permit application area during the survey (ENV, 2006c).

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

Methodology DEC (2007)
ENV (2006b)
ENV (2006c)
GIS Database:
- Declared Rare and Priority Flora List

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

Comments

Proposal is not likely to be at variance to this Principle

A search of available databases revealed that there are no known Threatened Ecological Communities (TECs) within the application area (GIS Database). The nearest known TEC is the Ethel Gorge aquifer stygobiont community, whose buffer is located approximately 2 kilometres east of the most easterly of three areas applied to clear (GIS Database).

DEC confirmed that there were no known TECs located within the application area or in close proximity to the application area (DEC, 2007).

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

Methodology DEC (2007)
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 clearing application area falls within the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) bioregion in which approximately 100% of the pre-European vegetation remains (see table) (GIS database; Shepherd, 2009). This gives it a conservation status of "Least Concern" according to the Bioregional Conservation Status of Ecological Vegetation Classes (Department of Natural Resources and Environment, 2002).

The vegetation of the clearing application area has been mapped as Beard vegetation association 82 "Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*" (GIS Database). According to Shepherd (2009) approximately 100% of Beard vegetation association 82 remains at both the state and bioregional level (see table). This vegetation association would be given a conservation status of "Least Concern" at both a state and bioregional level (Department of Natural Resources and Environment, 2002).

Although large scale mining operations are located in close proximity to the application area, the region in which the clearing is proposed to occur has not undergone broad scale clearing. Hence the application area does not represent a significant remnant of native vegetation in an area that has been extensively cleared (DEC, 2007).

	Pre-European area (ha)*	Current Extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,193	17,785,001	~99.89	Least Concern	~6.32
Beard veg assoc. – State					
82	2,565,901	2,565,901	~100	Least Concern	~10.24
Beard veg assoc. – Bioregion					
82	2,563,583	2,563,583	~100	Least Concern	~10.25

* Shepherd (2009)
** Department of Natural Resources and Environment (2002)

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

Methodology DEC (2007)
Department of Natural Resources and Environment (2002)
Shepherd (2009)
GIS Database:
- IBRA WA (Regions - Sub Regions)
- Pre-European Vegetation

(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

There are no permanent watercourses or wetlands within the areas proposed to clear, however, there are several minor non-perennial creeks within the application area (GIS Database). Creeks in the surrounding area are dry for most of the year, only flowing briefly immediately following significant rainfall (BHP Billiton, 2006).

The Whaleback Creek, a minor seasonal watercourse flows intermittently through part of the application area (GIS Database). This creekline will be diverted as part of the Newman Hub expansion project (BHP Billiton, 2006). The Department of Water (DoW) has considered the proposal and has granted BHP Billiton a permit to modify the bed and banks of Whaleback Creek, in accordance with the *Rights in Water and Irrigation Act 1914* (BHP Billiton, 2006; DoW, 2007). In assessing the proposal the DoW took into consideration the disturbance of the riparian vegetation along the banks of Whaleback Creek (BHP Billiton, 2006).

Based on the above, the proposed clearing is at variance to this Principle. However, vegetation associated with minor drainage lines is widespread in the region, and the small area of proposed clearing is unlikely to have any significant impact on any watercourse or wetland.

Methodology BHP Billiton (2006)
DoW (2007)
GIS Database:
- Hydrography, Linear

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

Comments

Proposal is not likely to be at variance to this Principle

There are no recorded acid sulphate soils in the area and the clearing is unlikely to result in an increased risk of salinity (BHP Billiton, 2006; GIS Database).

The majority of the application area falls within the Newman and Rocklea Land Systems (GIS Database).

The Newman Land System consists of lower slopes, with stony soils and some red loamy earths; narrow drainage floors up to 400 metres in width with stony mantles on shallow red loam soils; and lower stony plains with stony soils, shallow loams or loamy earth soils. The Newman Land System soils are not particularly prone to soil erosion (DAFWA, 2006).

The Rocklea Land System consists of lower slopes of shallow red loams or duplex soils that usually have protective stone mantles; stony plains of shallow red loam, sand or clay soils; and drainage line and drainage floor land units with a range of often shallow soils. The Rocklea Land System is quite resistant to soil erosion in its natural state (DAFWA, 2006).

A very small section at the north western corner of the western-most application area is mapped as the Elimunna Land System (GIS Database).

The Elimunna Land System consists of hills and low rises with stony soils on shallow red loams; Groves land unit on red loamy earth soils; and drainage floors with self mulching cracking clay soils. The Elimunna Land System is also reasonably resistant to soil erosion, however soil disturbance or altered water flows may cause localised soil erosion (DAFWA, 2006).

DAFWA (2006) advised that clearing within the above land systems is unlikely to cause appreciable land degradation provided surface water runoff is managed.

The proponent has advised that appropriate measures will be implemented to minimise erosion and surface-water run-off. Drainage will be incorporated within the design of the expansion works, including the realignment of the intermittently flowing Whaleback Creek (BHP Billiton, 2006). Cleared areas will be progressively rehabilitated to further minimise the risk of land degradation (BHP Billiton, 2006).

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

Methodology BHP Billiton (2006)
DAFWA (2006)
GIS Database:
- Acid Sulfate Soils Risk Map, 100K
- 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 is not located within a conservation reserve (GIS Database). The nearest DEC managed lands are Collier Range National Park, approximately 115 kilometres south-south-west of the application area; and Karijini National Park, approximately 110 kilometres west-north-west of the application area (GIS Database).

This proposal is unlikely to impact on the environmental values of any adjacent or nearby conservation area, based on the large distance to the nearest conservation reserve (DEC, 2007).

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

Methodology DEC (2007)
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 is located within the Newman Water Reserve, a Public Drinking Water Source Area (PDWSA) (GIS Database). One water source bore (V18) occurs within the clearing permit application area. In consultation with the Department of Water (DoW), the proponent has developed strategies to minimise the risk to the water quality of bore V18. The DoW has advised that they have no objection to the proposed clearing within the water reserve, providing the strategies developed to protect water bore V18 are adhered to (DoW, 2007; DoW, 2011).

Creeklines and gullies within the application area feed into Whaleback Creek, which feeds into the Fortescue River. Creeklines are dry most of the year, only flowing briefly following significant rainfall (BHP Billiton, 2006). Appropriate surface water management practices will be implemented to minimise erosion and minimise potential impacts on the quality of surface water (BHP Billiton, 2006).

Groundwater quality monitoring is conducted as part of the existing mine operations at the Mount Whaleback and Orebody 29 mine sites (BHP Billiton, 2006). The water quality of Whaleback Creek is also monitored, when it is flowing. This information is reported in the Annual Environmental Report (AER) submitted to the Department of Environment and Conservation (DEC) (BHP Billiton, 2006).

The proposed clearing is unlikely to cause deterioration in the quality of any surface or underground water.

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

Methodology BHP Billiton (2006)
DoW (2007)
DoW (2011)
GIS Database:
- Hydrography, Linear
- Public Drinking Water Source Areas
- WIN Groundwater Sites

(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**
Average annual rainfall at Mount Whaleback is 310 mm, and the average annual evaporation exceeds the annual rainfall by as much as 2500 mm per year (BHP Billiton, 2006).

There are no permanent watercourses within the application area (GIS Database). Creeklines are dry most of the year, only flowing briefly following significant rainfall (BHP Billiton, 2006).

Natural flooding occurs occasionally during the wet season (November to March) following intense rainfall events (BHP Billiton, 2006; BHP Billiton, 2011).

The application area is located within the Fortescue River Upper catchment area (GIS Database). Given the size of the area to be cleared (46.79 hectares) in relation to the size of the catchment area (2,975,192 hectares) (GIS Database), the proposed clearing is not likely to 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 BHP Billiton (2006)
GIS Database:
- Hydrographic Catchments - Catchments
- Hydrography, Linear

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

Comments

There are five Aboriginal Sites of Significance recorded as occurring wholly or partly within the clearing permit application areas (Site IDs: 60, 6702, 11969, 17391 and 21316), and several others in close proximity (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

There is one native title claim (WC05/6) over the area under application (GIS Database). This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the mining 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*.

The application area is within the Newman Water Reserve, a Public Drinking Water Source Area (PDWSA) (GIS Database). In consultation with the Department of Water (DoW), the proponent has developed strategies to minimise the risk to water quality within the PDWSA. The DoW has advised that it has no objection to the proposed clearing within the water reserve, providing the strategies discussed with the proponent are adhered to (DoW, 2007; DoW, 2011).

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.

Clearing permit CPS 4025/1 was granted by the Department of Mines and Petroleum on 23 December 2010 and was valid from 15 January 2011 to 31 December 2015. The clearing permit authorised the clearing of up to 28.19 hectares of native vegetation. An application to amend this permit was received by the Department of Mines and Petroleum on 8 August 2011. The application requested an increase of 18.6 hectares to the amount of clearing permitted and an increase of approximately 13 hectares to the permit boundary. The purpose of the permit has also been changed from 'stockpiling of ore, overburden and topsoil' to 'mineral production and associated activities' to allow for the proposed warehouse construction. It is considered unlikely that the proposed amendment will cause any significant additional environmental impacts.

Methodology DoW (2007)
DoW (2010)
GIS Database:
- Aboriginal Sites of Significance
- Native Title Claims – Registered with the NNTT
- Public Drinking Water Source Areas

4. References

BHP Billiton (2006) Newman Hub Expansion Works. Vegetation Clearing Permit Supporting Documentation. December 2006. BHP Billiton Iron Ore Pty Ltd, Western Australia.

BHP Billiton (2011) Newman Joint Venture Mt Whaleback Warehouse Expansion. August 2011. BHP Billiton Iron Ore Pty Ltd, Western Australia.

CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management, Western Australia.

DAFWA (2006) Land degradation assessment report. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR). Office of the Commissioner of Soil and Land Conservation, Department of Agriculture Western Australia.

DEC (2007) Land clearing proposal advice for CPS 1655/1. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR). Department of Environment and Conservation, 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.

DoW (2007) Public Drinking Water Source Area (PDWSA) Advice. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR). Department of Environment, Western Australia.

DoW (2011) Public Drinking Water Source Area (PDWSA) Advice. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Mines and Petroleum (DMP). Department of Water, Western Australia.

ENV (2006a) Mount Whaleback Fauna Assessment Survey - Phase III Summary Report. ENV Australia, Western Australia.

ENV (2006b) Mount Whaleback Flora and Vegetation Assessment - Phase III Summary Report. ENV Australia, Western Australia.

ENV (2006c) RGP4 Newman Hub Topsoil Stockpile and Borrow Areas for Construction. Flora and Vegetation Assessment. ENV Australia, Western Australia.

ENV (2011) Mt Whaleback East Flora, Vegetation and Fauna Assessment. ENV Australia, 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.

Shepherd, D.P. (2009) Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.

Western Australian Herbarium (2011) FloraBase – The Western Australia Flora. Department of Environment and Conservation. URL: http://florabase.dec.wa.gov.au (Accessed 28/9/2011).

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.