



1. Application details

1.1. Permit application details

Permit application No.: 3094/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Nickel West Pty Ltd

1.3. Property details

Property:
Mining Lease 53/56
Mining Lease 53/57
Mining Lease 53/165
Mining Lease 53/166
Mining Lease 53/167
Mining Lease 53/218
Mining Lease 53/462
Mining Lease 53/489
Local Government Area: Shire of Wiluna
Colloquial name: Mount Keith Mine Project

1.4. Application

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

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

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

39: Shrublands; mulga scrub

The application area was flora surveyed by Western Botanical staff on 20 November and between 1-5 December 2008 (Western Botanical, 2008). The following vegetation types were identified within the application area (Western Botanical, 2008):

Hills and Slopes, Sclerophyll Shrublands

Stony Ironstone Mulga Shrublands (SIMS): Characteristically have a scattered upper storey of *Acacia aneura* and/or *Acacia quadrimarginea*. A mid storey dominated by shrubs of *Thryptomene* sp. Leinster, *Dodonaea petiolaris*, *Dodonaea rigida*, *Calytrix desolata*, *Scaevola spinescens* and *Senna* spp. A lower storey usually dominated by annuals including *Ptilotus helipteroides*, *Brachycome iberidifolia* and other annual *Asteraceae* spp. produce a good show of ephemerals following winter rains (Western Botanical, 2008).

Stony Ironstone Low Shrublands (SILS): Small areas with gravelly upper to lower slopes which are dominated by *Thryptomene* sp. Leinster and *Calytrix desolata* with *Senna* spp., *Scaevola spinescens*, *Dodonaea petiolaris* and *D. rigida* also present. Characteristically there is no upper storey of mulga present. The lower storey of annuals, if present is dominated by *Ptilotus helipteroides* and occasionally various *Asteraceae* spp. (Western Botanical, 2008).

Undulating Plains, Sclerophyll Shrub Dominated

Scattered *Acacia-Eremophila* Shrublands (SAES): Colluvial plains and low rises with stony ironstone and/or quartz mantles supporting scattered sclerophyllous shrublands. The upper storey is characteristically very scattered *Acacia aneura* and the mid storey is dominated by *Eremophila galeata*, either with or without significant annual herbage lower stratum (*Helipterum craspedioides*, *Cephalopterum drummondii*, *Velleia* spp. and *Goodenia* spp.) (Western Botanical, 2008).

Hard Pan Mulga Shrublands (HPMS): Level or gently inclined clay-loam plains with a well developed hardpan supporting an upper storey of scattered to moderately close *Acacia aneura* woodland/shrubland with very scattered mid storey of sclerophyllous shrubs including *Sida ectogama* and a well developed annual herb lower stratum of various *Asteraceae* *Helipterum craspedioides* and *Rhodanthe charslleyae* (Western Botanical, 2008).

Loamy Plain Mulga Shrublands (PLMS): Characteristically scattered to moderately close tall mulga shrublands often with scattered *Eremophila gilesii* and *Grevillea deflexa* low shrub component on deep alluvial loamy soils (Western Botanical, 2008).

Undulating Plains, Grass Dominated

Wanderrie Bank Mulga Shrublands (WABS): Very scattered to scattered mulga shrublands on hardpan with discrete sandy rises where perennial grasses such as Woollybutt Grass (*Eragrostis eripoda*) are common or dominant. The lower shrub component usually includes *Eremophila latrobei*, *Sida platycalyx*, *Sida ectogama*, *Ptilotus obovatus*, *Eremophila forrestii* and *Eremophila spectabilis*.

Sandplain Hummock Grasslands with Mulga Overstorey (SAMU): An upper storey of *Acacia aneura*, *Acacia linophylla* and *Acacia coolgardiensis* dominated shrublands/woodlands either with or without significant *Eucalyptus kingsmillii* and *E. trivalvis*, with a mid storey of *Eremophila forrestii*. A lower storey of hummock grassland *Triodia basedowii* is often also associated with other grasses such as Woollybutt Grass (*Eragrostis eripoda*), Buck Wanderrie Grass (*Thyridolepis multiculmis*) and Broad-leaved Wanderrie Grass (*Monachather paradoxus*), and Sticky Everlasting (*Lawrencella davenportii*). Occasionally *Eremophila demissa* occurs in small populations (Western Botanical, 2008).

Breakaway Grassy Plains (BRGP): Variable sites which can be regarded as the gently sloping footslopes of granite plateaux with many exposed granite rocks, sheets and tors evident. It is characterised by narrow to broad, gently inclined alluvial gritty, siliceous sandy plains supporting a lower storey of small range annuals (*Maireana carnosa*, *Scleroleana* spp.) and very few trees or perennial shrubs except in drainage lines and adjacent to granite rocks where preferential water penetration may occur. Broader drainage lines within this habitat support *Eucalyptus lucasii* in mixed woodlands with *Acacia quadrimarginea*, *Acacia aneura* var. *aneura* and *Pittosporum angustifolium* (Western Botanical, 2008).

Areas of Concentrated Drainage

Drainage Tract Mulga Shrublands/Woodlands (DRMS): Poorly defined narrow to broad drainage tracts dominated by *Acacia aneura* var. *latifolia*. Often little mid storey shrub component due to competition for light, however, the lower stratum is dominated by the annual *Rhodanthe charsleyae*. Soils are clay-loams and relief below surrounding plains is rarely more than 0.5 metres (Western Botanical, 2008)..

Drainage Tract Eucalypt Shrublands/Woodlands (DRES): Narrow to broad drainage tracts with *eucalypts* such as *Eucalyptus lucasii* present. A very scattered shrub stratum on banks and well defined incised ephemeral watercourse with sandy or rocky substrates, often 1-2 metres below the surrounding plains and banks is characteristic (Western Botanical, 2008).

No weed populations were recorded during the survey (Western Botanical, 2008).

Clearing Description

BHP Billiton Nickel West Pty Ltd (BHP Billiton) has proposed to clear up to 200 hectares of native vegetation within an application area of approximately 695 hectares (GIS Database). The proposed clearing is located approximately 73 kilometres south-south-east of Wiluna (GIS Database).

The purpose of the proposed clearing is mineral production. The application area has been subdivided into four sections: Northwest, Eastern, Southern and Plant and Surrounds (BHP Billiton, 2009).

BHP Billiton (2009), propose to clear for:

Northwest Section:

- Battering of waste dumps for progressive rehabilitation along the western waste dumps;
- Relocation of the mine access road;
- Relocation of the Albion Downs Borefield Pipeline; and
- Relocation of the HV Powerline.

Eastern Section:

- Progressive rehabilitation of the eastern dumps;
- Extension to workshop facilities;
- New biomediation facility;
- Laydown yards; and
- Access tracks.

Southern Section:

- Potential future topsoil stockpile area.

Plant and Surrounds Section:

- Potential expansion within the plant area (BHP Billiton, 2009).

Vegetation Condition	Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994) To Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).
Comment	The vegetation condition was derived from a vegetation survey conducted by Western Botanical (Western Botanical, 2008).

3. Assessment of application against clearing principles

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

Comments	<p>Proposal is not likely to be at variance to this Principle</p> <p>The application area occurs within the Eastern Murchison (MUR1) sub-region of the Murchison Interim Biogeographic Regionalisation of Australia (IBRA) (GIS Database). This sub-region is characterised by internal drainage, and extensive areas of elevated red desert sand plains with minimal dune development (CALM, 2001). It contains salt-lake systems associated with the occluded Paleodrainage system (CALM, 2001). This sub-region has broad plains of red-brown soils and breakaway complexes as well as red sand plains (CALM, 2001). The vegetation is dominated by Mulga woodlands often rich in ephemerals, hummock grasslands, saltbush shrub lands and <i>Halosarcia</i> shrub lands (CALM, 2001). One vegetation type within the application area is considered to be an ecological community at risk (SIMS) (Cockerton <i>et al.</i>, 2006).</p> <p>A vegetation survey of the application area and surrounding vegetation identified 211 native flora species belonging to 101 genera from 41 families (Western Botanical, 2008). The application area is described as being fairly degraded, primarily due to previous pastoral clearing and grazing activity (BHP Billiton, 2008) as well as previous mining activities. No alien weed species were recorded within the vegetation survey area (Western Botanical, 2008). Weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. This in turn can lead to greater rates of infestation and further loss of biodiversity if the area is subject to repeated fires. Should the permit be granted, it is recommended that appropriate conditions be imposed on the permit for the purpose of weed management.</p> <p>Biota Environmental Sciences Pty Ltd conducted a fauna survey of the application area and adjacent areas between 16 and 23 March 2006. This search identified a total of 101 vertebrate fauna species representing 39 families that could potentially occur within the survey area (Biota Environmental Sciences Pty Ltd, 2006). This tally comprised four frogs, 32 reptiles, 56 birds and nine non-volant mammals (Biota Environmental Sciences Pty Ltd, 2006).</p> <p>The landforms, vegetation and habitat types occurring within the application area are well represented within the surrounding region (BHP Billiton, 2008; Shepherd <i>et al.</i>, 2001). Given the past disturbances within the application area such as grazing and mining, the vegetation within the application area is not likely to represent an area of high biodiversity.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this Principle.</p>
Methodology	<p>BHP Billiton (2008) Biota Environmental Sciences Pty Ltd (2006) CALM (2001) Cockerton <i>et al.</i> (2006) Shepherd <i>et al.</i> (2001) Western Botanical (2008) GIS Database - Interim Biogeographic Regionalisation of Australia</p>

(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	<p>Proposal may be at variance to this Principle</p> <p>A desktop search of the Department of Environment and Conservation's (DEC) Threatened Fauna database was conducted. The co-ordinates used were 26.4748°S - 120.028°E and 27.9057°S - 121.282°E (Biota Environmental Sciences Pty Ltd, 2006).</p> <p>The following fauna species of conservation significance were identified as potentially occurring within the application area through this database search: Mulgara (<i>Dasyercus cristicauda</i>), Malleefowl (<i>Leipoa ocellata</i>), Giant Desert Skink (<i>Egernia kintorei</i>), Kwonkan moriartii, Australian Bustard (<i>Ardeotis australis</i>) and the Striated Grasswren (<i>Amytornis striatus striatus</i>)</p>
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Biota Environmental Sciences Pty Ltd (2006) conducted a fauna survey of the application area in March 2006. The principle element of this survey comprised 13 trapping grids in habitats considered to represent the range available within the study area (Biota Environmental Sciences Pty Ltd, 2006). From this survey the only species of conservation significance recorded was the Mulgara, which was recorded from a single trapping event (Biota Environmental Sciences Pty Ltd, 2006).

Biota Environmental Sciences Pty Ltd (2006) identified the following habitat units within the application area:

- Sandplain Mulga-Spinifex Shrublands (SAMU);
- Hardpan Mulga Shrublands (HPMS);
- Drainage Tract Mulga Shrublands/Woodlands (DRMS);
- Wanderrie Bank Grassy Shrublands (WABS);
- Granite Rock Sclerophyll Shrublands (GRSS);
- Scattered *Acacia - Eremophila* Shrublands (SAES); and
- Stony Ironstone Mulga Shrublands (SIMS).

The minor drainage features (DRMS) associated with the Monk Land System and located immediately north of the accommodation buildings are considered to have a moderate conservation value as they provide a landscape function role beyond the confines of the vegetation unit itself (Biota Environmental Science Pty Ltd, 2006). In addition, Biota Environmental Sciences Pty Ltd (2006) have suggested that the SAMU habitat type of the Bullimore Land System be given a ranking of 'moderately high' conservation significance as it comprises the primary habitat for the Mulgara. However, the Bullimore Land System occurs widely throughout the region and the proposed clearing will not significantly impact on the SAMU habitat type with only 0.13% occurring within the application area (Biota Environmental Sciences Pty Ltd, 2006; Western Botanical, 2008).

Furthermore, the Draft Recovery Plan, 2005-2009 for the Mulgara states that it is relatively secure in its range, and recovery actions focus on the clarification of its status (Masters, 2005). Given the large area of habitat within the region that the Mulgara can utilise, and the small proportion of SAMU vegetation identified within the application area (0.13%), the vegetation within the application area is not likely to be significant habitat for this species.

Based on the above, the proposed clearing may be at variance to this Principle.

Methodology Biota Environmental Sciences Pty Ltd (2006)
Masters (2005)
Western Botanical (2008)

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

Comments Proposal is at variance to this Principle

According to available databases, no Declared Rare Flora (DRF) or Priority Flora species occur within the application area (GIS Database).

A flora survey was conducted over the application area by Western Botanical on 20 November and between 1-5 December, 2008 (Western Botanical, 2008). This survey involved on-foot traverses at 50 metre intervals in an east-west direction. When priority flora were encountered, individuals within small populations were individually recorded, while for large populations, the boundary was recorded and the population size estimated (Western Botanical, 2008).

During the flora survey six of the seven Priority flora species listed below were recorded. The winter growing annual *Goodenia modesta* was not seen during the survey due to the dry seasonal conditions (Western Botanical, 2008).

P1 - *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362)

P3 - *Baeckea* sp. Melita Station P3 (HJ Pringle 2738); *Calytrix erosipetala*; *Calytrix uncinata*; *Goodenia modesta* and *Hybanthus floribundus* subsp. *chloroxanthus*; and

P4 - *Hemigenia exilis* (Western Botanical, 2008).

One remnant population of *Hemigenia exilis* (P4) containing 28 individuals was recorded during the flora survey (Western Botanical, 2008). These plants belonged to one of two original populations noted at Mount Keith totalling 722 plants found in 1998. The northern sub-population supporting around 690 plants has been almost totally destroyed by the encroachment of the western waste dump and is considered unviable, while the southern sub-population initially supported 32 plants but encroachment of a topsoil stockpile and senescence of mature plants has left 28 mature plants alive as of December 2008 (Western Botanical, 2008).

A study conducted by Mattner *et al.* (2001) found that the northern populations of *H. exilis* are genetically different to the southern populations. The population found within the application area represents the northern most limit of *H. exilis*'s range and therefore the remaining population is significant (Western Botanical, 2008).

Based on the above, the proposed clearing is at variance to this Principle. Should a permit be granted, it is recommended that a condition be imposed on the permit for the purpose of flora management whereby a flora specialist shall inspect the application area for the presence of *Hemigenia exilis* and where recorded prevent the clearing of native vegetation within 50 metres of this species within the application area.

Methodology Mattner *et al.* (2001)
Western Botanical (2008)
GIS Database
- Declared Rare and Priority Flora List

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

Comments **Proposal is not likely to be at variance to this Principle**
A search of available databases reveals that there are no Threatened Ecological Communities (TEC's) within the application area (GIS Database). There are no TEC's located within the East Murchison IBRA sub-region (CALM, 2001).

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

Methodology CALM (2001)
GIS Database
- Threatened Ecological Communities

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

Comments **Proposal is not at variance to this Principle**
The application area falls within the IBRA Murchison Bioregion (GIS Database). Shepherd *et al.* (2001) report that approximately 100% of the pre-European vegetation still exists in this Bioregion.

The vegetation in the application area is recorded as Beard Vegetation Association 39: Shrublands; mulga scrub (GIS Database; Shepherd *et al.*, 2001).

According to Shepherd *et al.*, (2001) approximately 100% of Beard Vegetation Association 39 remains within the Murchison Bioregion (see table below).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Murchison	28,120,558	28,120,558	~100.0%	Least Concern	~1.1%
Beard veg assoc. – State					
39	6,613,602	6,613,496	~100.0%	Least Concern	~7.2%
Beard veg assoc. – Bioregion					
39	1,148,411	1,148,411	~100.0%	Least Concern	~0.0%

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

** Department of Natural Resources and Environment (2002)

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

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

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

Comments **Proposal is at variance to this Principle**
According to available GIS Databases, there are no permanent watercourses within the application area,

however, there are several minor, non-perennial watercourses within the application area (GIS Database).

The Wiluna region has a high average annual evaporation rate of approximately 3,400 millimetres which is significantly higher than its average annual rainfall of approximately 257 millimetres (BoM, 2009). Based on this, the watercourses within the application area would only be expected to carry water during high rainfall events as during normal rainfall events surface water is either quickly utilised by vegetation or lost to evaporation.

The application area lies within a catchment for a major drainage line, which drains eastward from the Mt Keith Operations (MKO) minesite (Western Botanical, 2008). Runoff from this catchment can no longer follow its original path through the MKO pit area and is diverted around the minesite by two diversion drains which discharge into the natural broad, braided drainage line east of the MKO minesite (Western Botanical, 2008).

Based on the above, the proposed clearing is at variance to this Principle. Management measures which address drainage diversion and hydrological isolation of vegetation communities will be implemented through the Mining Proposal assessment under the *Mining Act 1978*.

Methodology BHP Billiton (2009)
BoM (2009)
Western Botanical (2008)
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 may be at variance to this Principle

The application area has been surveyed by the Department of Agriculture and Food (Van Vreeswyk *et al.*, 1994). The application area is comprised of the following land systems (GIS Database; Biota Environmental Sciences Pty Ltd, 2006);

Land System	Description	Area (ha)	% Application Area
Bevon Land System	Irregular low ironstone hills with stony lower slopes supporting mulga shrublands	138	19.9%
Bullimore Land System	Extensive sandplains supporting spinifex hummock grasslands	1	0.2%
Jundee Land System	Hardpan plains with ironstone gravel mantles supporting mulga shrublands	110	15.8%
Laverton Land System	Ridges and hills on greenstone and basalt supporting scattered shrublands of <i>Acacia</i> and <i>Ptilotus obovatus</i>	51	7.3%
Monk Land System	Hardpan plains with occasional sandy banks, supporting mulga tall shrublands and Wanderrrie grasses	166	23.8%
Sherwood Land System	Granite breakaways and extensive stony granitic plains with mulga shrublands and minor halophytic shrublands	84	12.2%
Teutonic Land System	Hills and stony plains on acid volcanic rocks, supporting <i>Acacia</i> shrublands	<0.1	<0.1%
Violet Land System	Undulating stony and gravelly plains and low rises, supporting mulga shrublands	145	20.8%
Total		695	100%

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'hills and hillslopes', 'low rises', 'stony plains' and 'drainage lines' land units of the Bevon Land System. Soils were generally described as shallow red earths on greenstone and lithosols (Van Vreeswyk *et al.*, 1994). The drainage tracts of the Bevon Land System are susceptible to erosion, particularly in areas where perennial shrub cover is substantially reduced and/or the soil surface is disturbed (Van Vreeswyk *et al.*, 1994). The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'loamy plains' land unit of the Bullimore Land System. Soils were generally described as deep sandy-surfaced red earths (Van Vreeswyk *et al.*, 1994). This land unit is not susceptible to erosion. The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'drainage tracts' land unit of the Jundee Land System. Soils were generally described as red earths on hardpan at variable depths (Van Vreeswyk *et al.*, 1994). This land unit is not susceptible to erosion due to a surface

mantle of gravel. The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'hills and ridges' land unit of the Laverton Land System. Soils were generally described as lithosols (Van Vreeswyk *et al.*, 1994). This land unit is not susceptible to erosion due to astony surface mantle. The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'stony hardpan plains', 'hardpan plains', 'narrow drainage tracts' and 'sandy banks' land units of the Monk Land System. Soils were generally described as red earths on hardpan (Van Vreeswyk *et al.*, 1994). The narrow drainage tracts of the Monk Land System are mildly susceptible to water erosion (Van Vreeswyk *et al.*, 1994).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'stony plains' and 'drainage tracts' land units of the Sherwood Land System. Soils were generally described very shallow red sand, shallow duplex, shallow red earth or red clay on granite (Van Vreeswyk *et al.*, 1994). The drainage tracts of this land system have fragile soils which are highly susceptible to water erosion. The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'stony plains' land unit of the Teutonic Land System. Soils were generally described as shallow red earth on rocks associated with the greenstone domain (Van Vreeswyk *et al.*, 1994). The soils of this land system are not susceptible to soil erosion, partly as a consequence of extensive stone mantles (Van Vreeswyk *et al.*, 1994). The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

An analysis of GIS databases for the application area reveals the application area is most likely to fall within the 'low rises', 'stony plains' and 'narrow drainage tracts' land units of the Violet Land System. Soils were generally described as shallow red earths on greenstone, deep red earths and lithosols (Van Vreeswyk *et al.*, 1994). The abundant mantles provide protection against soil erosion over most of this land system, except where the soil surface has been disturbed, or in the narrow drainage tracts which are mildly susceptible to water erosion (Van Vreeswyk *et al.*, 1994). The vegetation described by Van Vreeswyk *et al.* (1994) accurately reflects the vegetation types described in vegetation surveys conducted over the area (Western Botanical, 2008).

Based on the above, the proposed clearing may be at variance to this Principle. It is recommended that should a permit be granted, a condition be imposed on the permit with regard to stockpiling of all cleared topsoil and vegetation for use in rehabilitation, as well as a staged clearing condition whereby the purpose for which the clearing has been approved is enacted within six months of the clearing taking place.

Methodology Biota Environmental Sciences Pty Ltd (2006)
Van Vreeswyk *et al.* (1994)
Western Botanical (2008)
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 is located approximately 4.5 kilometres to the north-west of Wanjarri Nature Reserve (GIS Database). At this distance it is not likely that the vegetation within the application area provides a buffer to the conservation area, or is an important ecological linkage to the conservation area.

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

Methodology GIS Database
- CALM Managed Lands and Waters

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

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

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

The application area is located within an arid region (CALM, 2001), with an average annual rainfall of approximately 257 millimetres and an average annual pan evaporation rate of approximately 3,400 millimetres (BoM, 2009, Western Botanical, 2008). The average seasonal rainfall pattern reflects the influence of summer

thunderstorms due to tropical rain bearing depressions (BHP Billiton, 2009). Rainfall at this time can be brief but heavy. Run-off is likely to be as sheet flow and fresh, although heavy with sediments. The proposed clearing is not likely to cause surface water quality to deteriorate.

Three groundwater aquifers are known to exist within the application area (BHP Billiton, 2009):

- A shallow unconfined aquifer within the alluvial surface sediments, with a water table 14-18 metres below ground level. Water quality is sub-potable with a salinity of 700-2,000 milligrams/Litre Total Dissolved Solids (TDS);
- A tertiary semi-confined palaeochannel aquifer, with a water table 60-100 metres below ground level. Water quality is sub-potable with a salinity of 700-2,000 milligrams/Litre Total Dissolved Solids (TDS); and
- A deep fractured rock aquifer confined by low permeability clay sediments which have developed within oxidised granitic sediments. Water within this aquifer is extremely saline, with a typical salinity level of 60,000-80,000 milligrams/Litre Total Dissolved Solids (TDS) (BHP Billiton, 2009).

Mine dewatering has caused groundwater levels to drop within the vicinity of the mine (BHP Billiton, 2008) and due to the high evaporation rate and low rainfall of the area, the recharge rate to the aquifer is likely to be low. In consideration of the above, the proposed clearing of native vegetation is unlikely to cause a decrease in surface or groundwater quality, or groundwater quantity.

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

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

Methodology BHP Billiton (2008)
BHP Billiton (2009)
BoM (2009)
CALM (2001)
Western Botanical (2008)
- Public Drinking Water Source Area
- Potential Groundwater Dependent Ecosystems

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

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

The application area lies in a broad valley flanked to the west, north and north-east by low hills and breakaways (BHP Billiton, 2009). There are no permanent water features within the application area, however, there are several minor, non perennial watercourses within the application area (GIS Database).

Low annual rainfall (approximately 257 millimetres) (BoM, 2009), high evaporation rates (3,400 millimetres/year) (BHP Billiton, 2009) and the absence of permanent water bodies and watercourses in the application area (GIS Database) would suggest that this area is not prone to flooding under normal rainfall conditions.

The application area is located within the Lake Carey catchment area (GIS Database). The size of the area to be cleared (200 hectares) in relation to the size of the Lake Carey catchment area (11,378,213 hectares) is not likely to increase the potential for flooding within the application area (GIS Database).

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

Methodology BHP Billiton (2008)
BHP Billiton (2009)
BoM (2009)
GIS Database
- Hydrography - Linear
- Hydrographic Catchments - Catchments

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

Comments

There are no native title claims over the area under application.

There are several known Aboriginal sites of significance within the application area (ID_1482, ID_1483, ID_2719, ID_17228 and ID_21487) (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 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.

No public submissions were received in regard to this Clearing Permit application.

Methodology GIS Database
- Aboriginal Sites of Significance
- Native Title Claims

4. Assessor's comments

Comment

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

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

5. References

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6. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government.
CALM	Department of Conservation and Land Management, Western Australia.
DAFWA	Department of Agriculture and Food, Western Australia.
DA	Department of Agriculture, Western Australia.
DEC	Department of Environment and Conservation
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DoE), Western Australia.
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia.
DMP	Department of Mines and Petroleum
DoE	Department of Environment, Western Australia.
DoIR	Department of Industry and Resources, Western Australia.
DOLA	Department of Land Administration, Western Australia.

DoW	Department of Water
EP Act	Environment Protection Act 1986, Western Australia.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System.
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
RIWI	Rights in Water and Irrigation Act 1914, Western Australia.
s.17	Section 17 of the Environment Protection Act 1986, Western Australia.
TECs	Threatened Ecological Communities.

Definitions:

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

- P1** **Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2** **Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3** **Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- P4** **Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R** **Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X** **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

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

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

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

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

conservation lands.

P5 **Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

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

EX **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.

EX(W) **Extinct in the wild:** A native species which:
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

CR **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

EN **Endangered:** A native species which:
(a) is not critically endangered; and
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

VU **Vulnerable:** A native species which:
(a) is not critically endangered or endangered; and
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

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