Department of Industry and Resources

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2190/1

Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **BHP Billiton Nickel West Pty Ltd**

1.3. Property details

Property: M69/74
M69/75
E69/2201

Local Government Area: Shire of Ngaanyatjarraku

Colloquial name: West Musgrave Project

1.4. Application

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

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Beard Vegetation Associations have been mapped at a 1:250,000 scale for the whole of Western Australia, and are a useful tool to examine the vegetation extent in a regional context. Two Beard Vegetation Associations are located within the area proposed to be cleared (GIS Database, Shepherd *et al.,* 2001). These are: **18:** Low woodland; mulga between sandridges; and **19:** Low woodland; mulga (*Acacia aneura*) (GIS Database, Shepherd *et al.,* 2001). The application area, as well as surrounding areas have been surveyed by Western Botanical (2005; 2007). The 2007 survey was conducted over the period between 16 and 24 May 2007 (Western Botanical, 2007). Thirteen habitat units were delineated and mapped within the project area (Western Botanical, 2007). These are: **WABS:** Wanderrie Bank Mulga Shrubland - Scattered Mulga over perennial Wanderrie grasses including *Eragrostis eriopoda*; **HPMS:** Hardpan Mulga Shrubland - Hardpan plains with Mulga, perennial shrubs and annual grasses and herbs; **CPX:** Discrete, small, calcrete rises within WABS, SASP or SAMS habitat units - Vegetation is characterised by *Petalostylis cassioides* shrubs and scattered Spinifex on a stony mantle, often 1 to 1.5 metres above the surrounding habitat; **SASP-C:** Sandplain Spinifex Hummock Grasslands with underlying calcrete - Extensive sand sheets supporting *Acacia ligulata*, Acacia species and Spinifex with calcrete outcropping and subcropping; **SDAGS:** Sand Dune Acacia - Grevillea Shrubland - Low to moderate Aeolian red sand dunes supporting shrublands of *Grevillea stenobotrya*, Acacia *ligulata* and *Gyrostemon ramulosus* with minor occurrence of Spinifex; **SDAGS+Myrtaceae:** SADGS Myrtaceae - *Aluta maisonneuvei* shrubland - Footslopes of moderate dunes supporting thickets of *Aluta maisonneuvei*, long unburnt; **SAEC:** Sandplain Acacia - Eucalypt Calcrete Shrubland - Extensive level to gently undulating sandplains supporting mallee, Acacia and Spinifex; **MTS:** Melaleuca - Acacia - Triodia Shrubland on stony calcrete plain - *Melaleuca glomerata* shrubland on stony calcrete plains with *Acacia ligulata* and Spinifex; **SAMS:** Sandplain Mallee Spinifex - Spinifex hummock grasslands with emergent mallees. Species of mallee may vary; **SAWS:** Sandplain Spinifex and Acacia (other than Mulga) - Extensive sand sheets supporting Acacia shrublands (other than *Acacia aneura*) and Spinifex hummock grasslands; **SAMU:** Sandplain Mulga Spinifex - Sandplains supporting Mulga and Spinifex hummock grasslands; **GRMU:** Mulga Groves - Internally drained resource gaining sites supporting dense stands of Mulga and associated Sclerophyl shrubs; and **CPN:** Clay pan, vegetated - Internally drained clay pans with perennial grasses and annual herbs and grasses.

	These vegetation units were well represented throughout the application and surrounding areas, and some trends were noted. These trends include that the north-western portion of the tenements are dominated by extensive hardpan plains supporting mulga, and the landforms in the eastern portion of the tenement are dominated by low, undulating sand sheets with rocky calcareous outcrops either outcropping or subcropping (Western Botanical, 2007). Also of note were the low to moderate red Aeolian dunes supporting *Grevillea stenobotrya* and other shrubs, which were scattered throughout the western, south-central and eastern portions of the tenement (Western Botanical, 2007).
Clearing Description	BHP Billiton Nickel West Pty Ltd (from this point forward referred to as BHPB Nickel West) has applied to clear up to 50 hectares of native vegetation, within a total application area of approximately 9,227 hectares. The proposed clearing is for the purpose of mineral exploration. The proposed clearing areas are located approximately 600 kilometres north-east of Laverton town site (GIS Database).
Vegetation Condition	Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994)
Comment	The vegetation condition is derived from the vegetation description provided in Western Botanical (2007). BHPB Nickel West has developed an Environmental Management System (EMP), based on the AS/NZS ISO14001:1996 Environmental Management System (EMS) standard, and the BHP Billiton EMS guidelines (BHPB Nickel West - EMP, 2007). This EMP will be used to minimise environmental impacts of the proposed exploration works. The BHPB Nickel West- EMP outlines the techniques which will be employed during clearing. These include: - where possible, existing tracks will be utilised; - ground disturbance will be kept to a minimum; - drill pads will be designed so that disturbances to landforms and vegetation will be minimised, especially to declared rare and priority flora that have been mapped; - pads will be positioned to avoid the need for clearing substantial stands of trees and large shrubs; and - where earthmoving machinery is required, vegetation should be rolled with a blade to preserve root stock and encourage regrowth (BHPB Nickel West-EMP, 2007).

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 proposed clearing is located within the Central Ranges Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, and the Central Ranges - Mann-Musgrave Block IBRA subregion (GIS Database). Graham and Cowan (2001) assessed the biodiversity of the Mann-Musgrave Block IBRA subregion, finding that the subregion is rich and diverse in both its flora and fauna. However, most species are wide ranging and usually occur in at least one, and often several adjoining subregions (Graham and Cowan, 2001).

The Western Botanical (2007) survey identified a total of 221 native species within the whole West Musgrave project area. The report also states that the flora of the West Musgrave project area is not greatly biodiverse.

Only three weed species were recorded, though represent a significant issue for the project area (Western Botanical, 2007).

Three flora species of conservation significance were noted during the survey (*Goodenia lunata* (Priority 1); *Stackhousia clementii* (Priority 1) and *Calotis latiuscula* (Priority 3)) (Western Botanical, 2007). However, BHPB Nickel West have committed to avoiding these species (BHPB Nickel West, 2007). The assessing officer recommends that conditions relating avoidance of priority species be included on any permit granted.

The vegetation habitat types occurring within the application area are well represented in the region (GIS Database; Western Botanical, 2007), and the application area is unlikely to be of higher biodiversity value than the surrounding areas.

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

Methodology

Graham and Cowan (2001).
Western Botanical (2007).
GIS Database:
- Interim Biogeographic Regionalisation of Australia - EA 18/10/00.
- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00.
- Pre-European Vegetation - DA 01/01.

(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

There are no records of fauna of conservation significance occurring within the area applied to clear (GIS Database).

A search of the Department of Environment and Conservation (DEC) databases conducted by DEC on behalf of the proponent, revealed ten species of conservation significance previously recorded within a 100 kilometre radius of the application area. These are shown below, including their conservation status in accordance with the *Wildlife Conservation Act* 1950 and DEC's own priority list:

- *Isoodon auratus auratus* (Golden Bandicoot - Wintarru) - Vulnerable;
- *Macrotis lagotis* (Bilby) - Vulnerable;
- *Mymecobius fasciatus* (Numbat) - Vulnerable;
- *Notoryctes sp* (Marsupial Mole) - Endangered;
- *Petrogale lateralis ssp.* (McDonnell Range Rock-wallaby) - Vulnerable;
- *Leporillus conditor* (Greater Stick-nest rat (Wopilkara) - Extinct;
- *Lepioa ocellata* (Malleefowl) - Vulnerable;
- *Egernia kintorei* (Giant Desert Skink) - Vulnerable;
- *Onychogalea lunata* (Crescent Nailtail Wallaby) - Extinct; and
- *Sminthopsis longicaudata* (Long-tailed Dunnart) - Priority 3 (BHPB Nickel West, 2007).

The Golden Bandicoot is restricted to the west Kimberley coastal area and a few offshore islands (WA Museum, 2007). It is unlikely that the Golden Bandicoot would occur within the areas proposed to be cleared, or that the proposed moderate area of clearing would provide significant habitat for this species.

The Bilby formerly occurred across the arid and semi-arid zones of Australia, however, the species is now restricted to 20% of its former range (Naturebase, 2007). The species is now confined to sparse desert populations in the eastern Pilbara and south to Warburton (WA Museum, 2007). The major habitats they now occupy include sandy desert areas in spinifex (Triodia species) grasslands (Threatened Species Network, 2005). They also seem to prefer freshly burnt country, where there are plentiful supplies of preferred food (Threatened Species Network, 2005). The Bilby may be present within the areas proposed to be cleared. However, based on the moderate amount of clearing (50 hectares within 9227 hectares), the dispersed nature of clearing (long, narrow tracks) and the temporary nature of clearing (all exploration works must be rehabilitated within 6 months of completion of the drilling program), it is unlikely that the application area would provide significant habitat for the Bilby.

Numbats were once spread across southern semi-arid and arid Australia (Naturebase, 2007). They are currently only known from a few populations in the south-west of Western Australia (Naturebase, 2007). It is unlikely that the Numbat would be found within the areas proposed to be cleared.

The Marsupial Mole is an enigmatic species, rarely observed or recorded (Naturebase, 2007). The species is an inhabitant of sandy desert areas (DEC, 2007), and in Western Australia inhabits sandy areas from the Pilbara, south to Warburton (WA Museum, 2007). It is possible that the marsupial mole would be present within the clearing envelope, however, it is unlikely that the vegetation within the application area would provide significant habitat for this species, given its widespread distribution.

The habitat of the McDonnell Range Rock-wallaby is granite outcrops, sandstone cliffs and scree slopes in ranges with hummock grassland and occasional fig trees and low shrubs, caves and coastal limestone cliffs (Naturebase, 2007). As these habitats do not occur within the application area, the vegetation within the application area is not significant habitat for this species.

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

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

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

The Long-tailed Dunnart lives in rugged rocky areas (DEC, 2007). As these types of do not occur within the

application area, the species is unlikely to occur there.

Even though it was not reported in the DEC database search or in the area previously, the Mulgara (*Dasycercus cristicauda*) is known to occur in the deserts of central Australia, including Western Australia (Nocon, 1999; Australian Fauna, 2001). The preferred habitat for the Mulgara is open Mulga woodlands (*Acacia aneura*) over mature hummock grasslands (*Triodia besedowii*). Sandplains and dune systems with sandy loams are necessary to enable burrowing. It is possible that the Mulgara occurs within the application area, however, it is unlikely that the proposed clearing area would provide significant habitat for the Mulgara.

The surveys of the area have confirmed that the habitats found within the areas proposed to be cleared are not unique (Mattiske, 2001; Western Botanical, 2005; 2007). Based on this information, and relatively moderate amount of clearing proposed (50 hectares) It is unlikely that the proposed clearing would represent significant habitat for fauna indigenous to Western Australia.

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

Methodology

Australian Fauna (2001).
BHPB Nickel West (2007).
DEC (2007).
Mattiske (2001).
Naturebase (2007).
Nocon (1999).
Threatened Species Network (2005).
WA Museum (2007).
Western Botanical (2005).
Western Botanical (2007).
GIS Database:
- Threatened Fauna - CALM 30/9/05.

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

Comments

Proposal is not likely to be at variance to this Principle

According to available datasets, there are no known records of threatened flora species within a 50 kilometre radius of the application area (GIS Database). The nearest recorded threatened flora species is *Isotropis winneckei* (Priority 1), located approximately 120 kilometres north of the proposed clearing area (GIS Database).

A desktop survey of the Department of Environment and Conservation (DEC) and Western Australian Herbarium rare flora databases conducted on behalf of the proponent found 18 priority flora species which may occur within or proximite to the application area (Mattiske, 2001). These are:
- *Fuirena nudiflora* (P1);
- *Goodenia gibbosa* (P1);
- *Goodenia grandiflora* (P1);
- *Grevillea aspera* (P1);
- *Isotropis winneckei* (P1);
- *Menkea lutea* (P1);
- *Neurachne lanigera* (P1);
- *Schoenus centralis* (P1);
- *Daviesia arthropoda* (P3);
- *Acacia auricoma* (P3);
- *Calotis latiuscula* (P3);
- *Eucalyptus sparsa* (P3);
- *Goodenia modesta* (P3);
- *Lythrum paradoxum* (P3);
- *Prostanthera centralis* (P3);
- *Comesperma viscidulum* (P4); and
- *Goodenia schwerinensis* (no longer listed as threatened);
(Mattiske, 2001).

During the Western Botanical (2007) flora survey, three species of conservation significance were noted. These were:
- *Calotis latiuscula* (Priority 3);
- *Goodenia lunata* (Priority 1); and
- *Stackhousia clementii* (Priority 1) (Western Botanical, 2007).

Calotis latiuscula (P3) is a small annual found within the Wanderrie Bank Mulga Shrubland (WABS) habitat unit (Western Botanical, 2007). There are 14 records of this species on Florabase (2008). The habitat for this

species is wide ranging, including near creek beds, rocky hillsides, stony ridges and red sand flood plains (Florabase, 2008). Given the overall lack of survey in the region, and the extensive nature of the WABS habitat unit in this area, it is likely to be more common than records indicate (Western Botanical, 2007). Due to the extensive habitat range and records on Florabase (2008), moderate clearing area (50 hectares within 9227 hectares) and the commitment from BHPB Nickel West to avoid the species, it is unlikely that the application area would represent significant habitat for this species.

Goodenia lunata (P1) is a small, annual herb, recorded in the Melaleuca Triodia Spinifex (MTS) habitat unit (Western Botanical, 2007). Only one population was recorded during the survey (Western Botanical, 2007). Being a small geosporous annual, its conservation status is unlikely to be adversely affected by the drilling program (Western Botanical, 2007). This species is far more widespread and common in the Northern Territory, South Australia and Queensland (Western Botanical, 2007). BHPB Nickel West has committed to avoiding the species (BHPB Nickel West-EMP, 2007).

Stackhousia clementii (P1) is a dense, broom like perennial herb (Florabase, 2008). These plants were recorded within the Sandplan Spinifex Hummock Grasslands (SASP) habitat unit. This species is widespread in Western Australia, Northern Territory and South Australia, and the records at the Western Australian Herbarium do not adequately reflect it's distribution (Western Botanical, 2007). As only one population of 100 plants was recorded, it can be readily avoided in accessing the proposed drill sites (Western Botanical, 2007). BHP Nickel West have made a commitment to this effect (BHPB Nickel West-EMP, 2007).

The Priority 3 species *Microcorys macredieana*, previously recorded in the areas outside but near the West Musgrave tenement was not recorded within the application area, though it was specifically targeted in searches of suitable habitat (Western Botanical, 2007).

The Western Botanical (2007) flora survey also recorded six species of taxonomic significance. The report states that these species do not as yet have conservation significance (Western Botanical, 2007). Given the overall lack of systematic botanical survey in the region and the extensive nature of most vegetation communities, it is not considered likely that any of these taxa would represent species that may be restricted in distribution (Western Botanical, 2007). These species were:

- *Acacia aff. oglana*
  - similar in appearance to Witchety Bush, *Acacia kempeana*. Typical *Acacia oglana* is relatively common in Northern Territory and further investigation needed to positively identify the species;
- *Chrysocephalum sp. nov little Sandy Desert*
  - small perennial daisy known from two collections at the Western Australian Herbarium;
- *Eremophila forrestii x latrobei ssp. glabra HYBRID*
  - shrub to 1.8 metres high and is a naturally occurring hybrid, with both parents adjacent. It has taxonomic interest but no conservation significance and is unlikely to be disturbed during access to proposed drilling sites;
- *Halgania cyanea var. Allambi Station*
  - shrub to 0.3 metres high with blue flowers. It is likely far more common in the region than current records indicate, and its occurrence within the application area represents a slight eastward range extension. It is also widespread in Western Australia and has no conservation significance;
- *Sita sp. Tiny Glabrous Fruits*
  - the record within the application area represents an eastward range extension of this species; and
- *Stackhousia muricata ssp. annual*
  - commonly occurring annual on metabasalt hills and on the margins of salt lakes. It's occurrence within the West Musgrave would appear to be a significant range extension, however, it is likely to be found across central Australia. It is not considered likely to warrant conservation significance, however, is yet to be formally published (Western Botanical, 2007).

The BHPB Nickel West-EMP outlines a number of commitments to protect flora, including:

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

Therefore, given the wide ranging nature of the species of conservation significance found within the application area, the large areas of suitable habitats within the region in which they may be found and the low impact associated with exploration activities, the vegetation to be removed is not significant habitat for conservation significant flora.

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

Methodology
BHPB Nickel West-EMP (2007).
Florabase (2008).
Mattiske (2001).
Western Botanical (2007).
GIS Database:
- Declared Rare and Priority Flora List - CALM 01/07/05.

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

Comments

Proposal is not likely to be at variance to this Principle

There are no known Threatened Ecological Communities (TECs) within the proposed clearing area (GIS Database). The nearest Ministerially endorsed TECs are located approximately 780 kilometres south west of the proposed clearing area (GIS Database).

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

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

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

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

Comments

Proposal is not at variance to this Principle

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

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

* Shepherd *et al.* (2001) updated 2005
** Department of Natural Resources and Environment (2002)

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

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

Methodology
BHPB Nickel West (2007).
Department of Natural Resources and Environment (2002).
Mattiske (2001).
Shepherd *et al.* (2001).
Western Botanical (2005).
Western Botanical (2007).
GIS Database:
- Interim Biogeographic Regionalisation of Australia (subregions) - EA.

- Interim Biogeographic Regionalisation of Australia - EA 18/10/00.
- Pre-European Vegetation - DA 01/01.

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

Comments

Proposal is not at variance to this Principle

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

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

The closest non-perennial watercourse is located approximately 5 kilometres west of the proposed clearing envelope (GIS Database).

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

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

Methodology

BHPB Nickel West-EMP (2007).
GIS Database:
- Hydrography, linear - DOE 1/2/04.
- Hydrography, linear (medium scale, 250k GA).
- Hydrography, linear (hierarchy) - DOW.
- Hydrography, linear (course scale, 1M GA).
- Hydrography, linear - DOE 1/2/04.

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

Comments

Proposal is not likely to be at variance to this Principle

The average annual rainfall is 300 millimetres (GIS Database). Rainfall in single events can be high, but as the landscape has a low relief, with sand dunes and calcrete rises constituting the raised area (GIS Database; Western Botanical, 2007), the potential for erosion is very low. Soils in the more undulating areas are sandy in the majority, providing a high potential for infiltration. This is not likely to lead to water erosion.

Land disturbance will be limited to a series of small drill pads, sumps and connecting tracks which will be rehabilitated within six months of the drilling program's completion (including replacement of topsoil where available) (BHPB Nickel West, 2007). It is unlikely that the removal of vegetation will result in land degradation (BHBNW, 2007).

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

Methodology

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

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments

Proposal is not likely to be at variance to this Principle

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

The proposed area of disturbance is small in comparison to the total area listed within the Ranges of the Western Desert. Given the moderate area to be cleared, it is unlikely that the vegetation contributes significantly to the conservation value of the area.

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

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

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

Comments

Proposal is not likely to be at variance to this Principle

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

Groundwater within the area under application is fresh to brackish, at between 1,000 - 3,000 milligrams per litre of Total Dissolved Solids (GIS Database). Given the relatively moderate size of the proposed clearing, and the exent of the Musgrave Groundwater Province (32,404 square kilometres) the quality of the groundwater is unlikely to be impacted by the proposed clearing activity.

The proposed clearing area is relatively flat, and is not associated with any permanent watercourses or waterbodies (GIS Database). Therefore, the clearing is unlikely to cause sedimentation of watercourses outside the application area.

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

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

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

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

Comments

Proposal is not likely to be at variance to this Principle

The limited amount of clearing proposed (50 hectares within 9,227 hectares) in comparison with the extent of the Warburton Basin catchment area (which is approximately 17,195,989 hectares) (GIS Database), is unlikely to result in an increase in peak flood height or duration.

The mean annual rainfall for the area is approximately 300 millimetres, whilst the annual evaporation rate of the area around 3,400 millimetres (GIS Database). Therefore, it is unlikely that the proposed clearing will cause or exacerbate the incidence or intensity of flooding.

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

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

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

Comments

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

There is a native title claim over the area under application (WC04_003). This claim has been registered with the National Native Title Tribunal. However, the mining tenements have been granted in accordance with the future act regime of the *Native Title Act 1993*, and the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There is a record of an Aboriginal Site of Significance within the areas proposed to be cleared (Site ID: 2888) (GIS Database). As this site is a closed site, BHPB Nickel West will not be entering this area, or conducting any exploration activities in its vicinity. To ensure that there is no disturbance to archaeological heritage or ethnographic sites, BHPB Nickel West conducts heritage assessments and surveys under the supervision of a properly qualified anthropologist (or archaeologist), who is acceptable to the Ngaanyatjarra people (BHPB Nickel West-EMP, 2007). Usually this involves both a female and male Ngaanyatjarra Council employee or consultant (BHPB Nickel West-EMP, 2007). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Environment and Conservation and the Department of Water to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

Methodology

BHPB Nickel West (2007).
BHPB Nickel West-EMP (2007).
GIS Database:
- Aboriginal Sites of Significance - DIA.
- Native Title Claims - DLI.

4. Assessor's comments

Purpose	Method	Applied area (ha)/ trees	Comment
Mineral Exploration	Mechanical Removal	50	The proposal has been assessed against the Clearing Principles, and is considered to be not at variance to Principle (e) and (f) and not likely to be at variance to Principles (a), (b), (c), (d), (g), (h), (i) and (j). Should a permit be granted, it is recommended that conditions be imposed on the permit in relation to avoiding priority flora, rehabilitation of areas cleared for exploration, as well as reporting on any clearing undertaken during the life of the permit.

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.
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.