



1. Application details

1.1. Permit application details

Permit application No.: 2222/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Nickel West

1.3. Property details

Property: AML70/255
Local Government Area: Shire Of Leonora
Colloquial name: Nickel (Agnew) Agreement Act 1974, Mineral Lease 255SA (AML70/255)

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
400		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 and are useful to look at vegetation extent in a regional context. Two Beard vegetation associations are located within the application area (GIS Database):

18: Low woodland; mulga (*Acacia aneura*). According to the Shared Land Information Platform (SLIP, 2007), Beard vegetation association 18 is a low woodland dominated by *Acacia aneura*.

39: Shrublands; mulga scrub. According to the Shared Land Information Platform (SLIP, 2007), Beard vegetation association 39 is a shrubland dominated by *Acacia aneura*, with subdominants *A. quadrimarginea*, *A. grasbyi*, *Hakea lorea* shrubland over *Senna sp.*, *Eremophila sp.* shrubs over *Ptilotus obovatus*, *Clanthus formosus*, *Podolepis auriculata*, *Swainsona incei*, *Waitzia aurea*, *Ptilotus alopecuroideus*, *P. helipteroideus*.

A flora and vegetation survey conducted by Western Botanical (2007) utilised Land Systems and Habitat Units defined by Pringle et al (1994) to describe the vegetation within the application area. These are:

SIMS: Stony Ironstone Mulga Shrublands occurring on ironstone ridges and associated slopes. Dominated by *Acacia aneura* scrub over *A. linophylla* ssp. *linophylla*, *Scaevola spinescens* open low scrub over *Eremophila spectabilis*, *Ptilotus schwartzii* var. *schwartzii* open dwarf scrub.

GRSS: Granite Rock Sclerophyll Shrublands. Upper-storey of *Acacia aneura*, *A. quadrimarginea*, *A. burkittii* over *Frankenia spp.* *Asteraceae spp.* and *Aristida contorta*.

GRMS: Granite Rock Mulga and Chenopod Shrublands. Upper-storey of *Acacia aneura*, *A. quadrimarginea*, *A. craspedocarpa*, *A. tetragonophylla* over *Maireana carnosae*, *M. georgei*, *M. triptera*, *Sclerolaena fusiformis*, *Sida sp.* unisexual and *Scaevola spinescens*.

BRX: Breakaways. Dominated by *Acacia quadrimarginea*, *A. aneura* and *A. balsamea* (P4), over shrub layer of *Calytrix uncinata* (P1), *Dodonaea microzyga*, *Dodonaea viscosa*, *Ptilotus obovatus*, *Eremophila* and *Thryptomene spp.*

SAES: Scattered *Acacia-Eremophila* Shrublands. Dominated by *Eremophila ramiflora*, *E. galeata* and *E. forrestii* and *Acacia tetragonophylla* open low scrub over *Ptilotus obovatus*, *Ptilotus schwartzii* dwarf scrub.

HPMS: Hardpan Mulga Shrubland: Dominated by scattered *Acacia aneura*, *A. linophylla* over shrub layer of *Eremophila spectabilis*, *E. galeata* and *E. homoplastica*, over herbaceous layer of *Ptilotus schwartzii*, *Eragrostis eriopoda*, *E. desertorum*.

PLMS: Plain, Loamy Mulga Shrublands. Dominated by *Acacia aneura*, *A. craspedocarpa*, *A. linophylla* and *A. xanthocarpa*, over shrub layer of *Eremophila serrulata*, *E. fraseri*, *Ptilotus obovatus*, *Rhagodia eremaea* and *Atriplex codonocarpa*, over herb layer of *Helipterum craspedioides* and *Rhodanthe charsleyae* in non-saline areas.

SACS: Sandplain *Acacia* Shrublands: Dominated by *Acacia linophylla*, *A. aneura*, *Eucalyptus leptopoda* and *Eucalyptus kingsmillii* over shrub layer of *Eremophila spectabilis*, *E. latrobei*, *E. forrestii* and *Senna spp.*, over *Eragrostis eriopoda* and *E. desertorum* tussock grasses.

LHMS: Lateritic Hardpan Mulga Shrublands. Dominated by *Acacia aneura*, *A. quadrimarginea*, *A. linophylla* ssp. *linophylla* open low woodland/open scrub over *Eremophila spectabilis*, *E. latrobei* ssp. *latrobei*, *E. forrestii* open low scrub over *Eragrostis eriopoda* very open grasses.

WABS: Wanderie Bank Grassy Shrublands. Occasional emergent *Acacia aneura* and *A. linophylla* ssp. *linophylla*, *A. tetragonophylla* over scattered *Eremophila spectabilis* and *Ptilotus obovatus* over a dominant layer of *Eragrostis eriopoda* and *E. desertorum*.

LMWS: Lateritic Mulga-Wanderie Shrublands. Upper-storey of *Acacia linophylla* and *A. aneura*, over shrub layer of *Eremophila spectabilis*, *E. forrestii* over *Aristida contorta*, *Eragrostis eriopoda* and *Eragrostis desertorum*.

BCLS: Breakaway Chenopod Low Shrublands. Very few trees - *Acacia aneura* and *Hakea preissii*, over *Ptilotus obovatus* and *Maireana triptera*.

GRMU: Mulga Groves on Hardpan Plains. Dominated by *Acacia aneura*, *A. craspedocarpa* and *A. quadrimarginea*, over *A. tetragonophylla*, *Eremophila spectabilis*, *Sida* sp. unisexual and *Ptilotus obovatus*, *P. schwartzii*, over *Eragrostis eriopoda*.

DRMS: Drainage Tract Mulga Shrubland. Upper-storey of *Acacia aneura*, *A. craspedocarpa* and *A. tetragonophylla* woodlands/shrublands over *Eremophila latrobei*, *E. serrulata*, *Ptilotus obovatus* and *Sida* sp. unisexual over *Aristida contorta* and *Eragrostis lanipes*.

Clearing Description

BHP Billiton Nickel West (hereafter referred to as BHPB Nickel West) have applied to clear 400 hectares within their Leinster Nickel Operations State Agreement Mineral Lease for the purpose of exploration, mine maintenance activities and the re-activation of an existing TSF. BHPB Nickel West expect clearing to occur over the next seven years. Mine maintenance activities include maintenance of firebreaks, roads, drainage, tailings storage facility embankments and evaporation ponds, minor expansion of laydown areas, access to existing infrastructure, and topsoil and caprock stockpiles. Areas cleared for exploration purposes will be limited to drill pads and access tracks where necessary. BHPB Nickel West advise that drill pads and sumps are rehabilitated within 6 months of completion of drilling.

Vegetation Condition

Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery 1994)

To

Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery 1994)

Comment

Vegetation condition was described by Western Botanical as moderate (Western Botanical, 2007). During a site visit, the assessing officer noted that there were multiple disturbances present due to proximity of the vegetation to the existing mine, as well as impacts from grazing by feral goats. The assessing officer considers the vegetation condition within the application area to be 'Degraded' to 'Good' on the Keighery (1994) scale.

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 may be at variance to this Principle

The application area is located within the Eastern Murchison Interim Biogeographic Regionalisation of Australia (IBRA) sub-region. (GIS Database). This sub-region is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development (CALM, 2002). Salt lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaway complexes, as well as red sandplains are widespread. Vegetation is dominated by mulga woodlands and is often rich in ephemerals, hummock grasslands, Saltbush shrublands and *Halosarcia* shrublands (CALM, 2002). The application area is dominated by Mulga shrublands with some Mulga groves and displays high variation in vegetation types. One vegetation type within the application areas (Stony Ironstone Mulga Shrublands - SIMS) is considered to be an ecological community at risk (Western Botanical, 2007). SIMS vegetation community comprises the majority of the application area and some SIMS will be cleared if the permit is granted. However, SIMS is common in the wider area.

The sub-region is rich and diverse in both its flora and fauna but most species are wide ranging and usually occur in adjoining regions (CALM, 2002). Nine priority flora species and seven taxonomic significant species occur within the application areas (Western Botanical, 2007). These are mostly associated with ironstone ridges running roughly north-south through the application area and breakaway habitat. A flora survey of the application area identified 180 flora species from 36 families (Western Botanical, 2007). The application area therefore is an area of high biological diversity. Mimosaceae (29 sp.), Myoporaceae (24 sp.), Chenopodiaceae (21 sp.) and Poaceae (19 sp.) were of highest diversity (Western Botanical, 2007), which is typical of the region's vegetation.

Vegetation communities within the bioregion are generally in fair or good condition and are either declining or show a static trend (CALM, 2002). All of these communities are threatened by grazing (stock, goats and rabbits) and changed fire regimes. Within the application areas, grazing by goats is apparent and is impacting negatively on the condition of the vegetation. Following a site inspection, the assessing officer considers most

vegetation communities present within the application area to be in good condition (Keighery, 1994), although some are degraded due to impact from the adjoining mine site.

The Eastern Murchison IBRA sub-region is recognised as being rich and diverse in faunal assemblages, with low levels of endemism (CALM, 2002). However, given the proximity to mining and the multiple disturbances observed during the site inspection, it is likely that the faunal assemblages present within the application areas will be depauperate in relation to the IBRA sub-region.

Based on the above, the proposed clearing may be at variance to this Principle. The assessing officer recommends that should a permit be granted, conditions be placed on the permit regarding rehabilitation of areas subject to exploration and avoidance of several priority and taxonomically significant species.

Methodology CALM (2002)
Keighery (1994)
Western Botanical (2007)

(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**

Coffey Environments conducted a Level 1 fauna survey over the application area (Coffey, 2007). This survey searched available databases to compile a list of fauna species that may occur within the application area and also involved a reconnaissance visit to the application area to identify fauna habitats and assess the potential risks associated with the proposed clearing on the fauna of the area. This survey and subsequent report adequately meets the requirements of EPA Guidance Statement 56 'Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia' (EPA, 2004a).

As a result of the survey, two major terrestrial fauna habitat types were identified (Coffey, 2007). These were breakaways and mulga woodlands. Breakaways were sparsely vegetated stony ridges with little ground cover or soil. Mulga woodlands varied in relation to the density of overstorey and understorey vegetation, soil type and topography. Vegetation was most dense in drainage lines where nutrients accumulate. Coffey (2007) consider that these areas may be important for some bird species but not for overall fauna assemblages in the region.

Coffey (2007) identified the following conservation significant fauna species that may occur within the application area based on distribution and habitat type: Princess Parrot (*Polytelis alexandrae*), Peregrine Falcon (*Falco peregrinus*), Major Mitchell Cockatoo (*Cacatua leadbeateri*), Australian Bustard (*Ardeotis australis*), Bush Stone-curlew (*Burhinus grallarius*), Fork Tailed Swift (*Apus pacificus*), Great Egret (*Ardea alba*), Rainbow Bee-eater (*Merops ornatus*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Callidris ruficollis*) and White-winged Black Tern (*Sterna leucoptera*).

The Sandpipers, Egret, Tern, Swift and Stint are likely to be observed occasionally within the application area, drawn either by the permanent water afforded by evaporation ponds and tailings dams or following extreme rainfall events with standing water in nearby salt lakes. The clearing of native vegetation is not likely to result in the loss of significant habitat for these species.

The Princess Parrot (Department of Environment and Conservation (DEC) Priority 4) occupies the eastern desert areas of Western Australia extending into South Australia, and has been recorded in the vicinity of Wanjarri Nature Reserve previously (Coffey, 2007). The Princess Parrot is said to occur in swales between sand dunes, where they feed on a variety of seeds, as well as flowers, fruits and foliage of shrubs and trees. Nests have been recorded in hollows in River Red Gum (*Eucalyptus camaldulensis*) and Desert Oak (*Allocasuarina decaisneana*) (Garnett et al, 2000). The species may be a sporadic visitor to the area, and there is a vast amount of vegetation it could utilise for feeding within the local area. Therefore, the vegetation within the application area is not likely to be significant habitat for this species.

The Peregrine Falcon (Schedule 4 - Fauna in need of special protection, *Wildlife Conservation (Specially Protected Fauna) Notice 2006*) has a wide home range and utilise tall trees, cliffs, granite outcrops and quarries for nesting (Coffey, 2007). The application area would represent a small fraction of their range if present and therefore the vegetation within the application area is not likely to be significant habitat for this species.

The Major Mitchell Cockatoo (Schedule 4 - Fauna in need of special protection, *Wildlife Conservation (Specially Protected Fauna) Notice, 2006*) occurs in semi-arid and arid areas where suitable nesting (large eucalypts) and food species (*Acacia*, *Callitris*) occur (Slater et al, 1994). Major Mitchell's may occur within the area during favourable conditions, although Coffey (2007) reported a lack of suitable nesting trees within the application area. Therefore, the vegetation within the application area is not likely to be significant habitat for this species.

The Australian Bustard (DEC Priority 4) prefers tussock grassland, *Triodia* hummock grassland, grassy woodland and low shrublands (Garnett et al, 2000). This species may occur within the application area, however, given the widespread distribution of this species and the degraded nature of the vegetation to be cleared, the habitat within the application area is not significant habitat for this species.

The Bush Stone Curlew (DEC Priority 4) prefers sparsely grassed, lightly timbered, open forest or woodland. In southern Australia, they persist most often where there is a well-structured litter layer and fallen timber debris (Garnett et al, 2000). The Bush Stone Curlew has previously been recorded from the Wanjarri Nature Reserve (Coffey, 2007). There is suitable habitat for the species within the application area. However, there is a vast amount of vegetation in the region that the species can potentially utilise and therefore the vegetation within the application area is not likely to be significant habitat for this species.

The Rainbow Bee-eater (Migratory species under the *Environmental Protection and Biodiversity Conservation Act, 1996*) nests in sandy soils and is able to utilise a wide range of habitat types (Coffey, 2007). Given the species widespread distribution and ability to utilise many different vegetation types, the vegetation within the application area is not significant habitat for this species.

A site visit was conducted by the assessing officer on 30 November 2007. The assessing officer noted that the vegetation was in 'good' condition (Keighery, 1994) and that there were no unique or restricted fauna habitat types. The assessing officer did not consider the vegetation within the application area to be significant habitat for fauna.

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

Methodology Coffey (2007)
EPA (2004a)
Garnett et al (2000)
Slater et al, (1994)

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

Comments Proposal may be at variance to this Principle

According to available databases, there are no recorded populations of Declared Rare or Priority Flora species present within the application area (GIS Database).

A Level 1 flora survey was undertaken over the application area by Western Botanical in September and October 2007. This survey involved a desktop search of available databases to identify any conservation significant flora species that may occur within the application area. A field survey was then conducted within the application area to identify any conservation significant species present. The survey also mapped vegetation types within the application area. The survey and subsequent report adequately meet the requirements of Guidance Statement 51 "Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia" (EPA, 2004b).

As a result of the flora survey, no Declared Rare Flora species were identified within the application area. However, eight DEC listed Priority Flora species were found within application area. These are: *Thryptomene sp.* Leinster (P1), *Phyllanthus baeckeoides* (P1), *Baeckea sp.* Melita Station (P3), *Calytrix erosipetala* (P3), *Calytrix uncinata* (P3), *Sauropus ramosissimus* (P3), *Acacia balsamea* (P4) and *Eremophila pungens* (P4). Western Botanical (2007) also noted several species of taxonomic interest, including *Thryptomene nealensis sp. nov.* This is the second recorded population of this species.

All species have been recorded outside of the application area, both during this survey as well as during previous surveys (Western Botanical, 2007).

Western Botanical (2007) were able to quantify the impacts to these Priority species.

Acacia balsamea is located within areas subject to mine maintenance activities and exploration activities within the application area. Approximately 144 plants will be impacted by mine maintenance (Western Botanical, 2007). A further 3,328 plants are located within areas subject to exploration activities (Western Botanical, 2007). Therefore, the total number of plants that may be impacted by the proposed clearing is 3,472. This represents approximately 51% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Clearly, this species is common in the local area and is likely to be found over a much larger area given the extensive amount of potential habitat that occurs within the region. Therefore, the vegetation within the application area is not likely to be significant habitat for this species. Furthermore, plants found within the area subject to exploration may return following rehabilitation as many plants were recorded in historically disturbed areas (Western Botanical, 2007).

Baeckea sp. Melita Station is located within areas subject to mine maintenance and exploration activities. Approximately 97 plants occur within mine maintenance areas (Western Botanical, 2007). A further 2,981 plants occur within areas subject to exploration activities (Western Botanical, 2007). Therefore, the total number of plants that may be impacted by the proposed clearing is 3,078. This represents approximately 39% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Clearly, this species is common in the local area and is likely to be found over a much larger area given the extensive amount of potential habitat that occurs within the region. Therefore, the vegetation within the application area is not likely to be significant habitat for this species.

Calytrix erosipetala is located within the area subject to exploration. A total of 20 plants may be impacted by exploration activities (Western Botanical, 2007). This represents 6.5% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Given that the species has not been recorded widely within the local area, the vegetation within the application area may be significant habitat for this species. It is noted that suitable habitat for this species is likely to be found extensively throughout the region.

Calytrix uncinata is located within the areas subject to mine maintenance and exploration activities. Approximately 67 plants occur within the mine maintenance areas (Western Botanical, 2007). A further 3,226 plants occur within areas subject to exploration activities (Western Botanical, 2007). Therefore the total number of plants that may be impacted by the proposed clearing is 3,293. This represents approximately 25% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Clearly, this species is common in the local area and is likely to be found over a much larger area given the extensive amount of potential habitat that occurs within the region. Therefore, the vegetation within the application area is not likely to be significant habitat for this species.

Eremophila pungens is located within the areas subject to mine maintenance and exploration activities. Approximately 718 plants occur within mine maintenance areas (Western Botanical, 2007). A further 3,115 plants occur within areas subject to exploration activities (Western Botanical, 2007). Therefore, the total number of plants that may be impacted by the proposed clearing is 3,833 plants. This represents approximately 50.1% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Clearly, this species is common in the local area and is likely to be found over a much larger area given the extensive amount of potential habitat that occurs within the region. Therefore, the vegetation within the application area is not likely to be significant habitat for this species. Furthermore, plants found within the area subject to exploration may return following rehabilitation as many plants were recorded in historically disturbed areas (Western Botanical, 2007).

Phyllanthus baeckeoides is located within the areas subject to exploration activities. Approximately 513 plants occur within areas subject to exploration activities (Western Botanical, 2007). This represents approximately 31% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Given that the species has not been recorded widely within the local area, the vegetation within the application area may be significant habitat for this species. It is noted that suitable habitat for this species is likely to be found extensively throughout the region.

Sauropus ramosissimus is located within areas subject to mine maintenance and exploration activities. A total of two plants have been identified within mine maintenance areas (Western Botanical, 2007). A further 39 plants occur within areas subject to exploration activities (Western Botanical, 2007). Therefore, the total number of plants which may be impacted by the proposed clearing is 41 plants. This represents approximately 100% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Therefore, the vegetation within the application area is significant habitat for this species. It is noted that suitable habitat for this species is likely to be found extensively throughout the region.

Thryptomene sp. Leinster is located within areas subject to exploration activities. Approximately 128 plants occur within mine maintenance areas (Western Botanical, 2007). This represents approximately 2% of the total number of plants recorded between Mt Keith and Leinster by Western Botanical over many surveys (Western Botanical, 2007). Clearly, this species is common in the local area and is likely to be found over a much larger area given the extensive amount of potential habitat that occurs within the region. Therefore, the vegetation within the application area is not likely to be significant habitat for this species.

A further 7 species of taxonomic interest were found within the application area (Western Botanical, 2007). Their conservation significance is difficult to assess. Western Botanical recommended in their survey report that two individual *Thryptomene nealensis* sp. nov. be avoided as they may have conservation significance (Western Botanical, 2007).

The findings of the flora survey conducted by Western Botanical over the application area suggest that the application area is host to many priority species and species of taxonomic interest. Western Botanical (2007) suggests this is due to a combination of a high degree of habitat variation, extensive surveys in the local area and lack of survey throughout the region. The application area encompasses landforms such as breakaways and ironstone outcrops that have high concentrations of conservation significant flora species, and includes populations of flora that have not been recorded extensively in the local area, but may occur extensively throughout the region.

Based on the above, the proposed clearing may be at variance to this principle. The assessing officer recommends that should a permit be granted, conditions be placed on the permit in relation to the conservation of *Sauropus ramosissimus*, *Phyllanthus baeckeoides*, *Calytrix erosipetala* and *Thryptomene nealensis* sp. nov., and the rehabilitation of areas cleared for exploration.

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

According to available databases, there are no Threatened Ecological Communities within the application area (GIS Database).

A vegetation survey of the area conducted by Western Botanical (2007) identified one vegetation type (SIMS) which is considered an ecological community at risk (CALM, 2002). Its conservation status is considered vulnerable and vegetation condition is rated as fair to good but not in decline. This vegetation type is under threat from grazing pressure (CALM, 2002). SIMS is known to cover a substantial area (2,905.9 hectares) across BHPB Nickel West tenements (Western Botanical, 2007), and constitutes the largest area within the application area. Pringle et al (1994) state that SIMS is found throughout the North Eastern Goldfields but is most extensive between Laverton and Leonora. However, only a very small amount of SIMS vegetation will be cleared (approximately half of the eastern application area). This minimal amount of clearing is not likely to affect the conservation status of the SIMS vegetation type.

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

Methodology CALM (2002)
 Pringle et al (1994)
 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

According to available databases, the application area falls within the Murchison IBRA Bioregion (GIS Database). This bioregion's vegetation extent remains at approximately 100% of its Pre-european extent (see table).

Beard vegetation association's 18 and 39 occur within the application area (GIS Database). These vegetation associations remain at 100% of their Pre-European extent for both the State and the Murchison IBRA Bioregion (see table). Although not well represented in conservation estate, their conservation status is secure considering the total extent of these vegetation types that (see table).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european ha in IUCN Class I-IV Reserves
IBRA Bioregion – Mallee	28,120,558	28,120,558	~100	Least Concern	295,435
Beard veg assoc. – State					
18	19,890,795	19,890,029	~100	Least Concern	421,016
39	6,613,453	6,613,453	~100	Least Concern	479,439
Beard veg assoc. – Bioregion					
518	12,403,248	12,403,248	~100	Least Concern	45,626
39	1,148,411	1,148,411	~100	Least Concern	232

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

Therefore, the application areas do not constitute a significant remnant in an area that is otherwise cleared.

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)

GIS Database:

- 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 at variance to this Principle

According to available databases, several minor, non-perennial drainage lines intersect with the application area (GIS Database). During a site inspection the assessing officer noted that the drainage lines are very shallow and are not likely to experience water flows except during times of intense rainfall. The vegetation within the drainage lines is not riparian in nature, although the vegetation type (GRMU) is restricted to the drainage line. It is acknowledged in the assessment of Principle (g) that the soil types within the drainage lines can be susceptible to erosion.

Based on the above, the proposed clearing is at variance to this Principle, although the impact from the proposed clearing is not likely to be significant. The assessing officer recommends that should a permit be granted, conditions be placed on the permit in regard to avoiding clearing in drainage lines when conducting exploration activities.

Methodology GIS Database:
- 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 at variance to this Principle

The application areas have been surveyed by the Department of Agriculture and Food (Pringle et al 1994).

The application areas are composed of the following land systems (GIS Database):

- **Bevon**
- **Brooking**
- **Gransal**
- **Sherwood**
- **Tiger**
- **Violet**

Jundee and Rainbow land systems are also located within the application area, but are very minor components.

The Bevon Land System is described as irregular low ironstone hills with stony lower slopes supporting mulga shrublands (Pringle et al, 1994). The land system is generally not susceptible to erosion except on breakaway footslopes or drainage tracts (Pringle et al, 1994). The Bevon Land System is divided into eight land units of which three are most likely to occur within the western application area - Ridge (RDG) and Stony Plain (PLN) and Narrow Drainage Tract (DRN). DRN is susceptible to erosion if soil is disturbed.

The Brooking Land System is described as prominent ridges of banded iron formation, supporting mulga shrublands; occasional minor halophytic communities in the south-east (Pringle et al, 1994). Soil erosion can occur if stony mantles are removed (Pringle et al, 1994). The Brooking Land System is divided into four land units of which all four occur within the application area, Ridge (RDG), Hillslope (HSL), Stony Plain (PLG) and Narrow Drainage Floors (DRN). Unit RDG hosts the majority of Priority Flora species found within the application area. The area has already been highly disturbed through mining activities and does not appear to be showing significant signs of erosion.

The Gransal Land System is described as stony plains and low rises on granite, supporting mainly halophytic shrublands (Pringle et al, 1994). Breakaway footslopes, and alluvial plains are respectively highly and moderately susceptible to water erosion where shrub cover is substantially removed. Disturbance to soil surface on these units and on saline stony plains is likely to initiate erosion (Pringle et al, 1994). The Gransal Land System is divided into eight land units of which two are most likely to occur within the application area, Low Rise/Breakaway (RIL) and Stony Plain (PLG). The breakaway area is highly susceptible to erosion.

The Sherwood Land System is described as Granite breakaways and extensive stony granitic plains, with mulga shrublands and minor halophytic shrublands (Pringle et al, 1994). Most of this area has been highly disturbed by mining activities. The areas remaining undisturbed are likely to consist of the lower footslope (FOL), Stony Plain (PLG) and Drainage Tract (DRN) land units. The footslopes and drainage tracts have fragile soils that are highly susceptible to water erosion (Pringle et al, 1994).

The Tiger Land System is described as gravelly hardpan plains and sandy banks with mulga shrublands and wanderrie grasses (Pringle et al, 1994). The system is generally not susceptible to erosion (Pringle et al, 1994).

The Tiger Land System is divided into five land units of which Sandy Banks (BAS), Loamy Plains (PLO) and Drainage Tracts (DRN) are most likely to occur. None of these land units are susceptible to erosion, although impedence to sheet flow should be avoided to prevent water starvation downslope.

The Violet Land System is described as undulating stony gravelly plains and low rises, supporting mulga shrublands (Pringle et al, 1994). Two areas of Violet Land System occur within the application area, one to the north and one to the south. The Northern area is mostly disturbed from previous mining activities. The area to the south remains uncleared. The Violet Land System is divided into five land units of which three are most likely to occur, Stony Plain (PLG), Hardpan Plains (PLH) and Narrow Drainage Tracts (DRN). Removal of stony mantles can make soils moderately susceptible to water erosion (Pringle et al, 1994).

Therefore, areas within the application area such as breakaways and some drainage areas are susceptible to erosion. The Department of Agriculture and Food, Western Australia (DAFWA) suggests that exploration should avoid these high risk areas where possible, and avoid altering surface hydrology where sheet flow is important for dependant vegetation (DAFWA, 2008).

Based on the above, the proposed clearing is at variance to this Principle. The assessing officer recommends that should a permit be granted, conditions be placed on the permit with regard to rehabilitation of areas cleared for exploration purposes, as well as avoidance of clearing in breakaway areas and drainage lines when conducting exploration activities.

Methodology DAFWA (2008)
Pringle et al (1994)
GIS Database:
- Groundwater Salinity, Statewide - DoW
- Rangeland Land System Mapping - DA

(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 at variance to this Principle

There are no conservation areas within close proximity to the application areas. The nearest conservation estate is Wanjarri Nature Reserve, located approximately 30 kilometres to the north (GIS Database).

Based on the above, the proposed clearing is not 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

The application area occurs in a very arid climate. The Bureau of Meteorology have recorded an average yearly rainfall for Leinster of 290.8 millimetres (BoM, 2007), with most rainfall occurring in the summer months between December and March. This rainfall is likely to be associated with low pressure troughs bringing warm moist air from the tropics. Rainfall during these tropical thunderstorms is likely to be short and intense. Surface water run-off in these events is likely to be as sheet flow towards existing natural drainage lines.

A drainage line has been constructed around the western side of the application area to accommodate a 1 in 50 year rainfall event. This drain diverts surface flows away from the application area into existing natural drainage lines. This drain means that it is unlikely that sufficient water will flow over the application area to create turbidity or cause sedimentation downstream.

The application occurs within a surface water management area (GIS Database). DoW (2007) advise that: "in line with the administrative agreement between the Water and Rivers Commission (DoW) and the Department of Industry and Resources for mineral exploration and prospecting activities and mining operations in water resource areas of Western Australia - schedule AA1 'Exploration activities or mining operations that may disrupt the natural flow of any watercourse or hydrology of a wetland are prohibited unless written approval is first obtained from the Waters and Rivers Commission (DoW)'." It is the applicant's responsibility to determine whether a Beds and Banks permit is required.

Groundwater in the application areas ranges from fresh to brackish (GIS Database). Given the small amount of clearing relative to the size of the groundwater basins, it is unlikely that the proposed clearing will lead to increased groundwater salinity.

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

Methodology BoM (2007)
DoW (2007)

- GIS Database:
- Groundwater Salinity, Statewide
 - Surface Water Management Areas (DRAFT)

(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 is located within the Lake Carey catchment area which is approximately 113,782 square kilometres in size (GIS Database). The removal of 400 hectares of native vegetation within this catchment area represents an extremely small amount of clearing in relation to the size of the catchment.

Given the low annual rainfall experienced by the catchment and its size, the proposed clearing is not likely to lead to an increase in the amount of run-off within the catchment. Therefore, there will not be any increase in flood height or duration within the catchment.

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

- Methodology** GIS Database:
- Hydrographic Catchments - Catchments

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

Comments

There is no native title claim over the area under application (GIS Database).

Aboriginal Heritage Sites DIA 686, 687 and 24081 occur within 2 kilometres of the application area (GIS Database). BHP Billiton Nickel West has undertaken previous Aboriginal Heritage studies to confirm the true location of these sites. As a result, BHP Billiton Nickel West has confirmed that no Aboriginal Heritage Site will be disturbed or destroyed by the application (BHP Billiton Nickel West, 2007). The assessing officer does not consider it necessary to refer the application to the EPA on the grounds of impact to heritage sites. 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.

The application occurs in a surface water management area (GIS Database). DoW (2007) advise that "in line with the administrative agreement between the Water and Rivers Commission (DoW) and the Department of Industry and Resources for mineral exploration and prospecting activities and mining operations in water resource areas of Western Australia - schedule AA1 'Exploration activities or mining operations that may disrupt the natural flow of any watercourse or hydrology of a wetland are prohibited unless written approval is first obtained from the Waters and Rivers Commission (DoW)'." It is the applicant's responsibility to determine whether a Beds and Banks permit is required.

No submissions were received from interested third parties during the public submission period.

- Methodology** BHP Billiton Nickel West (2007)
DoW (2007)
GIS Database:
- Native Title Claims
 - Aboriginal Sites of Significance (STATUS)
 - Surface Water Management Areas (DRAFT)

4. Assessor's comments

Purpose	Method	Applied area (ha)/ trees	Comment
Mineral Production	Mechanical Removal	400	<p>The proposal has been assessed against the Clearing Principles and has been found to be at variance to Principle (f) and (g), may be at variance to Principle (a) and (c), is not likely to be at variance to Principles (b), (d), (i) and (j) and is not at variance to Principle (e) and (h).</p> <p>It is recommended that should a permit be granted, conditions be imposed on the permit with regard to rehabilitating areas cleared for exploration, avoiding several Priority and taxonomically significant flora species, avoiding clearing in breakaways and drainage lines during exploration activities, as well as reporting on areas cleared and rehabilitated.</p>

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:
- is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
 - 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:
- is not critically endangered; and
 - 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.