



1. Application details

1.1. Permit application details

Permit application No.: 1695/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP BILLITON NICKEL WEST PTY LTD

1.3. Property details

Property: M53/167
M53/56
M53/165
M53/489
M53/57
M53/166
Local Government Area: Shire Of Wiluna
Colloquial name: Mt Keith Nickel Operations

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
717.51		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

The vegetation within the application area has been mapped at a 1:250000 scale as Beard Vegetation Association 39 (Shrublands; Mulga scrub) (Shepherd *et al*, 2001).

The application area has been divided into four separate areas by Cockerton *et al* (2006) and the vegetation types in each area described.

Area A – 48.76 ha north east of the Mt Keith plant area:

DRMS - Drainage Line Mulga Shrublands (*Acacia anuera*, *Acacia quadrimarginea*, *Acacia tetragonophylla*, over *Eremophila* sp. over *Ptilotus obovatus*)
WABS - Wanderrrie Bank Grasslands/Shrublands (*Eragrostis eriopoda* with scattered shrubs including *Eremophila latrobei*, *Sida* sp. unisexual and *Sida platycalyx*)

Area B – a relatively large area (372.78 ha) to the south of the Mt Keith wastedumps and pit:

DRMS - Drainage Line Mulga Shrublands (*Acacia anuera*, *Acacia quadrimarginea*, *Acacia tetragonophylla*, over *Eremophila* shrubs over *Ptilotus obovatus*)
HPMS - Hardpan Mulga Shrublands (*Acacia quadrimarginea*, *Acacia anuera*, *Acacia tetragonophylla*, over *Sida* sp. unisexual, over *Aristida contorta*)
WABS - Wanderrrie Bank Grasslands/Shrublands (*Eragrostis eriopoda* with scattered shrubs including *Eremophila latrobei*, *Sida* sp. unisexual and *Sida platycalyx*)

Clearing Description

BHP Billiton have applied to clear up to 717.51 hectares of vegetation at the Mt Keith Nickel Operations to extend waste landforms, construct plant and infrastructure and to create an access road.

Vegetation Condition

Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery 1994)

to

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

Comment

The vegetation condition within the application area can vary. Cockerton *et al* (2006) have described the vegetation thus:

- * Area A is described as Very Poor to Fair due to water starvation and saline spray drift.
- * Area B is described as excellent to pristine with some tracks.
- * Area C is described as excellent to pristine with few tracks and gridlines present.
- * Area D is described as moderate to good due to water starvation.

The site was inspected by the assessing officer, the Commissioner for Soil and Land Conservation and an officer from the Biodiversity Coordination Section at DEC. The assessing officer concurs with the findings of the flora survey conducted by Western Botanical (Cockerton *et al*, 2006) in regards to vegetation condition, although tree deaths due to water starvation within vegetation type DRMS in Area D may be due to dry conditions.

Area C – a moderately sized area (97.84 ha) to the west of the Mt Keith western waste dumps and pit:

DRMS - Drainage Line Mulga Shrublands (*Acacia anuera*, *Acacia quadrimarginea*, *Acacia tetragonophylla*, over *Eremophila* shrubs over *Ptilotus obovatus*)

SAES - Stony Acacia-Eremophila Shrublands (*Acacia anuera*, over *Eremophila fraseri*, over *Ptilotus obovatus*)

SIMS - Stony Ironstone Mulga Shrublands (*Acacia anuera*, over *Ptilotus obovatus*, *Hakea preissii*, *Sida* spp. and *Ptilotus aervoides* on low hills and colluvial slopes)

Area D – a 12.81 ha proposed road corridor from the Mt Keith village access road to the southern end of Mt Keith Pit ("Southpark"):

DRMS - Drainage Line Mulga Shrublands (*Acacia anuera*, *Acacia quadrimarginea*, *Acacia tetragonophylla*, over *Eremophila* shrubs over *Ptilotus obovatus*)

HPMS - Hardpan Mulga Shrublands (*Acacia quadrimarginea*, *Acacia anuera*, *Acacia tetragonophylla*, over *Sida* sp. unisexual, over *Aristida contorta*)

WABS - Wanderrie Bank Grasslands/Shrublands (*Eragrostis eriopoda* with scattered shrubs including *Eremophila latrobei*, *Sida* sp. unisexual and *Sida platycalyx*)

The populations of *Hemigenia exilis* (P4) and *Goodenia modesta* (P3) which occur outside the application area are not likely to be impacted by the clearing activities. A small area known as 'Lake Jane' caused by ponding at the foot of the western waste dump attracts wildlife such as waterbirds, finches, white browed babbler and birds of prey. This area is not within the application area.

3. Assessment of application against Clearing Principles

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

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

The application area is located within the East Murchison Sub-Biogeographic Region (GIS Database). This sub-region is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. 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 grasslands with occasional mulga emergents (WABS) as well as mulga shrublands in drainage lines (DRMS) and other mulga shrublands. One vegetation type within the application area is considered to be an ecological community at risk (SIMS) (Cockerton *et al*, 2006).

The bioregion is rich and diverse in both its flora and fauna but most species are wide ranging and usually occur in adjoining regions (CALM, 2002). No Declared Rare or Priority Flora occurs within the application area. Two priority flora species occur outside of the application area at the south west corner of the south-west waste dump at Mt Keith (*Hemigenia exilis* (P4) and *Goodenia modesta* (P3)) (Cockerton *et al*, 2006). The application area is also host to two undescribed species at the southern extent of their range (Cockerton *et al*, 2006). However, populations of these species have also been found outside of the application area at Yakabindie and Leinster. One of the species, *Sida* sp. Tiny glabrous fruits has been noted occurring in rehabilitation trials at Mt Keith.

Woodlands and shrublands (*Acacia*, chenopod, *Melaleuca*, *Casuarina* and *Eucalyptus*) and grasslands 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 area, stock has largely been eliminated, although grazing by goats continues at low levels. Most vegetation communities present within the application area are considered to be in very good to excellent condition (Cockerton *et al*, 2006).

More than 40 per cent of the Murchison's original mammal fauna is now regionally extinct. Rare species for the subregion include, Great Desert Skink (*Egernia kintorei*), Mallee Fowl (*Leipoa ocellata*), Alexandra's Parrot (*Polytelis alexandrae*) and Mulgara (*Dasycercus cristicauda*) (CALM, 2002). A Mulgara was trapped during a fauna survey of the application area and surrounds (Biota, 2006), although not in the application area.

There is no information to suggest that the application area is an area that is more biodiverse than other vegetation found locally or in the bioregion.

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

Methodology Biota (2006)

CALM (2002)
Cockerton *et al* (2006)
Western Australian Herbarium (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

In March 2006, Biota Environmental Sciences (Biota) were commissioned to complete a baseline fauna survey mostly within the application area. This involved documenting the fauna habitats found within the study area, creating an inventory of fauna assemblage occurring within the study area using a combined approach of desktop reviews of existing data and a site specific fauna survey utilising established survey techniques, identifying fauna of conservation significance, reporting findings in relation to existing data for the region and provision of recommendations for management of fauna of conservation significance (Biota, 2006). This survey adequately meets the requirements of Guidance Statement 56 'Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia' (EPA, 2004a).

The field component involved a total of 1,136 trap nights (mammal, reptile and short range endemics), as well as over 15 hours of avifauna sampling and 16 trap nights of bat sampling (Biota, 2006).

Fauna habitats were determined on the basis of landform type and vegetation type. In this way, 6 primary fauna habitats were identified, being Loamy Plain, Drainage Tracts, Hardpan Plain, Hills, Stony Plain and Sand Sheet, with fauna assemblages differing with vegetation type (Biota, 2006).

The survey identified a total of 101 vertebrate fauna species, and two short range endemic spiders (Biota, 2006).

Of the vertebrate species, the following species were identified by Biota (2006) as being of conservation significance: Malleefowl (*Leipoa ocellata*), Princess Parrot (*Polytelis alexandrae*), Peregrine Falcon (*Falco peregrinus*), Bush Stone-curlew (*Burhinus grallarius*), Australian Bustard (*Ardeotis australis*), Striated Grasswren (*Amytornis striatus striatus*), Rainbow Bee-eater (*Merops ornatus*), Crested Bellbird (*Oreoica gutturalis*), and Mulgara (*Sminthopsis longicaudata*). A discussion of each follows.

The Malleefowl (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice* 2006) is largely confined to arid and semi-arid woodland that is dominated by mallee Eucalypts on sandy soils, with less than 430 millimetres of rainfall annually. They may also be found in Mulga (*Acacia aneura*), and other sclerophyllous associations (DEC, 2007). They require sandy soils with an abundance of leaf litter for breeding. The species has been recorded at Mt Keith and nearby Wanjarri Nature Reserve but was not recorded during the Biota survey (Biota, 2006). The species could be present at Mt Keith in any habitat described above. However, the habitats present are well represented in the region and as such if the Malleefowl is present it is not likely that the proposed clearing will significantly impact the conservation of this species.

The Princess Parrot (DEC Priority 4) occupies the eastern desert areas of Western Australia extending into South Australia, and has been recorded in the vicinity of Mt Keith previously, although not during the Biota survey (Biota, 2006). 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. The proposed clearing is not likely to significantly impact the conservation of this species.

The Peregrine Falcon (Schedule 4 - Fauna that is in need of special protection, *Wildlife Conservation (Specially Protected Fauna) Notice* 2006) have a wide home range and utilise tall trees, cliffs, granite outcrops and quarries for nesting (Biota, 2006). The Peregrine Falcon was not recorded during the Biota survey (Biota, 2006). The application area would represent a small fraction of their range if present and therefore it is not likely that the proposed clearing will significantly impact on the conservation of these 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 been recorded from the Wanjarri Nature Reserve previously but was not located during the Biota survey (Biota, 2006). 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 proposed clearing is not likely to significantly impact the conservation of this species.

The Australian Bustard (DEC Priority 4) prefers tussock grassland, Triodia hummock grassland, grassy woodland and low shrublands (Garnett *et al*, 2000). The species has been observed in nearby studies but was not recorded during the Biota survey (Biota, 2006). The application area is likely to support habitat for the Australian Bustard, but there are vast amounts of vegetation within the area that the Bustard can utilise and therefore the proposed clearing is not likely to significantly impact the conservation of this species.

Striated Grass-wrens (DEC Priority 4) live on sandplains dominated by mature Triodia hummock grassland with

an overstorey of shrubs, usually mallee Eucalypts, or Acacia (Garnett *et al*, 2000). The species was not recorded during the Biota survey but has been recorded from the vicinity of Mt Keith and Wanjarri Nature Reserve (Biota, 2006). Suitable habitat for the Striated Grass-wren occurs within the application area, however, there are vast amounts of vegetation within the area that the species can utilise and as such, the proposed clearing is not likely to significantly impact the conservation of this species.

The Rainbow Bee-eater (Migratory species under the *Environmental Protection and Biodiversity Conservation Act* 1996) is able to utilise a wide range of habitat types and nests in sandy soils. The species was recorded by Biota during the survey exclusively within DRMS (Drainage Line Mulga Shrublands) vegetation type within the Monk Land System (Biota, 2006). However, this vegetation type is well represented throughout the region and therefore, the proposed clearing is not likely to significantly impact the conservation of this species.

The Crested Bellbird (DEC Priority 4) is known to inhabit the shrub-layer of eucalypt woodland, mallee, Acacia shrubland, Triodia hummock grassland, Saltbush and heath. It is particularly sensitive to habitat fragmentation (Garnett *et al*, 2000). This species was recorded by Biota across a range of vegetation types (Biota, 2006). Given its ability to utilise a wide range of habitat types, the proposed clearing is not likely to significantly impact the conservation of this species.

The Mulgara (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice* 2006) prefers habitat comprising largely immature hummock grassland, particularly where this coincides with better watered areas such as drainage lines in sandplain or sand-dune habitat. The Mulgara was trapped during the Biota survey (Biota, 2006), in one location outside of the application area. The habitat at this site is described as Bullimore Land System - Sandplain Mulga Spinifex Shrublands (SAMU) on Loamy Plain. This land system occurs extensively throughout the region (Biota, 2006). This is not considered to be core habitat for the species. The *Draft Recovery Plan, 2005-2009* for the Mulgara states that it is relatively secure in its range, and recovery actions focus on the clarification of its status (Masters, 2005 in Biota, 2006). Given the large area of habitat within the region that the Mulgara can utilise, it is considered unlikely that the Mulgara's conservation status or abundance will not be affected by the proposed clearing.

The Biota fauna study also considered a Trapdoor spider (*Kwonkan moriartii* - DEC Priority 2) as potentially occurring within the application area (Biota, 2006) given the proximity of the application area to its only known location, near Wiluna. However, an assessment of the likely impact of this proposal on the conservation of this species is not possible due to a lack of information regarding this species.

Mygalomorph spiders are known to support a number of taxa that have very limited distributions and as such, may have heightened conservation status. Two mygalomorph spiders were collected during the Biota survey. Of these, one (*Selenocosmia* sp.) has been recorded at another site during a previous Biota survey approximately 35 km to the South East. The other has been tentatively identified as *Gaius villosus*, which has been recorded throughout the Goldfields region (Biota, 2006).

Biota considers the SAMU vegetation type of the Bullimore Land System to have moderately high conservation significance as fauna habitat due to the presence of Mulgara, the SIMS vegetation type to have moderate conservation significance as fauna habitat as it is an ecological community at risk and may host short range endemic species, and DRMS vegetation type of the Monk Land System to have moderate conservation significance as fauna habitat as it performs a function beyond the confines of the vegetation type (Biota, 2006).

The site was inspected by the assessing officer for the presence of significant fauna habitat within the application area on 8th February 2007. Although no sites are significant fauna habitat in a regional context, a small area known as 'Lake Jane' where water ponds against the foot of the western waste dump supports waterbirds, finches, birds of prey and other small birds. The assessing officer considers that this area has importance as fauna habitat on a local scale. However, this area is not within the application area.

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

Methodology Biota (2006)
DEC (2007)
EPA (2004a)
Garnett *et al* (2000)

(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

A search of available GIS databases identified the following rare or priority flora species within a 50 km radius of the application area: *Hemigenia exilis* (P4) and *Grevillea inconspicua* (P3) (GIS Database). There are no records of any Declared Rare or Priority flora occurring within the application area, although a population of *H. exilis* is known to occur immediately to the south west of the western waste dump at Mt Keith Operations (MKO) (Cockerton *et al*, 2006).

Western Botanical were commissioned by the proponent to undertake a botanical survey of the application area, involving a review of habitat mapping previously conducted by Cockerton and Stratford in 1997, review of the flora of the MKO project area with an emphasis on updating knowledge of significant species that may

occur within the application area. The on site component of the survey took place between the 1st and 4th August 2006 (Cockerton *et al*, 2006). The survey and subsequent report adequately meets the requirements of *Guidance Statement 51 - Guidance for the Assessment of Environmental Factors - terrestrial flora and vegetation surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b).

As a result of the survey, Western Botanical identified a new population of *Goodenia modesta* (P3) within the known *H. exilis* population referred to above (Cockerton *et al*, 2006). This population is not within the application area and the proposed clearing is not likely to impact on the conservation of this population or the species.

The *H. exilis* population is known to the proponent and receives intensive and specific management (Cockerton *et al*, 2006). There is a risk that this population and the *G. modesta* population may suffer from flooding due to the construction of mine dumps, if adequate drainage is not provided.

Four undescribed but regionally reasonably common plant species were recorded within the project area (Cockerton *et al*, 2006). These were:

- * *Sida* sp. Tiny glabrous fruits (A.A. Mitchell PRP 1152);
- * *Sida* sp. Verrucose glands (F.H. Mollemans 2423);
- * *Sida* sp. Unisexual (NH Speck 574); and
- * *Ptilotus obovatus* ssp. Ironstone hills (G. Cockerton 12281).

Sida sp. Tiny glabrous fruits is a prostrate annual to short lived perennial to 0.02 m high x 1 m wide (Cockerton *et al*, 2006). It has short pedicels 5mm long and small ovate leaves 10mm long by 5mm wide. The taxon has been poorly collected state wide with only three collections lodged at the Herbarium. These are from the Gascoyne and Central Desert botanical regions from locations near Newman, northeast of Wiluna and from the Gibson Desert. The collections of *Sida* sp. Tiny glabrous fruits at Mt Keith add to those found at Yakabindie and represent a significant range extension to the south into the Murchison Biogeographic region. This species has also been noted occurring in rehabilitation trials at Mt Keith, following topsoil movement from habitat adjacent to the Central Discharge Tailings Storage Facility. This species is not considered to be of conservation significance.

Sida sp. Verrucose glands (F.H. Mollemans 2423) is a prostrate shrub to 0.1 m high x up to 1.2 m wide (Cockerton *et al*, 2006). It has a long peduncle, up to 20mm and a large leaf, 30mm long by 10mm wide with the widest point at its base. The taxon is known from ten records within the Pilbara botanical region generally occurring on hardpan plains and sandy watercourses. The collection of *Sida* sp. Verrucose glands at Mt Keith add to those recently made at Yakabindie and Leinster by Western Botanical and represents a significant southward range extension of this species. This species is likely reasonably common in the region (Cockerton *et al*, 2006).

Sida sp. Unisexual (NH Speck 574) was noted commonly within the HPMS habitat immediately south of the existing waste dumps within Area B (Cockerton *et al*, 2006). This is a common and widespread shrub in the north-eastern Goldfields, often found growing in drainage foci and loamy soils on the margins of drainage lines, within Mulga groves and similar resource-gaining sites in hardpan plains.

Ptilotus obovatus ssp. Ironstone hills (G. Cockerton 12281) is a distinct form of an otherwise widespread species and seems to be restricted to ironstone hills, colluvial slopes and duricrust outcrops. It has been noted in the Leinster, Yakabindie and Mt Keith areas by G. Cockerton and C. O'Keefe in previous surveys for Nickel West. This form is also recognised by Mr Rob Davis, WA Herbarium, as occurring widely on ironstone hills in the Pilbara region. The taxonomy of this species has not yet been investigated and records are few, however, anecdotal information from Mr Davis indicates that the species is common in the Pilbara. It is possible that occurrences in the Leinster-Mt Keith area represent the southern extremity of the range of this species. Significant numbers, estimated at many hundreds of plants were noted outside the proposed disturbance envelope, adjacent to the Goldfields Highway, and it is estimated that approximately 140 plants may exist within the wastedump expansion footprint within Area C. Impacts by the current development on the local population of this variety are not considered significant.

The site was inspected by the assessing officer on 8th February 2006 who confirmed that the priority species, *Hemigenia exilis* (P4) and *Grevillea inconspicua* (P4), are not within the application area but occur within an adjacent area that may collect water if adequate drainage is not provided for. The BIF formation to the west of the application area is highly weathered and eroded and is not a significant BIF in the region.

The Biodiversity Coordination Section of the Department of Conservation and Land Management have stated that it is recommended that a drain be constructed to prevent flooding of *H. exilis* and *G. modesta* populations.

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

Methodology Cockerton *et al* (2006)
DEC (2007)
EPA (2004b)
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 may be at variance to this Principle

A search of available databases reveals that there are no Threatened Ecological Communities (TECs) within 50 km of the application area (GIS Database).

A vegetation survey by Western Botanical in August 2006 (Cockerton *et al*, 2006) of the Mt Keith Operations area, which includes the application area, identified three vegetation types that could be considered to be locally significant or an ecological community at risk as identified in 'Bioregional Summary of the 2002 Biodiversity Audit of Western Australia' (CALM, 2002).

The Stony Ironstone Mulga Shrublands (SIMS) vegetation type identified by Western Botanical occurs on low hills and colluvial slopes supporting scattered Mulga, *Ptilotus obovatus*, *Hakea preissii*, *Sida sp. Ptilotus aevoides* and occasional grasses (Cockerton *et al*, 2006). Western Botanical estimated approximately 51.2 hectares of SIMS vegetation type occurred within the application area and could be considered to be in excellent to pristine condition (Cockerton *et al*, 2006). SIMS is considered to be an ecological community at risk. Mapping supplied by Cockerton *et al* (2006) suggests the SIMS community is common to the west of the area applied to be cleared and that clearing of 51.2 ha of this vegetation type would not significantly impact the conservation of this vegetation type.

A well defined area within the SIMS vegetation type west of the existing waste dump was further defined as Stony Low Ironstone Shrublands (SILS) vegetation type. SILS occurs on low lateritic duricrust outcrop supporting scattered shrubs including *Thryptomene decussata*, *Mirbelia rhagodioides* and *Dodonaea petiolaris* (Cockerton *et al*, 2006). SILS is naturally fragmented in the landscape and could therefore be considered to be of local significance.

A small Banded Ironstone Formation (BIF) outcrop was also noted within the SIMS vegetation type immediately to the west of the existing waste dumps and immediately north of the SILS vegetation type (Cockerton *et al*, 2006). BIFs are uncommon in the Mt Keith area and whilst this outcrop is not considered to of conservation significance, it could be considered to be of local significance.

Both the SILS vegetation type and BIF do not occur within the application area.

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

Methodology CALM (2002)
Cockerton et al (2006)
EPA (2004b)
GIS database: Threatened Ecological Communities - CALM 12/4/05

(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

	Pre-European area (ha)	Current extent (ha)	Remaining %	Conservation Status	% in IUCN Class I-IV Reserves (current ha)
IBRA Bioregion - Murchison	28,120,558*	28,120,558*	100*	Least concern**	1.1 (1.1)*
Shire of Wiluna	18,129,342***	18,129,342	100	Least Concern	n/a
Beard vegetation association (state) – - 39	6,613,602*	6,613,496*	100*	Least concern**	7.2 (7.2)*

* Shepherd et al. (2001a) updated 2005

** Department of Natural Resources and Environment (2002)

*** GIS Database

Options to select from: Bioregional Conservation Status of Ecological Vegetation Classes (Department of Natural Resources and Environment 2002)

Presumed extinct Probably no longer present in the bioregion

Endangered* <10% of pre-European extent remains

Vulnerable* 10-30% of pre-European extent exists

Depleted* >30% and up to 50% of pre-European extent exists

Least concern >50% pre-European extent exists and subject to little or no degradation over a majority of this area

* or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

Explanation:

At a regional level, the Murchison IBRA Region remains at approximately 100% of its Pre-European vegetation extent. According to the 'Bioregional Conservation Status of Ecological Vegetation Classes' (Department of Natural Resources and Environment, 2002), this value gives the region a Conservation Status of 'Least Concern'.

The proposed clearing area falls within the Shire of Wiluna. There is no information as to the current extent of vegetation within the Shire. However, the Shire of Wiluna falls entirely within the Murchison IBRA Region and it is therefore considered that the Shire remains at approximately 100% of its Pre-European vegetation extent. According to the 'Bioregional Conservation Status of Ecological Vegetation Classes' (Department of Natural Resources and Environment, 2002) this value would give the Shire a Conservation Status of 'Least Concern'.

Statewide, Beard vegetation association 39, located within the application area remains at approximately 100% of its Pre-European vegetation extent. According to the 'Bioregional Conservation Status of Ecological Vegetation Classes' (Department of Natural Resources and Environment, 2002), this value gives the vegetation type a Conservation Status of 'Least Concern'. It is noted that the amount of vegetation association 39 currently in conservation estate is 7.2% which does not meet the 15% benchmark for representation in conservation reserves (JANIS Forests Criteria, 1997).

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

Methodology Department of Natural Resources and Environment (2002)
GIS Database: Local Government Authorities - DLI
JANIS Forests Criteria (1997)
Shepherd *et al* (2001a) updated 2005

(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

Several minor drainage lines cross the application area. These are described as "minor - non-perennial" (GIS database). An inspection of the area by the assessing officer revealed that these drainage lines are only likely to carry water during high rainfall events. Several of these drainage lines are diverted by drains around the mine and discharged into drainage lines south of the Tailings Storage Facility. Western Botanical reported that a drainage line near the MKO village is suffering from water starvation downstream of where it crosses the MKO village access road (Cockerton *et al*, 2006). These drainage lines will need to be diverted further south when construction of the southern waste dumps begins. These diversions are subject to the Mining Proposal assessment.

There are no groundwater dependent ecological communities within the application area (Cockerton *et al*, 2006; GIS database).

Based on the above, while the proposed clearing is at variance to this principle, management which will be implemented through the Mining Proposal assessment under the *Mining Act* 1978 will address drainage diversion and vegetation starvation issues.

Methodology Cockerton *et al* (2006)
GIS Database: Hydrography, Linear - DoE 1/2/04
Potential Groundwater Dependent Ecosystems - DoE 2004

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

Comments Proposal may be at variance to this Principle

An inventory and condition survey of the north eastern goldfields, conducted in 1994 (Pringle *et al*) shows that the and the application area is composed of the following land systems:

- * Monk;
- * Jundee;
- * Bevon; and
- * Violet.

The Monk land system is described as hardpan plains with occasional sandy banks, supporting Mulga shrublands and Wanderrrie grasses (Pringle *et al*, 1994). Drainage tract land units within the system are mildly susceptible to water erosion. Alteration of natural flow regimes may lead to water starvation of vegetation down gradient.

The Bevon Land System is described as irregular low ironstone hills with stony lower slopes supporting Mulga shrublands (Pringle *et al* 1994). Breakaway footslopes and incised drainage channels are susceptible to soil

erosion, particularly if perennial shrub cover is substantially reduced or the soil surface is disturbed.

The Jundee Land System is described as hardpan plains with ironstone gravel mantles, supporting Mulga shrublands (Pringle *et al* 1994). Impedance to natural sheet flows can initiate soil erosion and cause water starvation and consequent loss of vigour in vegetation downslope.

The Violet Land System is described as undulating stony and gravelly plains and low rises, supporting Mulga shrublands (Pringle *et al* 1994). Moderate soil erosion may occur where mantles are disturbed.

Land degradation may occur in the application area if stony mantles are removed or natural flow regimes are altered. The creation of waste dump landforms are not likely to lead to soil erosion but may cause water starvation in some areas.

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

Methodology Pringle *et al* 1994

(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 nearest conservation reserve is Wanjarri Nature Reserve, located approximately 4.5 km south east of the application area (GIS Database). It is not expected that the clearing will affect the conservation values of the reserve at this distance.

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

Methodology GIS Database - CALM Managed Lands and Waters - CALM 1/07/05

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

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

The application area is located within a semi-arid area. The nearest Bureau of Meteorology (BOM) recording station is Wiluna. Wiluna experiences an average 256 mm rainfall per year (BOM, 2007). Most of this rainfall occurs in the late summer and autumn months due to tropical rain bearing depressions. Rainfall at this time can be brief but heavy. Run-off is likely to be as sheet flow and fresh, although heavy with sediments. The proposed clearing does not occur within a Public Drinking Water Source Area (GIS Database). The proposed clearing is not likely to cause surface water quality to deteriorate.

Groundwater levels within the application area and surrounds are approximately 20-35 m below ground level and are considered fresh to brackish at 1500 - 2000 mg/L Total Dissolved Solids (Jeanes, 2006). Mine dewatering has caused groundwater levels to drop within the vicinity of the mine. The application area experiences high evaporation rates. For example, pan evaporation rates for Wiluna are 5440 mm/year (Luke *et al*, 1987). Therefore, due to low rainfall, and high evaporation rates, the recharge rate to the aquifer is likely to be low. The proposed clearing is not likely to cause groundwater quality to deteriorate.

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

Methodology BOM (2007)
GIS Database: Public Drinking Water Source Areas (PDWSAs) - DoE 7/2/06
Jeanes (2006)
Luke *et al* (1987)

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

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

The application area lies east of a small low Banded Ironstone Formation BIF which directs water directly towards the existing waste dumps. A diversion drain is to be constructed to divert water away from the dumps, south of the mine and Tailings Storage Facility (TSF) and will discharge water into natural drainage lines to the east of the TSF (Jeanes, 2006). Therefore, the application area will have little opportunity to act as a catchment.

Based on the above, the proposed clearing is not likely to cause an increase in flood height or flood peak duration.

Methodology Jeanes (2006).

Planning instrument, Native Title, RIWI Act Licence, EP Act Licence, Works Approval, Previous EPA decision or other matter.

Comments

No submissions were received during the advertised public comments period.

The application area is not subject to native title claim.

The following Aboriginal Sites of Significance occur wholly or partly within the application area: Mt Keith Station 3, Mt Keith Silcrete Quarry, Ngarlunypa/Nyaluti, Mt Keith New Village, and Mt Keith Scatter. It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

Under an MOU between the Department of Industry and Resources (DoIR) and the Environmental Protection Authority (EPA), Aboriginal Sites of Significance within 2 km of a proposal can be a trigger for referral to the EPA. DoIR takes advice from the Department of Indigenous Affairs as to whether a proposal should be referred on the grounds of an Aboriginal Site of Significance. DIA have advised that the proposal will not need referral to the EPA, but that the proponent should identify the areas during clearing and notify the Aboriginal Community prior to clearing (DIA, 2007).

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

GIS Databases: Native Title Claims - DLI 7/11/05
 Aboriginal Sites of Significance - DIA
 DIA (2007)

4. Assessor's recommendations

Purpose	Method	Applied area (ha)/ trees	Decision	Comment / recommendation
Mineral Production	Mechanical Removal	717.51	Grant	<p>The proposal has been assessed against the clearing principles and the proposal has been found to be not at variance to principle e, not likely to be at variance to principles a, b, h, i and j, may be at variance to principles c, d and g, and is at variance to principle f.</p> <p>While the proposed clearing is at variance to principle f, this is because there are several minor non-perennial drainage lines which cross the application area. An inspection of the area by the assessing officer revealed that these drainage lines are only likely to carry water during high rainfall events. Management of drainage diversion and downstream vegetation starvation issues will be implemented through the Mining Proposal assessment under the <i>Mining Act 1978</i>.</p> <p>The assessing officer recommends the clearing permit be granted subject to the following conditions:</p> <ol style="list-style-type: none"> 1. The Permit Holder shall record the following for each instance of clearing: a) the location where the clearing occurred, expressed as grid coordinates using the Geocentric Datum of Australia 1994 coordinate system; b) the size of the area cleared in hectares; c) the method of clearing; d) the purpose of clearing; 2. The Permit Holder shall provide a report to the Director, Environment, Department of Industry and Resources by 28th February each year for the life of the permit setting out the records required under condition 1 of this permit in relation to clearing carried out between 1st January and 31st December the previous year. This report can be included as an addendum to an Annual Environmental Report. The report must also provide detail as to how the Permit Holder has complied with all other conditions. 3. The Permit Holder shall stockpile topsoil and vegetative material to be used in rehabilitation. 4. The permit holder shall construct a drain sufficient to prevent the flooding of populations of <i>Hemigenia exilis</i> and <i>Goodenia modesta</i>.

Definitions

In this permit Annual Environmental Report means a report produced as a requirement of tenement conditions under the *Mining Act 1978*.

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.