



1. Application details

1.1. Permit application details

Permit application No.: 1997/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Western Areas NL

1.3. Property details

Property: Mining Lease M74/57
Mining Lease M74/58
Mining Lease M74/90
Local Government Area: Shire Of Kondinin
Colloquial name: Forrestania Nickel Project

1.4. Application

| Clearing Area (ha) | No. Trees | Method of Clearing | For the purpose of: |
|--------------------|-----------|--------------------|---------------------|
| 70 | | 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. Four Beard vegetation associations are located within the application area:

519 - Shrublands; mallee scrub, *Eucalyptus eremophila*. According to the Shared Land Information Platform (SLIP, 2007), Beard vegetation association 519 is dominated by *Eucalyptus eremophila*, with sub-dominance of *Eucalyptus* sp. (mallee), with a lower shrub strata of *Melaleuca* sp.

936 - Medium woodland; salmon gum. According to the Shared Land Information Platform (SLIP, 2007), Beard vegetation association 936 is dominated by Salmon gum.

128 - Bare areas; rock outcrops. No strata are recorded for this Beard vegetation type on SLIP (2007). It is likely that this vegetation association refers to the existing open cut mine.

1413 - Shrublands; *Acacia*, *Casuarina* & *Melaleuca* thicket. According to the Shared Land Information Platform (SLIP, 2007), Beard vegetation association 1413 is dominated by *Eucalyptus loxophleba*, with a middle shrub strata of *Allocasuarina dielsiana*, *Senna* sp., *Dodonaea stenozyga*, *Melaleuca acuminata*, *Calothamnus quadrifidus* and *Santalum acuminatum* with a lower shrub strata of *Boronia inornata*, *Westringia dampieri* and *Halgania lavandulacea*.

The application area was surveyed in by Botanica Consulting (2006). The following vegetation communities were described by Botanica Consulting (2006):

Transitional *Eucalyptus* woodland: Upper-storey of *Eucalyptus flocktoniae* ssp. *flocktoniae* and *E. urna* with some *E. salmonophloia*, mid-storey of many *Melaleuca* sp., *Daviesia nematophylla*, *Senna artemisioides* ssp. *filifolia*, *Halgania andromedifolia* and *Dodonaea bursariifolia*, with an under-storey of *Olearia muelleri*, *Wilsonia humilis*, *Atriplex stipitata*, *Astroloma serratifolium*, *Acacia intricata*, *A. deficiens* and *Microcybe albiflora*.

***Eucalyptus* mallee woodland:** Upper-storey of *Eucalyptus eremophila* ssp. *eremophila*, *E. calycogona* and *E. cylindrocarpa*, with mid-storey of *Eremophila drummondii*, *Melaleuca adnata*, *M. elliptica*, *M. hamata*, *Daviesia bethamii* ssp. *acanthoclada* and *Hakea multilinea*, with understorey of *Cooperookia strophiolata*, *Westringia cephalantha*, *Acacia sphaelata* ssp. *sphaelata* and *A. intrica*.

Banded Ironstone Formation: Upper-storey of *Eucalyptus eremophila* ssp. *eremophila*, *E. flocktoniae* ssp. *flocktoniae* and *E. urna*, with mid-storey of *Goodenia pinifolia*, *Calothamnus quadrifidus*, *Melaleuca cordata*, *M. adnata*, *M. hamata*, *M. cardiophylla*, *Daviesia nematophylla*, *Grevillea lullfittzii* (P1), *G. insignis* ssp. *elliottii* (P3), *Hakea multilinea* and *Petrophile divaricata*, with an under-storey of *Olearia muelleri*, *Lepidosperma brunonianum*, *Hibbertia pungens*, *Astroloma serratifolium* and *Westringia cephalantha*.

***Eucalyptus eremophila* woodland:** Upper-storey of *Eucalyptus eremophila* ssp. *eremophila*, *E. phenax*, *E. pileata*, with a mid-storey of *Melaleuca adnata*, *M. hamata*, *M. uncinata* and *Thryptomene kochii*, with an under-storey of *Olearia muelleri*, *Lepidosperma brunonianum*, *Westringia cephalantha*, *Acacia sphacelata* ssp. *sphacelata* and *Boronia inornata*.

***Eucalyptus salubris* woodland:** Upper-storey of *Eucalyptus salubris*, *E. calycogona*, *E. yilgarnensis*, with a mid-storey of *Melaleuca acuminata*, *M. cardiophylla*, *M. pauperiflora* ssp. *pauperiflora*, *Exocarpus aphyllus* and *Santalum acuminatum*, with an under-storey of *Olearia muelleri*, *Astroloma serritifolium*, *Acacia deficiens*, *A. erinacea*, *A. intricata* and *A. sphacelata* ssp. *sphacelata* and a moss, *Barbula calycina*.

Rehabilitation: Species present include *Angianthus tomentosus*, *Olearia muelleri*, *Eucalyptus flocktoniae* ssp. *flocktoniae*, *E. salubris*, *E. annulata*, *E. salmonophloia*, *Acacia deficiens*, *A. erinacea*, *A. hemiteles*, *Melaleuca adnata*, *Daviesia nematophylla*, *Dodonaea bursariiflora* and *D. viscosa*.

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| Clearing Description | Western Areas NL have applied to clear up to 70 hectares within an application area of approximately 369 hectares for the purpose of developing infrastructure associated with the Digger Rocks south project. Digger Rocks South is located approximately 80 km east of Hyden. An existing mine site occurs at Digger Rocks south. The new mine will either be a satellite pit or a cut back of the existing pit. |
| Vegetation Condition | Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery 1994) |
| Comment | According to Botanica Consulting (2006), vegetation condition within the application area ranges from excellent to very good, except for the rehabilitation vegetation community which is described as good condition. |

Botanica Consulting refer to the vegetation within the application area as both communities and groups with no description as to the meaning of either term (Botanica Consulting, 2006). For the purpose of this assessment, vegetation described by Botanica Consulting (2006) will be referred to as communities.

A site visit was conducted by the assessing officer prior to the application being submitted. The assessor noted that the vegetation was in excellent condition for the most part, except where previous clearing and rehabilitation had taken place. The assessing officer noted that the vegetation was excellent fauna habitat for several conservation significant species.

3. Assessment of application against clearing principles

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

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| Comments | <p>Proposal is at variance to this Principle</p> <p>The application area occurs within the Western Mallee IBRA sub-Bioregion (GIS Database). This sub-region is characterised by clays and silts underlain by kankar, exposed granite, sandplains, isolated uplands of laterite pavements and salt lake systems (on a granite basement) (CALM, 2002). Mallee communities can be found on a variety of surfaces and <i>Eucalyptus</i> woodlands occur mainly on fine-textured soils, with scrub-heath on sands and laterite (CALM, 2002). Mallee over myrtaceous-proteaceous heaths on duplex (sand over clay) soils are common (CALM, 2002). <i>Melaleuca</i> shrublands characterise alluvia, and <i>Halosarcia</i> low shrublands occur on saline alluvium (CALM, 2002). A mosaic of mixed eucalypt woodlands and mallee occur on calcareous earth plains and sandplains overlying Eocene limestone strata in the east (CALM, 2002). The subregion shows a very high degree of endemism, particularly in the Proteaceae family (632 spp, 99% endemic; 16 genera, 5 endemic), in particular the genera <i>Grevillea</i> and <i>Hakea</i> (CALM, 2002). <i>Eucalyptus</i>, <i>Acacia</i>, <i>Dryandra</i> and <i>Asteraceae</i> also contain very high numbers of endemics (CALM, 2002). Within the application area a total of 244 species were identified from 42 Families and 94 Genera (Botanica Consulting, 2006). This is a very high level of speciation in a small area and reflects the diverse nature of both the eucalypt woodlands and the banded ironstone formations that occur within the application area. For instance, within the application area there are 60 species within the Myrtaceae family and 42 species within the Proteaceae family, reflecting the diversity of these families within the subregion.</p> <p>More than 75 per cent of the Western Mallee IBRA subregion has been cleared for agriculture (CALM, 2002). However, the application area occurs within that part of the subregion that has not been extensively cleared, ie/ not within the intensive land use zone (ILZ). It is an area that is important for maintaining landscape scale ecosystem functions.</p> <p>The application area includes two areas of Banded Ironstone Formation (BIF). BIF's are known biodiversity hotspots and are often refuges for threatened flora and fauna species and centres of endemism due to their isolation from each other and the different ecological processes involved. The BIF's within the application area are high in species diversity and are habitat for many priority flora species. The rare <i>Banksia sphaerocarpa</i> ssp. <i>dolichostyla</i> is also located within the BIF community.</p> <p>More than 35 per cent of the Mallee bioregion's original mammal fauna is now regionally extinct (CALM, 2002). This is mainly due to the extensive land clearing that has occurred. The application area is suitable habitat for many conservation significant fauna species, including Malleefowl (<i>Leipoa ocellata</i>), Chuditch (<i>Dasyurus geoffroii</i>) and the Lake Cronin Snake (<i>Paraplocephalus atriceps</i>) which is endemic to the area (Biota, 2007).</p> <p>The Department of Environment and Conservation (DEC) had some concerns regarding the size of the area to be cleared in relation to the size of the tenement (DEC, 2007). In response, DoIR advised DEC that the</p> |
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purpose permit was for 70 hectares within an application area of 369 hectares. The application area is located within 3 tenements which total 2469 hectares. The application area includes areas previously mined and other disturbed areas such as old evaporation ponds. Consequently the impacts from the proposed clearing are likely to be localised.

Based on the above, the proposed clearing is at variance to this principle. However, it is noted that some of the area subject to the application has already been disturbed from previous mining activity, including some intentionally planted vegetation for rehabilitation purposes. As a result biological diversity within the application area may be impacted. The assessing officer recommends that conditions be placed on the permit preventing clearing within Banded Ironstone Formations.

Methodology Biota (2007)
Botanica Consulting
CALM (2002)

(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

According to available databases, there are no rare or priority fauna species within the application area (GIS Database).

Biota Environmental Sciences (Biota) were commissioned by Western Areas NL to conduct a Level 2 fauna assessment over the application area as well as a proposed pipeline route from the application area to cleared farmland (Biota, 2007). The fauna survey aimed to describe the fauna habitats present, identify any conservation significant habitats, record the fauna assemblage from both desktop database searches and field survey, identify fauna of conservation significance and provide recommendations for the management of perceived impacts to fauna (Biota, 2007). The survey and subsequent report adequately meet 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, a total of 12 fauna habitats were recorded. Of these, Site DR01 "Open over-storey of Salmon Gum (*E. salmonophloia*) and Red Morrel (*E. longicornis*) to 10 m, over mid-storey of mallee eucalypts to 2m. Very sparse under-storey, primarily of *Acacia* sp." was the most diverse fauna habitat with 27 species recorded (12 reptile, 14 avian and 1 mammal) (Biota, 2007). This woodland community is very common in the Forrestania area.

A total of 20 fauna species of conservation significance were recorded from the study area, either during the survey, or through previous surveys and database searches. For the purpose of this assessment, only those species that have been observed within the application area or adjacent areas during the current Biota survey or previous surveys are considered. They are (Biota, 2007): Carnaby's White Tail Black Cockatoo (*Calyptorhynchus latirostris*), Malleefowl (*Leipoa ocellatus*), Chuditch (*Dasyurus geoffroi*), Western Rosella (*Platycercus icterotis zanthogenys*), Peregrine Falcon (*Falco peregrinus*), Carpet Python (*Morelia spilota imbricata*), Shy Groundwren (*Hylacola cauta whitlocki*), Rufous Fieldwren (*Calamanthus campestris montanellus*), Crested Bellbird (*Oreocica gutturalis gutturalis*), White-browed Babbler (*Pomatostomus superciliosus ashbyi*), Western Brush Wallaby (*Macropus irma*) and Rainbow Bee-eater (*Merops ornatus*).

The Carnaby's White-tailed Black Cockatoo (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2006*) forage in woodland and heath that is dominated by proteaceous species (DEC, 2006a). They nest in hollows of large eucalypts, usually Salmon Gum and Wandoo (DEC, 2006a). The species has severely declined between the 1970's and the present due mainly to extensive land clearing, shooting and nest robbing (DEC, 2006a). The Lake Cronin - Forrestania area is the eastern-most extent of its distribution and it would occur there occasionally (Biota, 2007). It is not known if the species breeds in the area, but Biota have indicated that there are large hollow bearing salmon gums in the application area near site DR01 (Biota, 2007). The proposed clearing is not likely to impact the conservation of this species.

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 (DEC, 2006b). They may also be found in Mulga (*Acacia aneura*), and other sclerophyllous associations (DEC, 2006b). They require sandy soils with an abundance of leaf litter for breeding (DEC, 2006b). Biota recorded a disused mound within the application area and an active mound was located 30km north during a previous survey (Biota, 2007). Western Areas NL staff regularly record the species within the application area (Biota, 2007). The assessing officer observed a bird several kilometres north of the existing Digger Rocks pit in November 2006. It is likely that the species occurs within the application area.

The Chuditch (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice 2006*) occupies a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts (DEC, 2006c). They have large home ranges of up to 15 sq. km (males) (DEC, 2006c). Chuditch den in hollow logs and burrows and have also been recorded in tree

hollows and cavities. Suitable hollow or burrow entrance diameters are often at least 30 centimetres in diameter. An adult female chuditch may utilise an estimated 66 logs and 110 burrows within her home range (DEC, 2006c). This species was recorded 40 km north of the application area in 2005 by Biota (Biota, 2007). The species may occur within the application area, particularly given the feral animal control currently conducted by Western Areas NL and the availability of suitable habitat within the application area.

The wheatbelt subspecies of Western Rosella (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice 2006*) lives in Eucalypt woodland and its persistence is associated with habitat remnants (Garnett et al, 2000). The main food of the western subspecies is the seeds of *Casuarina*, but it also takes seeds from grass, weedy herbs and fruit. Nesting of this subspecies is in Eucalypt hollows (Garnett et al, 2000). This species was recorded from within the application area (Biota, 2007). Biota has stated that the species requires small tree hollows to breed (Biota, 2007), suggesting the species is not reliant on mature trees.

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. This species was observed over the application area in 2005 (Biota, 2007) and is likely to be present sporadically within the application area.

The South West Carpet Python (Schedule 4 - Fauna that is in need of special protection, *Wildlife Conservation (Specially Protected Fauna) Notice 2006*) is widespread throughout the south west from Northampton to Kalgoorlie to Esperance (DEC, 2006d). It is able to utilise a wide variety of habitats from semi-arid coastal and inland habitats, *Banksia* woodland, eucalypt woodlands and grasslands, where it occurs at low densities (DEC, 2006d). This species has been recorded 40km north of the application area (Biota, 2007). It is likely to be present within the application area at low densities.

Shy Groundwrens (DEC - Priority 4) are known to inhabit dense mallee woodland (Garnett et al, 2000). A Shy Groundwren was recorded during the fauna survey and has been recorded previously within the local area (Biota, 2007). It is likely to be widespread within the application area and surrounds.

Rufous Fieldwren (DEC - Priority 4) live in low, sparse heath, saltmarsh or samphire, with or without emergent trees (Garnett et al, 2000). Although declining within the wheatbelt, the species persists in the continuous habitat that surrounds the wheatbelt (Garnett et al, 2000). This species has been recorded within the local area during previous surveys and is likely to occur within the application area (Biota, 2007).

Crested Bellbirds (DEC - Priority 4) live in the shrub-layer of eucalypt woodland, mallee, Acacia shrubland, saltbush, spinifex grasslands and heath (Garnett et al, 2000). It appears to be particularly sensitive to subsequent fragmentation, with areas of apparently suitable habitat as large as 5,000 ha now unoccupied (Garnett et al, 2000). This species has been recorded within the local area during previous surveys and is likely to occur within the application area (Biota, 2007).

The White-browed Babbler (DEC - Priority 4) utilises Eucalypt forest and woodlands within the wheatbelt and Southern Goldfields/Great Southern region. It has declined severely in the agricultural region but persists in the uncleared continuous habitat surrounding the wheatbelt (Garnett et al, 2000). This species was recorded during the fauna survey (Biota, 2007).

The Western Brush Wallaby (DEC - Priority 4) prefers open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland (DEC, 2006e). This species was observed within the application area and is likely to occur within the local area at low densities.

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. It has been recorded in the local area during previous fauna surveys (Biota, 2007). It is likely that this species occurs within the application area whilst feeding.

A specimen of Lake Cronin Snake (*Paraplocephalus atriceps*) was observed opportunistically, approximately 27 km north of the application area. This snake is thought to be endemic to the Lake Cronin area and is seldom collected. This record may suggest that it could be found in suitable habitat within the application area, although its true distribution is currently unknown.

Three species of mygalomorph spiders and one species of pseudoscorpion were also located within the application area (Biota, 2007). These species are possible short range endemics. However, the habitat in which these species were recorded is extensive and it is likely that they occur in similar habitat in the local area.

None of the above species depend upon the vegetation within the application area for their continued existence. The fauna habitats within the application area are common and widespread throughout the surrounding areas. Furthermore, previous disturbance within the application area may have reduced the habitat value of the vegetation to be cleared. Therefore the assessing officer does not consider the vegetation within the application area to be significant habitat for fauna, although it may be host to conservation significant fauna species.

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

Methodology Biota (2007)
DEC (2006a)
DEC (2006b)
DEC (2006c)
DEC (2006d)
DEC (2006e)
EPA (2004a)
GIS Database:
- Threatened Fauna - CALM 30/9/05

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

Comments Proposal may be at variance to this Principle

According to available databases, there are no records of Declared Rare Flora (DRF) or DEC listed Priority flora species occurring within the application area (GIS Database).

Two separate vegetation and flora surveys have been conducted over the application area (Botanica Consulting, 2006). These surveys involved a desktop search of DEC's Threatened Flora database and the Western Australian Herbarium database (WAHERB) for rare or priority flora species within known coordinates encompassing the Ironcaps from Mt Holland to Hatters Hill. A rare flora search was then conducted for these species in suitable habitat types within the application area (Botanica Consulting, 2006). Botanica Consulting (2006) also mapped vegetation communities within the application area and assessed the vegetation condition. The surveys and subsequent reports adequately meet the requirements of EPA Guidance Statement 51 "Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia" (EPA, 2004b).

As a result of these surveys a total of 244 species were identified from 42 Families and 94 Genera. Of these, eight species of conservation significance were recorded within the application area. These species are *Banksia sphaerocarpa* ssp. *dolichostyla* (R), *Grevillea lullfitzi* (P1), *Stenanthemum liberum* (P1), *Logania exilis* (P2), *Acacia singula* (P3), *Grevillea insignis* ssp. *elliottii* (P3), *Dryandra viscida* (P3) and *Eucalyptus rugulata* (P4). These were all located within the Banded Ironstone Formation vegetation community, with the exception of *G. lullfitzi* which was also found within the Transitional *Eucalyptus* woodland vegetation community.

Western Areas have advised (pers coms) that they do not intend to clear banded ironstone vegetation and are committed to avoiding priority flora species where possible. Western Areas have also excised a 50m buffer from their application area surrounding the *Banksia sphaerocarpa* ssp. *dolichostyla* population.

Based on the proposed footprint of disturbance, one population of *Grevillea lullfitzi* consisting of 2 plants may be taken during clearing. However, the flora survey conducted by Botanica Consulting over the application area and surrounds identified 383 individual of this species in 42 separate populations. Therefore the impact to this species conservation by the removal of this small population is not considered significant.

Based on the above, the proposed clearing may be at variance to this principle. The assessing officer recommends a condition be placed on the permit to prevent clearing within Banded Ironstone Formations.

Methodology Botanica Consulting (2006)
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 the application area. The nearest TEC is located approximately 80km to the north (Parker Range System).

Digger Rocks is a Banded Ironstone Formation that occurs within the Ironcap Hills complex. The Ironcap Hills complexes (Mt Holland, Mid, North and South Ironcap Hills and Hatters Hill) are listed in 'A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002' (CALM, 2002) as being an 'ecosystem at risk'. The Ironcap Hills complexes are given a status of 'Vulnerable' and threatening processes are listed as mining, changed fire regimes, feral animals (rabbits) and weeds. Vegetation subgroups within the complexes are listed as 'Mallee *Eucalyptus* low open woodlands' and 'Mixed species arid *Acacia* woodlands and shrublands'. The Ironcap Hills complexes are said to be in fair condition but in decline (Gibson, 2004).

BIFs are known to be biodiversity hotspots due to their isolation from one another, allowing for greater

speciation and endemism over time. Gibson (2004) noted that the Ironcap Hills were centres of endemism and restricted vegetation assemblages and that the vegetation and flora of these ironstones differ widely from the nearest other Banded Ironstone Formations. Gibson (2004) found that nine of the ten local endemic species were restricted to the banded ironstone and laterite outcrops of the range.

Two areas of Banded Ironstone Formation occur within the application area (Botanica Consulting, 2006). The majority of priority species present within the application area (7 of 10), and the rare *Banksia spaerocarpa* var. *dolichostyla* occur within this community type. The vegetation communities described by Botanica Consulting are very species rich, comprising 88 species from 24 Families and 47 Genera. It is considered that these two areas of Banded Ironstone vegetation communities are necessary for the maintenance of rare and priority flora populations and that the vegetative communities differ from other nearby banded ironstone communities within the Ironcap complex as stated by Gibson (2004).

Western Areas NL have advised that where possible, clearing of vegetation will avoid areas where priority flora species are located (Western Areas NL, 2007).

Based on the above, the proposed clearing may be at variance to this Principle. DoIR will liaise with Western Areas to determine what measures can be taken to protect the Banded Ironstone Formations.

Methodology CALM (2002)
Botanica Consulting (2006)
Gibson (2004)
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 likely to be at variance to this Principle

According to available GIS databases, the application area occurs within the Mallee IBRA Bioregion and Western Mallee IBRA Sub-bioregion (GIS Databases). The Mallee IBRA Bioregion remains at 54% of its pre-European vegetation extent. This gives the IBRA Bioregion a conservation status of "least concern" according to "Bioregional Conservation Status of Ecological Vegetation Classes" (Department of Natural Resources, 2002). See table below.

The bioregion straddles that area of the state subject to intensive land clearing (Intensive Landuse Zone - ILZ) and that area of the state that is largely uncleared (Extensive Landuse Zone - ELZ). The Western Mallee IBRA Sub-bioregion falls largely within the ILZ and remains at 33% of its pre-European vegetation extent. This gives the Western Mallee IBRA Sub-bioregion a conservation status of "depleted" according to "Bioregional Conservation Status of Ecological Vegetation Classes" (Department of Natural Resources, 2002). However, the application area falls within the ELZ. The proposed clearing will not cause vegetation extent to fall below threshold levels within either the bioregion or sub-bioregion.

Vegetation within the Shire of Kondinin remains at 50% of its pre-European extent. The majority of the remaining vegetation is located within the ELZ. The assessing officer suggests that the conservation status of the remaining vegetation should be given a rating of "depleted" as much of the vegetation remaining within the ILZ is of varying condition and occurs in small isolated remnants whose condition is likely to be in decline.

Both state-wide and within the Bioregion, the four Beard vegetation associations located within the application area have a conservation status of "least concern" according to "Bioregional Conservation Status of Ecological Vegetation Classes" (Department of Natural Resources, 2002). Within the subregion, Beard vegetation associations 519 and 128 have a conservation status of "depleted" according to "Bioregional Conservation Status of Ecological Vegetation Classes" (Department of Natural Resources, 2002). It should be noted that vegetation association 128 (Bare areas, rock outcrops) is likely to be the existing open cut mine.

| | Pre-European area (ha)* | Current extent (ha)* | Remaining %* | Conservation Status** | Pre-european % in IUCN Class I-IV Reserves (and post clearing %) |
|-------------------------------------|-------------------------|----------------------|--------------|-----------------------|--|
| IBRA Bioregion – Mallee | 7,395,902 | 4,017,869 | 54 | Least Concern | 18 (31) |
| IBRA Subregion – Western Mallee | 3,981,720 | 1,307,541 | 33 | Depleted | 10 (25) |
| Local Government – Kondinin | 737,192 | 369,708 | 50 | Depleted | n/a |
| Beard veg assoc. – State | | | | | |
| 519 | 2,333,452 | 1,400,703 | 60 | Least Concern | 2 (9) |
| 936 | 698,754 | 675,658 | 96 | Least Concern | 2 (2) |
| 128 | 329,872 | 280,953 | 85 | Least Concern | 13 (15) |
| 1413 | 1,679,930 | 1,247,090 | 74 | Least Concern | 14 (15) |
| Beard veg assoc. – Bioregion | | | | | |
| 519 | 2,100,363 | 1,209,507 | 58 | Least Concern | 11 (18) |
| 936 | 77,222 | 57,300 | 74 | Least Concern | 10 (13) |
| 128 | 47,856 | 29,893 | 62.5 | Least Concern | 23 (35) |
| 1413 | 42,068 | 40,297 | 96 | Least Concern | 5 (5) |
| Beard veg assoc. - subregion | | | | | |
| 519 | 1,563,620 | 743,701 | 48 | Depleted | 13 (26) |
| 936 | 44,718 | 25,209 | 56 | Least Concern | 15 (25) |
| 128 | 30,558 | 14,020 | 46 | Depleted | 18 (36) |
| 1413 | 16,603 | 15,982 | 96 | Least Concern | 6 (6) |

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

Analysis of aerial photography suggests much of the application area appears to be previously disturbed and therefore is not likely to be a significant remnant of vegetation in an area that is extensively cleared.

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

Methodology Department of Natural Resources and Environment (2002)
Shepherd et al (2001) updated 2005
GIS Databases:
- Pre-European Vegetation - DA 01/01
- Interim Biogeographic Regionalisation of Australia - EA 18/10/00
- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00

(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, a minor, non-perennial drainage line traverses the application area in a north east, south west direction (GIS Database).

Botanica Consulting describe this drainage line as a slightly incised, broad, ephemeral watercourse that carries rainfall run-off flows only after prolonged steady or short term, high intensity rain events (Botanica Consulting (2006b)). Furthermore, the vegetation within the drainage line does not differ from that of the surrounding

vegetation and could not be considered riparian in nature (Botanica Consulting, 200b). Analysis of aerial photography suggests the drainage line has been diverted at several points to bypass an existing pit and old evaporation pond.

Based on the above, the proposed clearing is at variance to this principle. However, Western Areas have advised that they are unlikely to be clearing vegetation in this part of the application area. Western Areas have stated that surface water management earthworks will be implemented to reduce the risk of erosion or sedimentation (Western Areas, 2007).

Methodology Botanica Consulting (2006b)
Western Areas (2007)
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 not likely to be at variance to this Principle

Soil types within the application area vary from red lateritic gravelly soils on Banded Ironstone Formations, to heavy red clay loams on lower areas.

The red shallow gravel soil located on the ironstone formations are described as being >20% gravel, mixed with sand or loam (Schoknecht, 2002). They have low wind and water erodability due to gravel content (Schoknecht, 2002).

The heavy red clay loam soil located in the lower undulating plains within the application area have a low wind erodability (Schoknecht, 2002).

Ground water levels at the existing Digger Rocks mine are in the order of 50m below ground level, and 22m below ground level at the existing evaporation pond (Western Areas, 2007). At these depths, the clearing of native vegetation is not likely to lead to a rise in groundwater, causing salinisation. Furthermore, groundwater pumping associated with the Digger Rocks mine is likely to significantly reduce groundwater levels in this area.

Western Areas NL have advised that they intend to utilise previously disturbed ground if possible and will be installing surface water management earthworks to prevent accelerated erosion (Western Areas, 2007).

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

Methodology Schoknecht (2002)
Western Areas (2007)

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

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

The application area is located approximately 8 km north east of Jackson Nature Reserve (GIS Database). It is unlikely that the proposed clearing will effect the conservation values of the reserve at this distance.

Methodology GIS Database:
- CALM Managed Lands and Waters - CALM 1/7/05

(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 not located within a Public Drinking Water Source Area (GIS Database).

The area receives ~344.6 mL/y (BOM, 2007) and experiences a pan evaporation rate of 2200 mm/y (Luke et al, 1987). Therefore, there is likely to be little surface water flow during normal seasonal rains. Sedimentation or turbidity of waterbodies is not likely as there are no permanent water bodies in the application area or near vicinity. The drainage line that runs through the application area is not likely to carry run-off unless there are very intense rainfall events.

Groundwater in the area has been measured at between 30,000- 50,000 Total Dissolved Solids (TDS) (Western Areas, 2007). This groundwater is located 50 metres below the surface (Western Areas, 2007). Vegetation is not dependant on groundwater at this depth and at such hypersaline levels.

The low rainfall and high evaporation rates mentioned above suggest that the clearing of 70 hectares of vegetation is not likely to increase groundwater levels in the area.

It is noted by the assessing officer that Western Areas intends to pump saline groundwater from the Digger Rocks pit and discharge into evaporation ponds. Therefore, groundwater levels will fall during the life of the project.

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

Methodology BOM (2007)
 Luke et al (1987)
 Western Areas (2007)

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

Comments **Proposal is not likely to be at variance to this Principle**
 Average rainfall in the vicinity of the application area is approximately 344.6 mm per year (BOM, 2007). Rain falls mostly in winter with some summer falls associated with tropical depressions. The application area experiences an evaporation rate of 2200mm per year (Luke et al, 1987). This suggests that water that pools on the ground is likely to evaporate quickly.

The topography of the area displays a gentle fall to the south west. Surface water is minimal and is likely to evaporate or infiltrate the soil before pooling occurs. There is little likelihood that the area is subject to flood. The proposed clearing is not likely to lead to an increase in catchment to the point of causing flooding.

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

Methodology BOM (2007)
 Luke et al (1987)

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

Comments
 The application area is not subject to Native Title Claim (GIS Database).
 A submission was received from an interested party regarding aboriginal heritage issues and the possibility of an Aboriginal monitor being present during clearing. The party was advised that such requests should be directed to the applicant.
 There are no known Aboriginal Sites of Significance within the application area (GIS Database). It is the proponent's responsibility to comply with the Aboriginal Heritage Act, 1972 and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.
 The Department of Water (DoW) advises that the application area falls within the Kondinin-Ravensthorpe Groundwater Area, a proclaimed area under the Rights in Water and Irrigation (1914). The DoW advises that a license will be required to extract or dewater groundwater in this area. It is the proponent's responsibility to ensure that all other approvals have been obtained.

Methodology GIS Database:
 - Aboriginal Sites of Significance - DIA
 - Native Title Claims - DLI 7/11/05

4. Assessor's comments

| Purpose | Method | Applied area (ha)/ trees | Comment |
|--------------------|--------------------|--------------------------|---|
| Mineral Production | Mechanical Removal | 70 | <p>The proposal has been assessed against the Clearing Principles and the proposal has been found to be at variance to Principles A and F, may be at variance to principle C and D not likely to be at variance to Principles B, E, G, H, I and J.</p> <p>It is recommended that conditions be placed on any permit granted to prevent clearing within the Banded Ironstone Formation vegetation group, to retain topsoil and vegetative material for rehabilitation, to record areas cleared and to report clearing on an ongoing, yearly basis.</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:
(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.