Department of Industry and Resources

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2001/1

Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **GME Resources Limited**

1.3. Property details

Property: M39/819
M39/717
L39/177

Local Government Area: Shire of Leonora

Colloquial name: Hepi Trial Mine

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
47		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	Clearing Description	Vegetation Condition	Comment
Beard vegetation associations have been mapped at 1:250,000 scale for the whole of WA, and are a useful tool to examine the vegetation extent in a regional context. One Beard vegetation association is located within the area proposed to be cleared (GIS Database, 2007). This vegetation association is: Beard Vegetation Association 18: Low woodland; mulga (*Acacia aneura*). A vegetation survey of the project area was completed in April 2007 by Paul Armstrong & Associates (2007). As a result of the survey, five different vegetation communities were identified within the project area. These are: 1.) Mulga Scrub on uplands and slopes: The upper stratum was Scrub, dominated by *Acacia aneura* growing 3 to 5m tall; over Open Low Scrub with no species dominating; over Open Dwarf Scrub, dominated by *Scaevola spinescens* growing to 0.7 metres tall; over Open Dwarf Scrub dominated by *Eremophila pantonii* growing to 0.4 metres tall; 2.) Low Shrubland on plain: The upper stratum was scattered patches of Scrub dominated variously by *Acacia aneura* or *Hakea preissii* growing 2 to 4 metres tall; over Open Dwarf Scrub with no species dominating growing to 1.5 metres tall; over Dwarf Scrub dominated by *Maireana triptera* and *Frankenia georgei* growing to 0.3 metres tall; 3.) Mulga Scrub on plains: The upper stratum was Scrub with occasional patches of Thicket dominated by *Acacia aneura* growing 3 to 5 metres tall; over Open Low Scrub dominated by *Acacia tetragonophylla* and *Eremophila georgei* growing to 1.5 metres tall; over Open Dwarf Scrub dominated by *Scaevola spinescens* growing to 0.6 metres tall; over Very Open Low Grass dominated by *Enneapogon caerulescens* growing to 0.2 metres	GME Resources propose to clear 47 hectares for the Hepi Trial Mine Project within a 47 hectare purpose permit boundary (Rapallo, 2007). Clearing for the project will occur in two stages: 1) clearing for trial pit mining; and 2) clearing for expanded trial pit mining (Rapallo, 2007). During stage one of the project, infrastructure will include: - an open pit mine of approximately 10.65 hectares (found in the south-west corner of the application area on low breakaways); - a waste rock landform and ore stockpile area of approximately 11.08 hectares (to be built in the far eastern side of the project area on the lower plains); - a mine access road (running from north to south in the north-east of the application area on upper portions of the flat plains); and - a haul road approximately 4.9 hectares in size (connecting the waste rock landform and the pit area, which also covers the lower plains to upland areas). During stage two, the trial pit will be expanded a further 20.37 hectares to the eastern boundary of the central portion of the application area (Rapallo, 2007).	Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery 1994)	The application area shows signs of disturbance in the form of exploration gridlines, laydown area and access tracks (Paul Armstrong & Associates, 2007). The entire application area has been subject to grazing as it is located within the Minara Pastoral Station (GIS Database). Three weeds of significance were identified during the flora survey. These were: Pie Melon (*Citrullus lanatus*), Black Berry Nightshade (*Solanum nigrum*) and Prickly Paddy Lemon (*Cucumis myriocarpus*) (Paul Armstrong & Associates, 2007).

tall;

4.) Mulga Open Scrub at base of hills: This association occurred at the base of the hills where runoff was greater than that which occurs on the low plains. The dominant and upper stratum was Open Scrub dominated by *Acacia aneura* growing to 3 metres tall; over Open Low Scrub with no species dominating; over Open Dwarf Scrub dominated by *Scaevola spinescens* growing to 0.5 metres tall;

5.) Mulga Thicket along drainage lines: The upper stratum was Thicket dominated by *Acacia aneura* growing 4 to 6 metres tall; over Low Heath dominated by *Scaevola spinescens* growing to 0.7 metres tall; over Open Dwarf Scrub D dominated by *Eremophila pantonii* growing to 0.4 metres tall.

3. Assessment of application against clearing principles

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

Comments

Proposal may be at variance to this Principle

The clearing permit application is located within the East Murchison Interim Biogeographic Regionalisation of Australia (IBRA) subregion (GIS Database). The subregion is rich and diverse in both its flora and fauna however most species are wide ranging and usually occur in at least one, and often several subregions (Cowan, 2001). Grazing activities are the major land use (84.5%) within this region, while mining in nickel and gold also make up a considerable portion (Cowan, 2001). The application area is located within the Minara pastoral station (GIS Database).

According to Cowan (2001), vegetation in the subregion is dominated by Mulga Woodlands often rich in ephemerals, hummock grasslands, saltbush shrublands and Halosarcia shrublands. Most of the vegetation mentioned above was identified by Paul Armstrong & Associates (2007) as occurring in the application area, and noted as being common.

A vegetation survey of the project area was completed in April 2007. In total 71 native plant taxa from 27 families were identified (Paul Armstrong & Associates, 2007). This is indicative of a moderate level of species diversity within the project area. During the vegetation survey there were four Priority flora species that were identified in the application area: *Calytrix erosipetala*, *Frankenia georgei*, and *Hybanthus floribunda* subsp. *chloroxanthus* - all Priority 3, and *Hemiandra exilis* - Priority 4. In addition there were four species of interest recorded: *Alectryon oleifolius* subsp. *oleifolius* (range extension), *Atriplex quinii* (poorly collected), *Cratystylis centralis* (significant range extension) and *Olearia calcarea* (poorly collected). The presence of the Priority Flora and species of interest within the application area is likely to contribute to the biodiversity values of the subregion.

However, further survey work completed by Paul Armstrong & Associates (2007) proved that there were other populations of Priority Flora and species of interest outside of the application area, on a local and regional level. The exception was *Alectryon oleifolius* subsp. *Oleifolius*, as only one specimen was identified within the application area and no other populations were located in the surrounding areas. GME Resources have committed to undertake further survey work to try and identify this species surrounding the application area in Spring 2008 and report the findings to Department of Industry and Resources (DoIR). As a result it is recommended that should the permit be granted, a condition be placed on the permit for flora management.

As a result of the initial flora survey completed in April 2007, one of the species of interest (*Cratystylis centralis*) was thought to be a new species. Given that the status of this species was unknown in Western Australia, it was treated as a Declared Rare Flora (DRF) species. However, further survey work by Paul Armstrong & Associates (2007) revealed it was a significant range extension having been found 1,300 kilometres from its previously recorded location around Alice Springs. Subsequent targeted flora surveys proved that there were further populations in the north-west of the application area, immediately north of the application area, and at Barwidgee Station near Wiluna. Subsequently GME Resources created an exclusion zone where *Cratystylis centralis* populations were found. Planned infrastructure has been relocated and as a result, impacts to this species will be avoided.

A fauna survey of the application area was completed by Rapallo (2007). No species of conservation significance were recorded. According to Rapallo (2007) the application area is largely a heterogeneous Acacia dominated habitat. Five habitat types were identified within the project area, including Mulga Uplands and Slopes, Mulga Open Scrub at the Base of Hills, Mulga Plain, Low Shrubland Plain and Mulga Drainage. None of these habitat types are known to be significant on a local or regional level (Rapallo, 2007).

The application area is located within the Minara Pastoral Station (GIS Database, 2007). Paul Armstrong &

Associates (2007) have stated that grazing pressure from goats has degraded land within the application area, resulting in a reduced density of shrub stratum within vegetation associations. Other forms of disturbance within the application area include exploration grid lines and vehicle tracks. These disturbances were confirmed during the site visit completed on the 19th of October 2007 by the assessing officer (DoIR). The presence of gridlines and vehicle tracks has reduced the condition of the vegetation within the application area.

During the flora survey three weed species were recorded: *Citrullus lanatus*, *Solanum nigurm* and *Cucumis myriocarpus*. Paul Armstrong & Associates (2007) have stated that these species were restricted to the edges of disturbed areas such as gridlines and tracks. The presence of introduced flora species reduces the biodiversity value of the proposed clearing area. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Should a clearing permit be granted, it is recommended that a condition be imposed on the clearing permit for the purposes of weed management.

Given the presence of Priority Flora and species of interest within the application area and the biodiversity values attributed to these species, the proposal may be at variance to this Principle. However, GME Resources have committed to undertake a number of Priority Flora management measures which will reduce the impact to these species.

Methodology

Cowan (2001).
Paul Armstrong & Associates (2007).
Rapallo (2007).
GIS Database:
- Interim Biogeographic Regionalisation of Australia - EA 18/10/00
- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00
- Pastoral Leases -DOLA 10/01

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments

Proposal is not likely to be at variance to this Principle

A level one reconnaissance survey was conducted by Rapallo (2007) within the application area. This involved a desktop review of fauna in the region and a site investigation to verify information gathered through publications (Rapallo, 2007).

The desktop survey identified 54 species of reptiles, 26 species of extant mammals and 75 bird species which may occur within the project area (Rapallo, 2007). Of the species that were mentioned above, four were listed under the Western Australian *Wildlife Conservation Act 1950*. These are the Malleefowl (*Leipoa ocellata*), Peregrine Falcon (*Falco peregrinus*), Gecko (*Branchinella apophysata*) and Australian Bustard (*Ardeotis australis*) (Rapallo, 2007). There were also a further four species identified which are listed under the *Environment Protection and Biodiversity Conservation* (*EPBC*) *Act 1999* (Rapallo, 2007). These are the Slender-billed Thornbill (western) (*Acanthiza iredalei iredalei*), Rainbow Bee-eater (*Merops ornatus*), Oriental Plover (*Charadrius veredus*) and Great Egret (*Ardea alba*).

Based on habitat preferences and known distributions the following species are most likely to be found within the application area: the Rainbow Bee-eater, Australian Bustard and the Slender-billed Thornbill.

The Rainbow Bee-eater (migratory species) is a medium sized bird, and the only species of bee-eater in Australia (Department of Environment and Water Resources (DEWR), 2007a). This species was not identified during the ground survey of the project area (Rapallo, 2007). The Rainbow Bee-eater is distributed across much of mainland Australia and on several near shore islands. It occurs in a range of habitats including open forests and woodlands, shrubland areas, grasslands, inland and coastal sand dune systems, mangroves and cleared or semi-cleared habitats (DEWR, 2007a). The Rainbow bee-eater is listed as a migratory species under the *EPBC Act 1999*, however the species has a widespread distribution and is not considered to be threatened (DEWR, 2007a). It is unlikely the habitat of the Rainbow Bee-eater will be significantly impacted from the proposed clearing, as the habitats of the project area are well represented locally and regionally (Cowan, 2001).

The Australian Bustard (Department of Environment & Conservation - Priority 4) is limited to the arid areas of Northern and Central Australia (Caughley et al., 1986). It is found in tussock grasslands, Triodia hummock grassland, grassy woodland and low shrublands (Garnett & Crowley, 2000). Rapallo (2007) have stated that the Australian Bustard was not recorded during the ground survey of the project area. During good seasons when grasses are present it is possible that the species may frequent the area, however it wouldn't be dependant on the area for habitat. The proposed clearing area is therefore unlikley to represent significant habitat.

The Slender-billed Thornbill (Vulnerable) occurs in arid and semi-arid regions of southern Western Australia through to south-western South Australia (DEWR, 2007b). It inhabits treeless Chenopod shrublands but prefers saline flats associated with salt lakes, particularly where there is samphire (Garnett & Crowley, 2000). It is possible that the species may inhabit the Chenopods of the Low Shrubland Plain in the project area, however this habitat is well represented locally and regionally (Rapallo, 2007).

One species of local conservation significance may occur in the Hepi Project Area; the Burrowing Pygopodid Legless-lizard (*Aprasia picturata*) (Rapallo, 2007). This species is only known from two specimens collected

less than 10 kilometres from the project area, plus a third specimen collected near Wiluna. Its habitat is known as low eroded granite hills covered in Acacia scrub in the Murrin-Murrin/Minara area (Rapallo, 2007). Rapallo (2007) have stated that based on the information above, it is possible that *Aprasia picturata* may inhabit the small outcrop of coarse grain mafic in the project area. However, during a site visit, Rapallo's herpetologist stated that the habitat of the application area (granite hills) was not suitable to this species needs, and rather would inhabit breakaways of a sandy nature. Therefore it is unlikely that the proposed clearing area is representive of significant habitat for this species.

A ground survey of the project area was completed in April 2007 (Rapallo, 2007). According to Rapallo (2007) the project area is largely a heterogeneous Acacia dominated habitat. There were five habitat types identified within the project area, these were: Mulga Uplands and Slopes, Mulga Open Scrub at the Base of Hills, Mulga Plain, Low Shrubland Plain and Mulga Drainage. None of the habitat types mentioned are known to be significant locally or regionally (Cowan, 2007).

Based on the lack of significant habitat for conservation species identified in the project area and the fact that fauna habitats identified are well represented locally and regionally, it is unlikely the proposed clearing will have any adverse impact on any significant fauna habitat.

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

Methodology

Caughley et al (1986)
Cowan (2007).
DEWR (2007a).
DEWR (2007b).
Garnett & Crowley (2000).
Rapallo (2007).

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

Comments

Proposal is at variance to this Principle

A vegetation survey and rare flora search of the application area was completed by Paul Armstrong & Associates in April 2007. The survey involved a search of the Department of Environment and Conservation's (DEC) rare flora database to identify any significant flora species that occur in the general area. A ground survey was commissioned to search for DRF or Priority Species identified in the database search, and to describe the different plant communities of the application area (Paul Armstrong & Associates, 2007).

The database search identified 1 DRF and 24 Priority Flora species as occurring in the general area (Paul Armstrong & Associates, 2007). Of these species, 3 taxa were recorded within 20 kilometres of the Project. These were *Hemigenia exilis* (Priority 4); *Hybanthus floribunda* subsp. *chloroxanthus* (Priority 3); and *Triglochin protuberans* (Priority 3).

Most of the species on the DEC's list of significant flora occurring in the area were perennial shrubs or trees. These species would have been apparent during the ground survey, however there were seven species of annual, ephemerals or cryptic nature that may have not have been apparent (Paul Armstrong & Associates, 2007). Paul Armstrong & Associates (2007) have stated that due to the timing of the survey, these species wouldn't have been present. However, it was also stated that even if a survey was conducted during spring, ephemeral species wouldn't be present due to the lack of rainfall experienced during that time of the year (Paul Armstrong & Associates, 2007).

The ground survey was completed over a two day period in April 2007 (Paul Armstrong & Associates, 2007). Most of the native species identified were common and widespread, the exceptions being four Priority Flora and four species of interest. These species were: *Calytrix erosipetala*, *Frankenia georgei*, *Hynbanthus floribunda* subsp. *chloroxantus* (all Priority 3), *Hemigenia exilis* (Priority 4), *Alectryon oleifolius* subsp. *Oleifolius*, *Atriplex quinii*, *Cratystylis centralis* and *Olearia calcarea*.

Based on the number of Priority Flora species and species of interest found within the application area, further flora surveys were required from GME Resources for the following purposes:

- find new populations of these species in and around the application area, and to prove that other significant populations of these plants exist locally and regionally; and
- to determine the total impact to the Priority Flora species and species of interest, over the two stages of the project in the form of a 'Cumulative Impact Assessment'.

The results of subsequent flora surveys and Cumulative Impact Assessment on the Priority Flora species and species of interest are discussed below.

Calytrix erosipetala is typically found in rocky sandstone or granite breakaway areas of the Murchison and Yalgoo IBRA Bioregions (Western Australian Herbarium, 2007). According to the Western Australian Herbarium (2007), this species has been recorded as common in several areas including Yakabindie, Lake Barlee,

Leinster, Woolgorong and Mertondale Station. Paul Armstrong & Associates (2007) have stated that 650 plants of *Calytrix erosipetala* were recorded from one population comprised of three subpopulations; 200 plants north of the proposed waste rock landform; 250 plants east to south-east of the pit and 200 plants south of the pit. Based on the Cumulative Impact Assessment completed by GME Resources, approximately 31% of the population in the application area will be cleared as a result of the Hepi Project (Rapallo, 2007). Given that there are several populations adjacent to the application area, and there are several areas where it has been recorded throughout Western Australia, the proposed clearing is unlikely to threaten the conservation status of this species.

Frankenia georgei is a small shrub known to be found on rocky slopes of the Kalgoorlie and Laverton areas. This species has also been recorded to the north of Wiluna and south and east of Kalgoorlie (Paul Armstrong & Associates, 2007). This species was recorded from three locations, all in the low shrublands on the plains. The total population of *Frankenia georgei* was estimated to be between 250 and 500 plants, and this species was observed within areas to the south of the proposed waste rock landform area (Paul Armstrong & Associates, 2007). Based on the Cumulative Impact Assessment completed by GME Resources, it is estimated that approximately 40% of the population in the application area will be cleared during the two stages of the project (Rapallo, 2007). Given the relatively wide distribution of this species, and that other populations of *Frankenia georgei* exist adjacent to the application area, it is unlikely that that the conservation status of this species will be affected as a result of this project.

Hemigenia exilis is known to occur within habitats such as laterite, breakaways and slopes of areas including Lake Darlot, Leinster, Leonora, Mt Keith and Yakabindie (Western Australian Herbarium, 2007). This species was recorded from four locations mostly within lower slopes of the hills of the proposed pit location, and to the south of the pit outside the application area (Paul Armstrong & Associates, 2007). Based on the Cumulative Impact Assessment, of the 151 plants identified, approximately 26% of these will be cleared during the two stages of the project (Rapallo, 2007). Given the low number of plants proposed to be cleared, it is unlikely this population will be significantly impacted from the proposed clearing.

Hynbanthus floribunda subsp. *chloroxantus* is described as occurring on dark red-brown soil, rich in iron oxides growing on laterite and rocky areas, along creek banks and drainage lines (Western Australian Herbarium, 2008). It is known to occur in the Leonora and Laverton areas. An estimated 1,300 plants of *Hybanthus floribundus* subsp. *Chloroxanthus* occur within and surrounding the application area. The majority of the plants that will be cleared during the project will be in the pit and the haul road areas (Paul Armstrong & Associates, 2007). However, there were significant populations identified outside the application area to the south and north during subsequent surveys. According to the Cumulative Impact Assessment, approximately 44% of the local population identified will be cleared during the two stages of the Hepi Project (Rapallo, 2007). Although this represents a significant proportion to be cleared, the assessing officer has received DEC advice regarding impacts to Priority species of the application area, and this level of impact was not raised as a significant issue by DEC (2008). As a result, it is unlikely the overall status of this species will be significantly impacted as a result of the proposed clearing.

Atriplex quinii (poorly collected) is known to occur in clayey sand on rocky hill slope areas (Western Australian Herbarium, 2008). It is listed as a species of interest, as it is poorly collected in the state with only eight recordings to date. These recordings were within the Gascoyne, Little Sandy Desert, Murchison and Nullarbor bioregions (Western Australian Herbarium, 2008). In the application area, this species was recorded in the western region on the mid slopes of the Mulga Scrub uplands and slopes, where the trial pit is to be located as well as parts of the haul road (Paul Armstrong & Associates, 2007). Based on subsequent flora surveys, it is estimated that approximately 579 individuals of this species occur within the application area (Paul Armstrong & Associates, 2007). According to the Cumulative Impact Assessment, approximately 34% of this population will be cleared over the two stages of this project (Rapallo, 2007). DEC (2008) have raised concerns about the amount of *Atriplex quinii* proposed to be cleared. Although a significant level (34%) of the *Atriplex quinii* population will be cleared, Paul Armstrong & Associates (2007) have stated that several other populations of *Atriplex quinii* were identified to the south, and also in the Murrin Murrin area approximately 10 kilometres north of the application area. Based on this, the localised impacts to this species would not be as significant as first thought by DEC. Additionally, DEC (2007) have recommended that seed be collected from the *Atriplex quinii* population within the application area before any clearing commences. GME Resources have committed to collect seed before and during the two stages of the Hepi Project, and submit collected seed to the Threatened Flora Seed Centre at the Western Australian Herbarium. It is recommended that should the permit be granted, a condition be placed on the permit for the purposes of flora management.

Alectryon oleifolius subsp *oleifolius* (range extension) is listed as occurring in grey sandy clay or red sand or limestone growing on coastal plains and sand dunes (Western Australian Herbarium, 2008).This species has been recorded in numerous locations within 200 kilometres of the coast, within the Carnarvon, Gascoyne, Pilbara and Geraldton Sandplain bioregions (Western Australian Herbarium, 2008). A single individual of *Alectryon oleifolius* subsp *oleifolius* was recorded on the mid slopes of the Mulga Scrub uplands and slopes, to the east of the trial pit (Paul Armstrong & Associates, 2007). The discovery of this species within the application area represents a significant range extension. Based on the Cumulative Impact Assessment the single individual of *Alectryon oleifolius* subsp *oleifolius* will be cleared during stage two of the project (Rapallo, 2007). DEC advice was received by the assessing officer in regards to impact to this species. The DEC have recommended that this species be avoided during stage two of the project, as this single recording of this species within the application area represents a significant geographic range extension. However, the single specimen of *Alectryon oleifolius* subsp *oleifolius* is located within the proposed pit boundary and will inevitably

be removed should a clearing permit be granted. GME Resources have committed to conduct targeted flora surveys in spring 2008 in the surrounding region, to ascertain whether there are further populations of this species. As a result, it is recommended that should the permit be granted, a condition be placed on the permit for the purposes of flora management.

A *Cratystylis* sp. was recorded within the application area in April 2007, from a single location within the application area during the initial flora survey (Paul Armstrong & Associates, 2007). During subsequent surveys, additional plant material was collected and the plant was later identified as *Cratystylis centralis* (Paul Armstrong & Associates, 2007). A large population of approximately 962 plants was identified, with the majority of these plants following the soil type of red clayey loam with iron stone pebbles on the surface. This species was identified within the original turn around area.

According to Paul Armstrong & Associates (2007), this species was previously only recorded at a few locations around Alice Springs, and an unconfirmed sighting from Barwidgee Station (near Mt Keith). The discovery of this species in Western Australia represents a significant range extension of approximately 1,300 kilometres (Paul Armstrong & Associates, 2007). In August 2007, advice was received from DEC regarding this species. Due to the lack of information regarding the status of *Cratystylis centralis*, DEC recommended the species be treated as a DRF species (DEC, 2008). As a result of this, GME Resources commissioned Paul Armstrong & Associates (2007) to conduct targeted flora surveys for *Cratystylis centralis* in and surrounding the application area, and also at Barwidgee Station near Wiluna. The additional surveys resulted in the identification of a large population in the north-west of the application area as well as another further north of the application area. A population was also identified by Paul Armstrong & Associates (2007) around Barwidgee Station. This confirmed that there were several populations around the Hepi Project and to the north around Wiluna.

Using the information from targeted significant flora surveys of the project area, GME Resources were able to revise its proposed mine layout so the *Cratystylis centralis* species was totally avoided (Rapallo, 2007). GME Resources relocated planned infrastructure, such as the turn around area and the laydown area so this species was totally avoided and a Clearing Exclusion Zone was created to protect the population. A revised clearing permit area depicting this change was submitted to the assessing officer in October 2007. As a result of this information, GME Resources have committed to avoid all *Cratystylis centralis* species, and locate the turnaround and laydown areas elsewhere in the project area. Based on this, there will be no direct impact to this species.

Olearia calcarea is a poorly collected species, though it has a wide distribution throughout Western Australia (Paul Armstrong & Associates, 2007). This species was collected from locations on low flat gravelly plain and was intermittently dispersed throughout the application area. During the targeted flora surveys, additional locations of *Olearia calcarea* were identified 7 kilometres and 12 kilometres north of the application area and also adjacent to *Cratystylis centralis* at Barwidgee Station. Paul Armstrong & Associates (2007) estimated a population of approximately 490 plants within the application area. However, the majority of these are located in the exclusion zone and will not be cleared. Based on the Cumulative Impact Assessment, it is estimated approximately 16% of this population will be cleared during the project (Rapallo, 2007).

Given the level of Priority Flora species and species of interest proposed to be cleared within the application area, the proposed clearing is at variance to this Principle. However, through further survey work, GME Resources have demonstrated that the Priority Flora Species and species of interest found within the application area also have significant populations surrounding the application area that will not be subject to clearing. Further to this, GME Resources have created an exclusion zone in areas where *Cratystylis centralis* species are located, and have thus eliminated direct impact to this species. Additionally, GME Resources have committed to conducting further targeted survey work in spring 2008 around the application area, which will focus on identifying further populations of *Alectryon oleifolius* subsp *oleifolius* species. GME Resources have also committed to collecting seed from the population of *Atriplex quinii*, as requested by DEC. These actions and commitments are likely to reduce impacts to Priority Flora species and species of interest from the proposed clearing.

Methodology

DEC (2008)
Paul Armstrong & Associates (2007).
Rapallo (2007).
Western Australian Herbarium (2008).
GIS Database:
- Declared Rare and Priority Flora List - CALM 01/07/05

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

Comments

Proposal is not likely to be at variance to this Principle

There are no known Threatened Ecological Communities (TEC's) located within a 50 kilometre radius of the application area (GIS Database). No known TEC's were identified during the flora survey of the application area (Paul Armstrong & Associates, 2007). None of the TEC's identified by Cowan (2001) within the East Murchison Subregion, are located within or near the application area.

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

Methodology Paul Armstrong & Associates (2007).
GIS Database:
- Threatened Ecological Communities - CALM

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

Comments

Proposal is not at variance to this Principle

The area applied to be cleared is located within the Murchison IBRA Bioregion (Shepherd, 2001). According to Shepherd (2001) there is approximately 100% of Pre-European vegetation remaining within the Bioregion. The vegetation of the application area is classified as Beard vegetation association 18 - Low woodland; mulga (*Acacia aneura*) (GIS Database, 2007). This vegetation association remains at approximately 100% of pre-European extent in the state and also in the Murchison Bioregion (Shepherd, 2001). The proposed clearing of 47 hectares will not reduce the extent of Beard vegetation association 18 below the current recognised threshold levels at the Bioregional level. As a result the area proposed to clear does not represent a significant remnant of vegetation in an area that has been extensively cleared.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	% of Pre-European area in IUCN Class I-IV Reserves (and current %)
IBRA Bioregion – Murchison	21,794,202	21,794,202	~ 100	Least Concern	8.5
Local Government Leonora	No information available				
Beard veg assoc. – State					
18	19,891,436	19,891,436	~ 100	Least Concern	5.8
Beard veg assoc. – Bioregion					
18	12,403,248	12,403,248	~ 100	Least Concern	4.3

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

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

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

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

Comments

Proposal is at variance to this Principle

There is a minor non-perennial watercourse located on the western side of the application area (GIS Database). The vegetation located within this watercourse is described as Mulga Thicket along drainage lines. Paul Armstrong & Associates (2007) state that this vegetation type was thicker than other areas, and this is likely to be a result of the position of this area in the landscape where more water is likely to collect. However, it was also stated that this vegetation was not confined to drainage lines and was not riparian in nature, and therefore would not be considered to be environmentally significant (Paul Armstrong & Associates, 2007). Based on this, the proposed clearing may be at variance to this Principle.

However, there is already a vehicle track which intersects this area and GME Resources have committed to utilising this track, and stated it will not need to be widened (GME Resources, 2007). As a result, there will be no significant impacts to vegetation situated within this watercourse.

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

Methodology Paul Armstrong & Associates (2007).
GME Resources (2007).
GIS Databases:
- Hydrography, linear - DOE 1/2/04

- Geodata, Lakes - GA 28/06/02

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

Comments

Proposal may be at variance to this Principle

The application area lies within both the Leonora Land System and the Hootanui Land System (GIS Database).

Part of the southern and eastern portions of the application area lie within the Leonora Land System (GIS Database). This area includes the open pit, workshop office and part of the adjoining access track and haul road (Rapallo, 2007). The Leonora Land System is described as low greenstone hills and stony plains, supporting mixed Chenopod shrublands (Pringle et al, 1994). The application area contains two landforms of the Leonora Land System; these are the hills and lower footslopes. The hills portion of the land system (which is where the pit is to be located) is described as rounded hills (up to 40 metres of relief) with abundant mantles of greenstone pebbles, local patches of ferruginous duricrust; gently inclined upper slopes locally with calcrete outcrop and rubble. The lower footslopes (where the access track, haul road and workshop office are proposed) are very gently inclined lower slopes with moderate to abundant mantles of quartz, ironstone and greenstone pebbles local calcrete outcrop and rubble (Pringle et al, 1994). Both of these areas have substantial stony mantle covers and therefore are not susceptible to erosion (Pringle et al, 1994).

The northern half of the application area is found in the Hootanui Land System (GIS Database). This land system is described as breakaways, hills and ridges with extensive saline gravelly and stony lower plains, supporting scattered halophytic low shrublands (Pringle et al, 1994). Clearing within this land system will be required for the access track, haul road, turn around area and ore and waste bodies (Rapallo, 2007). There are several land units of the Hootanui Land System which will be required to be cleared these include stony plains, alluvial plains and creeklines.

The majority of the application area is protected from erosional forces as a stony mantle is present, however there is a small drainage line located in the western region of the application area which is not protected by a stony mantle. Given the summer rainfall events associated with dissipating cyclonic activities (Bureau of Meteorology, 2007), it is possible that the removal of native vegetation may cause erosion within this area. However, GME Resources have stated there is already a vehicle track which crosses this area which they will utilise during mining operations. Therefore there will be no further disturbance to the creek bed (Rapallo, 2007). The remainder of the application area is protected by a stony mantle and is less likely to erode, however, the removal of the stony mantle during clearing may initiate soil erosion.

Based on the above, the proposed clearing may be at variance to this Principle. However, all disturbances to the land surface made as a result of the Hepi Project will be rehabilitated after the completion of the project. The implementation of rehabilitation management measures will assist to mitigate the potential for land degradation (Rapallo, 2007). These measures include:

- minimising the area requiring vegetation removal;

- use of existing tracks and disturbed areas;

- conducting topsoil-stripping activities during periods of low winds;

- stockpiling of topsoil for use in rehabilitation; and

- ensuring all staff and contractors are subject to GME Resources Environmental Induction.

Methodology

Bureau of Meteorology (2007).
Rapallo (2007).
Pringle et al (1994).
GIS Database:
- Rangeland Land System Mapping - DA
- Topographic Contours, Statewide - DOLA 12/09/02

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

Comments

Proposal is not likely to be at variance to this Principle

The closest conservation area to the Hepi Project Area is Goongarie National Park, which is situated approximately 110 kilometres to the south-west (GIS Database, 2007). There are no other conservation areas nearby. It is therefore unlikely that there would be any detrimental effects to the environmental values of this conservation area from the proposal.

Based on the above, the proposal 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 proposal is not located within a Public Drinking Water Supply Area (GIS Database).

The majority of the land surface in the application area is made up of a gravelly stony mantle, with the size of this mantle becoming more prominent in the hills than on the plains. The soil found in these areas has a very low erosion potential due to the protective covering from the mantle against wind and water forces (Pringle et al, 1994). As a result it is unlikely that sedimentation would result from clearing activities in the majority of the application area.

There is a minor, non-perennial drainage line located on the western edge of the application area (GIS Database). It is not a defined river or creek system and does not have riparian vegetation, rather thicker Mulga vegetation in places of soil deposition (Rapallo, 2007). Given that the trial mining at Hepi will take a short period of time, GME Resources will not need to widen the access track which intersects the drainage line (Rapallo, 2007). As there is no widening of the creek or river bed, there will be no disturbance to the bed, no cutting into the existing drainage and no imported fill in this area. GME Resources have also committed to cease mining and hauling during non-seasonal rainfall periods to prevent the roads, equipment and soil from being damaged (Rapallo, 2007). Based on the information above, it is unlikely that surface water quality will be reduced in the drainage line within the application area.

Rapallo (2007) have stated that groundwater of the application area will not be intersected from mining operations, and will not be used for mining processes. Additionally there has been no groundwater modelling undertaken to determine the impact of native vegetation removal on groundwater levels and quality. However, it is not expected that the proposed clearing will significantly impact the groundwater of the area.

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

Methodology

Pringle et al (1994).
Rapallo (2007).
GIS Database:
- Groundwater Salinity, Statewide
- Public Drinking Water Source Areas (PDWSAs) - DOW

(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 climate of the region is semi-arid, with an average annual rainfall of 260 millimetres, although there may be considerable variation from year to year (Bureau of Meteorology, 2007). The most reliable rains occur in winter from cold fronts arriving from the west, and cloud bands from the north-west. Although rare, decaying tropical cyclones originating off the north-west coast can also move through the Goldfields, producing heavy rains and occasional localised flooding (Bureau of Meteorology, 2007).

During heavy rainfall, water is likely to move down gradient towards a large perennial watercourse located to the north of the application area (GIS Database). This is likely to occur in either via sheetflows in the central and eastern upper parts of the application area, or via a non-perennial drainage line in the western side of the application area. Consequently water is unlikely to collect as it will most likely be dispersed northwards.

Leonora is the nearest town to the area under application and it has an annual evaporation rate of 3,473 millimetres per year (Luke et al., 2003), This is 13 times the annual rainfall and it is therefore unlikely that the proposed clearing will increase the incidence or intensity of natural flooding events.

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

Methodology

Bureau of Meteorology (2007).
Luke et al. (2003).
GIS Database:
- Evaporation Isopleths - BOM 09/98
- Hydrography, linear (medium scale, 250k GA)

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

Comments

There are no native title claims over the area under application (GIS Database). The mining tenement has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is

not a future act under the Native Title Act 1993.

There is one registered Site of Aboriginal Significance located approximately 700 metres to the south of the area applied to clear (Site ID 15438) (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Environment and Conservation and the Department of Water (DOW) 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 Database:
- Aboriginal Sites of Significance - DIA
- Native Title Claims - DLI

4. Assessor's comments

Purpose	Method	Applied area (ha)/ trees	Comment
Mineral Production	Mechanical Removal	47	The Clearing Principles have been addressed and the proposed clearing may be at variance to Principles (a) and (g), is at variance to Principles (c) and (f), is not likely to be at variance to Principles (b), (d), (h), (i), and (j), and is not at variance to Principle (e). Should the permit be granted, it is recommended that conditions be imposed on the permit for the purposes of weed management, management of flora species, rehabilitation and permit reporting.

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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.