Government of **Western Australia**
Department of **Mines and Petroleum**

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4081/1
Permit type: Purpose Permit

1.2. Proponent details

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

1.3. Property details

Property: Exploration Licence 74/287
Local Government Area: Shire of Ravensthorpe
Colloquial name: Bakers Hill Exploration Program

1.4. Application

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

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 17 February 2011

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 in a regional context. Beard vegetation association 516 (Shrublands, mallee scrub black marlock) has been mapped within the application areas (GIS Database).

A vegetation and flora survey was undertaken by an independent botanist contracted by Keith Lindbeck and Associates. It was conducted on August 3 to 6, 17 September and on 12 and 20 October 2010, and the vegetation mapping on September 19 2010 within the vicinity of the application areas (Keith Lindbeck and Associates, 2010c).

The application areas consist of two areas with deposits called Quarry and Horseshoe. The Quarry area is located approximately 600 metres north, northeast of the Horseshoe area.

Keith Lindbeck and Associates (2010a) reported that nine vegetation types were identified in the Quarry area and five in the Horseshoe area and the application area is located on unnamed hills.

The Quarry Deposit area was reported to consist of the following vegetation types:

1. Woodland of *Eucalyptus salmonophloia* over scattered tall mallee *Eucalyptus oleosa* subsp. *corvina* and *Acacia acuminata* over *Acacia capillaris*, *A. binata*, *Dodonaea ptarmaecifolia*, Threlkeldia diffusa, *Enchylaena tomentosa* and *Zygophyllum billardierei*. On soft deep loam over clay.

2. Shrubland with emergent *Allocasuarina huegeliana* and scattered *Acacia acuminata*, of *Allocasuarina campestris*, *Hakea strumosa*, *Dodonaea pinifolius*, *Hybanthus floribundus*, *Hibbertia pungens*, *Acacia glaucoptera*, *Lepidosperma* sp. 'clathrate', and *Lepidosperma* aff.*diurnum*.

3. Dense shrubland of *Allocasuarina campestris*, *Hakea strumosa*, *Dodonaea pinifolius*, *Hybanthus floribundus*, *Hibbertia pungens*, *Acacia glaucoptera*, *Lepidosperma* sp. 'clathrate', and *Lepidosperma* aff. *diurnum*. On stony shallow gritty sandy clay over quartzy granite.

4. Low mallee shrubland of *Eucalyptus proxima*, *E. flocktoniae* over *Melaleuca cliffortioides*, *Hakea strumosa*, *Acacia glaucoptera*, *Acacia ingrata*, *Templetonia battii*, *Dodonaea pinifolius*, *Thomasia angustifolia*, *Hybanthus floribundus*, *Asteridea asteroides*, *Lepidosperma* sp. 'clathrate', *Lepidosperma* aff. *diurnum* and *Tetraria* sp. Mt Madden. On shallow red/brown clay over and among dark granitic rocks.

5. Medium mallee shrubland of *Eucalyptus flocktoniae* and *E. phenax* over *Melaleuca hamata*, *Hakea strumosa, Allocasuarina campestris*, *Acacia glaucoptera*, *sulcata, Hibbertia pungens*, *Eremophila glabra* and *Hybanthus floribundus*. On dark red/brown medium to shallow cracking clay over darker fine grained rocks.

6. Emergent *Eucalyptus occidentalis* and *E. salmonophloia*, over *Melaleuca hamata*, *Hakea strumosa*, *Acacia glaucoptera*, *A. sulcata*, *Hybanthus floribundus* and *Lepidosperma* aff. *diurnum*. On loamy clay in area of moisture expression on mid upper slopes over dolerite.

7. Mallee shrubland of *Eucalyptus uncinata*, *E. phenax*, *E. pluricaulis* and *E.* sp Ravensthorpe over *Allocasuarina campestris*, *Melaleuca hamata*, *M. cliffortioides*, *Gyrostemon subrudus*, *Acacia ingrata*, *Thomasia angustifolia*, *Dampiera angulata*, and *Lepidosperma* aff *diurnum*. On gritty sandy clay over broken quartz over pegmatite.

8. Emergent scattered *Eucalyptus salmonophloia* over tall mallee of *E. oleosa* subsp. *corvina*, *Melaleuca cucculata*, *M. cuticularis*, *Santalum acuminatum*, *Hakea commutata*, *Templetonia retusa*, *Grevillea oligantha*, *Beyeria brevifolia*, *Halgania andromedifolia*, *Cryptandra nutans* and Lepidosperma fimbriatum. On sodic medium depth loam of lower slopes adjacent to a watercourse.

9. Woodland of *Eucalyptus occidentalis* with scattered *E. salmonophloia* over *Acacia acuminata, A. cyclops*, *Melaleuca cuticularis*, *M.*

acuminata, *Dodonaea ptarmicaefolia*, *Threlkeldia diffusa* and *Enchylaena tomentosa*. On deep sandy loam associated with watercourse.

The Horseshoe area was reported to consist of the following vegetation types:
1. Tall mallee shrubland of *Eucalyptus oleosa* subsp. *corvina* and patches of *E. cernua* over *Melaleuca cliffortioides*, *Acacia cyclops*, *Alyogyne hakeifolia*, *Dodonaea ptarmicaefolia*, *Halgania andromedifolia*, and *Acacia glaucoptera*. On dark redbrown mineralised cracking clays.
2. Mallee shrubland of *Eucalyptus pleurocarpa* and occasional *E. uncinata* over *Calothamnus quadrifidus*, *Melaleuca hamata*, *Allocasuarina campestris*, *Leptospermum erubescens*, *Daviesia pachyphylla*, *Acacia mimica* var. *angusta*, *Gastrolobium parviflorum*, *Gyrostemon subrudus*, *Goodenia scapigera*, *Commersonia* crispa, and *Lepidosperma* sp. Mt Benson. On sandy clay soils among white quartz rocks of weathered pegmatite.
3. Mallee shrubland of *Eucalyptus proxima*, *E. pluricaulis* and *E. flocktoniae* over *Melaleuca cliffortioides*, *M. lateriflora*, *Hakea strumosa*, *Eutaxia cuneata*, *Acacia glaucoptera*, *Dodonaea pinifolius*, *Hibbertia pungens*, *Boronia crenulata*, *B. inornata* subsp. *inornata*, *Lepidosperma* sp. Ravensthorpe, *Gahnia ancistrophylla*, and *Teucrium sessiliflorum*.
4. Tall mallee shrubland of *Eucalyptus sporadica* over *Calothamnus quadrifidus*, *Melaleuca hamata*, *Daviesia pachyphylla*, *Gastrolobium parviflorum*, *Gyrostemon subrudus*, *Goodenia scapigera*, *Dampiera angulata* and *Hibbertia recurvifolia*. On loamy clay in sites of moisture expression on mid slopes.
5. Melaleuca low shrubland of *Melaleuca elliptica* over *Spartochloa scirpiodea*, on open quartz rich granite sheets (Keith Lindbeck and Associates, 2010a).

Clearing Description

Galaxy Resources has applied to clear up to 4 hectares of native vegetation within an application area covering approximately 45 hectares, located over the Quarry and Horseshoe areas. The application areas are located in the Bakers Hill area, approximately 17 kilometres south west of Ravensthorpe (GIS Database).

The purpose of the clearing permit application is to conduct exploration drilling. The majority of clearing will consist of rolling and any topsoil and vegetation cleared will be stockpiled for use in rehabilitation works (Keith Lindbeck and Associates, 2010c).

Vegetation Condition

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

To

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

To

Pristine: No obvious signs of disturbance (Keighery, 1994).

Comment

The vegetation condition is based on the Level 1 flora and fauna surveys carried out by Keith Lindbeck and Associates between August and October 2010.

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

The application areas fall within the Fitzgerald sub-region of the Esperance Plains Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). This sub-region includes the Stirling Ranges Flora, the Fitzgerald River National Park (Biosphere) and has been recognised as a centre of species diversity in southwest Western Australia (CALM, 2002). The vegetation within this sub-region is characterised as having myrtaceous and proteaceous scrub and mallee heaths on sand plain overlying Eocene sediments; rich in endemics. Herb fields and heaths (rich in endemics) occur on abrupt granite tors and quartzite ranges that rise from the plain. Eucalypt woodlands occur in gullies and alluvial foot-slopes (CALM, 2002).

The application areas fall within the Cocanarup Reserve which is identified as an Environmentally Sensitive Area and is listed on the Register of National Estate for its natural values (GIS Database).

Level 1 flora and fauna surveys were conducted by Keith Lindbeck and Associates in 2010. This involved both desktop studies and site surveys of the application areas.

Keith Lindbeck and Associates (2010a) advised that the results of the flora and vegetation survey suggest that the application areas appear to have considerably less plant diversity than that of nearby areas (Ravensthorpe Range, Bandalup Hill and Kundip areas) that support high levels of floristic diversity. A possible explanation may be differences in the soil characteristics developed as a result of weathering, with no sand plain or laterite/gravel soils encountered in the application areas (Keith Lindbeck and Associates, 2010a).

The application areas were also subject to a wildfire in 2008. The reconnaissance fauna survey established that this created a mosaic burn, whereby some areas showed evidence of being burnt while others did not appear to have been burnt at all (Keith Lindbeck and Associates, 2010a). For those areas that had been burnt, the quality of the regeneration varied from 'very good' in some areas to 'poor' in others (Keith Lindbeck and Associates, 2010a). Overall, the condition of the majority of the vegetation in both areas was determined to be 'Excellent' with some areas ranging from 'Pristine' through to 'Good'. (Keith Lindbeck and Associates, 2010a).

The flora and vegetation survey recorded nine vegetation types within the Quarry area and five vegetation groups in the Horseshoe deposit area (Keith Lindbeck and Associates, 2010a). The vegetation types were reported to be represented extensively throughout the area, yet their differences in relatively small areas exemplifies the great diversity within this subregion (Keith Lindbeck and Associates, 2010a). There were no vegetation associations, natural features or landforms observed during the flora and vegetation survey that were considered to be unique or of high conservation value in the context of the Esperance bioregion (Keith Lindbeck and Associates, 2010a).

The Department of Environment and Conservation (DEC) database listed 12 Declared Rare Flora (DRF) and 78 Priority Flora, and the Environment Protection and Biodiversity Conservation Protected Matters Search Tool listed six flora species of conservation significance with the potential to occur within the application area, three of which were additional to the DEC database search. Of these, no DRF were recorded during the flora and vegetation survey. One Priority Four species *Eucalyptus proxima* was recorded as several occurrences in both the Quarry and Horseshoe areas (Keith Lindbeck and Associates, 2010a).

Eucalyptus proxima is not confined to the vegetation survey areas or immediate vicinity, and has populations at other locations. It is considered unlikely that the proposed mining operations will impact on the conservation values of this species (Keith Lindbeck and Associates, 2010a).

Keith Lindbeck and Associates (2010a) report that few weeds were recorded within the application areas. Scarlet Pimpernel (*Anagallis arvensis*) and Capeweed (*Arctotheca calendula*) were recorded in the creek north of the Quarry deposit. These species are not listed as Declared Weeds (Keith Lindbeck and Associates, 2010a) however the presence of introduced flora species may decrease the biodiversity of the survey areas. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

The application areas are located within a Dieback (*Phytophthora cinnamomi*) Risk Zone (Keith Lindbeck and Associates, 2010a). Keith Lindbeck and Associates (2010a) have noted that Dieback is not known in the immediate Cocanarup (project) area and no signs of dieback were observed during the survey. The relatively rich soils limit the amount of susceptible species with only a few proteaceous and other susceptible taxa present. Further, the recent wildfire, which was extensive in the areas proposed for disturbance, limits the expression of disease (Keith Lindbeck and Associates, 2010a). Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a dieback management condition.

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

Methodology

CALM (2002)
Keith Lindbeck and Associates (2010a)
GIS Database:
- Cadastre (Label)
- EPA Red Book 1976-91
- IBRA WA (Regions - Sub-Regions)
- Register of National Estate (Status)
- System 1 to 5 and 7 to 12 areas

(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 may be at variance to this Principle

Potential fauna habitats within the application areas consist of: Eucalyptus woodlands and mallee shrublands with *Melaleuca* spp. The application areas were subject to a wildfire in 2008 (Keith Lindbeck and Associates, 2010a). The flora and vegetation survey established that the wildfire created a mosaic burn where evidence of fire was only seen in selected areas (Keith Lindbeck and Associates, 2010a). For those areas that had been burnt, the quality of the regeneration varied from 'very good' in some areas to 'poor' in others.

Desktop studies were conducted by Keith Lindbeck and Associates (2010a). This consisted of interrogating:
- the Environment Protection and Biodiversity and Conservation (EPBC) Protected Matters Search tool to determine any species listed under the *Environment Protection and Biodiversity Act 1999* (EPBC Act 1999) for the area;
- threatened and Priority Fauna Database held by the Department of Environment and Conservation (DEC);
- the Western Australia Museum database NatureMap for records of vouchered fauna specimens; and
- the Birds Australia Atlas Database for bird species listed within the survey areas.

The results showed that five mammal species, five amphibians and sixteen reptiles and 184 birds may occur within the application area (Keith Lindbeck and Associates, 2010a). Results of the DEC database searches indicated that sixteen species of conservation significance could potentially occur in the application areas (Keith Lindbeck and Associates, 2010a).

Level 1 fauna assessments were undertaken in July and September 2010. Fauna sightings recorded included more mobile species: one skink species, two mammal species and 19 bird species (Keith Lindbeck and Associates, 2010a). The Crested Bellbird (*Oreoica gutturalis gutturalis*) (Priority Four species on the DEC Threatened and Priority Fauna database) was heard during the reconnaissance survey (Keith Lindbeck and Associates, 2010a). Advice from the Office of the EPA states that the threatened classification for this species only refers to the southern populations within fragmented vegetation (Keith Lindbeck and Associates, 2010a). As vegetation in the Bakers Hill area has not been subject to fragmentation, the proposed disturbance is not likely to impact this species.

Significant habitats for fauna were identified during the flora and vegetation surveys and fauna reconnaissance survey of the application area. These were located in the northern section of the Quarry area and comprised: the *Eucalyptus salmonophloia* and *E. occidentalis* with scattered *E. salmonophloia* woodlands (Keith Lindbeck and Associates, 2010a). Scattered *E. salmonophloia* plants were also recorded in the south east section of the application area (Keith Lindbeck and Associates, 2010a). These Eucalypt species may provide stags, hollow logs, hollows or potential hollows large enough for Carnaby's Cockatoo (*Calyptorhynchus latirostis*) (listed as EPBC Act and Schedule 1), breeding events and refuges for Chuditch (*Dasyurus geoffroii*), Western Rosella (*Platycercus icterotis xanthogenys*) and Numbat (*Myrmecobius fasciatus*) (Schedule 1 species under the *Wildlife Conservation Act 1950*) (Keith Lindbeck and Associates, 2010a). Although these habitats are significant, it was also established that they are not unique, to the Ravensthorpe area, as the vegetation types are also represented in three reserves within the Esperance Plains (Keith Lindbeck and Associates, 2010a).

The Galaxy Resources Exploration Management Plan highlighted that Mallefowl mounds are not common in the area, however if encountered (active or not) during the clearing will be avoided by a minimum of 50 metres (Keith Lindbeck and Associated, 2010b). Potential impacts to Malleefowl as a result of the proposed clearing may be minimised by the implementation of a fauna management condition.

The Numbat was not listed to occur in the vicinity of the application areas, however it could potentially occur in the Ravensthorpe area as captive bred animals have been released in the Cocanarup Timber Reserve since 2006 (Keith Lindbeck and Associates, 2010a). No surveys have been conducted to date to determine the dispersal and/or survival of these individuals (Keith Lindbeck and Associates, 2010a).

The Numbat's preferred habitat is in Eucalyptus forests and woodlands dominated by *Eucalyptus marginata*, *Eucalyptus calophylla* and *Eucalyptus wandoo* (SEWPAC, 2011a). It is unlikely that Numbats would frequent the application area as the habitat within the application area does not contain these particular Eucalyptus species and the area consists of predominantly mid storey species as opposed to upper storey forests and is still regenerating from the 2008 fire.

Keith Lindbeck and Associates (2010c) have stated that Galaxy Resources will implement management measures to ensure that the proposed exploration program does not adversely impact fauna, in particular Carnaby's Cockatoo, the Chuditch and the Numbat (Keith Lindbeck and Associates, 2010c). Potential impacts to fauna species listed in the *Wildlife Conservation (Specially Protected Fauna) Notice, 2010 (2)* as a result of the proposed clearing may be minimised by the implementation of a fauna management condition.

The nature of the proposed disturbance is expected to be relatively low as the vegetation will be scrub rolled rather than completely cleared. Therefore the disturbed areas will regenerate readily following completion of the exploration program.

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

Methodology SEWPAC (2011a)
Keith Lindbeck and Associates (2010a)
Keith Lindbeck and Associates (2010b)
Keith Lindbeck and Associates (2010c)

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

Comments

Proposal is not likely to be at variance to this Principle

A desktop review was conducted by Keith Lindbeck and Associates (2010a) to determine if any Declared Rare Flora (DRF) occur within the application areas. This review consisted of assessing the Department of Environment and Conservation's DRF database and the online Protected Matters Search Tool that interrogates the Federal *Environment Protection and Biodiversity Conservation Act 1999* (Keith Lindbeck and Associates, 2010a).

The search of the databases revealed that twelve DRF species could occur within the application areas (Keith Lindbeck and Associates, 2010a). The nearest recorded population is located approximately 10 kilometres south of the application areas (GIS database). No DRF were recorded during the flora and vegetation survey of the application areas (Keith Lindbeck and Associates, 2010a).

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

Methodology Keith Lindbeck and Associates (2010a)
GIS Database:
- Declared Rare and Priority Flora List

(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) within the application areas (GIS Database). In addition, Keith Lindbeck and Associates (2010a) reported that no communities recorded during the flora and vegetation survey were representative of TEC's.

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

Methodology Keith Lindbeck and Associates (2010a)
GIS Database:
-Threatened Ecological Sites Buffered

(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 application areas fall within the Fitzgerald sub-region of the Esperance Plains Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). Shepherd (2009) reported that approximately 51% of the Pre-European vegetation remains within the bioregion (see table). The vegetation of the application areas has been broadly mapped as Beard vegetation association 516: Shrublands, mallee scrub - black marlock (GIS Database). This vegetation association remains at approximately 54.75% at a state level and approximately 68.77% within the Esperance Plains bioregion (Shepherd, 2009) Therefore, the area proposed to be cleared does not represent a significant remnant of native vegetation within an area that has been extensively cleared.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion - Esperance	2,899,949	1,500,348	~51	Least Concern	28.4
IBRA Subregion - Fitzgerald	1,570,679	863,924	~55	Least Concern	27.7
Local Government - Ravensthorpe	982,190	601,790	~61.27	Least Concern	19.47
Beard vegetation associations - State					
516	607,402	322,576	~54.75	Least Concern	24.07
Beard vegetation associations - Bioregion					
516	318,746	219,186	~68.77	Least Concern	28.4
Beard vegetation associations - subregion					
516	219,038	182,678	~83.40	Least Concern	37.95

* Shepherd (2009)
** Department of Natural Resources and Environment (2002)

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

Methodology Department of Natural Resources and Environment (2002)
Shepherd (2009)
GIS Database:
- IBRA WA (Regions - Sub Regions)
- Pre-European Vegetation

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

Comments

Proposal is not likely to be at variance to this Principle

There are several minor ephemeral creeks within the application areas (GIS Database). Keith Lindbeck and Associates (2010c) has advised that no disturbance of the minor ephemeral drainage lines in the application areas is required as existing crossings will be utilised for the exploration program. Furthermore Galaxy Resources will be liaising with Department of Water in relation to the requirement for a bed and banks permit (Keith Lindbeck and Associates, 2010c).

The application areas lie approximately one kilometre south of the Phillips River (GIS Database) and within the vicinity of the West River, Steere River and Jerdacuttup Catchment areas in the Fitzgerald Biosphere Reserve (Keith Lindbeck and Associates, 2010a). The application areas are located within the same catchment as the Ramsar listed Lake Gore and Lake Warden systems (Keith Lindbeck and Associates, 2010a). Keith Lindbeck and Associates (2010a) have stated that the proposed clearing required for the exploration program will not impact surface runoff or drainage lines; therefore it is not expected to impact the catchment or these systems.

There are no permanent watercourses or wetlands within or in close proximity to the application areas (GIS Database), however the vegetation described during the flora and vegetation survey contains species representative of riparian vegetation and many of the communities occurred on loamy clay soils and or in moist zones (Keith Lindbeck and Associates, 2010a).

Given the nature of the proposed clearing it is unlikely that any significant impact to the vegetation associated with the drainage lines would occur. Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

Keith Lindbeck and Associates (2010a)
Keith Lindbeck and Associates (2010c)
GIS Database:
- Evaporation Isopleths
- Hydrography, linear
- Ramsar Wetlands
- Rivers

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

Comments

Proposal is not likely to be at variance to this Principle

The Department of Agriculture and Food Western Australia (DAFWA) soil-landscape mapping indicated that the application areas lie mostly within the Kybulup 1 subsystem, with a small portion within the Kybulup 6 subsystem (Keith Lindbeck and Associates, 2010a).

The Kybulup 1 subsystem comprises low rises and undulating plains with many headwater tributaries. Alkaline grey shallow sandy duplex soils with minor grey deep sand (gravelly) duplex soils and gravelly duplex soils. The Kybulup 6 subsystem occurs within a small portion of the Quarry area and comprises steep slopes, bare rock and stony soils (Keith Lindbeck and Associates, 2010a).

Keith Lindbeck and Associates (2010a) reported that these subsystems have a low risk of water logging and salinity. Also, half of these subsystems have a very low to moderate risk of water erosion and phosphorus loss. The wind erosion risk ranges from low to high (Keith Lindbeck and Associates, 2010a).

The applicant has described the soils of the application areas as comprising dark red/brown cracking clays over dolerite, white sandy clay with quartz 'gravel' over quartz pegmatite, and colluvial and alluvial gritty loams (Keith Lindbeck and Associates, 2010a). DAFWA was consulted as the soils of the Kybulup land systems did not appear to match those described during the survey.

DAFWA (2011) reconciled that the soils described by the applicant are interchangeable and representative of the Kybulup land system. DAFWA (2011) further advised that the high wind erosion risk listed for some of the soils may be over-stated, as gravel-sized course fragments within the surface soil will reduce the risk.

The nature and size of the proposed clearing is unlikely to result in appreciable land degradation.

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

Methodology

DAFWA (2011)
Keith Lindbeck and Associates (2010a)

(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 areas fall within the following conservation areas: the Cocanarup Reserve which is identified as an Environmentally Sensitive Area and is listed on the Register of National Estate (GIS Database); Red Book Area, System 3.3 Cocarnup Reserve; and a Crown Reserve (Timber Reserve 30795) (GIS Database).

The Cocanarup Reserve is significant, as the salmon gum (*Eucalyptus salmonophloia*) woodland and jam (*Acacia acuminata*) woodland of this reserve are remnants of the vegetation communities which were widespread in the wheat belt before clearing occurred. Many ecotypes that occur in this reserve are poorly reserved elsewhere in the region (SEWPAC, 2011b).

Review of Redbook Areas in 1993 recommended that Timber Reserve C30795 retain its current vesting with the Department of Environment and Conservation and also be established as an A Class reserve to ensure that the conservation of flora and fauna as well as timber production is managed (EPA, 1993).

The proposed clearing will impact approximately 0.05% of the approximately 9000 hectares encompassed by the Register of National Estate (GIS Database). The proposed clearing of 4 hectares within the application area of approximately 45 hectares is not likely to have any significant impact on the conservation values of this or any nearby conservation areas.

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

Methodology

EPA (1993)
Keith Lindbeck and Associates (2010a)
SEWPAC (2011b)
GIS Database:
- EPA Red Book 1976-91
- Register of National Estate (Status)
- System 1 to 5 and 7 to 12 areas

(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 areas are not located within a Public Drinking Water Source Area (PDWSA) (GIS Database). The groundwater salinity within the application areas is between 7000 - 14,000 milligrams per litre of Total Dissolved Solids (TDS) (GIS Database).

There are no permanent water bodies or watercourses within the application areas, however there are several minor, ephemeral drainage lines (GIS Database). It is expected that these would only flow after or during significant seasonal rainfall events, or substantial localised falls. The Galaxy Resources Exploration Management Plan states that seasonal watercourses will be avoided during clearing activities (Keith Lindbeck and Associates, 2010b).

The clearing of 4 hectares of vegetation within the application areas is not likely to have a significant impact on the quality of the groundwater or surface water in the local area.

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

Methodology

Keith Lindbeck and Associates (2010b)
GIS Database:
- Groundwater Salinity, Statewide
- Hydrography, Linear
- Public Drinking Water Source Areas (PDWSA)

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

Comments

Proposal is not likely to be at variance to this Principle

The application areas are located within the Culham Inlet Phillips West Steere catchment which covers an area of 71,334 hectares (GIS Database).

There is a minor ephemeral creek that runs between the Quarry and Horseshoe application areas (GIS Database). In addition, there are two minor ephemeral drainage lines in the application areas, one to the north of the Quarry area and the other through the centre of the Horseshoe area (GIS Database). These are expected to be dry throughout the summer months.

This region has an average annual rainfall of approximately 425 millimetres and around 75% of the rainfall occurs between March and October (Keith Lindbeck and Associates, 2010c). The average annual evaporation

rate is approximately 1,800 millimetres (GIS Database). Given the small amount of vegetation proposed to be cleared and the extent of native vegetation in the area, it is considered unlikely that the proposed clearing will result in increased risk of peak flood height or duration.

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

Methodology Keith Lindbeck and Associates (2010c)
GIS Database:
- Evaporation Isopleths
- Hydrographic Catchments -Catchments
- Hydrography, Linear

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

Comments

The clearing permit application was advertised on 29 November 2010 by the Department of Mines and Petroleum inviting submissions from the public. One submission was received regarding Aboriginal heritage issues. A written response was provided on the matter raised.

There are two Native Title Claims (WC96/109 and WC98/70) over the areas under application (GIS Database). These claims have been registered with the National Native Title Tribunal on behalf of the claimant groups. However, the mining tenure 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 are no registered Aboriginal Sites of Significance within the application areas (Department of Indigenous Affairs, 2010). 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.

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

Methodology GIS Database:
- Native Title Determined
- Native Title Federal
- Native Title NNTT

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5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
CALM	Department of Conservation and Land Management (now DEC), Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DEC), Western Australia
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DoE	Department of Environment (now DEC), Western Australia
DoIR	Department of Industry and Resources (now DMP), Western Australia
DOLA	Department of Land Administration, Western Australia
DoW	Department of Water
EP Act	*Environmental Protection Act 1986*, Western Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
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 Act	*Rights in Water and Irrigation Act 1914*, Western Australia
s.17	Section 17 of the *Environment Protection Act 1986*, Western Australia
TEC	Threatened Ecological Community

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.