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

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 6117/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Cristal Mining Australia Limited**

1.3. Property details

Property: Mining Lease 70/758
Miscellaneous Licence 70/159
Local Government Area: City of Busselton
Colloquial name: Wonnerup South Mineral Sands Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
6.7		Mechanical Removal	Mineral sands extraction and associated infrastructure

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 9 May 2015

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 for the whole of Western Australia and are useful to look at vegetation in a regional context. Three Beard vegetation associations have been mapped within the application area (Government of Western Australia, 2013; GIS Database):

- 990: Low forest: peppermint (*Agonis flexuosa*)

- 949: Low woodland; banksia

- 1136: Medium woodland; marri with some Jarrah, Wandoo, River Gum and Casuarina.

The application area falls within vegetation complex mapping conducted by Mattiske and Havel (1998). The following vegetation complexes have been mapped in the application area (GIS Database):

- AB: Woodland and open forest of *Corymbia calophylla* on flats and low rises in the humid zone.

- Ad: Woodland of *Corymbia calophylla*, *Agonis flexuosa*, *Allocasaurina fraseriana* and *Nuytsia floribunda*.

- AF: Woodland of *Corymbia calophylla-Agonis flexuosa* and tall shrubland of Myrtaceae-Proteaceae spp. on terraces and valley floors in the humid zone.

- Aw: Tall shrubland of *Melalauca viminea* and woodland of *Eucalyptus rudis*, *Melaleuca rhaphiophylla* with occasional *Corymbia calophylla*.

- Lw: Open woodland of *Melaleuca rhaphiophylla* and sedgelands of Cyperaceae-Restionaceae spp. on broad depressions in the subhumid zone.

Two flora and vegetation surveys have been undertaken over the application area; Onshore Environmental in April 2006 and Ekologica in October 2012. The Onshore Environmental (Onshore) survey identified four vegetation communities within the application area (Onshore, 2006):

- *Agonis flexuosa* Low Forest over **Lolium rigidum* Dense Low Grass.
- *Corymbia calophylla*/*Agonis flexuosa* Forest over **Lolium rigidum* Low Grass.
- *Melaleuca rhaphiophylla* Low Forest over **Zantedeschia aethiopica*/**Rumex pulcher* Open Dwarf Scrub over **Lolium rigidum* Low Grass.
- *Corymbia calophylla* Woodland over **Rumex pulcher* Open Dwarf Scrub over **Lolium rigidum*

Low Grass.

The Ekologica (2012) survey identified the following four vegetation communities within the application area:

- *Eucalyptus rudis* and *Agonis flexuosa* woodland over grassland/herbland of introduced taxa including **Pennisetum clandestinum.*
- *Corymbia calophylla* and *Eucalyptus marginata* woodland over *Agonis flexuosa*, *Nuytsia floribunda* low woodland over grassland/herbland of **Lolium rigidum*, **Hordeum leporinum*, **Arctotheca calendula* and other introduced species.
- Melaleuca rhaphiophylla low woodland over grassland/herbland of *Lolium rigidum, **Hordeum leporinum*, **Arctotheca calendula* and other introduced species.
- *Melaleuca rhaphiophylla* low forest over **Zantedeschia aethiopica* and **Rumex pulcher* herbland.

** introduced species*

Clearing Description

Wonnerup South Minerals Sands Project
Cristal Mining Australia Ltd (Cristal Mining) proposes to clear 6.7 hectares of native vegetation within a total boundary of approximately 162.7 hectares for the purpose of mineral sands extraction and associated infrastructure. The project is located approximately 6 kilometres south-east of Busselton, in the City of Busselton.

Vegetation Condition

Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).

To

Degraded: Basic vegetation structure severely impacted by disturbance (Keighery, 1994).

Comment

The vegetation condition was determined by botanists from Ekologica and Onshore.

The proponent initially applied for a permit boundary of 187 hectares. After consultation with the Department of Mines and Petroleum, the proposed permit boundary was reduced to approximately 162.7 hectares.

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

The application area occurs within the Perth subregion of the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database).This subregion is dominated by Banksia or Tuart on sandy soils, *Casuarina obesa* on outwash plains and paperbark in swampy areas (CALM, 2002).The outwash plains, once dominated by *C. obesa*-marri woodlands and Melaleuca shrublands, are extensive only in the south (CALM, 2002).

The application area has been substantially cleared for agricultural purposes and has been subject to gazing over the last 150 years (Ekologica, 2012). The remaining vegetation is confined to small pockets of remnant vegetation or isolated trees with little to no understorey (Ekologica, 2012; GIS Database).

Two vegetation and flora surveys have been undertaken over the application area whereby four vegetation communities were identified in each survey (Onshore, 2006; Ekologica, 2012). A total of 40 species of flora were identified within the application area, none of which were Threatened or Priority flora species (Ekologica, 2012). Of the 40 flora species recorded, 8 species are native and 32 are introduced. Weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. Given the relatively few native flora species recorded in the flora surveys, it appears that weeds have significantly reduced the biodiversity of the area.

Eight records of the Priority Ecological Community (PEC) 'Busselton Yale community (*Eucalyptus cornuta*, *Agonis flexuosa* and *Eucalyptus decipiens* forest on deep yellow-brown siliceous sands over limestone)' are located within one kilometre of the application area (GIS Database). The application area does not fall within the buffer of these PECs.

Two fauna surveys have been undertaken over the application area; a general fauna assessment in 2006 and a targeted Western Ringtail Possum (WRP) survey and Black Cockatoo habitat assessment in 2013 (Greg Harewood, 2006; 2013). A total of 45 fauna species were observed within the application area, comprising of two amphibian, one reptile, 34 avian and 8 mammal species (Greg Harewood, 2006). The fauna survey observed two fauna species of conservation significance within the application area; Baudin's Black Cockatoo and Western Ring Tail Possum which are both listed as Schedule 1 under the *Wildlife Conservation Act 1950* (WC Act) and Vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999* (Greg

Harewood, 2006). The high level of avian species may be attributed to the presence of the Vasse-Wonnerup Wetland System within approximately two kilometres of the application area, which is a RAMSAR wetland system known to support a large and diverse bird population (Department of Environment, 2011).

The land use for the application area has historically been agricultural activities, which has led to a high level of weed infestation and habitat decline within the few remaining pockets of native vegetation in the application area. The vegetation surveys recorded a very low number of native flora species within the application area. A variety of native fauna species have been recorded within the small patches of remaining native vegetation. However the biodiversity has been reduced due to the small size and isolated nature of these vegetation remnants and extensive historical disturbance.

The areas proposed to be cleared are considered unlikely to represent an area of high biological diversity in comparison to larger or more intact areas of remnant vegetation in the surrounding areas.

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

Methodology

CALM (2002)
Department of Environment (2011)
Ekologica (2012)
Greg Harewood (2006)
Greg Harewood (2013)
Onshore (2006)
GIS Database:
- IBRA WA (Regions - Sub Regions)
- Threatened and Priority Flora
- Threatened Ecological Sites Buffered

(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 at variance to this Principle

A fauna survey has been undertaken over the application area by Greg Harewood (2006). The survey observed two conservation significant species within the application area; Baudin's Black Cockatoo and Western Ringtail Possum (WRP). Based on database searches and the vegetation communities present, a further eight conservation significant fauna species have been identified as potentially utilising the application area, including; Great Egret, Cattle Egret, Carnaby's Black Cockatoo, Masked Owl, Southern Brush-tailed Phascogale, Quenda, Western False Pipistrelle and Water Rat (Greg Harewood, 2006),

The Great Egret, Cattle Egret and Western False Pipistrelle are highly mobile and suitable habitat is located in the vicinity of the application area, particularly the Vasse Estuary to the north, and Tuart National Park to the north-east (GIS Database).

The Masked Owl, Southern Brush-tailed Phascogale, Quenda and Water Rat may potentially use the vegetation along the Sabina River, which contains a relatively denser understorey and tree hollows (Greg Harewood, 2006). Although the Sabina River is predominantly outside of the application area, Cristal Mining proposes to clear a 30 metre section of the river to accommodate a services corridor and access way (Cristal Mining, 2014a). Cristal Mining has advised that the section of Sabina River chosen for the crossing is highly degraded, with no native understorey and very few trees (Cristal Mining, 2014a). Cristal Mining is also proposing to revegetate a minimum of 8 hectares of the Sabina River Reserve to re-establish the habitat value and ecological functions of the river (Cristal Mining, 2014b). Therefore the proposed clearing is not likely to have any significant impact on the available habitats for these species.

Present populations of WRP mostly inhabit coastal peppermint (*Agonis Flexuosa*) woodlands and peppermint/tuart associations from Bunbury to Albany (DEC, 2012). Where predator control is absent, tree hollows and dreys (a type of nest) in tree canopies are usually used (DEC, 2012).The 2006 fauna survey investigated the occurrence of suitable WRP habitat particularly targeting areas of peppermint trees (Greg Harewood, 2006). A total of five dreys were found, ranging from deteriorating condition to good condition (Greg Harewood, 2006). In terms of the WRP population, nocturnal surveys recorded three WRP on the first night and six on the second night (Greg Harewood, 2006).

A follow-up WRP survey was undertaken in 2013 where the same remnant pockets of trees were inspected for WRP and dreys (Greg Harewood, 2013). No dreys were recorded in the application area and only one WRP was recorded in the nocturnal count (Greg Harewood, 2013).

Despite the apparent decline in WRP recorded in the 2013 survey, the vegetation within the application area is still considered to be significant habitat for the WRP.

Threatened Black Cockatoos such as Carnaby's, Baudin's and Forest Red-tail range from temperate Jarrah, Karri and Marri forests and woodlands to drier woodlands dominated by Salmon Gum and Wandoo (DPaW, 2012; Saunders, 1992). They nest in hollows in mature eucalypts, particularly Marri, Karri, Salmon Gum and Wandoo (Saunders, 1992). The Busselton area has been identified as a known breeding area for the Black Cockatoos (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC),

2012). A Black Cockatoo habitat assessment was undertaken over the application area, which found 195 trees within or very near to the study area that fit DSEWPaC's criteria for black cockatoo breeding habitat (Greg Harewood, 2013). Of these 195 trees, one tree was found to contain a suitable hollow (Greg Harewood, 2013). The majority of the trees surveyed were Marri (Greg Harewood, 2013), which is suitable feeding habitat for Black Cockatoos (DSEWPaC, 2012) and evidence of foraging was found to support this (Greg Harewood, 2013).

Cristal Mining has advised that a fauna management plan will be implemented prior to clearing, with the objective of mitigating any impacts to WRP and Black Cockatoos (Cristal Mining, 2014c). This will involve avoiding clearing habitat where possible, checking each tree for fauna before clearing, relocating fauna to suitable alternative habitat and recovering intact hollows for later use in rehabilitation (Cristal Mining, 2014c). Cristal Mining is also proposing to offset the clearing by revegetating a minimum of eight hectares of land within the Sabina River Reserve, including enhancing the habitat values for WRP and Black Cockatoos by planting comparable vegetation, weed control, feral animal control and fencing (Cristal Mining, 2014b).

Potential impacts to WRP and Black Cockatoos may be minimised by the implementation of a fauna management condition and an offset condition.

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

Methodology
Cristal Mining (2014a)
Cristal Mining (2014b)
Cristal Mining (2014c)
DEC (2012)
DSEWPaC (2012)
Greg Harewood (2006)
Greg Harewood (2013)
Saunders (1992)
GIS Database
- DEC Tenure

(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

According to available datasets there are no known records of Threatened flora within the application area (GIS Database). The nearest record of Threatened Flora is located approximately 2.5 kilometres south-west of the application area (GIS Database).

The flora surveys undertaken by Ekologica (2012) and Onshore (2006) did not identify any Threatened flora within the application area.

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

Methodology
Ekologica (2012)
Onshore (2006)
GIS Database:
- Threatened and Priority Flora

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

Comments

Proposal may be at variance to this Principle

According to available databases, there are no known Threatened Ecological Communities (TECs) within the application area (GIS Database). The nearest known TEC is located approximately 120 kilometres south-west of the application area.

There were no TECs identified in the flora surveys undertaken by Ekologica (2012) and Onshore (2006). Ekologica (2012) found that the *Corymbia calophylla* and *Eucalyptus marginata* woodland community would once have had affinities with the "*Corymbia calophylla* woodlands on heavy soils of the southern Swan Coastal Plain" (SCP01b) TEC (Ekologica, 2012). However, apart from the tree overstory, the remnants bear no resemblance to this or any other TEC or PEC (Ekologica, 2012).

A Busselton Plain Floristic Survey undertaken for the then Department of Environment and Conservation has found that the Cokelup Subsystem, which is a soil type described as wet clayey flats, is known to support several shrub and herbland communities that are listed as TECs (Webb et al, 2009). DPaW (2014) has advised that the presence of Cokelup wet clayey flats within the application area may suggest the occurrence of the TEC SCP08: herb rich shrublands in clay pans.

The clay pans of SCP08 typically occur on low lying areas of seasonally inundated/water logged clay flats (Threatened Species Scientific Committee, 2012). Vegetation generally occurs as a shrubland over a ground

layer of geophytes, herbs and sedges (Threatened Species Scientific Committee, 2012). SCP08 is dominated by one or more of the shrubs; *Viminaria juncea*, *Melaleuca viminaria*, *M. lateritia*, broom bush, *Kunzea micrantha* or *K. recurva* with occasional emergents of *Eucalyptus wandoo* (Threatened Species Scientific Committee, 2012).

The flora survey undertaken by Ekologica (2012) did not record any of these species within the application area. The vegetation recorded within the application area consisted of low forests and woodlands of *Agonis flexuosa*, *Corymbia calophylla* and *Melaleuca rhaphiophylla* over a completely alien understorey of rye grass and arum lily (Ekologica, 2012). Given the lack of native shrubs or herbs within the application area and significant historical disturbance, it is considered unlikely that the vegetation within the application is representative of this TEC.

Nevertheless, Cristal Mining has reduced the application area to exclude some of the vegetation located on Cokelup soils.

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

Methodology

DPaW (2014)
Ekologica (2012)
Onshore (2006)
Threatened Species Scientific Committee (2012)
Webb *et al* (2009)
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 at variance to this Principle

The application area falls within the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database) in which approximately 39.15% of pre-European vegetation remains (Government of Western Australia, 2013). This gives it a conservation status of 'Depleted' according to the Bioregional Conservation Status of Ecological Vegetation Classes (Department of Natural Resources and Environment, 2002). The vegetation within the application area is recorded as Beard vegetation associations:

990: Low forest: peppermint (*Agonis flexuosa*),

949: Low woodland; banksia; and

1136: Medium woodland; marri with some Jarrah, Wandoo, River Gum and Casuarina.

Beard vegetation association 1136 retains approximately 8% of its pre-European extent which is less than the 30% threshold level recommended in the National Objectives Targets for Biodiversity Conservation, below which species loss appears to accelerate exponentially at an ecosystem level (EPA, 2000). Beard vegetation associations 990 and 949 retain approximately 78% and 57% of their pre-European extents within the State respectively; however Beard vegetation association 990 only retains approximately 18% within the Swan Coastal Plain bioregion (Government of Western Australia, 2013).

The vegetation within the application area is restricted to approximately five remnant patches (GIS Database). These patches predominantly occur within the mapped areas of Beard vegetation complexes 949 and 1136 (GIS Database). Vegetation complex 1136 is the more depleted of the two, with only 8% of pre-European vegetation remaining (Government of Western Australia, 2013). The flora survey undertaken over the application area by Ekologica (2012) recorded Marri, Jarrah and River Gum, but did not record any Wandoo or Casuarina. The only River Gum recorded was within the Sabina River Reserve (Ekologica, 2012). Although some of the proposed clearing will occur within Beard vegetation complex 1136, the vegetation within the application area is not considered to be a good representation of this vegetation complex due to its poor condition likely caused by historical disturbance from agricultural activities.

The application area is located within the following vegetation complexes as mapped by Mattiske and Havel (1998), which provide a more detailed description of the vegetation:

AB: Woodland and open forest of *Corymbia calophylla* on flats and low rises in the humid zone.

Ad: Woodland of *Corymbia calophylla*, *Agonis flexuosa*, *Allocasaurina fraseriana* and *Nuytsia floribunda.*

AF: Woodland of *Corymbia calophylla-Agonis flexuosa* and tall shrubland of Myrtaceae-Proteaceae spp. on terraces and valley floors in the humid zone.

Aw: Tall shrubland of *Melalauca viminea* and woodland of *Eucalyptus rudis*, *Melaleuca rhaphiophylla* with occasional *Corymbia Calophylla*.

Lw: Open woodland of *Melaleuca rhaphiophylla* and sedgelands of Cyperaceae-Restionaceae spp. on broad depressions in the subhumid zone.

The AB, AF and Aw vegetation complexes are not represented by any vegetation within the application area. Where the application area intersects with the mapped extents of AB, AF and Aw there is only cleared agricultural land (GIS Database). The proposed clearing is not likely to impact on these vegetation complexes.

A small remnant is proposed to be cleared within the Lw complex. The Lw complex is the most depleted vegetation complex identified within the application area, with only approximately 3% of pre-European vegetation remaining (Mattiske, 2009). Cristal Mining originally proposed to clear approximately 1.3 hectares of vegetation within the Lw complex; however Cristal Mining has reduced the application area so that approximately 0.4 hectares will be impacted. Cristal Mining has prepared an offset management plan with the aim of revegetating an eight hectare area within the Lw complex (Cristal Mining, 2014b). This will occur along the Sabina River Reserve and involve planting local native species, weed control, feral animal control and fencing, which will ensure the revegetated area is protected from grazing (Cristal Mining, 2014b).

The majority of the clearing will be occurring within the Ad vegetation complex (GIS Database) which has the most pre-European vegetation remaining at 30% (Mattiske, 2009). It is not anticipated that the proposed clearing will reduce the pre-European vegetation extent below 30%, which is an important threshold for biodiversity conservation (EPA, 2000).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DPaW Managed Land
IBRA Bioregion - Swan Coastal Plain	1,501,221	587,708	~39	Depleted	16.71
IBRA Subregion - Perth	1,117,757	473,909	~42	Depleted	36.70
Local Government - Busselton	146,478	62,332	~42	Depleted	32.39
Beard vegetation associations - State					
990	18,691	14,501	~78	Least Concern	61.41
949	218,193	124,116	~57	Least Concern	40.06
1136	48,124	3,823	~8	Endangered	0.84
Beard vegetation associations - Bioregion					
990	1,951	360	~18	Depleted	2.79
949	209,983	121,247	~58	Least Concern	52.64
1136	48,118	3,818	~8	Endangered	3.52
Beard vegetation associations - subregion					
990	1,951	360	~18	Depleted	2.79
949	184,476	105,108	~57	Least Concern	44.87
1136	48,118	3,818	~8	Endangered	0.84
Mattiske and Havel vegetation complex					
AB	8,007	657	~8	Endangered	0
Ad	1,208	368	~30	Vulnerable	0
AF	1,905	215	~11	Vulnerable	0
Aw	9,094	478	~5	Endangered	0.25
Lw	186	6	~3	Endangered	0

* Government of Western Australia (2013)
** Department of Natural Resources and Environment (2002)

The application area partially intersects the Sabina River which has been identified as a Regional Ecological Linkage under the South West Regional Ecological Linkages Project (SWREL) (Mollay et al, 2009). The SWREL project seeks to identify a network of regional scale ecological linkages that connect areas of remnant

vegetation and facilitates the movement of organisms within, and across, the landscape (Mollay et al, 2009). Cristal Mining is proposing to clear a 30 metre wide section of the river to construct a service crossing and access way across the river. The area chosen for this crossing is highly degraded with only sparse vegetation (Cristal Mining, 2014a). Cristal Mining is proposing to rehabilitate the Sabina River to improve the quality of the vegetation and fauna habitat (Cristal Mining, 2014b). The proposed clearing is unlikely to significantly impact the Sabina River's function as an ecological linkage between areas of remnant vegetation.

Based on the above the proposed clearing is at variance to this Principle. The impact on these patches of remnant vegetation may be minimised through the implementation of an offset condition.

Methodology

Cristal Mining (2014a)
Cristal Mining (2014b)
Department of Natural Resources and Environment (2002)
EPA (2000)
Government of Western Australia (2013)
Mattiske (2013)
Mattiske and Havel (1998)
Mollay et al (2009)
GIS Database:
- IBRA WA (Regions - Sub Regions)
- Pre-European Vegetation
- Mattiske 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 at variance to this Principle

The Sabina river flows north through the eastern portion of the application area and discharges into the Vasse-Wonnerup Wetland system two kilometres downstream (Cristal Mining, 2014b; GIS Database). The Sabina River contains occasional pools that retain standing water throughout the summer months (Cristal Mining, 2014a). The Vasse-Wonnerup System is a RAMSAR listed wetland that supports tens of thousands of resident and migrant waterbirds and has the largest regular breeding colony of Black Swan in south-western Australia (Department of Environment, 2011).

Cristal Mining is proposing to clear native vegetation along approximately 30 metres of the Sabina River to accommodate a service corridor and vehicle access way across the river (Cristal Mining, 2014a). The proposed works will involve a vehicle access road and pipes for conveying material from the South Wonnerup Project to the North Wonnerup Project on the other side of Sues Road (Cristal Mining, 2014a). The area proposed for the crossing is highly degraded, with very little native vegetation (Cristal Mining, 2014a). Both the road and pipework will be situated on the crossing, which will utilise either large culverts or a bridge to maintain stream flow (Cristal Mining, 2014a). The life of the vehicle crossing and access way is predicted to be five years, after which time it will be removed (Cristal Mining, 2014a).

The application area occurs within an area known to support Spearwood Dune/Pinjarra Plain Interface wetlands, which is a regional chain of wetlands across the Busselton Plain (Webb *et al*, 2009). These clay based wetlands have been inferred to support TECs and are considered to have high conservation value (Webb *et al*, 2009). According to DPaW's Geomorphic Wetlands of the Swan Coastal Plain dataset, the application area intersects with three 'Multiple Use' wetlands (Ecosystem Solutions, 2012). 'Multiple Use' wetlands are considered to be significantly degraded, possessing few natural attributes and limited human-use interest (EPA, 1993). According to the Wetland Buffer Investigation undertaken by Ecosystem Solutions (2012), the wetlands within the application area are not considered to support any significant flora, fauna or ecological values. The flora and vegetation surveys undertaken over the wetland remnants contained within the application area recorded *Melaleuca rhaphiophylla* over a completely alien understorey (Ekologica, 2012; Onshore, 2006). The wetland vegetation has been significantly degraded due to stock grazing over a long period of time, and are not considered to retain a high conservation value (Ecosystem Solutions, 2012).

Based on the above, the proposed clearing is at variance to this Principle. In response, Cristal Mining has amended the application area to exclude a 0.9 hectare area of *Melaleuca rhaphiophylla* which may represent wetland vegetation. Cristal Mining is also proposing to rehabilitate 8 hectares of the Sabina River by fencing, undertaking weed and feral animal control and planting local native species (Cristal Mining, 2014b). The proposed rehabilitation works aim to improve the ecological values of the Sabina River (Cristal Mining, 2014b).

Methodology

Cristal Mining (2014a)
Cristal Mininig (2014b)
Department of Environment (2011)
Ecosystem Solutions (2012)
Ekologica (2012)
EPA (1993)
Onshore (2006)
Webb *et al* (2009)

GIS Database:
- Hydrography, linear

(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 area under application has been mapped as soil type MT7 which Northcote *et al* (1968) describes as:

Strongly undulating lands often with granite tor outcrop on higher slopes: a range of loamy mottled yellow or grey earths occur. Moderately deep loamy duplex soils occur on lower slopes, with shallow sands common on higher slopes and adjacent to rock outcrop.

As the majority of the property is already cleared and the proposal is to remove isolated remnant patches of vegetation, the risk of increased wind and water erosion is considered minimal.

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

Methodology

Northcote et al (1968)
GIS Database:
- Soils Statewide

(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 may be at variance to this Principle

The proposed clearing is not located within a conservation reserve (GIS Database). The nearest conservation area is the Ludlow State Forest and the Tuart Forest National Park, which are located approximately one kilometre north-northeast of the application area (GIS Database).

The proposed clearing is not likely to introduce or encourage the spread of weeds into these conservation areas as weeds are already prevalent in the area.

The proposed clearing of vegetation along the Sabina River may potentially impact on the vegetative linkage that connects the Ludlow State Forest and the Tuart Forest National Park with other areas of native vegetation. The Sabina River has been identified as an important ecological linkage under the SWREL Project (Mollay et al, 2009) and the proposed clearing may impede fauna movement along this corridor. Cristal Mining is proposing to reduce the impact on the Sabina River by rehabilitating eight hectares of foreshore by undertaking weed control, feral animal control and revegetation with local native species (Cristal Mining, 2014b).

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

Methodology

Cristal Mining (2014b)
Mollay et al (2009)
GIS Database:
- DEC Tenure

(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 may be at variance to this Principle

According to available databases, the application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database).

The application area intersects with the Sabina River. Cristal Mining is proposing to clear a section of riparian vegetation along the Sabina River for a service corridor and vehicle access way (Cristal Mining, 2014a). The clearing works may temporarily decrease the water quality of the river through increased sedimentation but given the degraded nature of the Sabina River, the proposed clearing is not likely to significantly alter the water quality in the long term. Cristal Mining is proposing to rehabilitate eight hectares of the river, which will include weed control, fencing and revegetation with local native species (Cristal Mining, 2014b). The proposed rehabilitation activities will likely lead to an increase in water quality.

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

Methodology

Cristal Mining (2014a)
Cristal Mining (2014b)
GIS Database:
- PDWSAs

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

Comments

Proposal is not likely to be at variance to this Principle

The application area experiences a warm Mediterranean climate with hot dry summers and cool wet winters, with an annual average rainfall of approximately 807.6 millimetres per year (CALM, 2002; BoM, 2014). The proposal is for clearing isolated pockets of vegetation within previously cleared paddocks. The clearing of 6.7 hectares within an application area of 163 hectares is not likely to cause or exacerbate the incidence or intensity of flooding.

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

Methodology

BoM (2014)
CALM (2002)

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

Comments

There are two Native Title Claims (WC2003/006; WC2006/004) over the area under application (GIS Database). These claims have been filed at the Federal Court of Australia and registered with the National Native Title Tribunal respectively. 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 numerous registered Aboriginal Sites of Significance within the application area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal sites of significance are damaged through the clearing process.

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

The Wonnerup South Mineral Sands project was referred to the Environmental Protection Authority (EPA) by Cristal Mining. On 28 January 2014 the EPA set the level of assessment as 'Not Assessed - No Advice Given'.

The proposed clearing may impact on a protected matter under the *Environmental Protection and Biodiversity Conservation Act 1999* (the EPBC Act). The proposal was referred to the (Federal) Department of Environment (DotE) for an environmental impact assessment under the EPBC Act. The trigger for this referral was impacts on wetlands of international importance. On 16 December 2014, DotE approved the proposed action subject to conditions.

The clearing permit application was advertised on 4 August 2014 by the Department of Mines and Petroleum inviting submissions from the public. Two submissions were received; one stating no objection to the proposed clearing and the second regarding the potential impacts to Western Ringtail Possums, Threatened Ecological Communities and the Sabina River. These issues have been addressed under the relevant clearing Principles.

Methodology

GIS Database:
- Aboriginal Sites of Significance
- Native Title Claims - Filed at the Federal Court
- Native Title Claims - Registered with the NNTT

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5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia (now DPaW and DER)
DER	Department of Environment Regulation, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DRF	Declared Rare Flora
DotE	Department of the Environment, Australian Government
DoW	Department of Water, Western Australia
DPaW	Department of Parks and Wildlife, Western Australia
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DotE)
EPA	Environmental Protection Authority, Western Australia
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
PEC	Priority Ecological Community, Western Australia
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:

{DPaW (2013) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia}:-

T **Threatened species:**
Specially protected under the *Wildlife Conservation Act 1950,* listed under Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna or the Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened Fauna and Flora are further recognised by DPaW according to their level of threat using IUCN Red List criteria. For example Carnaby's Cockatoo *Calyptorynchus latirostris* is specially protected under the *Wildlife Conservation Act 1950* as a threatened species with a ranking of Endangered.

Rankings:
CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.
EN: Endangered - considered to be facing a very high risk of extinction in the wild.
VU: Vulnerable - considered to be facing a high risk of extinction in the wild.

X **Presumed Extinct species:**
Specially protected under the *Wildlife Conservation Act 1950,* listed under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora).

IA **Migratory birds protected under an international agreement:**
Specially protected under the *Wildlife Conservation Act 1950,* listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice.
Birds that are subject to an agreement between governments of Australia and Japan, China and The Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.

S **Other specially protected fauna:**
Specially protected under the *Wildlife Conservation Act 1950,* listed under Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice.

P1 **Priority One - Poorly-known species:**
Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, rail reserves and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

P2 **Priority Two - Poorly-known species:**
Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

P3 **Priority Three - Poorly-known species:**
Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

P4 **Priority Four - Rare, Near Threatened and other species in need of monitoring:**
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

P5 **Priority Five - Conservation Dependent species:**
Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Principles for clearing native vegetation:

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

(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.

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

(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.

(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.

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

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

(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.

(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.

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