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

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2857/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Rocla Quarry Products**

1.3. Property details

Property: Mining Lease 70/776
Local Government Area: City of Swan
Colloquial name: Gnangara Mine Site Project

1.4. Application

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

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description

Beard Vegetation Associations have been mapped at a 1:250,000 scale for the whole of Western Australia and are useful to look at vegetation extent in a regional context. One Beard Vegetation Association is located within the application area (GIS Database):

- 949: Low woodland; Banksia.

Two Heddle Vegetation Complexes have been mapped in the application area (GIS Database):

Bassendean Complex - North: Consists of a Low Open Forest of Banksia spp., *Eucalyptus todtiana* to Low Woodland of *Melaleuca* spp. and Sedgelands which occupy the moister sites (RPS, 2009); and

Bassendean Complex - North Transition Vegetation: A transition complex of Low Open Forest and Low Woodland of Banksia spp., *Eucalyptus todtiana* on a series of high sand dunes. The understorey species reflect similarities with both the Bassendean - North and Karrakatta - North vegetation complexes (RPS, 2009).

RPS (2009) conducted a Level 1 flora survey of the proposed clearing area during Spring 2008. The following three vegetation units were mapped for the area:

1. *Pinus pinaster* Woodland over Low Open Woodland of *Eucalyptus todtiana, Banksia attenuata, Banksia menziesii* and *Nuytsia floribunda* over a Tall Open Shrubland of *Adenanthos cygnorum subsp. cygnorum* over Shrubland of *Xanthorrhoea preissii* over Low Open Shrubland of *Hibbertia hypericoides*;

Clearing Description

Rocla Quarry Products have applied for a Purpose Permit to clear up to 39.5 hectares of native vegetation on Mining Lease 70/776 in an area colloquially referred to as Tick Road, Melaleuca. The proposed clearing will allow the proponent to extract sand from four separate areas (ranging in size from 1.01 – 24.27 hectares) at its Gnangara mine site.

Vegetation will be cleared using mechanical means. Cleared vegetation will be stockpiled for use in rehabilitation, whilst stripped topsoil will be 'direct returned' to another area at the mine site requiring rehabilitation. Direct return of topsoil is preferable to stockpiling as seed viability and microbial activity are maximised (Pers comm. Rocla Quarry Products).

Vegetation Condition

Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994).

to

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

Comment

The vegetation condition rating is derived from a Level 1 Spring vegetation and flora survey of the proposed clearing area, conducted by RPS (2009).

Two officers from the Department of Mines and Petroleum (DMP) visited Rocla Quarry Products' Gnangara Road operations on 19 March 2009. Observations of sections of the proposed clearing area were made from a slow moving vehicle.

2. Scattered *Eucalyptus todtiana* with Low Woodland of *Banksia attenuata* and *Banksia menziesii* over an Open Heath of *Croninia kingina, Hibbertia hypericoides* and *Eremaea pauciflora var. pauciflora*; and

3. Low Open Woodland of *Eucalyptus todtiana, Banksia attenuata* and *Nuytsia floribunda* over a Tall Open Shrubland of *Adenanthos cygnorum subsp. cygnorum, Jacksonia floribunda* and *Regelia ciliata* over an Open Herbland of *Phlebocarya ciliata* and *Patersonia occidentalis*.

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

The application area is located within the Perth Interim Biogeographic Regionalisation for Australia (IBRA) subregion (GIS Database). The Perth subregion is characterised by heath and Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages and Marri on colluvials and alluvials (CALM, 2002). This subregion includes a complex series of seasonal wetlands and rainfall ranges between 600 and 1000 millimetres annually. It is part of the South West Botanical District which has a very high degree of species diversity.

With respect to the proposed clearing area, RPS (2009) recorded a total of 64 plant taxa from 27 plant families during a Level 1 Spring flora survey of the area. No Declared Rare Flora or Priority Flora species were recorded within the application area (RPS, 2009). Three vegetation associations were mapped from the application area by RPS (2009), none of which are gazetted as Threatened Ecological Communities or maintained on the Department of Environment and Conservation's list of Priority Ecological Communities (RPS, 2009). At a broader scale, two vegetation complexes have been mapped within the application area: Bassendean Complex - North and Bassendean Complex - North Transition Vegetation (Heddle et al, 1980). These vegetation complexes both have over 20% in conservation reserves and are also well represented in the area surrounding the application area.

RPS (2009) recorded a total of 10 introduced weed species within the proposed clearing area. This included: Pinaster Pine (*Pinus pinaster*), Bearded Oat (*Avena barbata*), Blowfly Grass (*Briza maxima*), Wild Gladiolus (*Gladiolus caryophyllaceus*), Burr Medic (*Medicago polymorphia*), Rose Pelargonium (*Pelargonium capitatum*), Capeweed (*Arctotheca calendula*), Smooth Catsear (*Hypochaeris glabra*), Ursina (*Ursina anthemoides*) and *Petrorhagia dubia*.

The presence of introduced flora species diminishes the biodiversity value of the proposed clearing areas. Care needs to be taken to ensure that vehicles and machinery brought onto the mining lease do not introduce weeds to non-infested areas. Similarly, it is equally important to ensure that machinery leaving the proposed clearing areas do not transport weed-bearing soil material or weed seeds off site. The most effective way of achieving this is to ensure that all vehicles and machinery are thoroughly cleaned to remove soil, plant matter and propagules prior to entering and exiting the mining lease subject to this clearing permit application. Should a clearing permit be granted, it is recommended that appropriate conditions be imposed with regards to weed management.

BSD Consultants (2002), cited in RPS (2009) undertook dieback mapping at the Gnangara Mine Site, and classified the proposed clearing areas as follows with respect to dieback status:

Polygon 1 (24.27 hectares) – uninterpretable;
Polygon 2 (8.47 hectares) – small pockets within polygon mapped as dieback infected;
Polygon 3 (5.79 hectares) - small pockets within polygon mapped as dieback infected; and
Polygon 4 (1.01 hectares) – dieback infected.

Dieback mapping conducted by BSD Consultants is now dated, and a new study would need to be undertaken by a qualified dieback interpreter to be certain of the current dieback status of the proposed clearing areas (RPS, 2009). Given the findings of BSD Consultants 2002 survey, hygiene protocols are recommended should a clearing permit be granted to ensure *Phytophthora cinnamomi* is not spread or introduced to non-infested areas.

RPS (2009) described the vegetation condition within the proposed clearing area as ranging from 'Very Good' to 'Degraded'. A high number of weeds were present in the areas on the west and east of the application area and vehicle tracks were also present in these areas. Given this, it is unlikely that the proposed clearing area is of a higher biodiversity value than other vegetation within the local or regional area.

Should a clearing permit be granted, all areas disturbed will be progressively rehabilitated back to native vegetation, potentially restoring biodiversity values of the area. Rocla Quarry Products has been in partnership with Kings Park and Botanic Gardens for the past 13 years to improve rehabilitation practices and scientific understanding of Banksia woodlands on the Swan Coastal Plain (Department of Industry and Resources, 2008). The partnership has seen species recovery and density increase dramatically in rehabilitated areas at the site in recent years, with best practice topsoil management, seed germination and plant survival techniques now being used. A Golden Gecko award was given to Rocla Quarry Products and Kings Park and Botanic Gardens by the Department of Industry and Resources in 2008, in recognition of the environmental excellence demonstrated at the Gnangara Mine Site (Department of Industry and Resources, 2008). In light of the above, there is a high likelihood that any areas approved to clear would be rehabilitated to a standard that meets expectations of government and the wider community.

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

Methodology

CALM (2002).
Department of Industry and Resources (2008).
Heddle et al (1980).
RPS (2009).
GIS Database
- Interim Biogeographic Regionalisation for Australia subregions.

(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

A search of the Department of Environment and Conservation's (DEC) Nature Map database was undertaken by the assessing officer using the coordinates 31°45"38"S and 115°54"29'E, thereby representing a 40 kilometre radius area. The search revealed a total of 15 threatened fauna species previously recorded within the search area. Of these, two species; Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) have the potential to occur within the area. There was also 14 Priority species recorded in the search area. Based on habitat preference, four of these species have the potential to occur within the application area.

Baudin's Black Cockatoo (*Calyptorhynchus* baudinii) is listed as Schedule 1 - fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008* and Vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999.* Baudin's Black Cockatoo are usually found in heavily forested areas that are dominated by *Corymbia calophylla* (Marri) and Eucalyptus species, especially Karri and Jarrah. It also occurs in *Eucalyptus wandoo* woodland and orchids and is occasionally recorded in farmland and grasslands (Department of Environment, Water, Heritage and the Arts, 2009). The main diet of *Calyptorhynchus baudinii* consists of eucalypt seeds, supplemented with insect larvae and seeds of other plants such as Banksia, Hakea and Erodium. Given the northern range limit of this species is Mundaring, and their preference for heavily forested areas it is unlikely that it would use the application area as habitat.

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is listed as Schedule 1 - fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008* and Endangered under the *EPBC Act 1999*. This species is widespread throughout the southwest of Western Australia. Carnaby's Black Cockatoo are found in uncleared or remnant areas of Eucalypt woodland, primarily *Eucalyptus salmonphloia* and *Eucalyptus wandoo*, as well as shrubland or kwongan heath dominated by Hakea and Banksia species. (Department of Environment and Conservation, 2009a). After breeding season flocks will move to higher rainfall coastal areas within Banksia woodland and/or pine plantations. Carnaby's Black Cockatoo has been recorded within 5 kilometres of the application area (Western Australian Museum, 2009). Given that it has been recorded nearby and the area has potential feeding grounds it is possible Carnaby's Black Cockatoo may be found within the application area.

The Western Brush Wallaby (*Macropus irma*) is only found in the southwest of Western Australia. Its optimum habitat is open forest or woodland, particularly favouring open seasonally wet flats with low grasses and open scrubby thickets (Department of Environment and Conservation, 2009b). Their diet includes a number of plant species with the most common being *Carpobrotus dactylon, Cynodon dactylon* and *Nuytsia floribunda*. *Nuytsia floribunda* has been recorded throughout the proposed clearing area (RPS, 2009). Given their preference for woodland habitat and the presence of a favoured food source it is possible Western Brush Wallabies may be found within the application area.

The southern Western Australian subspecies of Carpet Python (*Morelia spilota subsp. Imbricate*) is listed by the DEC as Priority 4, which is a species in need of monitoring. It has been recorded in a variety of habitats including Banksia woodland, Eucalypt woodland and grasslands. It is found in undisturbed remnant bush in the Perth area (Department of Environment and Conservation, 2009c). The area under application contains areas with a high level of weed infestation and notable signs of disturbance, but despite this the area may support the Carpet Python.

The Quenda (*Isodon obesulus subsp. fusciventer*) is listed by the DEC as Priority 5, which is a species in need of monitoring (Conservation Dependant). The Quenda is a small marsupial that is found in the southwest of

Western Australia. It prefers vegetation with dense cover up to one metre high and is often found in areas close to watercourses. On the Swan Coastal Plain they are often associated with wetlands (Department of Environment and Conservation, 2009d). There are several perennial wetlands adjacent to the application area and Quenda has been recorded within 5 kilometres of the area (GIS database). Given the above, the Quenda could potentially occur within the application area.

The Black-striped Snake (*Neelaps calonotos*) is listed as a Priority 3 by the DEC. It inhabits dunal areas supporting heathlands and Banksia/Eucalypt woodlands (GHD Pty Ltd, 2006). The range of this species is restricted to the Swan Coastal Plain between Lancelin and Mandurah (Storr, Smith & Johnstone, 2002). Given the proposed clearing area is Banksia and Eucalypt woodland the Black-striped Snake could potentially occur within the application area.

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

Methodology

Department of Environment and Conservation (2009a).
Department of Environment and Conservation (2009b).
Department of Environment and Conservation (2009c).
Department of Environment and Conservation (2009d).
Department of Environment, Heritage, Water and the Arts (2009).
GHD Pty Ltd (2006).
Storr, Smith & Johnstone (2002).
Western Australian Museum (2009).
GIS Database:
- Hydrography, linear.

(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 databases there are no known records of Declared Rare Flora (DRF) or Priority Flora within the proposed clearing area (GIS Database). A search of the Department of Environment and Conservation's threatened flora databases by RPS (2009) revealed that three species of conservation significance are known to occur within a 5 kilometre radius of the proposed clearing area: *Caladenia huegelii* (R), *Cyathochaeta teretifolia* (P3) and *Grevillea curviloba subsp. curviloba* (R). RPS (2009) did not locate any DRF or Priority Flora taxa within the proposed clearing area, despite two botanists traversing the area on foot and via vehicle in September 2008.

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

Methodology

RPS (2009).
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

According to available GIS Databases, there are no known Threatened Ecological Communities (TEC's) within the proposed clearing area (GIS Database).

RPS Environment and Planning Pty Ltd (2009) were commissioned by Rocla Quarry Products to undertake a Level 1 flora survey of the proposed clearing area in September 2008. As part of the Level 1 Survey, a search of the Department of Environment and Conservation's TEC Database was undertaken for known records of TEC's and/or Priority Ecological Communities (PEC's) within a 5 kilometres radius of the proposed clearing area. The search found that the TEC *Banksia attenuata* woodland over species rich dense shrublands was within a 5 kilometre radius of the application area, however, it was not identified within the application area during the flora survey.

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

Methodology

RPS (2009).
GIS Database:
- Threatened Ecological Communities.

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

Comments

Proposal is not likely to be at variance to this Principle

According to available databases, the application area falls within the Perth IBRA subregion (GIS Database). This bioregion's current vegetation extent is approximately 41.2% of its Pre-European extent. Beard Vegetation Association 949: Low woodland; Banksia occurs within the application area (GIS database).

According to Shepherd et al (2001), this vegetation association remains at approximately 57% of its Pre-European extent at a state level, and at 58.3% within this subregion (see table). Approximately 13.3% of the Pre-European extent of vegetation association 949 is protected in Class I-IV reserves.

Large areas surrounding the proposed clearing area have already been cleared (RPS, 2009). The application area is part of the Gnangara-Moore River State Forest which covers over 7,000 hectares. There is a bush forever site within 1 kilometre of the application area (GIS Database). Bush Forever site 399 covers an area of 4,150 hectares (Government of Western Australia, 2000). Whilst area surrounding the application area has been cleared there is still large amounts of remnant vegetation present in surrounding state forest and Bush Forever sites.

Whilst the Comprehensive, Adequate and Representative (CAR) conservation reserve system target of 15% has not been met for Beard Vegetation Association 949, the proposed clearing will not reduce the extent of Beard Vegetation Association 949 below current recognised threshold levels, below which species loss increases significantly.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves (and post clearing %)
IBRA Bioregion – Swan Coastal Plain	1,501,456	571,758	38.1	Depleted	10.4 (24.2)
IBRA Subregion – Perth	1,117,990	460,918	41.2	Depleted	11.5 (24.1)
Beard veg assoc. – State					
949	218,204	124,461	57	Least Concern	13.3 (23.1)
Beard veg assoc. – Bioregion					
949	209,999	122,388	58.3	Least Concern	13.4 (22.9)
Beard veg assoc. - subregion					
949	184,504	107,620	58.3	Least Concern	14.3 (24.4)

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

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

Presumed extinct	Probably no longer present in the bioregion
Endangered+	<10% of pre-European extent remains
Vulnerable+	10-30% of pre-European extent exists
Depleted+	>30% and up to 50% of pre-European extent exists
Least concern+	>50% pre-European extent exists and subject to little or no degradation over a majority of this area

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

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

Methodology

Shepherd et al (2001).
Department of Natural Resources and Environment (2002).
Government of Western Australia (2000).
RPS (2009).
GIS Database:
- Pre-Europoean Vegetation.
- Interim Biogeographic Regionalisation of Australia.
- Bush Forever.

(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 no perennial or intermittent watercourses or wetlands within the proposed clearing area (GIS

Database). There is one perennial swamp within 100 metres of the western side of the proposed clearing area, and three perennial swamps within 500 metres of the eastern extent of the proposed clearing area (GIS Database). The perennial swamp on the western side of the application area is separated from the proposed clearing area by an existing road.

A flora survey was conducted by RPS (2009) over the application area during which no wetlands, floodplains or riparian vegetation were identified within the proposed clearing area. In light of this, and given there is a sufficient buffer between nearby swamps, the proposed clearing is not likely to impact on vegetation growing in association with a wetland or watercourse.

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

Methodology RPS (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 application area is located within the City of Swan and is situated in the Bassendean unit of the Swan Coastal Plain geomorphic province (Churchward & McArthur, 1980). Soils in the area are identified as Cb39 which is characterised by subdued dune swale terrain with leached sands (GIS Database). The Bassendean unit is part of the Bassendean Dunes which are the oldest and furthest inland dunes on the Swan Coastal Plain (Churchward &McArthur, 1980). The Bassendean unit is characterised by its swamps having peaty podzol soils (Churchward & McArthur, 1980). Its swamps and lakes may also have a surface deposit of diatomite (Churchward & McArthur).

Rocla Quarry Products target topographically higher areas such as sand dunes, ridges and low hills at the Gnangara mine site where sand depths are greater and economically viable for sand extraction (Rocla Quarry Products pers comm. 19 March 2009). The application area consists of four separate polygons which consist of low rises which will be targeted for sand extraction. Soils at the Gnangara mine site are sandy in nature and would be expected to be mobile when vegetation cover is removed.

Two officers from DMP visited Rocla Quarry Products' Gnangara operations on 19 March 2009 and did not observe any major erosion, such as scalding or blow outs at the mine site. Rocla Quarry Products use stockpiled vegetation to restrict undesirable access into mine pits and rehabilitation areas. Stockpiled vegetation also plays an important role as a wind barrier, reducing the effects of wind erosion. Surrounding pine plantations and pockets of remnant native vegetation also serve as buffers reducing the effects of wind erosion (Rocla Quarry Products pers comm. 19 March 2009).

The proposed clearing area is in a moderate to low acid sulphate soils (ASS) risk zone, however there are areas of high to moderate ASS risk directly adjacent to some of the proposed clearing areas (GIS Database). The groundwater below the application area has total dissolved solids of less than 500 milligrams per litre (GIS Database). The proposed clearing area lies within areas that have been classified as having a 0-2% high to extreme soil-landscape degradation hazard risk (Department of Agriculture and Food, 2009).

Should a clearing permit be granted, native vegetation clearing will be undertaken on a progressive basis over a number of years (Rocla Quarry Products pers comm. 19 March 2009). Rocla Quarry Products also undertake progressive rehabilitation of mined areas at the Gnangara mine site. Progressive clearing and rehabilitation ensure that large expanses of cleared land are not left open at any one time. The aim of rehabilitation is to produce safe, stable and non-eroding landforms, which will eventually support self-sustaining ecosystems closely resembling those which existed prior to mining.

In 2008, Rocla Quarry Products, in association with Kings Park and Botanic Gardens, were awarded a Golden Gecko by the Department of Industry and Resources for achieving environmental excellence. Rocla Quarry Products have demonstrated best practice topsoil management techniques, in addition to seed germination, seedling establishment and plant survival through its 13 year partnership with Kings Park and Botanic Gardens. Rocla Quarry Products have demonstrated that sand extraction areas can be successfully rehabilitated at the cessation of mining (Department of Industry and Resources, 2008).

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

Methodology Churchward & McArthur (1980).
Department of Industry and Resources (2008).
Department of Agriculture and Food (2009).
GIS Database:
- Acid Sulphate Soils Risk Map, Swan Coastal Plain.

(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 area is located in the Gnangara- Moore River State Forest (GIS Database). The Gnangara-Moore River State Forest is over 7000 hectares. The majority of the vegetation proposed to be cleared was classified as Good – Degraded, with degradation due to the high numbers of weeds and vehicles tracks present (RPS, 2009). There were other areas within the proposed clearing described as Very Good, and given the surrounding areas of non-native plantation the proposed clearing may have an impact on the environmental values of the Gnangara-Moore State Forest.

The nearest nature reserves to the application area are an un-named nature reserve approximately 3.5 kilometres west of the proposed clearing area, and Jandabup Nature Reserve approximately 4.5 kilometres east of the application area (GIS Database). At these distances, the proposed clearing will not likely impact the environmental values of these conservation areas.

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

Methodology

RPS (2009).
GIS Database:
- CALM Managed Lands and Waters.

(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

There are no perennial or intermittent watercourses or wetlands within the proposed clearing area (GIS Database). There is one perennial swamp within 100 metres of the western side of the proposed clearing area and three perennial swamps within 500 metres of the eastern extent of the proposed clearing area (GIS Database). The perennial swamp on the western side of the application area is separated from the proposed clearing area by an existing road. Given the above, it is unlikely that the proposed vegetation clearing will impact upon the quality of any surface water features.

The proposed clearing area is located within Gnangara Underground Water Pollution Control Area, a Priority 1 Public Drinking Water Source Area (PDWSA) (GIS Database). The provision of the highest quality drinking water is the prime land use value in P1 areas, which are managed with the principle of risk avoidance (DoW, 2009). Statewide Policy No. 1 "Policy and Guidelines for Construction and Silica Sand Mining in Public Drinking Water Source Areas" was published in 1999 by the Water and Rivers Commission to protect water quality and quantity from adverse impacts of sand mining operations within PDWSA's, and to ensure that all sites are rehabilitated to an acceptable standard. Key guidelines which all sand mining activities in PDWSA's are subject to as part of licencing conditions include:

- sufficient clearance above the water table (a minimum 3 metres of undisturbed profile between the likely future maximum water table and the proposed final pit surface level in Priority 1 source protection areas. This can be reduced to 2 metres in exceptional circumstances); and
- an end land use compatible with the water resource objectives for the area (Water and Rivers Commission, 1999).

From a management perspective, it is acknowledged that clearing will be undertaken on a progressive basis. Rehabilitation of sand extraction areas will also take place on a progressive basis. Progressive clearing and rehabilitation are practices which are likely to minimise the impact of native vegetation clearing on the water table. It is also recognised that clearing and sand extraction activities have been undertaken progressively at the Gnangara mine site for approximately 20 years, with no significant impacts to groundwater levels or quality detected to date (Rocla Quarry Products pers comm. 19 March, 23 March 2009). It is unlikely that the amount of incremental clearing proposed (39.5 hectares) would significantly impact groundwater levels or quality given the size of the Swan- Avon/Lower Swan Catchment (396,685 hectares) (GIS Database).

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

Methodology

DoW (2009).
Water and Rivers Commission (1999).
GIS Database:
- Hydrographic Catchments - Catchments.
- Hydrography, linear.
- Public Drinking Water Source Areas.

(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 area of proposed clearing predominately comprises leached Bassendean sands, which are generally

considered to have high infiltration rates and therefore a low risk of water logging (Churchward & McArthur, 1980). The mean annual rainfall per year in the application area is 800 millimetres (GIS Database). The mean annual evaporation for the area is approximately 2,000 millimetres (GIS Database). Given the soils are well drained and that mean annual evaporation rate is over twice the annual rate of rainfall, the risk of flooding is low.

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

Methodology Churchward & McArthur (1980).
GIS Database:
- Evaporation Isopleths.
- Rainfall, Mean Annual.

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

Comments

The clearing permit application was advertised by DMP, inviting submissions from the public. One submission was received. The submission raised concerns regarding the potential impacts of the proposed vegetation clearing on Aboriginal Sites of Significance.

There are no 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.

There are no native title claims over the area under application (GIS Database). However, 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.

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 are required for the proposed works.

Methodology GIS Database:
- Aboriginal Sites of Significance.
- Native Title Claims.

4. Assessor's comments

Comment

The proposal has been assessed against the Clearing Principles, and the proposed clearing may be at variance to Principles (b) and (h) and is not likely to be at variance to Principles (a), (c), (d), (e), (f), (g), (i) or (j).

Should a clearing permit be granted, it is recommended that conditions be imposed on the permit for the purposes of weed management and dieback control, staged clearing, record keeping and permit reporting.

5. References

Churchward, H.M. & McArthur, W.M. (1980) Landforms and Soils of the Darling System, Western Australia, in Atlas of Natural Resources Darling System Western Australia. Department of Conservation and Environment, Western Australia.

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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.