



1. Application details

1.1. Permit application details

Permit application No.: 2594/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Shark Bay Resources Pty Ltd

1.3. Property details

Property: Shark Bay Solar Salt Industry Agreement Act 1983
Mining Lease 260SA (AM 70/260)
Crown Lease GE I-126360; Lot 62 on Plan 220252
Local Government Area: Shire of Shark Bay

Colloquial name:

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
4.5		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

Vegetation within the application area has been mapped at a 1:250,000 scale as the following Beard vegetation association (Shepherd et al., 2001; GIS Database);

- **112:** Hummock grasslands, shrub steppe; *Acacia ligulata* over *Triodia plurinervata*.

Mattiske Consulting Pty Ltd undertook a flora and vegetation survey of Mining Lease 260SA between 29 July and 2 August 1996. The flora and vegetation survey included the area under application. The vegetation within Mining Lease 260SA was defined and mapped at a scale of 1:25,000. A total of 17 vegetation associations were recorded during the flora and vegetation survey. One vegetation association was identified and described for the application area (Mattiske Consulting Pty Ltd, 1996):

- **Association 9:** Low Closed to Open shrubland with occasional emergent *Acacia ligulata* over *Triodia plurinervata* and/or *Triodia bromoides* on red sand dunes, occasionally with limestone pebbles larger than 20 centimetres, on the lower to upper slopes above birridas.

Clearing Description

Shark Bay Resources Pty Ltd propose to clear up to 4.5 hectares of native vegetation within an application area of 75.4 hectares for borrow pits in order to access materials (sand, clay and rock) which can be used for the maintenance of roads, levies and batters throughout the Shark Bay Salt mine site.

The vegetation will be cleared by excavator or bulldozer and will be collected and stockpiled for the use in the future rehabilitation of the borrow pits and other degraded areas on the lease area. Shark Bay Resources Pty Ltd have advised that the clearing will be slow and incremental in such a way that fill will be taken as required in order to perform general maintenance (Shark Bay Resources Pty Ltd, 2008).

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

Mattiske Consulting Pty Ltd (1996) notes that the vegetation association of the application area (Association 9) was common in the north of the lease area and also off the lease area.

The vegetation condition of the application area was assessed from photographs submitted with the clearing permit application and Mattiske Consulting Pty Ltd (1996).

The Assessing Officer notes that in Mattiske Consulting Pty Ltd (1996) *Triodia bromoides* was referred to as the Declared Rare Flora species *Plectrachne bromoides*. The Assessing Officer viewed Florabase on 22 August 2008 and discovered that *Plectrachne bromoides* is a nomenclatural synonym of *Triodia bromoides* and that the conservation status of the species has been downgraded to Priority 4 classification (Western Australian Herbarium, 1998-2008).

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 Geraldton Sandplains Interim Biogeographic Regionalisation for Australia (IBRA) region which encompasses an area of 3,140,478 hectares (Shepherd et al., 2001; GIS Database). Approximately 42.2% of the pre-European vegetation remains within the Geraldton Sandplains IBRA region (GIS database; Shepherd et al. 2001). The vegetation of the Geraldton Sandplains IBRA region comprises mainly proteaceous scrub-heaths, rich in endemics on sandy earths. In terms of its flora and fauna, the area represents the interzone between the south-western bioregions of Western Australia and the Carnarvon bioregion (Desmond and Chant, 2001).

The application area is located within a section of the Shark Bay Resources Pty Ltd State Agreement Mining Lease area that has been subject to a high degree of disturbance from mining activities over a long period of time. Aerial imagery indicates that the application area is situated adjacent to several salt crystallisation ponds and the Shark Bay airstrip (Shark Bay Resources Pty Ltd, 2008). The aerial imagery and photographs submitted with the clearing permit application demonstrate that the vegetation throughout the application area has been adversely impacted by the construction of roads, placement of access tracks and from clearing and earthworks associated with historical borrow pit sites (Shark Bay Resources Pty Ltd, 2008; GIS Database). As a result, the vegetation condition ranges from 'very good' in small isolated areas, to 'degraded' for areas within the vicinity of historical borrow pits and access tracks.

Mattiske Consulting Pty Ltd (1996) surveyed the Shark Bay Resources Pty Ltd State Agreement Mining Lease area and recorded a total of 185 vascular plants species from 124 genera and 54 families. The floristic diversity of the vegetation that has been identified on Mining Lease 260SA would be considered high. The vegetation within the application area was identified and described as Association 9: Low closed to open shrubland with occasional emergent *Acacia ligulata* over *Triodia plurinervata* and/or *Triodia bromoides* on red sand dunes, occasionally with limestone pebbles larger than 20 centimetres, on the lower to upper slopes above birridas (Mattiske Consulting Pty Ltd, 1996). Mattiske Consulting Pty Ltd (1996) commented that Association 9 was common in the north of the lease area and also off the mining lease area.

The previous disturbances that have occurred within the application area as well as the nearby mining activities are likely to have impacted on the biodiversity of the area, which would otherwise be quite high. Given the widespread distribution of higher quality vegetation throughout and off the mining lease area (Mattiske Consulting Pty Ltd, 1996), the vegetation within the application area is unlikely to be considered an area of outstanding biodiversity.

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

Methodology

Desmond and Chant (2001)
Mattiske Consulting Pty Ltd (1996)
Shark Bay Resources Pty Ltd (2008)
Shepherd et al. (2001)
GIS Database:
- Interim Biogeographic Regionalisation of Australia
- Shark Bay 1.4m Orthomosaic - Landgate 2002

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

Comments

Proposal is not likely to be at variance to this Principle

The application area is located within the Shark Bay Resources Pty Ltd mine site at Useless Loop (Shark Bay Resources Pty Ltd, 2008). The mine site operates within the Shark Bay Area Register of National Estate which has been noted for its importance as it provides significant marine and terrestrial fauna habitat for native fauna species, particularly habitats associated with steep salinity gradients in the bay and undisturbed refugial areas on isolated islands and peninsulas (Australian Heritage Database, 2008). The area under application is located on the Heirisson Prong within the Edel subregion and has been described by Desmond and Chant (2001) as a refuge for endangered mammals and reptiles. The subregion is also known to be a centre of high endemism for reptiles (Australian Heritage Database, 2008).

The application area is located within a section of the Shark Bay Resources Pty Ltd State Agreement Mining Lease area that has been adversely impacted on by mining activities over a long period of time. Aerial imagery indicates that the application area is situated adjacent to several salt crystallisation ponds and the Shark Bay airstrip (Shark Bay Resources Pty Ltd, 2008). The aerial imagery and photographs demonstrate that the vegetation throughout the application area has been adversely impacted by the construction of roads, placement of access tracks and from clearing and earthworks associated with historical borrow pit sites (Shark Bay Resources Pty Ltd, 2008). The relatively high degree of disturbance that has occurred within the application area is likely to have impacted on the habitat value for the area.

The Assessing Officer visited the Shark Bay Resources Pty Ltd State Agreement Mining Lease 260SA on 1

May 2008 to undertake a site visit in relation to Shark Bay Resources Pty Ltd Clearing Permit CPS 2377/1. Although a specific site inspection was not undertaken for this clearing permit application (CPS 2594/1), the Assessing Officer did observe the landform features of areas adjoining the salt crystallisation ponds. Taking into consideration the landforms observed on Mining Lease 260SA and after analysis of aerial imagery and photographs submitted with the clearing application, the diversity of landforms within the application area appears low in terms of ranges, ridges, outcrops or caves suitable to provide habitat for fauna.

The vegetation within the application area has been described by Matiske Consulting Pty Ltd (1996) as low closed to open shrubland with occasional emergent *Acacia ligulata* over *Triodia plurinervata* and/or *Triodia bromoides* on red sand dunes, occasionally with limestone pebbles large than 20 centimetres, on the lower to upper slopes above birridas. Matiske Consulting Pty Ltd (1996) stated that the vegetation association of the application area was common in the north of the mining lease area and that the vegetation association is common off the lease area. As the vegetation and landforms within the application area are common throughout the lease area and adjoining areas, it would be considered likely that most fauna would be able to relocate into these surrounding areas if present within the application upon clearing commencing.

Given that the application area has been disturbed by past and present mining activities and that larger areas of higher quality vegetation exist throughout and adjacent to the Shark Bay Resources Pty Ltd State Agreement Mining Lease area, it is unlikely that the vegetation within the application area would be considered as significant habitat for fauna.

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

Methodology Australian Heritage Database (2008)
Desmond and Chant (2001)
Matiske Consulting Pty Ltd (1996)
Shark Bay Resources Pty Ltd (2008)

(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 Declared Rare Flora (DRF) or Priority flora species within the application area (GIS database). The nearest recorded population of DRF is located approximately 72 kilometres south-east of the application area (GIS Database).

Matiske Consulting Pty Ltd carried out a flora and vegetation survey of Shark Bay Resources Pty Ltd Mining Lease area (Matiske Consulting Pty Ltd, 1996). The flora and vegetation survey included a search of the Department of Conservation and Land Management's (now the Department of Environment and Conservation) Threatened (Declared Rare) Flora databases for DRF and Priority flora species, a field survey to define and map the vegetation communities within the survey area and a search for the existence of conservation significant species (Matiske Consulting Pty Ltd, 1996).

Matiske Consulting Pty Ltd (1996) identified the vegetation within the application area as Association 9 - Low Closed to Open shrubland with occasional emergent *Acacia ligulata* over *Triodia plurinervata* and/or *Triodia bromoides* on red sand dunes, occasionally with limestone pebbles larger than 20 centimetres, on the lower to upper slopes above birridas. Matiske Consulting Pty Ltd (1996) reported that Association 9 comprised of the DRF *Triodia bromoides*. The Assessing Officer reviewed Florabase on 22 August 2008 and notes that *Triodia bromoides* has been reclassified as a Priority 4 species (Western Australian Herbarium, 1998-2008). Given the vegetation type of the application area, *Triodia bromoides* is likely to be present within the application area.

Matiske Consulting Pty Ltd (1996) stated that *Triodia bromoides* is common in many areas of the south-eastern and southern parts of the Shark Bay Resources Pty Ltd Mining Lease area and that Association 9 was common on and off the lease area. If present within the application area, the proposed clearing may impact on a small number of individuals of *Triodia bromoides*. Given that *Triodia bromoides* is common in many areas of the south-eastern and southern parts lease area (Matiske Consulting Pty Ltd, 1996), the proposed clearing is unlikely to significantly impact on the conservation of this species.

Other Priority species that were identified by Matiske Consulting Pty Ltd (1996) on the Shark Bay Resources Pty Ltd Mining Lease area include *Abutilon* sp. Hamelin (Priority 2), *Melaleuca huegellii* subsp. *pristicensis* (Priority 2), *Olearia occidentissima* (Priority 2), *Rhodanthe oppositifolia* subsp. *ornata* (Priority 2) and *Stenanthemum divaricatum* (Priority 3). All of these Priority 2 or Priority 3 species were identified within different vegetation associations to that of the application area (Matiske Consulting Pty Ltd, 1996). As a result, it would be considered unlikely that these species would occur within the application area.

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

Methodology Matiske Consulting Pty Ltd (1996)
Western Australian Herbarium (2008)
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 area (GIS database; Shark Bay Resources Pty Ltd, 2008). The nearest known TEC is located approximately 75 kilometres south-east of the application area (GIS database). Given the distance between the proposal and the nearest known TEC, the proposed clearing is unlikely to impact on the conservation of that TEC.

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

Methodology Shark Bay Resources Pty Ltd (2008)
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

The clearing application area is located within the Geraldton Sandplains Interim Biogeographic Regionalisation for Australia (IBRA) region in which approximately 42.2% of the pre-European vegetation remains (GIS database; Shepherd et al. 2001). See table below.

The vegetation of the clearing application area has been mapped as Beard vegetation association 112: Hummock grasslands, shrub steppe; *Acacia ligulata* over *Triodia plurinervata* (GIS Database). According to Shepherd et al., (2001) approximately 98.3% of Beard vegetation association 112 remains within the State. See table below.

There is no information available to indicate the extent of Beard vegetation association 112 remaining within the Geraldton Sandplains IBRA region.

According to the Bioregional Conservation Status of Ecological Vegetation Classes the conservation status for the Geraldton Sandplains Bioregion is "Depleted". With approximately 42.2% of the pre-European vegetation remaining, the conservation status of the Geraldton Sandplains IBRA region is unlikely to be considered at risk of becoming listed as "Vulnerable" (Department of Natural Resources and Environment, 2002).

According to the Bioregional Conservation Status of Ecological Vegetation Classes the conservation status for Beard vegetation association 112 is of "Least Concern" (Department of Natural Resources and Environment, 2002).

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european % in IUCN Class I-IV Reserves
IBRA Bioregion – Geraldton Sandplains	3,136,277	1,324,440	~42.2	Depleted	15.3
Beard veg assoc. – State					
112	26,457	26,007	~98.3	Least Concern	1.1
Beard veg assoc. – Bioregion					
No information available					

* Shepherd et al. (2001)

** Department of Natural Resources and Environment (2002)

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

Methodology Department of Natural Resources and Environment (2002)
Shepherd et al., (2001)
GIS Database:
- Interim Biogeographic Regionalisation of Australia
- 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

According to available databases, there are no watercourses or drainage lines within the application area (GIS Database). Aerial imagery and photographs supplied with the clearing permit application indicate that the vegetation within the application area is not growing in association with a wetland or watercourse (GIS Database; Shark Bay Resources Pty Ltd, 2008)

No groundwater dependent ecosystems are known to occur in or near the application area (GIS Databases).

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

Methodology Shark Bay Resources Pty Ltd (2008)
GIS Database:
- Geodata, Lakes
- Hydrography, Linear
- Shark Bay North 1.4m Orthomosaic
- Potential Groundwater Dependant Ecosystems
- Rivers

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

Comments Proposal may be at variance to this Principle

According to the Department of Agriculture in Technical Bulletin No 73 "An inventory and condition survey of rangelands in the Carnarvon Basin, Western Australia" the application area is located within the Edel Land System.

The Edel Land System consists of four land units (Payne et al., 1987). These are;

Unit 1: Longitudinal dunes: Longitudinal dunes and dune-like sandy crests over limestone ridges with soils consisting of reddish brown calcareous sands.

Unit 2: Stony rises and plains: Restricted limestone plains and rises which are densely strewn with pebbles, cobbles or boulders. Soils are variable but include very shallow sand, loamy or clayey sand and red, reddish-brown or yellow-brown sand.

Unit 3: Undulating sandy plains: Swales and undulating plains, sparsely to moderately strewn with limestone gravels. Soils consist of yellow-red or red-brown sands or loamy sands; and

Unit 4: Saline sands: Low-lying saline plains, lightly to moderately strewn with limestone cobbles or pebbles. Soils consist of very shallow grey loamy sands with calcareous inclusions (Payne et al., 1987).

The Assessing Officer visited the Shark Bay Resources Pty Ltd State Agreement Mining Lease 260SA on 1 May 2008 to undertake a site visit in relation to Shark Bay Resources Pty Ltd Clearing Permit CPS 2377/1. Although a specific site inspection was not undertaken for this clearing permit application (CPS 2594/1), the Assessing Officer did observe the landforms surrounding the salt crystallisation ponds and after careful analysis of the Department of Agriculture in Technical Bulletin No 73 it is considered most likely that the application area is located within Edel landform Unit 3 - Undulating sandy plains.

Edel landform Unit 3 has a mild susceptibility to wind erosion if the vegetative cover is removed (Payne et al., 1987). Due to its coastal location, the application area is likely to be exposed to prevailing onshore westerly winds, as well as offshore easterly winds that blow across Denham Sound. There is likely to be a moderate risk of wind erosion occurring within the application area if the vegetative cover is cleared. Shark Bay Resources Pty Ltd (2008) have advised that the proposed clearing within the application area will be incremental and that the cleared area will be rehabilitated as the area is exhausted of useful borrow material. To facilitate rehabilitation Shark Bay Resources Pty Ltd propose to collect and stockpile topsoil and vegetation for use in rehabilitation, as well as direct seeding the rehabilitated area with species endemic to the area (Shark Bay Resources Pty Ltd, 2008).

The application area is located at Useloop Loop which experiences mean annual rainfall of 300 millimetres and mean annual evaporation of approximately 2,600 millimetres (Mattiske Consulting Pty Ltd, 1996; GIS Database). Due to the sandy nature of the soils within the application area, it would be expected that any runoff from normal season rainfall events would infiltrate into the soil which would thereby minimise the risk of water erosion or water logging occurring.

Groundwater salinities within the application area have been measured in the range of 3,000-7,000 milligrams/Litre Total Dissolved Solids (GIS Database). The area under application is situated immediately adjacent to several salt crystallisation ponds which would be considered as hyper-saline. Topographic information indicates that application area is located at a vertical elevation ranging between 0-10 metres above the crystallisation ponds (GIS Database). Given the elevation of the application area from the salt crystallisation ponds as well as the low rainfall to high evaporation rate of the Shark Bay area, the proposed clearing is unlikely to increase land salinisation on or off site.

Based on the above, the proposal may be at variance to this Principle. The Assessing Officer recommends that should the permit be granted, conditions be imposed on the permit for the purpose of rehabilitation.

Methodology Mattiske Consulting Pty Ltd (1996)
Payne et al., (1987)
Shark Bay Resources Pty Ltd (2008)
GIS Database:
- Evaporation Isoleths
- Groundwater Salinity
- Topographic Contours

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

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

The application area is located within the Shark Bay Area Register of National Estate and the marine area surrounding the application area is part of the Shark Bay Marine Park (Australian Heritage Database, 2008; GIS Database). The Assessing Officer notes that the application area is located within a portion of the *Shark Bay Solar Salt Industry Agreement Act 1983* Mining Lease 260SA that has been excised from the Shark Bay World Heritage Area (Australian Heritage Database, 2008).

The Shark Bay Marine Park boundary is located approximately 1.5 kilometres west of the application area at its closest point (GIS Database). The Shark Bay Area Register of National Estate and Shark Bay Marine Park have immense conservation value as they provide significant habitat for a high number of marine aquatic and terrestrial fauna species (Australian Heritage Database, 2008). The application area is located within the operational Shark Bay Resources Pty Ltd mine site and as a result the vegetation has been subject to a considerable degree of disturbance over many years (Shark Bay Resources Pty Ltd, 2008). Aerial imagery and photographs submitted by Shark Bay Resources Pty Ltd indicate that the application area is situated immediately adjacent to several salt crystallisation ponds and the Shark Bay airstrip (Shark Bay Resources Pty Ltd, 2008), and it appears evident that the vegetation within the application area has been adversely impacted on by the construction of roads, access tracks and as a result of clearing and earthworks associated with historical borrow pit sites (Shark Bay Resources Pty Ltd, 2008). Given the disturbances that have occurred, it is likely that the conservation value of the vegetation within the vicinity of the Shark Bay Resources Pty Ltd mine site has been significantly reduced. It is considered unlikely that the conservation value of the Shark Bay Area Register of National Estate or Shark Bay Marine Park would be adversely impacted by the proposed clearing.

The nearest Department of Environment and Conservation (DEC) managed land is Friday Island Nature Reserve which is located approximately 4 kilometres north-west of the application area (GIS Database). Friday Island is listed as an 'A' Class nature reserve and is an important guano deposit and rookery for Cormorants. Given its isolation and distance from the application area, it is unlikely that the proposed clearing will have an impact on Friday Island Nature Reserve or the Cormorants that reside on the island.

The Heirisson Prong Biosphere Project which is situated approximately 7.5 kilometres north-west of the application area is of conservation significance as the project aims to re-establish rare and endangered mammals on a mainland peninsula at Shark Bay, Western Australia (Wildlife Research and Management Pty Ltd, 2005). The area north of the predator proof fence is managed by the Useless Loop Community Biosphere Project Group Inc (ULCBPG) under a management agreement signed in 1990 between the ULCBPG and SBSJV (Richards et al. 2000). Given the distance separating the Heirisson Prong Biosphere Project and the application area, it is unlikely that the proposed clearing will have a detrimental impact to the conservation values of the area.

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

Methodology Australian Heritage Database (2008)
Richards et al., (2000)
Shark Bay Resources Pty Ltd (2008)
Tengraph (2008)
Wildlife Research and Management Pty Ltd (2005)
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

Aerial imagery and photographs supplied with the clearing permit application, as well as analysis of Geographic Information System (GIS) hydrographic information indicates that there are no permanent wetlands or

watercourses within the application area (Shark Bay Resources Pty Ltd, 2008; GIS Database). The application area is situated adjacent to several salt crystallisation ponds which are used by Shark Bay Resources Pty Ltd for the production of salt. The quality of surface water within the crystallisation ponds is likely to be considered hyper-saline. The proposed clearing is not likely to reduce the quality of surface water in any nearby watercourses.

The application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database). The nearest PDWSA is the Carnarvon Water Reserve which is located approximately 145 kilometres north, north-east from the application area (GIS Database). Given the distance separating the application area and the nearest water supply area, the proposed clearing is unlikely to impact on the quality of the Carnarvon Water Reserve.

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

Methodology Shark Bay Resources Pty Ltd (2008)
GIS Database:
- Hydrography, linear
- Rainfall, Mean Annual
- 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 application area, which experiences mean annual rainfall of 300 millimetres and mean annual evaporation of approximately 2,600 millimetres (Mattiske Consulting Pty Ltd, 1996; GIS Database), is characterised by low rainfall, high evaporation and sandy porous soils (Short, 2000; GIS Database). As a result, it would be expected that there would be little surface flows during normal season rains.

No permanent or ephemeral water bodies are located within the application area (Shark Bay Resources Pty Ltd, 2008; GIS Database). The application area is situated adjacent to several salt crystallisation ponds which are permanently inundated as part of the Shark Bay Resources Pty Ltd salt production process and photographs indicate that a levee bank has been constructed to contain the hyper-saline solution to the confines of the crystallisation ponds. The proposed clearing of native vegetation within close proximity to the crystallisation ponds is unlikely to create a catchment area which would significantly increase runoff into ponds, and as a result, flood risk associated with a breach of the external levee bank is considered low. Due to the relatively small scale of the proposed clearing and the sandy nature of the soils, it would be expected that the majority of the volume from normal season rainfall would infiltrate the soil, or quickly evaporate given the low rainfall to high evaporation rate of the area.

The proposed clearing is unlikely to exacerbate or increase the incidence of flooding in the area.

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

Methodology Mattiske Consulting Pty Ltd (1996)
Shark Bay Resources Pty Ltd (2008)
Short (2000)
GIS Database:
- Hydrography, linear
- Geodata, Lakes
- Rainfall, Mean Annual
- Evaporation Isopleths
- Topographic Contours

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

Comments

There is one Native Title claim over the area under application; WC98_017. This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. 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*.

There are no 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 Sites of Aboriginal Significance are damaged through the clearing process.

One submission was received during the public submission period, however, no comment was made in relation to the proposal.

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

Methodology GIS Database
- Native Title Claims
- Sites of Aboriginal Significance DIA

4. Assessor's comments

Comment

The clearing principles have been addressed and the proposed clearing may be at variance to Principle (g), and is not likely to be at variance to Principle (a), (b), (c), (d), (e), (f), (h), (i) and (j).

Should the permit be granted, it is recommended that conditions be imposed on the permit for the purposes of rehabilitation, recording areas cleared and reporting against the permit conditions.

5. References

- Australian Heritage Database (2008). Shark Bay Area, Shark Bay, WA, Australia. Department of Environment, Water, Heritage and the Arts, Australian Government, <http://www.environment.gov.au/heritage/places/world/shark-bay/information.html>, report produced 31 July 2008.
- Department of Natural Resources and Environment (2002). Biodiversity Action Planning. Action planning for native biodiversity at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.
- Desmond, A. and Chant, A. (2001). Geraldton Sandplains 1 (GS1 ? Edel subregion). In a Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management, pp 252-264.
- Keighery, B.J. (1994). Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Mattiske Consulting Pty Ltd (1996). Flora and Vegetation - Useless Loop Shark Bay, Prepared for John Consulting Services, Prepared by Mattiske Consulting Pty Ltd, September 1996.
- Payne A. L., Curry, P. J., Spencer, G. F. (1987). Technical Bulletin - An inventory and condition survey of rangelands in the Carnarvon Basin, Western Australia, No 73, Department of Agriculture, Government of Western Australia, Perth, Western Australia.
- Richards, J. D., Short, J. and Cane, B. (2000). A short history of community involvement in the Heirisson Prong Endangered Mammal Research Project 1989 to 1999, and beyond... Report to the Useless loop Community Biosphere Project Group Inc, published by CSIRO Wildlife and Ecology, Perth Western Australia.
- Shark Bay Resources Pty Ltd (2008). Additional information Accompanying Clearing Permit Application 2594/1, Prepared for the Department of Industry and Resources, Prepared by Shark Bay Resources Pty Ltd, July 2008.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001). Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- Short J. (2000). Heirisson Prong Community Biosphere Reserve Shark Bay, Western Australia. Management Plan 2000-2005. Unpublished Management Plan prepared by Dr Jeff Short formerly of CSIRO Wildlife and Ecology on behalf of the Useless Loop Biosphere Project Group Inc.
- Western Australian Herbarium (1998-2008). Florabase - The Western Australia Flora, A search for *Plectrache bromoides*, Department of Environment and Conservation, <<http://florabase.calm.wa.gov.au.html>>, accessed 22 August 2008.
- Wildlife Research and Management Pty Ltd (2005). Heirisson Prong Threatened Species Project, <<http://www.wildliferesearchmanagement.com.au/overview.htm>>, last updated 8 November 2005, accessed 31 July 2008.

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.