Department of Industry and Resources

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2205/1

Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Hamersley Iron Pty Ltd**

1.3. Property details

Property: *Iron Ore (Hamersley Range) Agreement Act 1963*
Mineral Lease 70/246
General Purpose Lease 70/4
General Purpose Lease 70/14

Local Government Area: Shire Of Ashburton

Colloquial name: Paraburdoo TSF Upgrade Project

1.4. Application

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

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
Vegetation within the application area has been mapped at a 1:250,000 scale as the following Beard vegetation associations. - 181: Shrublands; mulga & snakewood scrub. - 82: Hummock grasslands, shrub steppe; *Grevillea refracta* & Hakea over soft spinifex. A flora and vegetation survey over the application area was undertaken on 2 August 2007 (Keith Lindbeck and Associates, 2007). The survey identified 7 vegetation types. These are: 1) Rocky Hillsides with scattered trees and shrubs (RH) - *Acacia aneura, Acacia marramamba, Acacia tetragonophylla* over *Triodia pungens, Eriachne mucronata, Eremophila fraseri, Eremophila latrobei, Grevillea berryana, Hibiscus coatesii* and *Maireana camosa*. 2) Lower Slopes with low open woodland and spinifex grassland (LS) - *Acacia aneura, Acacia pruinocarpa, Acacia tetragonophylla* over *Triodia pungens, Triodia wiseana* and *Marieana melanocoma*. 3) Grove 1: Densely vegetated drainage line dissecting LS (G1) - *Acacia wanyu, Acacia aneura* and *Acacia pruinocarpa* over *Triodia wiseana, Marieana melanocoma, Marsdenia australis* and *Ptilotus calostachyus, Ptilotus obovatus* var. *obovatus*, and *Tribulus suberosus*. 4) Mulga Plains with sparse understorey (MP) - *Acacia anuera* and *Acacia tetragonophylla* over sparsely populated *Triodia wiseana, Maireana villosa* and *Senna glutinosa* subsp. *glutinosa*. 5) Stony Plains (SP) - *Acacia aneura, Acacia rhodophloia, Acacia tetragonophylla, Acacia wanyu, Enneapogon polyphyllus and Eremophila cuneifolia* over a thin scattering of *Aristida contorta*. 6) Grove 2: Dense Mulga grove drainage line dissecting	Hamersley Iron Pty Ltd has applied to clear up to 92 hectares of native vegetation within an application area of 386 hectares. The vegetation proposed to be cleared lies adjacent to an existing Tailings Storage Facility (TSF). The purpose of the proposed clearing is to facilitate the expansion of the Paraburdoo TSF. All cleared areas will be used for either tailings deposition or for ancillary infrastructure and access roads. All vegetative material and topsoil from cleared areas will be collected and stockpiled for future rehabilitation purposes (Hamersley, 2008).	Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994) to Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994)	Vegetation condition was assessed by information provided Keith Lindbeck and Associates (2007). The clearing application area of 386 hectares includes the existing tailings storage facility disturbance footprint which occupies an area of approximately 298 hectares. Approximately 200 hectares of the tailings storage facility disturbance footprint is occupied by a existing TSF, whilst majority of the remaining area has been previously cleared under an approved Notice of Intent (Keith Lindbeck and Associates, 2007). The proposed clearing under this application relates to the remaining remnant native vegetation within the clearing application area.

SP (G2) - *Acacia aneura* and *Acacia wanyu* low closed forest *over Dodonaea petiolaris* and *Clerodendrum floribundum* closed scrub over *Senna glutinosa* subsp. *glutinosa* low closed heath.

7) Regrowth Areas (RA) - *Acacia aneura, Acacia bivenosa* and *Acacia synchronicia* low open forest with open heath over *Cenchrus ciliaris* open tussock grassland.

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 area of proposed clearing is located within the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) region which encompasses an area of 17,804,164 hectares (GIS database). The vegetation within the application area consists of two vegetation associations (Beard Vegetation Associations 82 and 181), both of which are common and widespread throughout this region, with approximately 100% of the pre-European vegetation remaining (Shepherd et al. 2001).

The application area relates to the remaining native vegetation which surrounds an existing operational Tailings Storage Facility (TSF). The TSF has a current disturbance footprint of approximately 298 hectares (Keith Lindbeck and Associates, 2007), and is situated within the Paraburdoo mine site which has been significantly degraded by past and present mining activities. The remnant vegetation communities within the application area are not considered to be rare, geographically restricted, unique or of significant conservation value (Keith Lindbeck and Associates, 2007). The vegetation communities are considered as being common within the Pilbara region and are unlikely to be of higher biodiversity than surrounding areas. As a result, the proposed clearing is unlikely to have a significant impact on the biological diversity of the region.

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

Methodology

Keith Lindbeck and Associates (2007)
Shepherd et al. (2001)
GIS Database
- Interim Biogeographic Regionalisation of Australia
- Pre-European Vegetation

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

Comments

Proposal is not likely to be at variance to this Principle

A desktop fauna assessment of the application area was undertaken by Biota Environmental Services in 2004. This review considered habitat types, previous fauna surveys and habitat assessment of nearby areas and fauna specimens identified from a Department of Environment and Conservation Threatened Fauna Database search (Keith Lindbeck and Associates, 2007). A search was conducted using the Department of Environment and Water Resources' Protected Matters Search Tool to identify species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* which may potentially occur within the application area (Keith Lindbeck and Associates, 2007). The review concluded that seven species of conservation significance could potentially occur within the application area. These include (Keith Lindbeck and Associates, 2007);

- Orange Leaf-nosed Bat (*Rhinonicteris aurantius*), listed under Schedule 1 (Fauna that is rare of is likely to become extinct) of the Wildlife Conservation (Specially Protected Fauna) Notice 2006.
- Pilbara Olive Python (*Liasis olivaceus barroni*), listed under Schedule 1 (Fauna that is rare of is likely to become extinct) of the Wildlife Conservation (Specially Protected Fauna) Notice 2006
- Peregrine Falcon (*Falco peregrinus*), listed under Schedule 4 (Other specially protected fauna) of the Wildlife Conservation (Specially Protected Fauna) Notice 2006.
- Western Pebble-mound Mouse (*Pseudomys chapmani*), Priority 4 of the Department of Environment and Conservation (DEC) Priority Fauna List.
- Lakeland Downs Mouse (*Leggadina lakedownensis*), Priority 4 of the DEC Priority Fauna List
- Ghost Bat (*Macroderma gigas*), Priority 4 of the DEC Priority Fauna List, and;
- Australian Bustard (*Ardeotis australis*), Priority 4 of the DEC Priority Fauna List.

The Orange Leaf-nosed Bat is known to prefer warm humid caves for roosting, although some have been found in tree hollows. Foraging habitats include grasslands, open woodlands, savannah woodlands and spinifex covered hills, although habitat use may be influenced by roost availability (Australian Museum Online 2007; EPA (Qld), 2006). The species is known from less than 10 localities in the Pilbara and from one locality in the Gascoyne. No natural colony sites are known from the Pilbara (Environment Australia, 1999). Known colonies in the Pilbara occupy abandoned, deep and partially flooded mines that trap pockets of warm, humid air in the mines constant temperature zone (Environment Australia, 1999). The application area lacks the presence of caves or hollows which provide suitable roosting habitat for this species and as a result, the

species is unlikely to inhabit the area (Keith Lindbeck and Associates, 2007). It is unlikely that the vegetation within the application area would be regarded as significant habitat for this species.

The Pilbara Olive Python is known to occur throughout the Hamersley and Chichester Ranges, parts of the East Pilbara and the Barlee Range Nature Reserve. It is known to inhabit rocky areas near waterholes with caves, overhang ledges and crevasses that provide shelter. The application area is devoid of rocky shelters, caves, ledges and vegetated waterholes (Keith Lindbeck and Associates, 2007). It is unlikely that the vegetation within the application area will provide suitable habitat for the Pilbara Olive Python. The proposed clearing is unlikely to impact on significant habitat for this species.

The Peregrine Falcon has a ubiquitous distribution throughout mainland Australia and inhabits a wide range of habitats including forest, woodlands, wetlands and open country (Keith Lindbeck and Associates, 2007). Kendrick (2001) states in the biodiversity audit of the Pilbara 3 - Hamersley subregion that the Peregrine Falcon is an uncommon resident, with very little data available regarding the species apart from occasional sightings. Given the widespread habitat and distribution of the Peregrine Falcon, the proposed clearing is unlikely to impact on significant habitat for this species.

The Western Pebble-mound Mouse is relatively widespread and abundant throughout much of the Pilbara 3 subregion, and parts of the Gascoyne (Kendrick, 2001; Keith Lindbeck and Associates, 2007). The species occurs on spinifex covered, gentle colluvial slopes with pebbles of size (approximately 70 grams) suitable for the transport and construction of pebble mounds (Keith Lindbeck and Associates, 2007). Within the application area, there is a lack of undulating spinifex covered lower slopes with a pebble mantle that would provide significant habitat for the Western Pebble-mound mouse. It is unlikely that the vegetation proposed to be cleared would be regarded as significant habitat for this species.

The Lakeland Downs Mouse is distributed across the Pilbara and Kimberley regions of Western Australia, and is known to occur on sandy soils and cracking clays that support grasslands (Keith Lindbeck and Associates, 2007; Biota, 2004b). There are no cracking clay ecosystems within the application area (Keith Lindbeck and Associates, 2007). The soils within the application area appear to consist of stony surfaces and mantles which are unlikely to provide suitable habitat for this species (Payne et al. 1988). The proposed clearing is unlikely to impact on significant habitat for the Lakeland Down Mouse.

The Ghost Bat is known to show preference for large, deep caves, crevices and old underground mining workings (Keith Lindbeck and Associates, 2007; Australian Museum Online, 2008). The application area lacks the presence of caves, crevices or mine shafts which may provide suitable roosting habitat for this species and as a result, the species is unlikely to inhabit the area. One of the main conservation threats to the Ghost Bat is the loss of feeding habitat by clearing. The Ghost Bat preys on large insects, frogs, birds, lizards and small mammals including other bats. They swoop on their prey and then fly to a feeding site to eat (Australian Museum Online, 2008). The vegetation under application adjoins an operational Tailings Storage Facility (TSF) and similar vegetation types are widespread throughout the surrounding region. The proposed clearing is unlikely to significantly impact on habitat for the Ghost Bat.

The Australian Bustard is known to occur within open rangeland habitats such as Triodia hummock grassland, grassy woodland, sandplains with spinifex, chenopod flats and low shrublands (Johnstone and Storr, 1998). During their breeding season the species can show preference for open grassland areas which border protective shrubland or woodlands (Australian Wildlife Conservancy, 2008). The species is known to be nomadic, with irregular widespread movements over long distances (Johnstone and Storr, 1998; Department of Environment and Climate Change NSW 2008). Photographs and descriptions of the vegetation types within the application area demonstrate that the majority of the vegetation types occur on stony mantles with a sparse understorey which are unlikely to provide significant habitat for the Australian Bustard. Approximately 17 hectares of the remaining vegetation within the application area has been described as Lower Slopes - Mulga Gidgee low open woodland with spinifex grassland. This vegetation type has been identified in the north and south-west of the application area and it is possible that the Australian Bustard may visit these areas at different times throughout the year. This vegetation type is likely to be common and widespread throughout the Pilbara and not restricted to the isolated areas within the application area (Payne et al. 1988; Shepherd et al. 2001). Given the nomadic nature of the species and its ability to cover long distances, the proposed clearing is unlikely to impact on significant habitat for the Australian Bustard.

A number a migratory bird species that are protected under the CAMBA and JAMBA treaties (China and Japan/ Australia Migratory Bird Agreements) may potentially occur within the application area. These include the Rainbow Bee-eater (*Merops ornatus*), Great Egret (*Ardea alba*), Cattle Egret (*Ardea ibis*), Oriental Plover (*Charadrius veredus*) and Fork-tailed Swift (*Apus pacificus*). All of these species may utilise the habitat within and adjoining the application area, for nesting or foraging, at different times throughout the year. The habitat types that have been identified within the application area are not restricted to the application area and there is a widespread distribution of similar, and for some species more suitable, habitat types throughout the Pilbara region. The proposed clearing is unlikely to impact on significant habitat required for the existence of these migratory species.

The vegetation under application relates to the remaining remnant vegetation which adjoins an existing and operational TSF. Aerial photography and information provided with the clearing application indicates that approximately 298 hectares of the 390 hectare clearing application area has been disturbed and is currently unvegetated. The disturbed area is likely to have little or no significant fauna habitat value. The remaining vegetation communities within the application area are considered as being common within the Pilbara region

and there are no landscape or vegetation features such as caves, ledges, hollows or waterholes that would provide significant habitat for fauna indigenous to Western Australia (Keith Lindbeck and Associates, 2007).

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

Methodology

Australian Museum Online (2007)
Australian Wildlife Conservancy (2008)
Biota (2004b)
Department of Environment and Climate Change NSW (2008)
Environment Australia (1999)
EPA (Qld) (2006)
Johnstone and Storr (1998)
Keith Lindbeck and Associates (2007)
Kendrick (2001)
Naturebase (2008)
Payne et al. (1988)
Shepherd et al. (2001)

(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 clearing application area (GIS database).

A flora and vegetation survey of the clearing application area for DRF and Priority Flora was undertaken by a biologist from Keith Lindbeck and Associates on 2 August 2007. No DRF or Priority flora species were recorded during the survey (Keith Lindbeck and Associates, 2007).

Botanists from Pilbara Iron carried out flora and vegetation surveys across the proposed clearing areas during October 2005 and September 2004, however, no DRF or Priority flora species were recorded within the clearing application area, or adjacent to the application area (Keith Lindbeck and Associates, 2007).

Botanists from Biota Environmental Services located a population of Priority 1 species *Ptilotus trichocephalus* during a survey for the Paraburdoo Gas Pipeline in September 2003. The survey extended across the eastern most section of the clearing application area and included the adjoining land south of the clearing application area. The closest known occurrence of *Ptilotus trichocephalus* is located approximately 1 kilometre south of the application area. Subsequent searches for this species by botanists from Keith Lindbeck and Associates and Pilbara Iron have failed to locate this species within the proposed clearing area or surrounding areas (Keith Lindbeck and Associates, 2007). Given the distance between the application area and the nearest known population of *Ptilotus trichocephalus*, the proposed clearing is unlikely to impact on in situ existence of this species.

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

Methodology

Keith Lindbeck and Associates (2007)
GIS Database:
- Declared Rare and Priority Flora List - CALM 01/07/05

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

Comments

Proposal is not likely to be at variance to this Principle

There are no known Threatened Ecological Communities (TEC) within the application area (GIS database; Keith Lindbeck and Associates, 2007). The nearest known TEC is located approximately 100 kilometres north of the application area (GIS Database). The TEC is not located within Hamersley Iron's mining lease (GIS Database). Given the distance separating the application area and the TEC, the proposed clearing activities are unlikely to result in any offsite adverse environmental impacts to the TEC.

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

Methodology

Keith Lindbeck and Associates (2007)
GIS Database:
- Mining Tenements
- Threatened Ecological Communities - CALM 12/4/05

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

Comments

Proposal is not at variance to this Principle

The clearing application area falls within the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) region in which approximately 99.9% of the pre-European vegetation remains (GIS database; Shepherd et al. 2001).

The vegetation of the clearing application has been mapped as Beard vegetation association 181: Shrublands; mulga & snakewood scrub, and 82: Hummock grasslands, shrub steppe; *Grevillea refracta* & Hakea over soft Spinifex. According to Shepherd et al. (2001) approximately 100% of these vegetation associations remain at both the state and regional level.

According to the Bioregional Conservation Status of Ecological Vegetation Classes the conservation status for the Pilbara Bioregion and Beard vegetation associations 181 and 82 is of "Least Concern" (Department of Natural Resources and Environment, 2002).

While a small percentage of the vegetation types within the Pilbara bioregion are protected within conservation reserves, the bioregion remains largely uncleared. As a result, the conservation of the vegetation associations within the bioregion is not likely to be impacted on by this proposal.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,164	17,794,651	~99.9	Least Concern	6.3
Beard veg assoc. – State					
181	1,697,329	1,697,329	~100	Least Concern	2.4
82	2,565,930	2,565,930	~100	Least Concern	10.2
Beard veg assoc. – Bioregion					
181	65,094	65,094	~100	Least Concern	4.9
82	2,563,610	2,563,610	~100	Least Concern	10.2

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

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

Methodology

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

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

Comments

Proposal is not likely to be at variance to this Principle

There are no permanent watercourses, drainage systems or wetlands within the application area (GIS Database). The proponent has advised that the proposed clearing will not impact on any significant creek or drainage systems (Keith Lindbeck and Associates, 2007). The closest regional watercourse is Turee Creek which is located approximately 13 kilometres south-east and Seven Mile Creek, a major creek system, which is located approximately 2.6 kilometres north-west of the application area (GIS Database; Keith Lindbeck and Associates, 2007). The application area drains towards Seven Mile Creek, however, Hamersley Iron has advised that the creek system that drains from the Tailings Dam valley has now been truncated by the Tailings Dam embankment wall. Site observations indicate that the vegetation downstream is healthy and verdant, thus showing no signs of stress as a result of restricted drainage patterns (Hamersley Iron, 2008).

A majority of the vegetation within the application area has been cleared under a previously approved Notice of Intent and is used for tailings storage (Keith Lindbeck and Associates, 2007). Given the distance between the application area and the nearest watercourses, the remaining vegetation within the application is not likely to act as a significant buffer area to these watercourses.

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

Methodology Keith Lindbeck and Associates (2007)
Hamersley Iron (2008)
GIS Database:
- Hydrography, linear (hierarchy)
- Hydrography, linear_1

(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

According to the Department of Agriculture in Technical Bulletin No 62 "An inventory and condition survey of the rangelands in the Ashburton River catchment, Western Australia" (Payne et al. 1988), the application area consists of four Land Systems. These are the Boolgeeda, Capricorn, Newman and Platform Land Systems;

- The Boolgeeda Land System consists of stony lower slopes and wide, low relief plains, below large range hill systems, that support spinifex grasslands and Mulga shrublands (Keith Lindbeck and Associates, 2007; Payne et al. 1988). Approximately 69.5% of the application area occurs within the Boolgeeda Land System (Keith Lindbeck and Associates, 2007; GIS Database). The soils of the Boolgeeda Land System consist of rocky outcrops with virtually no soil development and red loamy soils with dense stony mantles (Payne et al. 1988). The soils are likely to have high resistance to erosion due to the stony nature of the surface materials (Keith Lindbeck and Associates, 2007).

- The Capricorn Land System consists of hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands (Keith Lindbeck and Associates, 2007). Approximately 20.5% of the application area is located within the Capricorn Land System. The vegetation within the Capricorn Land System predominately occurs on the landform unit ridges, hills and upper slopes, and lower footslopes. The soils of the Capricorn Land System consist of rock outcropping and dense stony mantles with shallow, red loams (Payne et al. 1988). The rocky outcrops and stony surface materials are likely to offer high resistance to erosion (Keith Lindbeck and Associates, 2007).

- The Newman Land System consists of rugged jaspilitic ranges, plateaux, ridges and mountains that characterise and typify much of the Pilbara. Approximately 9.7% of the application area is located within the Newman Land System. The majority of the vegetation occurs on the landform unit ridges, mountains and hills, and lower slopes. The soils consist of rocky outcrops and dense stony mantles, with little soil development, and dark reddish brown stony silt loams. The soils are likely to have a high resistance to erosion due to the high occurrence of rock outcrops and stony mantles.

- The Platform Land System occurs as narrow raised plains with extensive dissected slopes with hard Spinifex and shrubs. Only one hectare of the application intercepts the Platform Land System (Keith Lindbeck and Associates, 2007; GIS Database). The landform units of the Land System include Stony upper plains, dissected slopes with incised drainage and drainage floors (Payne et al. 1988). The soil types consist of shallow, very stony reddish brown loams, cemented gravels and pebbles, and reddish brown loamy sands on drainage floors. The soils are likely to have high resistance to erosion due to the stony nature of the surface materials.

All of the Land Systems within the application area have stony surfaces or mantles which are likely to show high resistance to erosion. The proposed clearing may expose surface mantles which may cause an increase in surface water runoff, however, given the stony nature of the surface materials water and/or wind erosion is unlikely to occur.

Groundwater monitoring results have shown that the watertable can approach surface levels and this has been observed through mounding which occurs downstream from the tailings dam embankment wall (Keith Lindbeck and Associates, 2007). Groundwater mounding may have the potential to cause water logging and subsequently impact on native vegetation off-site.

Hamersley Iron (2008) has reported that groundwater mounding occurs when the water level within the decant pond increases which causes the aquifer to locally rise downstream. It is understood that this is partly due to the phreatic surface through the TSF embankment wall, and partly due to a fracture through the rock in the adjacent hill to which the decant pond is situated against (Hamersley Iron, 2008). A recovery bore was installed approximately six years ago to manage the height of the local aquifer. The recovery bore is located above the water mound and pumps water to a return sump, which then pumps the water back to the process plant. The recovery bores are monitored regularly and monitoring results are forwarded to Coffey Mining Pty Ltd for the production of a monthly summary report that is used by Pilbara Iron Pty Ltd to adjust abstraction practices (Keith Lindbeck and Associates, 2007). Hamersley Iron (2008) has reported that since the recovery bore has been installed there has been no occurrence of surface water or impact on vegetation at the downstream mounding site (Hamersley Iron, 2008). The proposed clearing may increase surface water runoff into the tailings dam, which in turn may increase the incidence of elevated water levels within the tailings dam that cause groundwater mounding downstream. However, the Assessing Officer is satisfied that Hamersley

has implemented a suitable management technique to control groundwater levels which will minimise the risk of water logging which may impact on native vegetation downstream.

Within the application area, groundwater salinities have been measured in the range from 1000 to 4000 mg/L Total Dissolved Solids (TDS), while occasional bore salinities have been recorded in excess of 20,000 mg/L TDS (Keith Lindbeck and Associates, 2007). The application area is located within the Turee Creek catchment area which occupies an area of approximately 675,000 hectares (Hamersley Iron, 2008). Rainwater is known to have a large impact on groundwater recharge (Keith Lindbeck and Associates, 2007). Paraburdoo, which is situated approximately 7 kilometres north-east of the application area, has mean annual rainfall of 280.8 millimetres and a mean annual evaporation rate of approximately 3600 millimetres (Keith Lindbeck and Associates, 2007; GIS Database). Due to the ratio of low rainfall to high evaporation, it is likely that the majority of groundwater recharge would occur following significant rainfall events. Given the size of the Turee Creek catchment system (675,300 ha) in relation to the size of the application area (92 ha), and considering the low rainfall to high evaporation rate, it is unlikely that the proposed clearing will significantly increase groundwater recharge or that land salinisation will be increased either on or off-site.

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

Methodology

Hamersley Iron (2008)
Keith Lindbeck and Associates (2007)
Payne et al. (1988)
GIS Database:
- Groundwater Salinity, Statewide
- Rainfall, Mean Annual
- Evaporation Isopleths

(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 proposed clearing area is not located within a Department of Environment and Conservation managed conservation area (GIS Database). The nearest conservation area is Karijini National Park which is situated approximately 37 kilometres east-northeast of the proposed clearing area (GIS database; Keith Lindbeck and Associates, 2007). Based on the distance between the proposal and the nearest conservation area, the proposed clearing is unlikely to impact on the conservation values of Karijini National Park.

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

Methodology

Keith Lindbeck and Associates (2007)
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 permanent watercourses, drainage systems or wetlands within the application area (GIS Database). The closest watercourses are Seven Mile Creek which is located approximately 2.6 kilometres north-west and Turee Creek which is located approximately 13 kilometres south-east of the application area (GIS Database; Hamersley Iron, 2008). The four land systems associated with the application area have low to massive resistance to erosion (Keith Lindbeck and Associates, 2007), thereby reducing the risk of increased sediment exports which may result in sedimentation and turbidity in nearby watercourses. The application lies within the boundary of the existing and proposed extension to the Tailings Storage Facility (TSF) which is located in a broad valley system that is bounded to the north and south by hill formations, and to the west by the main Tailings Storage Facility embankment wall. Surface water runoff from the application area will be contained within tailings dam catchment area and is unlikely to escape into the local environment (Hamersley Iron, 2008). The proposed clearing is unlikely to cause deterioration in the quality of surface water in the local area.

The application area is located within the Turee Creek catchment system which covers an area of 675,300 hectares (Hamersley Iron, 2008). The Turee Creek catchment is underlain by four aquifers (Keith Lindbeck and Associates, 2007). Aquifer 1 resides in shallow alluvium and colluvial scree that lies on top of weathered basement, paleochannel clays and in some areas directly on fractured basement rock. Aquifer 2 lies below Aquifer 1 and is a thick sequence of low permeability paleochannel clays which acts as an aquiclude. These low permeability clays are an effective barrier between the shallow aquifer and the deeper paleochannel sediments and fractured rock aquifers. Aquifer 3 occurs in paleochannel sediments that consist of sand, gravel and some silt and clay. Aquifer 4 is a fractured rock aquifer that lies below the paleochannel sediments.

Pilbara Iron has been conducting groundwater monitoring near the TSF and application area for 12 years. A total of 33 monitoring bores and standpipe piezometers are monitored on a monthly basis for standing water

levels, and multi-component analyses occur every six months. Rainwater is known to have a large impact on groundwater recharge (Keith Lindbeck and Associates, 2007). Paraburdoo, which is situated approximately 7 kilometres north-east of the application area has mean annual rainfall of 280.8 millimetres and a mean annual evaporation rate of approximately 3600 millimetres (Keith Lindbeck and Associates, 2007; GIS Database). It is likely that the majority of groundwater recharge would occur following significant rainfall events.

In relation to the shallow aquifer, given the size of the Turee Creek catchment system (675,300 ha) in relation to the size of the application area (92 ha) and considering the low rainfall to high evaporation ratio, it is unlikely that the proposed clearing will significantly increase groundwater recharge or impact on groundwater quality. In relation to the deeper underlying aquifers, due to the lack of interconnection between the shallow and deeper aquifers caused by presence of the aquiclude, it is unlikely that the proposed clearing will have any further impact on groundwater quality of the underlying deeper aquifers (Keith Lindbeck and Associates, 2007).

The application is not located within a Public Drinking Water Source Area (GIS Database).

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

Methodology

Keith Lindbeck and Associates (2007)
Hamersley (2008)
GIS Database:
- Hydrography, linear_1
- Hydrography, linear (hierarchy)
- Rainfall, Mean Annual
- Evaporation Isopleths
- Public Drinking Water Source Areas (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 is not associated with any permanent wetlands or watercourses (GIS database). The average annual rainfall of Paraburdoo which is situated approximately 7 kilometres north-east of the application area is approximately 280.8 millimetres. Annual rainfall is variable with monsoonal events from tropical cyclones capable of producing significant rainfall events during summer months (Keith Lindbeck and Associates, 2007). As a result, local flooding is known to occur seasonally in the Pilbara region between December and March. Numerous non-perennial watercourses are distributed across the landscape, and these are responsible for quickly dispersing floodwaters after significant rainfall events, thereby reducing peak flood heights (GIS database).

The application area is located in a broad valley system approximately 2.5 kilometres in width and bounded to the north and south by hill formations (Keith Lindbeck and Associates, 2007; GIS Database). As the application area is used as a Tailings Storage Facility (TSF) the area is also bound to the west by a main embankment wall (Keith Lindbeck and Associates, 2007; Hamersley Iron, 2008). The clearing of 92 hectares of native vegetation within the application area may cause an increase the volume of surface water runoff, however, as the clearing is located within the TSF catchment area, any surface water runoff is unable to escape into the local environment (Keith Lindbeck and Associates, 2007; Hamersley Iron, 2008). Flood risk for the TSF and subsequent spillage of excess floodwaters into the surrounding environment is minimised by the Tailings Dam water return circuit (Hamersley Iron, 2008). The proposed clearing of native vegetation for the upgrade of the Paraburdoo TSF is unlikely to cause or increase the incidence of flooding.

It is unlikely that the clearing required under this proposal will impact on drainage patterns within the Seven Mile Creek and Turee Creek catchment areas, or result in an increase in peak flood heights.

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

Methodology

Hamersley Iron (2008)
Keith Lindbeck and Associates (2007)
GIS Database:
- Hydrography, linear (hierarchy)
- Hydrography, linear_1
- Topographic Contours, Statewide

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

Comments

There are two native title claims over the area under application; (WC97/043) and (WC98/069) (GIS Database). These claims have been registered with the National Native Title Tribunal on behalf of the claimant group (GIS Database). However, the tenements have 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 3 registered Sites of Aboriginal Significance (Site ID: 21610, 511, 24000) within the area applied to clear (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. The Assessing Officer (DoIR) considers that the systems in place will ensure that no sites are disturbed illegally, or without consultation with local Aboriginal organisations.

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

Methodology

GIS Database:
- Native Title Claims – DLI 7/11/05
- Sites of Aboriginal Significance DIA

4. Assessor's comments

Purpose	Method	Applied area (ha)/ trees	Comment
Mineral Production	Mechanical Removal	92	The clearing principles have been addressed and the proposed clearing is not likely to be at variance to Principle (a), (b), (c), (d), (f), (g), (h), (i) or (j) and is not at variance to Principle (e). Should the permit be granted, it is recommended that conditions be imposed on the permit for the purposes of rehabilitation and reporting areas cleared.

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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.