



1. Application details

1.1. Permit application details

Permit application No.: 2029/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Opus Exploration Pty Ltd

1.3. Property details

Property: Mining Lease M47/473
Mining Lease M47/474
Mining Lease M47/475
Local Government Area: Shire Of Roebourne
Colloquial name: Indee Gold – Dewatering Project

1.4. Application

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

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 Beard vegetation association 93, and is described as: Hummock grasslands, shrub steppe; kanji over soft Spinifex (Shepherd *et al.*, 2001).

Astron Environmental (2007a) surveyed the vegetation within the Indee Gold lease area in April 2007, and identified the following vegetation associations:

- Ca1: Regenerating shrubland of *Acacia inaequilatera* with occasional *Grevillea wickhamii* over regenerating *Triodia* sp 'Indee' over herbland.
- Sp2: Mixed shrubland of *Acacia ancistrocarpa*, *A. inaequilatera* over tall hummock grassland of *Triodia* sp 'Indee' often with dense herbland of *Mollugo molluginis*, *Bonamia arrecta* (sterile). There are scattered *Hakea lorea* subsp *lorea*.
- Ca2: Regenerating shrubland of *Grevillea wickhamii* over herbland of *Goodenia stobbsiana* and *Corchorus elachocarpus* subsp *elachocarpus* over very open regenerating hummock grassland or *Triodia* sp 'Indee'. Scattered low trees of *Corymbia hamersleyana*.
- Dp2: Regenerating open or shrubland of *Grevillea wickhamii* over very open hummock grassland of *Triodia* sp 'Indee'.
- Dp5: Regenerating low open woodland of *Corymbia hamersleyana* over open shrubland of *Grevillea wickhamii* over open tussock grassland of *Chrysopogon fallax* with *Aristida holothera*.
- Dp: Regenerating low woodland of *Eucalyptus victrix* and *Corymbia hamersleyana* over open tussock grassland of *Chrysopogon fallax* with *Aristida holothera* over herbland of *Polymeria ambigua*. There are scattered *Hakea lorea* subsp *lorea* on low lying plain with deeper alluvial red brown silty loams.
- Dt2: Regenerating open to low woodland of *Corymbia hamersleyana* over open low shrubland of *Acacia ancistrocarpa* and *Grevillea wickhamii* over open tussock grassland of *Chrysopogon fallax* with *Triodia* sp 'Indee' over herbs.

The entire application area has been recently burnt (December 2006), and although there were occasionally some narrow fingers of unburnt vegetation, most of the vegetation was at the stage of early regeneration (Astron Environmental, 2007a). Some rainfall during 2007 had encouraged healthy basal and epicormic regrowth on most perennial tree and shrub species (*Eucalypt*, *Corymbia*, *Grevillea*, *Hakea*, *Acacia*). However, many *Acacia* shrubs were still only seedlings. Some annual species, especially fire colonizers, were present, but many had already senesced (Astron Environmental, 2007a).

During a field survey conducted by Astron Environmental (2007b) on 3 September 2007, the following vegetation habitats within the application area were described.

Low drainage area with red alluvial silts:

- *Corymbia hamersleyana* and *Eucalyptus victrix* open to low woodland over regenerating *Grevillea wickhamii* shrubland over *Dampiera candidans*, *Senna notabilis*, *Tephrosia sphaerospora*, *Goodenia* ssp low shrubland to heath with *Acacia* spp over very open regenerating hummock grassland of *Triodia* sp. There are scattered small groves of *Melaleuca lasiandra*.
- *Eucalyptus victrix* open low woodland over *Senna notabilis*, *Dampiera candidans* low shrubland with *Acacia* spp over *Triodia epactia* open regenerating hummock grassland with *Chrysopogon fallax*, *Aristida holothera* tussock grasses.

Slightly elevated "islands" within drainage track with sparse to moderate stones and some calcrete outcrops:

- *Grevillea wickhamii* shrubland to heath over regenerating *Senna notabilis*, *Corchorus parviflorus*, *Acacia* spp low open shrubland over *Triodia* sp very open regenerating hummock grassland. There are scattered trees of *Corymbia hamersleyana*.
- *Corymbia hamersleyana*/ *Acacia inaequilatera* open low woodland over *Senna notabilis* open low shrubland with *Acacia* spp over very open regenerating hummock grassland of *Triodia* sp.

Clearing Description	<p>Opus Exploration Pty Ltd (hereafter referred to as Opus Exploration) has applied for a clearing permit to disturb up to 40 hectares of vegetation within a 40 hectares permit area. The proposed clearing is for the discharge of excess water to a drainage path located approximately 450 metres south of the Camel Pit (Aquaterra, 2007b).</p> <p>The water will be transferred to the proposed discharge point via a 250 mm HDPE pipeline laying directly on the ground surface. From the discharge point, the water will gravity drain down-gradient to a drainage zone within a broad valley located around 1000 metres south from the Camel Pit area. The water will continue to flow in a westerly direction through intermittent drainage channels and wash areas towards a gap in the ridge to the northwest where it will gradually continue to dissipate by seepage and evaporation. It is anticipated that the discharge may typically spread over an area 10 metres to 20 metres wide in wash areas where the flow is unconstrained by channels. While the maximum downstream extent of discharge may be several kilometres, this will vary depending on the discharge rate, seasonal conditions and the seepage characteristics of the ground surface (Aquaterra, 2007b).</p> <p>The application area is located approximately 80 kilometres southwest of Port Headland, 25 kilometres north of Whim Creek and 8 kilometres east from the North West Coastal highway (GIS Database).</p>
Vegetation Condition Comment	<p>Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).</p> <p>The vegetation condition is based on the Keighery (1994) vegetation condition scale, from aerial photography and an assessment provided by Astron Environmental (2007a).</p> <p>The application area is located within the Mallina Pastoral Lease and 450 metres south of an active minesite – Camel Pit (GIS Database). Vegetation within the application area has therefore been previously disturbed by grazing, mining and exploration activities.</p> <p>Following initial discharge of excess water into a controlled area (under 10 hectare rule), a vegetation survey conducted by Astron Environmental on 3 September 2007 noted that:</p> <ul style="list-style-type: none"> • It is believed that the volume of water being discharged over the expected length of time (125,000 – 215,000 kL/month over a period of 6-10 months) will impact vegetation to some degree. • Some annual and small perennial species did show signs of stress. Tree species present (<i>Eucalyptus victrix</i> and <i>Corymbia hamersleyana</i>) may tolerate damp soils for short periods, as would occur naturally after heavy rainfall. • Similarly, the acacia and other low shrub species are those typically found on reasonably well draining alluvial silts or stony soils. It is envisaged these shrubs will not tolerate long term saturation. The <i>Triodia</i> species present are unlikely to tolerate these conditions. • Plant mortality will most probably occur over the saturated area and ponded area. This mortality will include tree, shrub and hummock grass species. • Damp soils may encourage the infestation of weeds into an environment where weed invasion is currently minimal (Astron Environmental, 2007b).

3. Assessment of application against clearing principles

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

Comments	<p>Proposal is not likely to be at variance to this Principle</p> <p>The application area is located within the Pilbara Bioregion and the Chichester Subregion of the Interim Biogeographic Regionalisation of Australia (IBRA) (GIS Database). The biodiversity values of the subregion were assessed by Kendrick & McKenzie (2001). The plains support a shrub steppe characterised by <i>Acacia inaequilatera</i> over <i>Triodia wiseana</i> (formerly <i>Triodia pungens</i>) hummock grasslands, while <i>Eucalyptus leucophloia</i> tree steppes occur on ranges (Kendrick & McKenzie, 2001).</p> <p>A total of sixty-six taxa were recorded during vegetation surveys for the Indee Gold Project area, which represents 27 families and 43 genera (Astron Environmental, 2007b). The most commonly recorded families were Poaceae (grasses) and Goodeniaceae, both with six species, followed by Mimosaceae and Anaranthaceae, both with five species. The most commonly recorded genera was <i>Acacia</i>, with five species. It is expected that the number of species present would be higher following rainfall (Astron Environmental, 2007b). The application area is within the Mallina pastoral lease, and has suffered long term disturbance from grazing (Astron Environmental, 2007a). Vegetation within the application area, although degraded in areas, is consistent with vegetation found within the Chichester Subregion.</p> <p>The Beard vegetation association found within the proposed clearing area is widely distributed, and is not restricted to the proposed clearing area (GIS Database). It is therefore unlikely that the biodiversity of the proposed clearing area will differ greatly from the surrounding, less disturbed areas.</p> <p>After a desktop fauna survey conducted by Bamford Consulting Ecologists (2004), it was concluded that the project area can be expected to support moderately rich fauna despite a history of grazing and frequent fires. However, the area is not likely to be as species rich as some locations in the Pilbara because of the lack of permanent water (Bamford Consulting Ecologists, 2004).</p> <p>Due to the level of disturbance that has already occurred within parts of the application area as a result of grazing and mining activities, and given the broad distribution of the vegetation association, it is unlikely that the proposal will result in the clearing of native vegetation that has higher biodiversity attributes than that of the surrounding undisturbed vegetation.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this Principle.</p>
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Methodology Astron Environmental (2007a)

Astron Environmental (2007b)
Bamford Consulting Ecologists (2004)
Kendrick and Mckenzie (2001)
GIS Database:
- Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00
- Pastoral Leases -DOLA 10/01- IBRA
- Pre European Vegetation DA 01/01

(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

According to databases available to DoIR (GIS Database), there are no known records of fauna of conservation significance within 15 kilometres of the application area.

Bamford Consulting Ecologists (2004) conducted a fauna desktop survey for the Indee Gold Project area. Information on fauna was drawn from the WA museum FaunaBase, the threatened fauna database maintained by the Department of Environment and Conservation (DEC) for the region 20° 45' to 21°30'S and 118°45' to 119°45'E, and the Birds Australia Atlas database (Bamford Consulting Ecologists, 2004).

The following information was drawn from the desktop survey:

- No fish species of conservation significance are expected in the project area.
- Impacts on frog species are likely to be minimal.
- The reptile fauna of the project area is likely to be rich, with as many as 80 species likely to be present. Several reptile species of conservation significance that may be present are: the Pilbara Olive Python *Morelia olivacea barroni*, a Skink *Ctenotus nigrilineatus*, a Skink *Lerista quadrivincula*, and the Blind snake *Ramphotyphlops ganei*.
- Because of the mobility of birds and the broadly similar vegetation structure (hummock grassland) across the project area, most bird species are likely to be encountered anywhere within the Indee Gold Project site. Several species of conservation significance that may be present are: the Peregrine Falcon, the Night Parrot, the Grey Falcon, the Australian Bustard, and the Bush Stone-curlew.
- A number of the mammal species recorded or expected within the project area of conservation significance are: the Orange Leaf-nosed Bat, the Pebble-mound Mouse, the Long-tailed Dunnart, the Spectacled Hare-Wallaby, and the Ghost Bat.

A reconnaissance survey was then undertaken during the 2nd and 3rd of November in 2005 by Outback Ecology Services. Information collected, combined with the results of the desktop survey enabled the below assessment of the likelihood of various threatened fauna species to occur within the application area.

The Pilbara Olive Python *Liasis olivaceus barroni* (Schedule 1, fauna that is rare or likely to become extinct, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') prefers deep gorges and water holes in the ranges of the Pilbara region (Department of the Environment and Water Resources, 2007a). Radio-telemetry has shown that individuals are usually in close proximity to water and rock outcrops (Department of the Environment and Water Resources, 2007a). Due to the lack of suitable habitat within the application area, this species is unlikely to be present (Bamford Consulting Ecologists, 2004; Outback Ecology Services, 2005).

The Skink *Ctenotus nigrilineatus* (listed by the DEC as Priority 1, taxa with few, poorly known populations on threatened lands) is typically found in Spinifex growing on calcrete along creeklines or at the base of granite outcrops (Bamford Consulting Ecologists, 2004). It is currently known only from Woodstock Station, about 100 kilometres east of the application area, and is unlikely to be affected by the proposed clearing (Bamford Consulting Ecologists, 2004).

The Skink *Lerista quadrivincula* (listed by the DEC as Priority 1, taxa with few, poorly known populations on threatened lands) is a poorly known species recorded only from near Karratha homestead, in habitats described as coastal plains (Bamford Consulting Ecologists, 2004). It is therefore unlikely that this species would occur near or within the application area.

The Blind snake *Ramphotyphlops ganei* (listed by the DEC as Priority 1, taxa with few, poorly known populations on threatened lands) is known from few specimens (Bamford Consulting Ecologists, 2004). Its ecological preferences are not clear, although it has been collected from *Triodia* over granite along creeklines (Outback Ecology Services, 2005). Due to the lack of watercourses within the application area, it is unlikely that the species will be affected by the proposal.

The Peregrine Falcon *Falco peregrinus* (Schedule 4, other specially protected fauna, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006'), is a wide ranging bird that has little habitat specificity apart from an affinity with cliffs, tall trees for nesting, and water (Pizzey & Knight, 1997). Given the lack of cliffs, tall trees or perennial watercourses within the application area, the proposal is unlikely to impact the conservation status of this species.

The Night Parrot *Pezoporus occidentalis* (Schedule 1, fauna that is rare or likely to become extinct, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') is an enigmatic species about which little is known, but it has been recorded in the Pilbara historically and is sometimes associated with Spinifex grassland

(Outback Ecology Services, 2005). Although it has been associated with grasslands in the past, its preferred habitat appears to be samphire flats and saltbush associates with salt lake systems, or freshwater pools (Outback Ecology Services, 2005). These habitats do not occur over the project area (Outback Ecology Services, 2005). It is unlikely that the conservation status of this species will be detrimentally affected by the proposal.

The Grey Falcon *Falco hypoleucos* (listed by the DEC as Priority 4, taxa in need of monitoring) is a wide ranging bird known to nest along watercourses in tall *Eucalyptus camaldulensis* (Garnett & Crowley, 2000). Due to the lack of perennial watercourses, and the lack of *E. camaldulensis*, the Grey Falcon is not likely to be affected by the proposed clearing.

The Australian Bustard *Ardeotis australis* (listed by the DEC as Priority 4, taxa in need of monitoring) prefers habitats of open sandplains, and water-courses (Bamford Consulting Ecologists, 2004). Two birds were observed during the reconnaissance survey approximately 10 kilometres east of the application area (Outback Ecology Services, 2005). However, due to the lack of suitable habitat within the application area, the proposed clearing is unlikely to affect the conservation status of this species.

The Bush Stone-curlew *Burhinus grallarius* (listed by the DEC as Priority 4, taxa in need of monitoring) is likely to be present in areas of acacia shrubland, particularly close to watercourses (Bamford Consulting Ecologists, 2004). The species also inhabits lightly timbered open woodlands (Pizzey and Knight, 1997). The species may occur within the application area but it is not likely to be dependent upon the vegetation within the application area for its continued existence in the local area.

The Orange Leaf-nosed Bat *Rhinonictis aurantius* (Schedule 1, fauna that is rare or likely to become extinct, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') known colonies in the Pilbara occupy abandoned, deep and partially flooded mines that trap pockets of warm, humid air in the mine's constant temperature zone (Department of the Environment and Water Resources, 2007b). No mine shafts are known from the Indee Gold lease area (Outback Ecology Services, 2005). Due to the restrictive roosting requirements of the Orange Leaf-nosed Bat, and the lack of suitable habitat, it is unlikely that the proposed clearing will impact the conservation status of this species.

The Pebble-mound Mouse *Pseudomys chapmani* (listed by the DEC as Priority 4, taxa in need of monitoring) occurs on skeletal soils containing an abundance of small pebbles, predominantly around foot-slopes as well as in calcrete habitats (Bamford Consulting Ecologists, 2004). The species builds its mounds on foothills and rocky slopes where the surface of the ground is carpeted with small rocks (Bamford Consulting Ecologists, 2004). Inactive and active mounds of this species have been reported from the Indee Gold lease area (Bamford Consulting Ecologists, 2004); however, the application area itself is unlikely to support habitats suitable for this species.

The Long-tailed Dunnart *Sminthopsis longicaudata* (listed by the DEC as Priority 4, taxa in need of monitoring) is associated with rocky areas with a scattered distribution from the Pilbara and across parts of inland Western Australia (Bamford Consulting Ecologists, 2004). Although the low, rocky hills in the south of the Indee Gold lease area may be suitable for this species, the proposed clearing is unlikely to affect the conservation status of this species.

The Spectacled Hare-Wallaby *Lagorchestes conspicillatus leichardti* (listed by the DEC as Priority 3, taxa with several, poorly known populations, some on conservation lands) favours tall, dense spinifex (*Triodia* sp) close to watercourses (Bamford Consulting Ecologists, 2004). A population is known from the general region of the project area, but is believed to be declining due to extensive fires and predation by feral cats (Bamford Consulting Ecologists, 2004). There may be some suitable habitat along water-courses in the Indee Gold lease area, but frequent fires may have led to the disappearance of the species in the region (Bamford Consulting Ecologists, 2004).

The Ghost Bat *Macroderma gigas* (listed by the DEC as Priority 4, taxa in need of monitoring) roosts in caves and old mine shafts (Bamford Consulting Ecologists, 2004). The Ghost bat is likely to occur in the region (Bamford Consulting Ecologists, 2004), but as there are no known caves or abandoned mines within the application areas, the likelihood of them roosting within the proposed clearing area is very low.

After a review of threatened fauna that may potentially occur within the application area, it was found that the Pebble-mound Mouse, the Australian Bustard and the Long-tailed Dunnart may occur near the application area, however, the application area itself is unlikely to provide suitable habitat for these species. No habitat types located within the application area are restricted; they are regionally broad and extensive. It is not likely that fauna species are dependent upon the vegetation within the application area for their continued existence.

Within the application area, a long fire history combined with grazing pressure has resulted in seral vegetation, dominated by a mosaic of fire resistant or fire encouraged tree and shrub species over areas of annual heath (Astron Environmental, 2007a). Reduced shelter from frequent burns may also lead to greater impacts on ground fauna from introduced predators (Outback Ecology Services, 2005).

Opus Exploration has committed to additional vegetation surveys and establishing monitoring sites to cover the full extent of the area affected by the discharge within drainage zone (Aquaterra, 2007b). Monitoring will be of plant health and condition, and potential weed infestation, by a suitably qualified botanist. Monitoring will occur within 3 weeks of the commencement of the discharge, then monthly for the first six months of the discharge,

and then at least bi-monthly for the remaining period of the discharge. Should the monitoring of the initial discharge area indicate that vegetation health is showing significant signs of deterioration, Opus Exploration commits to developing and implementing a post-discharge monitoring and rehabilitation program (Aquaterra, 2007b). Deterioration of vegetation health will be determined based on the professional judgement of a suitably qualified botanist (Aquaterra, 2007b). Management and monitoring of the vegetation should minimise the overall degradation of the application area and aid in maintaining potential fauna habitats.

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

Methodology Aquaterra (2007b)
Astron Environmental (2007a)
Bamford Consulting Ecologists (2004)
Department of the Environment and Water Resources (2007a)
Department of the Environment and Water Resources (2007b)
Garnett & Crowley (2000)
Outback Ecology Services (2005)
Pizzey & Knight (1997)
GIS Database:
- Threatened Fauna - CALM 30/9/05
- Pre European Vegetation DA 01/01

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

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

A search of the available database (GIS Database) indicates that no threatened flora species are known to occur within a 140 kilometre radius of the application area. The nearest recorded Declared Rare Flora (DRF) (*Lepidium catapycnon*) is located approximately 153 kilometres south of the application area (GIS Database).

During April and on 3 September 2007, Astron Environmental surveyed the application area to collect baseline information pertaining to the vegetation and flora that occur within the boundaries of the proposed water discharge area (Astron Environmental, 2007a; Astron Environmental, 2007b). The field survey involved walking the entire length and width of the envisaged discharge area – initially to establish habitat/vegetation types and again to record data from the different vegetation types that were identified (Astron Environmental, 2007a; Astron Environmental, 2007b). No flora species which have been declared as Rare Flora, pursuant to Subsection 2 of Section 23F of the *Wildlife Conservation Act 1950* were located in the surveyed area (Astron Environmental, 2007a; Astron Environmental, 2007b). No Priority Flora, as listed on the Department of Environment and Conservation Priority Flora List, 2006, were found during the survey (Astron Environmental, 2007a; Astron Environmental, 2007b).

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

Methodology Astron Environmental (2007a)
Astron Environmental (2007b)
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 (TECs) located in the vicinity of the application area, or within the application area itself (GIS Database).

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

Methodology Kendrick & McKenzie (2001)
GIS Database:
- Threatened Ecological Communities CALM 12/04/05

(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 vegetation proposed to be cleared has been mapped as Beard vegetation association 93, Hummock grasslands, shrub steppe; kanji over soft Spinifex (GIS Database). According to Shepherd *et al.* (2001), approximately 3,042,082 hectares or 100% of Beard vegetation association 93 remains for the Pilbara Bioregion.

Although the percentage of Beard vegetation association 93 in reserves or DEC managed land is only 0.4% in the Pilbara IBRA Bioregion, the regional extent is approximately 100% uncleared (Shepherd *et al.* (2001), and

therefore, the proposed clearing does not pose a threat to the conservation of this vegetation association.

The area proposed to be cleared does not represent a significant remnant of native vegetation in an extensively cleared area.

	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					
93	3,044,326	3,044,267	~100	Least Concern	0.4
Beard veg assoc. – Bioregion					
93	3,042,131	3,042,082	~100	Least Concern	0.4

* Shepherd *et al.* (2001) updated 2005

** 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 at variance to this Principle.

Methodology Department of Natural Resources and Environment (2002)
Shepherd *et al.* (2001)
GIS Database:
- 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

Opus Exploration is proposing to dispose of excess water produced through mine dewatering as a controlled surface discharge to a drainage path located approximately 450 metres south of the Camel Pit (Aquaterra, 2007b). The discharged water will then flow into the application area, which is located on a wash plain downstream of the drain (Aquaterra, 2007b). The proposal is likely to encourage the growth of vegetation usually associated with watercourses or wetlands (Astron Environmental, 2007a).

According to available databases (GIS Database) there are no watercourses or drainage lines recorded within the application area. There are several minor, non perennial drainage lines 200 – 800 metres north of the application area and a major, non perennial watercourse approximately six kilometres east of the permit area (GIS Database). It is unlikely that the proposal will affect vegetation growing in association with the above mentioned watercourses.

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

As there are no known wetlands or watercourses within the application area, it is unlikely that vegetation growing in, or in association with these environments will be affected. Additionally, the proposal is likely to enhance vegetation growth at the discharge area as a result of the dewatering activities.

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

Methodology Astron Environmental (2007a)
Aquaterra (2007b)
GIS Database:

- Geodata, Lakes - GA 28/06/02
- Hydrography, Linear - DoE 1/2/04
- Potential Groundwater Dependant Ecosystems - DOE 2004
- Rivers 250K - GA

(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 was surveyed by the Department of Agriculture and Food (DAFWA) and has been mapped predominantly as the Uaroo Land Systems (GIS Database). Land within the application area can be described as broad sandy surfaced plains with hard and soft Spinifex grasslands (Payne and Tille, 1992). This system is generally not susceptible to erosion or significant pasture degradation, however, there is some risk of wind erosion following burning (Payne and Tille, 1992). The proposed discharge of excess water is likely to decrease the risk of wind erosion due to the saturated nature of the soil.

Seven broad habitats have been described for the Indee Gold lease area (Astron Environmental, 2007a). The application area lies within one of these, namely:

- Dt: Drainage plains or tracts: can be extensive from sheet flow, with reddish brown sandy clay loam (Astron Environmental, 2007a).

Opus Exploration is proposing to dispose of excess water produced through mine dewatering as a controlled surface discharge to a drainage path located approximately 450 metres south of the Camel Pit (Aquaterra, 2007b). The velocity of flow at the discharge point has the potential to cause erosion. Potential impacts on vegetation and soils due to erosion in the immediate vicinity of the discharge will be managed through the construction of a flow dissipation structure. A flow dissipation structure has been designed to minimise erosion through discharging the flow through a manifold at a maximum flow rate of 100L/s. The manifold will comprise a 20 metre T-section of 250mm HDPE pipe with discharge holes at 1 metre intervals. The discharge structure will be underlain by geofabric and covered in a layer of coarse rock material (Aquaterra, 2007b).

Opus Exploration also commits to remedial work involving stabilisation of areas by placement of rip-rap at any points showing signs of significant erosion (Aquaterra, 2007b). The company will also visually monitor downstream of discharge point/s during vegetation health assessments, for signs of erosion. The monitoring will be conducted monthly during the first three months of discharge and then bi-monthly for the remainder of the discharge period (Aquaterra, 2007b).

Due to the low susceptibility to erosion for the Uaroo Land System, and Opus Explorations commitment to manage and monitor erosion, the proposal is unlikely to cause appreciable land degradation.

DAFWA (2007) has advised that based on available mapping, the land in question appears to be reasonably resilient. The concerns in relation to the need for site rehabilitation and also careful management of run-off water are real (DAFWA, 2007). However, provided these are addressed as conditions of approval, the proposed clearing should not be at variance with principle (g) and may proceed (DAFWA, 2007).

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

Methodology Aquaterra (2007b)
Astron Environmental (2007a)
DAFWA (2007)
Payne and Tille (1992)
GIS Database:
- Rangeland Land System Mapping - DA

(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 nearest recorded conservation area, the Mungaroona Range Nature Reserve, is located approximately 43 kilometres south of the application area (GIS Database). Given the distance between the conservation reserve and the application area, it is unlikely that the environmental values of the conservation area will be compromised by the proposed clearing.

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

Methodology GIS Database:
- CALM Managed Lands and Waters CALM 1/7/05

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

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

The application area is not located within a Public Drinking Water Source Area (PDWSA), and the nearest PDWSA is approximately 15 kilometres east of the application area (GIS Database).

The application area experiences approximately 400 millimetres annual rainfall and average annual evaporation rates of 3,400 – 3,600 millimetres (GIS Database). Due to relatively low rainfall and high evaporation rates, there is likely to be little natural surface water within the application area.

There are no permanent creeks in the application area (GIS Database), so siltation of a watercourse is considered highly unlikely.

Groundwater within the area under application is brackish at between 1000 – 3000 milligrams per litre of Total Dissolved Solids (TDS) and lies approximately 30 to 40 metres below the surface (GIS Database; Aquaterra, 2007a). The discharge of excess water at 3000mg/L TDS is unlikely to deteriorate the quality of ground water.

Additionally, no adverse impacts on groundwater quantity and/or quality are likely to occur as a result of the proposed discharge of water due to the following factors:

- discharge water quality is relatively fresh (<3000mg/L TDS)
- no significant aquifer systems underlie the discharge area, and
- no other users dependent of the groundwater source are in the vicinity of the discharge (Aquaterra, 2007b).

Opus Exploration has committed to restricting discharged water quality to 3000mg/L TDS or below (Aquaterra, 2007b). Monitoring of Salinity and pH will be conducted weekly to ensure that the discharged water quality remains below 3000mg/L TDS and pH remains between 6.5 and 7.5 (Aquaterra, 2007b).

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

Methodology Aquaterra (2007a)
Aquaterra (2007b)
GIS Database:
- Evaporation Isopleths - BOM 09/98
- Geodata, Lakes - GA 28/06/02
- Groundwater Salinity, Statewide - DoW Properties
- Hydrography, Linear - DoE 1/2/04
- Public Drinking Water Source Areas DoE 7/2/06
- Rivers 250K - GA

(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

Opus Exploration is proposing to dispose of excess water produced through mine dewatering as a controlled surface discharge to a drainage path located approximately 450 metres south of the Camel Pit (Aquaterra, 2007b). The water will flow in a westerly direction through intermittent drainage channels and wash areas towards a gap in the ridge to the northwest where it will gradually continue to dissipate by seepage and evaporation (Aquaterra, 2007b).

The application area is located in the Arid Sub Tropical Climatic Zone, which is part of the Port Hedland Meteorological District (Aquaterra, 2007b). As the area experiences an average annual rainfall of 400mm and average annual evaporation rates of 3,400 – 3,600mm (GIS Database), there is likely to be little natural surface water within the application area or surrounds, and recharge to groundwater would be low.

Advice received on 10 September, 2007 to the Assessing Officer from DoW was that it is anticipated that there will be little ponding due to high evaporation rates, and that the proposal is unlikely to increase the incidence of flooding (DoW, 2007).

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

Methodology DoW (2007)
Aquaterra (2007b)
GIS Database:
- Evaporation Isopleths - BOM 09/98
- Hydrography, Linear - DoE 1/2/04
- Rainfall, Mean Annual - BOM 30/09/01
- Rivers 250K - GA

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

Comments

There is one Native Title claim over the area under application; WC99_003. 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 (ie. 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 known Aboriginal Sites of Significance located within the clearing permit 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.

On 14 September 2007, a submission was received from the Town of Port Hedland stating that they had no objections to the proposed clearing application (Town of Port Hedland, 2007).

The proposed dewatering for Opus Exploration Pty Ltd is subject to the *Mining Act 1978* approval process. A mining proposal must be approved by DoIR prior to the commencement of the proposed works.

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

Methodology Town of Port Hedland (2007)
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 Exploration	Mechanical Removal	40	<p>The proposal has been assessed against the Clearing Principles, and is considered to be not at variance to Principle (e), not likely to be at variance to Principles (a), (c), (d), (f), (g), (h), (i) and (j), and may be at variance to principles (b).</p> <p>It is recommended that conditions be imposed on the permit in relation to erosion control, vegetation monitoring, weed management, as well as reporting on any clearing undertaken during the life of the permit.</p>

5. References

- Aquaterra (2007a) Stage One Indee Gold Mine, Dewatering Investigations. Prepared for Range River Gold Pty Ltd. Unpublished Report dated April 2007.
- Aquaterra (2007b) Indee Gold Project - Stage 1, Dewatering Discharge Options Evaluation and Environmental Impact Assessment. Prepared for Opus Exploration Pty Ltd. Unpublished Report dated April 2007.
- Astron Environmental (2007a) Indee Gold Project Water Discharge Vegetation Assessment Monitoring. Prepared for Range River Gold Pty Ltd. Unpublished Report dated April 2007.
- Astron Environmental (2007b) Indee Gold Project Baseline Vegetation and Flora Survey Along Envisaged Water Discharge Route. Prepared for Range River Gold Pty Ltd. Unpublished Report dated September 2007.
- Bamford Consulting Ecologists (2004) Indee Gold Project Desktop Assessment of Fauna Values. Prepared for Range River Gold Pty Ltd. Unpublished Report dated April 2004.
- 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.
- Department of the Environment and Water Resources (2007a). *Liasis olivaceus barroni* in Species Profile and Threats Database, Department of the Environment and Water Resources, Canberra. Available from: <http://www.environment.gov.au/sprat>
- Department of the Environment and Water Resources (2007b). *Rhinonictis aurantius* in Action Plan for Australian Bats, Department of the Environment and Water Resources, Canberra. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/action/marsupials/index.html>
- Department of Water (2007) Advice for land clearing application regarding incidence of flooding. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources, received 10 September 2007. Department of Water.
- Department of Agriculture and Food (2007) Advice for land clearing application regarding land degradation. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources, received 29 October 2007. Department of Agriculture and Food.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Outback Ecology Services (2005) Fauna Reconnaissance Survey - Habitat Assessment. Prepared for Range River Gold Pty Ltd. Unpublished Report dated November 2005.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status.

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.