



1. Application details

1.1. Permit application details

Permit application No.: 1851/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Iluka Resources Ltd

1.3. Property details

Property: State Agreement Act, Mining Lease 267SA (AM70/267)
Local Government Area: Shire of Carnamah
Colloquial name: Adamson North

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
25		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
<p>Beard vegetation associations have been mapped at a 1:250,000 scale for the whole of Western Australia. Three Beard vegetation associations are located within the areas proposed to be cleared. These are:</p> <ul style="list-style-type: none"> 379: Shrublands; scrub-heath on lateritic sandplain in the central Geraldton Sandplain Region. 378: Shrublands; scrub-heath with scattered <i>Banksia</i> spp, <i>Eucalyptus todtiana</i> & <i>Xylomelum angustifolium</i> on deep sandy flats in the Geraldton Sandplain Region. 49: Shrublands; mixed heath. <p>Vegetation association 379 is the predominant vegetation type located in the application area.</p> <p>Detailed surveys have been conducted over the proposed clearing area. Surveys were conducted in July and November 2005, which aimed to map the plant communities present within the proposed clearing area (Woodman Environmental Consulting, 2006). The surveys identified a total of fifteen plant communities in the Adamson Survey Area, four of which are present in the Adamson North application area (Woodman Environmental Consulting, 2006).</p> <ul style="list-style-type: none"> CL: Areas completely cleared of native vegetation for mining or agriculture. S12: Low Shrubland dominated by <i>Banksia leptophylla</i>, with emergent <i>Xylomelum angustifolium</i>, <i>Banksia attenuata</i> and <i>Banksia candolleana</i> on grey sand. S17: Low shrubland dominated by myrtaceous species on grey sand in a drainage line. T3: Thicket of <i>Melaleuca radula</i>, <i>Calothamnus quadrifidus</i> and <i>Scholtzia laxiflora</i> on grey silty sand in a drainage line. <p>The predominant vegetation community in the area proposed to be cleared is CL (Woodman Environmental Consulting, 2006).</p> <p>The Adamson North area covers approximately 580 hectares which consists of:</p> <ul style="list-style-type: none"> 397 hectares of pasture rehabilitation completed between 2000 and 2006; 	<p>Iluka Resources Limited (from now on referred to as Iluka Resources) is proposing to mine and re-mine sections within the Adamson North mine at Eneabba. The proposed clearing is for the purpose of mining mineral sands.</p> <p>The application area, Adamson North, is located approximately six kilometres south along the Brand Highway from Eneabba, within the Shire of Carnamah.</p> <p>The method of mining for the Adamson North application area will be the same as existing Eneabba operations. Topsoil will be removed and placed on rehabilitation areas, or stockpiled for later use. Rehabilitation topsoil and native vegetation topsoils will be stockpiled separately. Overburden will be removed and replaced directly into mining voids or stockpiled for later placement. Sand and clay tails will be</p>	<p>Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).</p> <p>To</p> <p>Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).</p>	<p>The vegetation condition (based on the Keighery 1994 scale) is based on information provided by Iluka Resources Ltd (2007), aerial and ground photography, and site visits.</p> <p>Disturbance from previous agriculture and mining is evident within the Adamson North application area. Mining has also recently occurred within the Adamson A and Adamson B adjoining mine sites (Site visit May 2007).</p> <p>The Adamson North area was mined and areas were rehabilitated back to pasture in the early 1980's. Some areas were revegetated with foreign farm trees such as <i>Eucalyptus</i> and tagasaste to provide buffers and fodder, respectively. Some areas remain open (unrehabilitated) and these include roads required for long-term access, tailings areas still being utilised and topsoil stockpiles (Iluka Resources, 2007).</p> <p>Cleared vegetation (farm trees and native vegetation) will be returned to native vegetation following mining using existing rehabilitation procedures (Iluka Resources, 2007).</p> <p>No evidence of dieback affected vegetation occurs within or</p>

- 19 hectares of farm trees planted as buffers and fodder;
- 6 hectares of native vegetation planted along a rehabilitated drainage line in the southern section of the area;
- 43 hectares of open (unrehabilitated) land that includes roads required for long-term access, tailings disposal, and stockpiles of ore and topsoil; and
- 110 hectares of previously unmined agricultural land (Iluka Resources, 2007).

returned to the mining void along the same pipe corridors that are used for ore transport (Iluka Resources, 2007).

adjacent to the proposed clearing area. Iluka Resources has a dieback management plan in place and is currently in the process of amending that plan following recent Department of Environment and Conservation (DEC) comments.

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

The application area is located in the Lesueur Sandplain GS3 Interim Biogeographic Regionalisation of Australia (IBRA) subregion (GIS Database). The biodiversity values of that subregion have been summarised by Desmond and Chant (2001). The area exhibits extremely high floristic endemism, with over 250 species of sandplain flora endemic to the subregion. The Lesueur Sandplain subregion is known Australia wide and internationally for its high floristic diversity and levels of endemism (Desmond and Chant, 2001).

Vegetation Surveys of the Adamson area (an area encompassing several of the Iluka Resources mine sites, including the application area) were conducted in July and November 2005 by Woodman Environmental Consulting. Fifteen separate plant communities were mapped for the Adamson area, four of which occur within the current application area (Woodman Environmental Consulting, 2006). During the 2005 surveys, two Declared Rare Flora (DRF) plant species were recorded within the proposal area, and twenty-four Priority flora species (Woodman Environmental Consulting, 2006).

Twelve DRF species have previously been recorded in the Eneabba region (GIS Database; Woodman Environmental Consulting, 2005), and twenty-five Priority species within ten kilometres of the application area (GIS Database). This suggests the vegetation within the application area and immediate surrounds is important for the maintenance of DRF and Priority species. However, the application area is predominantly rehabilitated pastoral land, which is unlikely to represent or support an area of high biodiversity.

Within the Adamson North application area, there are 422 hectares of previous rehabilitation. The rehabilitation ranges in age from nine to twenty-two years, with the majority completed between 1996 and 2004. However, the rehabilitation comprises predominantly of pasture, with small pockets of farm trees and native vegetation (Iluka Resources, 2007).

An equivalent area to the six hectares of native vegetation rehabilitation and the nineteen hectares of farm tree plantings will be rehabilitated to native vegetation along a drainage line (Iluka Resources, 2007), which will help to mitigate impacts on biodiversity and provide a net environmental benefit.

From previous studies and known records, 30 species of vertebrates of conservation significance may occur in the Eneabba area. This includes two reptiles, twenty-seven birds and a mammal species (Bamford and Bancroft, 2006).

Although the Lesueur Sandplain IBRA subregion comprises of a high level of biodiversity, the application area itself consists of predominantly rehabilitated pastoral land, and therefore does not represent or contain environments typical of the IBRA subregion.

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

Methodology

Bamford and Bancroft (2006)
 Desmond and Chant (2001)
 Iluka Resources (2007)
 Woodman Environmental Consulting (2005)
 Woodman Environmental Consulting (2006)
 GIS Database:
 Interim Biogeographic Regionalisation of Australia (subregions) - EA 18/10/00
 Declared Rare and Priority Flora List - CALM 01/07/05

(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 review of the fauna information that has been gained from previous studies at Iluka Resources operations at Eneabba was undertaken in 2005 (Bamford and Bancroft, 2006). This review included a one day site inspection that occurred in October 2005. Trappings and surveys for vertebrate species have occurred at Eneabba since

1981, and studies focussing on invertebrates as an indicator of rehabilitation success since 1980. The Eneabba area has a long history of fauna investigations and the vertebrate fauna of the area has been well documented from various studies carried out as part of Iluka Resources operations or environmental approval requirements (Bamford and Bancroft, 2006). Similarly the studies of the invertebrate fauna in the area are among the most extensive in Western Australia.

From previous studies and known records of fauna of conservation significance, 30 species of vertebrates that are of conservation significance may occur in the Eneabba area. This includes two reptiles, twenty-seven birds and one mammal species. Many of the 30 species of fauna are unlikely to be present or only present as vagrants across the Eneabba area and are not expected to be reliant on the application areas. Eight of the conservation significant birds are waterbirds, and given the lack of wetland or aquatic habitats within the application area, it is unlikely that the proposal will significantly impact these species (Iluka Resources, 2007).

Conservation significant bird species that may be impacted by the proposed clearing are: the Malleefowl; the Peregrine Falcon; the Grey Falcon; the Carnaby's Black Cockatoo; the Major Mitchell's Cockatoo; the Fork-tailed Swift; the Rainbow Bee-eater; the Rufous Fieldwren (western wheatbelt); the White-browed Babbler and the Crested Bellbird. In addition, two Python species, and two Specially Protected and/or Priority fauna species may be impacted by the proposed clearing. These are the Woma Python, the Carpet Python, the Shield-Backed Trapdoor Spider and the Scorpion Fly (Iluka Resources, 2007).

The Malleefowl *Leipoa ocellata* (Schedule 1, fauna that is rare or likely to become extinct, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006'). Malleefowl are largely confined to arid and semi-arid woodland that is dominated by mallee eucalypts on sandy soils, however, they can occur in habitats of acacia, paperbark, she-oak and other scrubs as well as eucalypt woodland and coastal heaths with an abundant layer of leaf litter for use in nest mounds (Garnett and Crowley, 2000). No active or inactive Malleefowl mounds were recorded in the field survey report (Iluka Resources, 2007), and on that basis it is unlikely that the birds occur in the area.

The Peregrine Falcon *Falco peregrinus* (Schedule 4, other specially protected fauna, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006'), may occur sporadically in the vicinity of the Eneabba mine, but is unlikely to be solely reliant on the proposed clearing areas (Iluka Resource, 2007). The species is a wide ranging bird, has little habitat specificity apart from an affinity with cliffs, tall trees for nesting and water (Pizzey and Knight, 1997). Given the lack of cliffs, tall trees or perennial watercourses within the project area, the proposal is unlikely to affect this species.

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

The Carnaby's Black Cockatoo *Calyptrorhynchus latirostris* (Schedule 1, fauna that is rare or likely to become extinct, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') has been recorded in the vicinity of the proposal area (Iluka Resources, 2007; WA Museum, 2003). Bamford and Bancroft (2006) have stated that there appears to be no suitable breeding habitat either on the Iluka leases or sufficiently close for the breeding birds to rely on the lease for foraging. There are large areas of suitable foraging habitat in the local area and it is unlikely that the clearing of the application area would significantly impact the species conservation given the already degraded nature of the application area. Although the species may at times forage within the application area, the food source will regenerate and it is expected that the clearing will not result in a long-term loss of foraging habitat.

The western subspecies of Major Mitchell's Cockatoo *Cacatua leadbeateri* (Schedule 4, other specially protected fauna, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') is classified as 'Least Concern', and its main habitat requirement is suitable nesting hollows (Garnett and Crowley, 2000). As the dominant vegetation within the clearing area is rehabilitated pastoral land, which does not include tree species that form hollows (*Eucalyptus salmonophloia*, *E. wandoo*, *E. camaldulensis*), the proposal is not likely to affect this species.

The Fork-tailed Swift *Apus pacificus* (JAMBA, CAMBA, the Bonn Convention, and Schedule 3, Birds protected under an international agreement, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') is reported to roost on cliffs and large trees, but it prefers open country where it is an aerial feeder rarely landing and is known to spend nights without landing (Pizzey and Knight, 1997). The species may forage or pass over the Iluka Eneabba Lease, but it is unlikely to be a permanent resident (Bamford and Bancroft, 2006).

The Rainbow Bee-eater *Merops ornatus* (JAMBA, CAMBA, the Bonn Convention, and Schedule 3, Birds protected under an international agreement, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') is a common breeding resident in northern Australia and a summer breeding migrant to southeast and southwest Australia (Pizzey and Knight, 1997). The Rainbow Bee-eater is an opportunistic species known to inhabit a wide range of habitats, where it prefers to nest in sandy ground, banks and cuttings (Pizzey and Knight, 1997). The species is an aerial feeder and is not likely to be directly impacted (Bamford and Bancroft, 2006).

The Rufous Fieldwren *Calamanthus campestris montanellus* (listed by DEC as Priority 4, taxa in need of monitoring) is listed by DEC as a priority sub-species and is not afforded special protection under any Acts. It is

a species that inhabits very low heath, has previously been recorded at Eneabba, and is likely to be a permanent and widespread resident species. However, due to the degraded nature of the application area, and the lack of suitable habitat for the species, the proposed application is unlikely to affect the Rufous Fieldwren.

The White-browed babbler *Pomatostomus superciliosus ashbyi* (listed by DEC as Priority 4, taxa in need of monitoring) favours eucalypt forests and woodlands (Garnett and Crowley, 2000). The main threat facing this species is large scale land clearing for agriculture, leading to habitat fragmentation (Garnett and Crowley, 2000). Given the large scale clearing that has already occurred for agriculture and mining within Adamson North, and the subsequent lack of suitable habitat, the proposed clearing is unlikely to affect this species.

The Crested Bellbird (southern) *Oreoica gutturalis* (listed by DEC as Priority 4, taxa in need of monitoring) favours the shrub-layer of eucalypt woodland, mallee, acacia shrubland, *Triodia* hummock grassland, saltbush and heath (Garnett and Crowley, 2000). The main threat facing this species is large scale land clearing for agriculture, leading to habitat fragmentation. Given the large scale clearing that has already occurred for agriculture and mining within Adamson North, and the subsequent lack of suitable habitat, the proposed clearing is unlikely to affect this species.

The South-Western Carpet Python *Morelia spilota imbricata* (Schedule 4, other specially protected fauna, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') tends to inhabit temperate climatic areas with good winter rains and dry summers, and has been recorded in semi-arid coastal and inland habitats, Banksia woodlands, eucalypt woodlands and grasslands (WA Museum, 2003).

The Woma Python *Aspidites ramsayi* (listed by DEC as Priority 1, taxa with few, poorly known populations on threatened lands) is found in the arid zones of Western Australia. It tends to favour open myrtaceous heath on sandplains, and dunefields dominated by spinifex (*Triodia* spp.) (WA Museum, 2003).

While some of the vegetation proposed to be cleared may be suitable habitat for either python species, the majority of the application area is degraded pastoral land, so the proposed clearing is unlikely to result in significant impacts to either species. Furthermore, the Carpet Python subspecies is highly ecologically flexible and tends to adapt to whatever habitats are available (Pearson *et al.*, 2005).

Iluka Resources review of historic pit trapping data from detailed invertebrate surveys conducted at Eneabba over the last 25 years in both native vegetation and rehabilitation areas yielded no recordings of either the Shield-backed Trapdoor Spider *Idiosoma nigrum* (Schedule 1, fauna that is rare or likely to become extinct, 'Wildlife Conservation (Specially Protected Fauna) Notice, 2006') or the Scorpion Fly *Mecopteran Austromeropé poultoni* (listed by DEC as Priority 2, taxa with few, poorly known populations on conservation lands) (Iluka Resources, 2007).

Previous advice provided by DEC (formerly CALM) for the nearby Adamson A proposal stated that:

- It is unlikely that the Shield-Backed Trapdoor Spider and the Scorpion Fly would be significantly impacted as a consequence of the proposed clearing based on the habitat availability in the local area, size and extent of proposal and available knowledge of these taxa in the local area (CALM 2005).

Many of the fauna listed above are unlikely to be present or only present as vagrants across the Eneabba area, and are not expected to be reliant on the Adamson North area. Furthermore, fauna habitats are unlikely to be affected, as the area mainly comprises of cleared agricultural land, foreign trees as buffers, or fodder that holds little value for native fauna.

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

Methodology Bamford and Bancroft (2006)
CALM (2005)
Garnett and Crowley (2000)
Iluka Resources (2007)
Pearson *et al.* (2005)
Pizzey and Knight (1997)
WA Museum (2003)

(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

Vegetation Surveys of the Iluka minesites and surrounding areas were conducted in July and November 2005, covering 846 hectares, which encompassed the current application areas. It was found that a total of 384 plant species belonging to 46 plant families occurred within the survey area (Woodman Environmental Consulting, 2006). Fifteen separate plant communities were mapped for the Adamson area, four of which occur within the current application area (Woodman Environmental Consulting, 2006). During the 2005 surveys, two Declared Rare Flora (DRF) plant species, and twenty-four Priority flora species were recorded (Woodman Environmental Consulting, 2006).

Twelve DRF species have previously been recorded in the Eneabba region (GIS Database; Woodman Environmental Consulting, 2005), and twenty-five Priority species within ten kilometres of the application area (GIS Database). This suggests the vegetation within the clearing area and immediate surrounds may support significant numbers of DRF and Priority species. However, the application area is predominantly rehabilitated pastoral land, which is unlikely to be necessary for the continued existence of rare flora.

The two DRF species known to occur in or adjacent to the Eneabba area are:

- *Eucalyptus johnsoniana*
- *Paracaleana dixonii* ms (Woodman Environmental Consulting, 2006).

The 24 Priority species recorded during the Adamson Vegetation Survey are:

- *Banksia micrantha* (P3)
- *Calytrix chrysantha* (P3)
- *Calytrix superba* (P3)
- *Comesperma acerosum* (P3)
- *Daviesia chapmanii* (P4)
- *Daviesia epiphyllum* (P3)
- *Desmoncladus elongatus* (P3)
- *Eucalyptus macrocarpa* subsp. *elachantha* (P4)
- *Georgeantha hexandra* ms (P4)
- *Grevillea rudis* (P4)
- *Hakea polyanthema* (P3)
- *Hemiandra* sp. Eneabba (H. Demarz 3687) (P1)
- *Isopogon tridens* (P3)
- *Lepidobolus quadratus* ms (P3)
- *Mesomelaena stygia* subsp. *deflexa* (P1)
- *Persoonia filiformis* (P2)
- *Persoonia rudis* (P3)
- *Pityrodia viscida* (P3)
- *Schoenus griffinianus* (P2)
- *Stachystemon axillaris* (P4)
- *Synaphea aephyysa* (P3)
- *Verticordia argentea* (P2)
- *Verticordia aurea* (P4)
- *Verticordia blepharophylla* (P2) (Woodman Environmental Consulting, 2006).

Within the Adamson North application area, no Declared Rare Flora (DRF) or Priority Flora were recorded (Iluka Resources, 2007). The Adamson North vegetation is dominated by farm trees (eucalyptus and pine trees) and fodder crops (tagasaste) planted as part of farming landcare practices during and after the historic mining in the area. The only native vegetation occurring within the proposed Adamson North mining area occurs along a rehabilitated drainage line running east-west across the southern extent of the area. The drainage line was rehabilitated in 1995 and 1996 and is located along the northern extent of the Adamson A mining area. The total area of the drainage line vegetation is approximately six hectares (Iluka Resources, 2007).

The majority of the area applied to clear is previously cleared agricultural land. Native vegetation within the rehabilitated drainage line will be impacted, however, the vegetation is unlikely to be significant and the species have demonstrated that they are able to return in rehabilitation (Iluka Resources, 2007).

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

Methodology Iluka Resources (2007)
Woodman Environmental Consulting (2005)
Woodman Environmental Consulting (2006)
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 Threatened Ecological Communities within the proposed Adamson North application area or within a 100 metre buffer (GIS Database; Iluka Resources, 2007).

The closest known Threatened Ecological Community (TEC) is the State listed type 72 Ferricrete floristic community (Rocky Springs type) located approximately eight kilometres southwest of the proposed clearing area (GIS Database; DEC, 2006).

Woodman Environmental Consulting (2006) states that no current or proposed TEC was observed during their

Adamson Vegetation Survey in 2005, which encompassed the proposed application area.

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

Methodology DEC (2006)
Woodman Environmental Consulting (2006)
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 may be at variance to this Principle

The application area is situated within the Geraldton Sandplain Bioregion and the Lesueur Sandplain subregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). Approximately 40.9% native vegetation cover remains within this subregion (Shepherd *et al.*, 2001). A similar percentage (38.7%) of native vegetation remains within the Shire of Carnamah (Shepherd *et al.*, 2001).

The vegetation associations proposed to be cleared are classified as Beard vegetation association 379 (Shrublands; scrub-heath on lateritic sandplain) 378 (Shrublands; scrub-heath with scattered *Banksia* spp, *Eucalyptus todtiana* & *Xylomelum angustifolium* on deep sandy flats) and 49 (Shrublands; mixed heath), but predominantly vegetation association 379 (GIS Database). Approximately 98,743 hectares or 26.7 % of Beard vegetation association 379 remains within the subregion (Shepherd *et al.*, 2001), and 20.7% within the State.

Based on the national Objective Targets for Biodiversity Conservation 2001-2005, the extent of vegetation type 379 left within the Lesueur Sandplain IBRA Subregion is classified as vulnerable.

	Pre-European	Current	Remaining	Conservation	% in reserves/CALM-
	area (ha) *	extent (ha) *	%*	Status**	managed land *
IBRA Region Geraldton Sandplains	3,136,277	1,324,440	42.2%	Depleted	35.5%
IBRA Subregion Lesueur Sandplain	1,171,804	478,987	40.9%	Depleted	41.4 %
Shire of Carnamah	290,750	112,511	38.7 %	Depleted	Not available
Beard vegetation Association (Subregion)					
- 379	370,097	98,743	26.7%	Vulnerable	18.7 %
- 378	90,932	58,543	64.4%	Least Concern	21.3%
- 49	33,141	12,273	37%	Depleted	22.2%

* Shepherd *et al.* (2001)

** Department of Natural Resources and Environment (2002)

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

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

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

The Adamson North vegetation is dominated by farm trees (eucalyptus and pine trees) and fodder crops (tagasaste) planted as part of farming landcare practices during and after the historic mining in the area. The only native vegetation occurring within the proposed Adamson North mining area occurs along a rehabilitated drainage line running east-west across the southern extent of the area. The drainage line was rehabilitated in 1995 and 1996 and is located along the northern extent of the Adamson A mining area. The total area of the drainage line vegetation is approximately six hectares. The clearing of six hectares of native vegetation rehabilitation and nineteen hectares of farm vegetation will have a negligible impact on the overall vegetation extent of the region.

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

Methodology Department of Natural Resources and Environment (2002)
Shepherd *et al.* (2001)
GIS Database:
Interim Biogeographic Regionalisation of Australia (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 at variance to this Principle**

According to available databases, a watercourse transects the southern section of the application area (GIS Database). It is described as a minor, non perennial watercourse (GIS Database). The proposal is to clear approximately six hectares of native vegetation along the drainage line.

The rehabilitated drainage line is part of a realigned natural drainage line which originates from the east and runs west across the Adamson North application area. This drainage line was re-established in 1996 and 1997 (Iluka Resources, 2007). The drainage line has not flowed on recent record and only displays minimal water following significant rainfall events. No wetlands are in or linked to this drainage line (Iluka Resources, 2007).

As there is a watercourse within the application area, the proposed clearing is at variance to this Principle.

However, it is considered that the removal of six hectares of rehabilitated vegetation along the drainage line will not be significant. Furthermore, an equivalent area to the six hectares of native vegetation rehabilitation and the nineteen hectares of farm tree plantings will be rehabilitated to native vegetation along the drainage line, which will help to mitigate impacts on biodiversity and provide a net environmental benefit.

Methodology Iluka Resources (2007)
GIS Database:
Evaporation Isopleths - BOM 09/98
Hydrography, linear - DOE 1/2/04
Mean Annual Rainfall Surface (1975-2003) - DOW

(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 consists of grey sand soils, and is subject to strong sea breezes in summer (Iluka Resources, 2006). Guidelines with regards to soil erosion caused by wind (Wells and King, 1989) indicate that the area has a capability class of IV, which allows clearing with wind protection. Wind erosion is the main land degradation risk associated with clearing on this land type (DAFWA, 2007). Careful planning will be required to avoid wind erosion problems at the site.

To minimise the potential for wind erosion as well as minimise the potential for dust issues to occur, the topsoil stockpiles and other open areas are routinely stabilised by Iluka Resources, using vegetation such as rye grass, native vegetation mulch, and glue on gravel. The process of clearing native vegetation starts with the cutting of the vegetation above ground level (native vegetation mulching) and leaving the plants root systems in place. Such a technique minimises the potential for wind erosion to occur. The mulched vegetation is then immediately used to cover recently reinstated areas and is an important component of the native vegetation rehabilitation process carried out on site (Iluka Resources, 2006).

The Department of Agriculture and Food Western Australia (DAFWA) provided land degradation advice for several previous clearing permit applications nearby to the current application: (South Tails (CPS 1704/1), Adamson A (CPS 716/1), Adamson B (CPS 1549/1), and the Mulching (CPS 1662/1) Clearing Permits). DAFWA concluded that the proposals were unlikely to be at variance with this principle for soil erosion, as the risk is manageable and the proposed rehabilitation program post mining has proven to be highly successful (DAFWA, 2006; DAFWA, 2007).

Iluka Resources currently implements a number of measures to manage water and erosion as part of their operations (Iluka Resources, 2005), and compliance under the *Mineral Sands (Eneabba) Agreement Act 1975*. Drainage mechanisms are put in place during operations and rehabilitation to control water flows (Iluka Resources, 2005).

As part of its reporting requirements under clause 8 of the *Mineral Sands (Eneabba) Agreement Act 1975*, Iluka Resources is required to submit detailed triennial reports that specifically address water quality, surface water discharge, rehabilitation plans and monitoring. Officers of the Department of Industry and Resources (DoIR), DEC and the Department of Water (DoW) inspect the operations at least once a year as a part of the Mineral Sands Agreement Rehabilitation Coordinating Committee (MSARCC) to review soil erosion and water

management issues.

A Dieback Management Plan exists for all Iluka Resources operations at Eneabba. A revised version of that document aiming to incorporate current best practices has been reviewed by DEC and has not been finalised at this stage. Two clearing permit conditions have been stipulated for this permit in view of the comments on the draft Dieback Management Plan provided by DEC to Iluka Resources.

Weed management is also part of the rehabilitation process on site and previous site visits by DoIR environmental officers do not indicate any serious issues in relation to weed or dieback management arising from current practices at the Eneabba operations.

As the mining and rehabilitation process includes wind erosion controls, drainage and water run-off controls, it is not foreseen that the proposed clearing will result in any significant land degradation.

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

Methodology DAFWA (2006)
DAFWA (2007)
Iluka Resources (2005)
Iluka Resources (2006)
Iluka Resources (2007)
Wells and King (1989)
GIS Database:
Topographic Contours, Statewide - DOLA 12/09/02

(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

An unnamed 'C' Class Nature Reserve occurs within two kilometres of the application area (northeast), and the 'C' Class South Eneabba Nature Reserve occurs four kilometres southeast of the application area (GIS Database).

Although the application area is in close proximity to a Nature Reserve, it has been previously used for agriculture and mining, and since rehabilitated back to pastoral land. Consequently, the application area is degraded, offering no protection, buffer, or ecological linkages to the nearby Nature Reserves. Furthermore, the Eneabba townsite is located between the application area and the Nature Reserve (GIS Viewer). Given the degraded nature of the application area, previous mining operations, and the presence of a townsite in between the Nature Reserve and the application area, the proposed clearing is unlikely to impact on the environmental values of the conservation areas.

Additionally, rehabilitation of native vegetation will be conducted with the intent of creating a net environmental benefit by providing a fauna corridor along the drainage line (Iluka Resources, 2007).

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

Methodology Iluka Resources (2007)
GIS Database:
CALM Managed Lands and Waters - CALM 01/07/05
Hill River Arrowsmith 1.4m Orthomosaic - DLI00/01/02
Towns - DLI 8/04

(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 Adamson North area is within the proposed extension to the Eneabba Public Drinking Water Source Area (PDWSA) (Iluka Resources, 2007; GIS Viewer). Mining was an existing land use prior to the PDWSA being established, and is permitted to continue under current DEC licence conditions. Iluka Resources has discussed requirements with the Department of Water (DoW) and is committed to continue mining in accordance with best practice, as outlined in DoW's Water Quality Protection Notes and Guidelines (Extractive Industries within PDWSA's and Guidelines for Mining and Mineral Processing) (Iluka Resources, 2007).

The whole of the Eneabba operations are subject to Licence 5645/7 under part V of the *Environmental Protection Act 1986*. The licence provides controls over groundwater and surface water runoff water quality by requiring an annual report on water quality, quantity and result monitoring against ANZECC guidelines and previous results. Condition W2(b) (i-v) of the licence defines discharge limits (pH, salinity, turbidity, erosion and impacts on surrounding vegetation).

There are no adjacent surface water bodies that will be impacted by the clearing. Groundwater at Eneabba is

below the ore-bodies, which are typically mined to a depth of 20-35 metres, and is not impacted by mining operations. Drainage mechanisms are put in place during operations and rehabilitation, to control water flows. The proposed clearing of native and pastoral vegetation is not likely to cause deterioration in the quality of surface or underground water (Iluka Resources, 2007).

Groundwater within the area under application is brackish at between 500 - 1000 milligrams per litre of Total Dissolved Solids (TDS) (GIS Database). Given the size of the proposed clearing and the degraded nature of the application area, the quality of the groundwater is unlikely to be impacted by the proposed clearing activity. Furthermore, as the area subject to application is not classified as being in a Salinity risk area (GIS Database), the proposed clearing is unlikely to increase land salinisation in the area.

Additionally, the proposed clearing area does not occur within an area where potential Groundwater Dependant Ecosystems may occur (GIS Database).

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

Methodology Iluka Resources (2007)
GIS Database:
Groundwater Salinity, Statewide - DOW
Potential Groundwater Dependant Ecosystems DoE 2004
Public Drinking Water Source Area DoE 07/02/06
Salinity Risk LM 25m DOLA 2000

(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

Although a minor non-perennial watercourse transects the southern section of the application area, at 120 metres above sea level, the proposed mulching area does not fall within a designated floodway or flood fringe area (GIS Database).

The average annual rainfall for the application area is approximately 600 mm (GIS Database), and the average annual evaporation in the application area is approximately 2,400 mm (GIS Database). It is therefore expected that there would be little surface water flow during normal seasonal rains.

The clearing of 25 hectares within the Indoon Logue Catchment (137,611 hectares) (GIS Database) is unlikely to result in an increase in flooding incidence or intensity.

Additionally, drainage mechanisms will be put in place during operations and rehabilitation to control water flows (Iluka Resources, 2007).

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

Methodology Iluka Resources (2007)
GIS Database:
DoE FMD ARI Floodway and Floodfringe Areas 2003
Evaporation Isopleths - BOM 09/98
Hydrographic Catchments - Catchments – DOW
Hydrography, linear - DOE 1/2/04
Rainfall, Mean Annual - BOM 30/09/01
Topographic Contours, Statewide - DOLA 12/09/02

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

Comments

There are two native title claims over the area under application; WC98_057 and WC04_002. These claims have been registered with the National Native Title Tribunal on behalf of the FRANKS and AMANGU claimant groups respectively. 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 Aboriginal Sites of Significance are damaged through the clearing process.

The Eneabba Townsite, a Public Drinking Water Supply Area and a 'C' Class Nature Reserve (Unnamed) are located within two kilometres of the application area (GIS Database). Advice received from the DEC on 21 May 2007 advised that a formal referral to the Environmental Protection Agency (EPA) would not be required given the degraded nature of the application area, and the extensive history of agriculture and mining in the area. DEC advised that the clearing permit application could be assessed under the 10 Clearing Principles by an

Environmental Assessor in the Native Vegetation Branch of DoIR.

Mining at the Iluka Resources Ltd Eneabba operations is conducted under the *Mineral Sands (Eneabba) Agreement Act 1975*. It is the proponent's responsibility to liaise with the DEC and the DoW to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

The Shire of Carnamah, in a letter dated 28 May 2007, expressed no objection to this clearing permit application.

Methodology DEC (2007)
Iluka Resources (2007)
GIS Database:
Aboriginal Sites of Significance - DIA
CALM Managed Lands and Waters - CALM 1/07/05
Public Drinking Water Source Areas (PDWSAs) – DOW
Native Title Claims - DLI 7/11/05
Towns - DLI 8/04

4. Assessor's recommendations

Purpose	Method	Applied area (ha)/ trees	Comment / recommendation
Mineral Production	Mechanical Removal	25	<p>Assessment against the ten clearing principles identified that the proposed clearing is not likely to be at variance to principle a, b, c, d, e, g, h, i and j, and is at variance to principle f.</p> <p>Although the Lesueur Sandplain IBRA subregion comprises of a high level of biodiversity, the application area itself consists of predominantly rehabilitated pastoral land, and therefore does not represent or contain environments typical of the IBRA subregion.</p> <p>The rehabilitated drainage line is part of a realigned natural drainage line which originates from the east and runs west across the Adamson North application area. This drainage line was re-established in 1996 and 1997 (Iluka Resources, 2007). The drainage line has not flowed on recent record and only carries minimal water following significant rainfall events. No wetlands are in or linked to this drainage line (Iluka Resources, 2007). It is therefore considered that the removal of six hectares of rehabilitated vegetation along the drainage line will not be significant. Furthermore, an equivalent area to the six hectares of native vegetation rehabilitation and the nineteen hectares of farm tree plantings will be rehabilitated to native vegetation along a drainage line, which will help to mitigate impacts on biodiversity and provide a net environmental benefit.</p> <p>The assessing officer therefore recommends that the permit be granted.</p> <p>Iluka Resources are required to finalise their Dieback Management Plan as a matter of priority. The assessor has recommended Conditions 1 and 2 as per previous permits on the same leases.</p> <p>The assessor therefore recommends that the clearing permit be granted subject to the following conditions:</p> <ol style="list-style-type: none">1. The Permit Holder shall not allow any external soils, road base or vegetation on site unless tested free of <i>Phytophthora cinnamoni</i> contamination or sourced from a known <i>Phytophthora cinnamoni</i> free source.2. All machinery and vehicles used during the clearing shall be cleaned of material that may be a source of <i>Phytophthora cinnamoni</i> contamination prior to entering the areas approved to clear.3. The Permit Holder shall record the following for each instance of clearing:<ol style="list-style-type: none">a) the location where the clearing occurred, expressed as grid coordinates using the Geocentric Datum of Australia 1994 coordinate system;b) the size of the area cleared in hectares;c) the method of clearing;d) the purpose of clearing;e) the area rehabilitated in hectares; andf) the dates on which the area was cleared.4. The Permit Holder shall provide an Annual Clearing Report to the Director, Environment, Department of Industry and Resources by 15 March each year for the life of the permit, demonstrating adherence to all the conditions of this permit, and setting out the records required under condition 3 of this permit in relation to clearing carried out between 1st January and 31st December the previous year. This report can be included as an addendum to the Annual Environmental Report submitted to DoIR.

5. References

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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.