Government of Western Australia
Department of Mines and Petroleum

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2799/2

Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Regis Resources Limited**

1.3. Property details

Property:
Mining Lease 38/303
Mining Lease 38/316
Mining Lease 38/317
Mining Lease 38/354
Mining Lease 38/407
Mining Lease 38/498
Mining Lease 38/499
Mining Lease 38/500
Mining Lease 38/589
Mining Lease 38/939
Mining Lease 38/1092
Micellaneous Licence 38/47

Local Government Area: Shire of Laverton

Colloquial name: Duketon Gold Project – Moolart Well, Dogbolter and Erlistoun Project Areas

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
1,170		Mechanical Removal	Mineral Production

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

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

- 18: Low woodland; mulga (*Acacia aneura*).

Outback Ecology Services were commissioned by Regis Resources Limited to undertake a desktop study and a botanical field survey of the vegetation and flora of the Moolart Well, Dogbolter and Erlistoun project areas, which included the vegetation within the application areas, in September 2006. In September 2007, a second round of surveying was undertaken across the proposed borefield to the north and east of the Moolart Well project area, along proposed haul road locations and across proposed disturbance footprints at each of the three project areas (Outback Ecology Services, 2007).

A total of 26 vegetation associations were identified across the Moolart Well and Dogbolter project areas (Outback Ecology Services, 2007). A total of eight vegetation associations were identified across the Erlistoun project area (Outback Ecology Services, 2007; HGM, 1999).

Moolart Well and Dogbolter Project Application Areas

1. Claypan/Drainage Areas

C1 - *Maireana pyramidata* and *Cratystylis subspinescens* Heath B over *Frankenia ?pauciflora* and *Halosarcia pergranulata* Dwarf Scrub D; and

C2 - *Muehlenbeckia florulenta* Heath to Low Scrub A: *Muehlenbeckia florulenta* dominates the vegetation with *Rhaghodia* sp. also featuring prominently.

2. Undulating Plains

P1 - Mulga Low Forest A: *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia* were present in groves with an understorey limited to occasional plants including *Psydrax latifolia, Eremophila latrobei* ssp*. latrobei, E. forrestii* ssp*. forrestii, Dianella revoluta* and *Cheilanthes austrotenuifolia*.

P2 - Mulga Open Scrub to Low Forest B over *Eremophila spectabilis* ssp. *brevis* Low Scrub B *over Eragrostis eriopoda* Open Low Grass: Sparse to mid-dense cover of *Acacia aneura* var. *aneura, A. aneura* var.*argentea* and *A. aneura* var. *intermedia.* Other shrub species present at lower densities included *Eremophila forrestii* ssp*. forresttii, E. youngii* ssp. youngii and *Senna artemisioides* ssp. *filifolia. Eragrostis eriopoda* dominated the mid-dense to sparse grass layer with *Monachather paradoxus, Aristida contorta* and *Thyridolepis multiculmis* also recorded.

P3 - Mulga Open Scrub to Low Forest A over *Eremophila youngii* ssp. *youngii* Dwarf Scrub C over *Eragrostis eriopoda* Open Low Grass: Very sparse to mid-dense cover of tall shrubs to low trees of *Acacia aneura.* Other shrub species present included *Eremophila spectabilis* ssp. *brevis* and *Senna artemisioides* ssp. *filifolia.* A sparse to mid-dense grass layer was present with *Eragrostis eriopoda* dominant. Other grass species included *Aristida contorta, Monachather paradoxus* and *Thyridolepis multiculmis*.

P4 - Mulga Open Scrub to Low Forest B over *Eremophila forrestii* ssp. *forrestii* Low Scrub B over *Eragrostis eriopoda* Open Low Grass: *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia* formed a sparse to mid-dense overstorey with a sparse shrub layer dominated by *Eremophila forrestii* ssp. *forrestii* present. Other shrub species included *Eremophila latrobei* ssp. *latrobei, E. spectabilis* ssp*. brevis* and *Ptilotus obovatus.* A sparse grass layer was dominated by *Eragrostis eriopoda* with *Aristida contorta* and *Monachather paradoxus* also present at low densities

P5 - Mulga Low Woodland B over Mixed Open Low Scrub C over *Eragrostis eriopoda* Low Grass: Sparse overstorey was comprised of *Acacia aneura* variants (*aneura, intermedia* and *argentea*) over tall shrubs to low trees of *Acacia ramulosa* var. *linophylla* and *Grevillea nematophylla* ssp. *supraplana*. A very sparse shrub layer was dominated by *Sida calyxhymenia*, *Ptilotus obovatus* and *Eremophila pungens.* Other shrub species recorded included *Solanum lasiophyllum, Eremophila ramiflora* and *Maireana georgei*.

P6 - Mulga Open Scrub over *Maireana triptera* Open Dwarf Scrub D over *Sclerolaena* Very Open Herbs: Areas contained a sparse to dense cover of ironstone gravel (with some quartz in the roadside plots). The very sparse (to absent) overstorey contained tall shrubs of *Acacia aneura* var. *aneura* over a very sparse low shrub layer of *Maireana triptera.*

P7 - Mulga Thicket to Low Woodland A over *Triodia basedowii* Mid-dense Hummock Grass: *Acacia aneura* var. *aneura, A. aneura* var. *argentea* and *A. aneura* var. *intermedia* dominated the sparse to mid-dense upper storey. Other less common upper storey species included *Eucalyptus* sp. Mulga Rock (K.D. Hill & L.A.S. Johnson KH 2668) and *Grevillea nematophylla* ssp. *supraplana*. A very sparse shrub layer was present at some sites with species including *Eremophila forrestii* ssp*. forrestii*, *E. glabra*, *E. youngii* ssp. *youngii* and *Grevillea sarissa* recorded.

P8 - *Senna artemisioides* ssp. *filifolia* Open Low Scrub B over *Prostanthera wilkieana* Low Heath C: The shrub species *Prostanthera wilkieana* dominated the mid-dense vegetation with *Senna artemisioides* ssp. *filifolia* providing a very sparse upper storey.

P9 - *Melaleuca xerophila* and Mulga Low Woodland to Forest A over *Melaleuca interioris* Heath B: *Melaleuca xerophila*, *Acacia aneura* var. *argentea* and *A. aneura* var. *intermedia* dominated the sparse to mid-dense upper storey with *Melaleuca interioris* providing a mid-dense middle storey (to 1.5m in height). *Eragrostis eriopoda* and *Triodia basedowii* were present at very low densities.

P10 - *Eucalyptus eremicola* Open Tree Mallee over Mulga Open Low Woodland B over *Eragrostis eriopoda* Very Open Low Grass: The sparse upper storey of this vegetation was dominated by the mallee species *Eucalyptus eremicola* and *Acacia aneura* var. *argentea*, *A. aneura* var*. intermedi*a and *A. aneura* var *microcarpa.* A sparse mid storey was provided by *Senna artemisioides* ssp. *filifolia* over *Ptilotus obovatus* with a very sparse under storey of *Eragrostis eriopoda. Triodia basedowii* was present at a low density as were the shrub species *Halgania cyanea* and *Eremophila youngii* ssp. *youngii.*

P11 - Mulga Low Woodland B over *Senna* spp Low Scrub B over *Ptilotus obovatus* Open Dwarf Scrub C: Very sparse to sparse upper storey was provided by *Acacia aneura* var. *aneura* and *A. aneura* var. *argentea*. *Ptilotus obovatus* dominated the mid storey, ranging from mid-dense to very sparse in cover. Other shrub species present included *Scaevola spinescens, Senna artemisioides* ssp. x *artemisioides, Senna* sp. Meekatharra and *Eremophila spectabilis* ssp. *brevis*. *Eragrostis eriopoda* and *Aristida contorta* were present at low densities at some sites.

P12 - Mulga Open Scrub to Low Woodland B over *Eragrostis eriopoda* Low Grass: This association was located on undulating plains with a very sparse to mid-dense cover of ironstone gravel. *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia* provide a very sparse to mid-dense upper storey. A very sparse shrub layer was present at some sites with species including *Scaevola spinescens, Ptilotus obovatus, Eremophila latrobei* ssp. *latrobei, Solanum lasiophyllum* and *Eremophila pungens* recorded. *Eragrostis eriopoda* cover ranged from mid-dense to dense.

P13 - Mulga Low Woodland B over *Aristida contorta* Open Low Grass: *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia* provided a sparse upper storey while a mid storey was either absent or very sparse and contained *Sida calyxhymenia* and *Ptilotus obovatus*. *Aristida contorta* dominated the lower storey, ranging from very sparse to sparse in cover.

3. Sandplain

S1 - *Eucalyptus kingsmillii* ssp. *kingsmillii* Open Tree Mallee over *Triodia basedowii* Mid-dense Hummock Grass: *Eucalyptus kingsmillii* ssp*. kingsmillii* dominates the sparse upper storey with *Acacia aneura* variants also occurring in some areas as tall shrubs with a very sparse cover. The lower storey was dominated by *Triodia basedowii* (mid dense cover) with *Leptosema chambersii* also featuring at the majority of sites. Sections of this vegetation association appear to have been burnt within the last two to three years.

S2 - *Eucalyptus gongylocarpa* Open Low Woodland A over *Triodia basedowii* Mid-dense Hummock Grass:

A very sparse upper storey of *Eucalyptus gongylocarpa* was present with some areas containing this species at a sparse to mid-dense cover. A sparse to very sparse mid storey of *Acacia* species, including *Acacia prainii, A. abrupta, A. kempeana* and *A. jennerae* was present across all sites. Other shrub species included *Grevillea juncifolia, Aluta maisonneuvei* ssp. *auriculata, Newxastelia hexarrhena, Olearia incana* and *Leptosema chambersii*. *Triodia basedowii* dominated the mid-dense lower storey.

S3 - *Eucalyptus eremicola* Open Tree Mallee over Mixed Low Scrub B over *Triodia basedowii* Mid-dense Hummock Grass: A sparse upper storey cover was provided by the mallee species *Eucalyptus eremicola*. A sparse mid storey quite distinct from other surrounding vegetation was present with species including *Hakea minima, Acacia* sp. (BJ143), *Aluta maisonneuvei* ssp. *auriculata, Halgania erecta* and *Enekbatus eremaeus. Triodia basedowii* dominated the mid-dense lower storey. Sections of this association had been burnt within the last two to three years.

S4 - *Eucalyptus erimicola* and *Eucalyptus* sp. Mulga Rock (K.D. Hill & L.A.S. Johnson KH 2668) Open Tree Mallee over *Triodia basedowii* Mid-dense Hummock Grass. A sparse upper storey is dominated by the mallee species *Eucalyptus erimicola* and *Eucalyptus* sp. Mulga Rock (K.D. Hill & L.A.S. Johnson KH 2668) while a sparse mid storey is provided by *Acacia prainii, Grevillea nematophylla* ssp. *supraplana* and *Senna artemisioides* ssp. *filifolia. Triodia basedowii* dominates the dense lower storey.

4. Drainage lines

D1 - Mulga Low Forest A over Mixed Open Scrub to Dwarf Scrub over Mixed Open Low Grasses: This association occurred across drainage lines in the survey area and displayed a mid-dense upper storey of *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia.* Other less common *Acacia* species included *A. craspedocarpa* and *A. ramulosa* var. *linophylla*. Mid-storey shrub species varied in density and diversity across the sites with cover generally being very sparse to sparse. Dominant species included *Eremophila punctata, E. spectabilis* ssp. *brevis, E. forrestii* ssp. *forrestii, E. pungens* (P3) and *Sida calyxhymenia*. A very sparse to mid-dense cover of grasses was recorded with dominant species including *Eragrostis eriopoda, Aristida contorta, Eriachne pulchella* and *E. flaccida,* the latter occurring in the larger drainage lines.

5. Low Hills

H1 - Mulga Low Woodland B over *Eremophila* and *Hakea* Scrub over *Ptilotus obovatus* Open Dwarf Scrub C: This vegetation association occurred on an area of quartz along the low ridgeline/hill running north-south between the proposed pit and TSF sites at Moolart Well. A sparse cover of *Acacia aneura* var. *intermedia, A. aneura* var. *aneura and A. aneura* var. *conifera* was recorded over a sparse cover of tall shrubs of *Eremophila scoparia, E. oldfieldii* ssp. *angustifolia, Hakea preissii* and *Scaevola spine*scens. A very sparse understorey of *Ptilotus obovatus* and *Maireana georgei* was present over a very sparse cover of the grass species *Aristida contorta*, *Eriachne pulchella* and *Enneapogon caerulescens*.

H2 - Mulga Low Woodland B over Mixed Low Scrub A: The sparse over storey was dominated by *Acacia aneura* var. *aneura* and *A. aneura* var. *argentea* while tall shrub species of *Eremophila ramiflora*, *Dodonaea rigida* and *Sida calyxhymenia* provided a sparse mid storey. The Priority Flora species *Baeckea* sp. Melita Station and *Eremophila pungens* were both present at low densities.

H3 - *Senna* species Open Scrub over *Ptilotus obovatus* Low Heath C over *Enneapogon caerulescens* Low Grass: A sparse cover of *Acacia aneura* var. *aneura* and var. *argentea* was recorded over a very sparse cover of *Senna* species. A sparse lower shrub layer was dominated by *Ptilotus obovatus* with *Solanum lasiophyllum* and *Maireana georg*ei also present. *Enneapogon caerulescens* cover ranged from mid-dense to sparse with other grass species present at lower densities including *Aristida contorta* and *Eragrostis dielsii*.

H4 - Mulga Open Scrub to Low Woodland B over *Eriachne mucronata* Open Low Grass to Low Grass: This association was present on low hills with a mid-dense to dense cover of ironstone gravel (and granite in some areas). A sparse over storey was provided by *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia* with *A. craspedocarpa*, *A. ramulosa* var. *linophylla* and *A. quadrimarginea* occurring in some areas. A very sparse mid storey was present with occasional shrubs of *Eremophila latrobei* ssp. *latrobei, E. punctata* and *Senna* sp. Meekatharra. *Baeckea* sp. Melita Station (P4) occurred in a number of sites but was not common. *Eriachne mucronata* dominated the lower storey ranging from very sparse to mid-dense in cover.

H5 - Mulga Low Woodland B over *Eremophila punctata* Low Scrub B: This association occurred on low hills with a dense cover of ironstone gravel. *Acacia aneura* var. *aneura* dominated the sparse over storey with other *Acacia* species including *A. craspedocarpa* and *A. ramulosa v*ar. *linophylla* also present in patches. A sparse to mid-dense shrub layer of *Eremophila punctata* was evident. Other shrub species present at lower densities included; *Eremophila latrobei* ssp. *latrobei, E. pungens* and *Sida excedentifolia*. The grass layer varied from a very sparse to sparse cover of *Eragrostis eriopoda, Eriachne mucronata* or *Aristida contorta*.

H6 - Mulga and *Acacia craspedocarpa* Scrub over *Baeckea* sp. Melita Station Low Scrub A: The defining feature of this association was the tall sparse shrub layer of *Baeckea* sp. Melita Station (P3). Fifty plants were recorded in the plot with hundreds of plants surrounding. The population was in good health with seedlings present. A sparse over storey of tall shrubs of *Acacia aneura* var. *aneura, A. aneura* var. *intermedia* and *A. craspedocarpa* was present with a very sparse to absent grass layer dominated by *Neurachne minor, Eragrostis eriopoda* and *Eriachne mucronata.*

Erlistoun Project Application Area

For the Erlistoun project application area the majority of the survey area had previously been mapped by HGM (1999), therefore, the same vegetation association descriptions were utilised by Outback Ecology Services (2007).

1. Mixed Acacia tall shrublands in drainage lines

Association 1 - Mixed *Acacia* Low Woodland/Tall Shrubland: Moderately dense low woodland/tall shrubland was dominated by *Acacia aneura* with a mixture of *A. burkittii, A. craspedocarpa, A. tetragonophylla* and *A. victoriae.* Other tree and tall shrub species included *Hakea lorea* ssp. *lorea, H. preissii, Santalum acuminatum, S. spicatum, Eucalyptus oleosa* and *E. lucasii*. The sparse to open cover of low shrubs typically included *Atriplex vesicaria, Cratystylis subspinescens, Eremophila youngii* ssp. *youngii, Ptilotus obovatus, Rhagodia drummondii, Senna artemisioides* ssp. *filifolia* and *Solanum lsiophyllum.* An open cover of grasses was provided by *Eriachne flaccida* and *E. helmsii* (HGM, 1999).

2. Mixed halophytic low shrublands on depositional plains

Association 2 - Maireana *pyramidata*/*Cratystylis subspinescens* low shrubland: This association occurred on saline sands within flat areas. The sparse cover of tall shrubs was generally dominated by *Hakea preisiii*, various *Acacia* species including *A. aneura* and *A. tetragonophylla*, and *Eremophila youngii* ssp. *youngii.* The open to moderately dense cover of low shrubs was dominated by *Cratystylis subspinescens* and *Maireana pyramidata* above a layer of shorter shrubs dominated by halophytic species including *Frankenia fecunda, F. setosa and Halosarcia doleiformis* (HGM, 1999).

Association 4 - **Sparse *Casuarina* and *Acacia* tall shrubs over open *Lawrencia helmsii*:** Sparse trees of *Casuarina pauper* occurred above a sparse cover of tall shrubs including *Acacia burkitii, A. aneura* var. *aneura, A. oswaldii, A. stowardii, Eremophila oppositifolia* and *Grevillea acuaria*. The relatively open cover of low shrubs was dominated by *Lawrencia helmsii.* Other low shrub species including *Atriplex amnicola, Maireana appressa, Olearia calcarea, Scaevola spinescens* and *Senna artemisioides* ssp*. filifolia* were also present (HGM, 1999).

Association 5 - Low mixed halophytic shrubland: This association occurred on shallow red earths. A shrub layer less than 0.5 m in height was comprised of *Roycea divaricata* with *Frankenia fecunda* and *Halosarcia doleiformis*. Occasional patches of tall shrubs included *Acacia aneura, A. tetragonophylla, Eremophila youngii* ssp. *Youngie* and *Hakea preissii* over *Cratystylis subspinescens* and *Maireana pyramidata* (HGM, 1999).

Association 6 - Low shrubland dominated by *Halosarcia*: This association occurred on shallow red earths usually with a layer of ironstone gravel on the surface. A sparse cover of tall shrubs included *Acacia aneura, A. tetragonophylla* and *Hakea preissii*. Patches of open tall shrubs occurred in drainage areas and included *Acacia burkittii, A. oswaldii* and occasional trees of *Pittosporum phylliraeoides. Halsosarcia* species (*H. doleiformis, H. pergranulata* and *H. halocnemoides*) dominated the open cover of low shrubs. Other low shrubs present included species of *Atriplex* and *Frankenia, Maireana appressa, M. pyramidata, Ptilotus obovatus and Solanum lasiophyllum* (HGM, 1999).

Association 7 - Sparse Mulga/*Hakea preissii* tall shrubs over open chenopods and *Aristida contorta*: The sparse tall shrub layer was dominated by *Acacia aneura* and *Hakea preisii* and various other *Acacia* species including *A. craspedocarpa* and *A. tetragonophylla* were present at lesser densities. The sparse to open cover of low shrubs was dominated by *Maireana pyramidata* above *Maireana triptera.* Other species within this layer included *Atriplex vesicaria, Cratystylis subspinescens*, *Eremophila platycalyx, Maireana georgei, Ptilotus obovatus* and *Solanum lasiophyllum*. Soft grasses were sparse to moderately dense and were dominated by *Aristida contorta* and *Enneapogon caerulescens* (HGM, 1999).

3. Mulga shrublands on undulating plains

Association 8 - Open Mulga tall shrubs over mixed low *Maireana*/*Sennal*/*Ptilotus obovatus* and open *Aristida contorta*: *Acacia aneura* dominated the open cover of tall shrubs with *A. burkitii, A. craspedocarpa, A. tetragonophylla, Eremophila oldfieldii, Hakea preissii, Rhagodia drummon*dii and *Santalum acuminatum* also present. The sparse to open low shrub layer included species of *Senna* above lower shrubs of *Maireana georgei, M. triptera, Ptilotus obovatus* and *Solanum lasiophyllum*. An open cover of soft grasses was provided by *Aristida contorta* with *Enneapogon caerulescens* and *Eragrostis eriopoda* also present (HGM, 1999).

Association 9: Sparse to open *Acacia*/*Hakea preisii* tall shrubs over mixed low shrubs: This association occurred on a variety of landforms from undulating plains to low hills and rocky outcrops with a surface layer of ironstone gravel, and sometimes quartz. *Acacia aneura* dominated the sparse to open cover of tall shrubs with lesser amounts of *Hakea preissii, Acacia burkittii* and *A. craspedocarpa.* The open cover of low shrubs included species such as *Cratystylis subspinescens*, *Eremophila latrobei*, *E. platycalyx* and a variety of *Maireana* species (including *M. pyramidata*) in addition to *Senna* sp. Meekatharra (particularly on the hills) and *S. artemisioides* ssp. *filifolia.* Grasses were generally sparse and included *Aristida contorta, Eriachne helmsii* and *Eragrostis eriopoda* (HGM, 1999).

Association 13 - Open Mulga tall shrubs over mixed low shrubs dominated by *Sennal*/*Maireana*.

Clearing Description

Regis Resources Limited has applied to clear up to 1,170 hectares of native vegetation within an application area totalling approximately 2,384 hectares for the purpose of mineral production. The proposed clearing will enable the development of the Duketon Gold Project which comprises of three disjunct project areas: Moolart Well, Dogbolter and Erlistoun. Vegetation will be cleared for open pits, waste dumps, access roads, topsoil stockpiles, processing plants, accommodation camp, airstrip, borefield and other related infrastructure (Coffey Natural Systems, 2008a).

Topsoil and vegetation from cleared areas will be stockpiled for use in later rehabilitation (Coffey Natural Systems, 2008).

Vegetation Condition

Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994).

to

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

1994).

Comment

The condition of the vegetation of the Moolart Well and Dogbolter project application areas ranged from 'excellent' to 'degraded' (Coffey Natural Systems, 2008a). Areas of vegetation that were considered to be in 'excellent' condition were those located on low hills or ridgelines where palatable grass and shrub species were less common (Coffey Natural Systems, 2008a; Outback Ecology Services, 2007). Outback Ecology Services (2007) assessed the vegetation within the immediate vicinity of the drilling programmes at both sites as 'degraded' due to disturbance. Cattle grazing had also adversely impacted on vegetation within the Moolart Well project application area (Outback Ecology Services, 2007).

The Erlistoun project application area is located predominately across a low halophytic shrubland. Aerial imagery indicates that historical mining and exploration has occurred throughout the application area. Vegetation immediately surrounding these areas was considered to be 'degraded' (Coffey Natural Systems, 2008a). The condition of the remaining vegetation throughout the application area was considered to be 'very good' to 'excellent'.

Clearing Permit CPS 2799/1 was granted on 19 March 2009. On 6 July 2010 Regis Resources Limited requested that the Permit be amended for the purpose of changing the date on which the annual clearing report is due. The proponent has requested that the due date for the clearing report be changed from 31 July 2011 to 31 March 2011 and annually on 31 March thereafter.

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 areas are located within the East Murchison subregion of the Murchison Interim Biogeographic Regionalisation for Australia (IBRA) bioregion which encompasses an area of 28,120,558 hectares (GIS Database; Shepherd et al., 2001). The East Murchison subregion is characterised by internal drainage, extensive areas of elevated red desert sandplains with minimal dune development, salt lake systems associated with the occluded paleodrainage system, broad plains of red-brown soils and breakaway complexes, as well as red sandplains (Cowan, 2001). Vegetation is dominated by Mulga woodlands which are often rich in ephemerals; hummock grasslands, saltbush shrublands and *Halosarcia* shrublands (Cowan, 2001).

The vegetation within the application areas consists of Beard Vegetation Association 18 which is common and widespread throughout the Pilbara region, with approximately 100% of the pre-European vegetation extent remaining (Shepherd et al., 2001; GIS Database).

A total of 26 vegetation associations were identified across the Moolart Well and Dogbolter project application areas, and eight vegetation associations were identified within the Erlistoun project application area (Outback Ecology Services, 2007). The number of vegetation associations identified by Outback Ecology Services (2007) is considered low given the total size of the application areas (approximately 2,384 hectares) and distances separating the three project application areas. None of the vegetation associations identified within the application areas comprised of Threatened Ecological Communities (TEC's) (Outback Ecology Services, 2007). All of the vegetation associations and landforms identified across the Moolart Well, Dogbolter and Erlistoun project application areas are considered as characteristic of the Murchison region, and are well represented outside of the proposed areas of disturbance (Outback Ecology Services, 2007).

Whilst there are no TEC's within the East Murchison subregion, Cowan (2001) has identified eighteen ecosystems that are classified as 'other ecosystems at risk'. Based on the vegetation associations that have been recorded within the application areas, Outback Ecology Services (2007) consider that three 'other ecosystems at risk' occur within the application area. These are plain mixed halophyte low shrublands of the north-east Goldfields **(PXHS)**, stony bluebush (*Maireana* spp.) mixed shrublands of the north-east Goldfields **(SBMS)** and stony ironstone Mulga (*Acacia aneura*) shrublands of the north-east Goldfields **(SIMS)** (Outback Ecology Services, 2007; Cowan, 2001). Outback Ecology Services (2007) have reported that **PXHS**, **SBMS** and **SIMS** each have wide ranging distributions throughout the north-eastern Goldfields, in addition to being recorded outside of the application areas during the survey of the application areas and adjoining areas. The conservation status of these 'other ecosystems at risk' is unlikely to be impacted on by the proposed clearing activities.

A total of 174 taxa (including subspecies and varieties) from 83 genera and 35 families were identified within the Moolart Well, Dogbolter and Erlistoun project application areas (Outback Ecology Services, 2007). The number of species recorded is considered relatively low for a survey area which totalled in excess of approximately 2,384 hectares. No species of Declared Rare Flora (DRF) were recorded within the application areas (Outback Ecology Services, 2007). Four Priority Flora species, *Phyllanthus baeckeoides*, *Baeckea* sp. Melita Station, *Calytrix praecipua*, and *Eremophila pungens*, were recorded within the project application areas (Outback Ecology Services, 2007). All of these Priority Flora species are not restricted to the vegetation communities or landforms that have been identified within the application areas and adjoining areas (Outback Ecology Services, 2007).

Coffey Environments (2008) determined that the application areas were characterised by one major fauna habitat. This has been described by Coffey Environments (2008) as:

1. **Mulga woodland with a sparse under storey of grasses on a sandy-clay substrate.**

Coffey Environments (2008) considers that the fauna habitat identified within the application areas is abundant throughout the adjacent areas. Shepherd et al. (2001) vegetation statistics indicates that approximately 100% of the pre-European vegetation extent remains within the Murchison IBRA region. It is considered that the destruction of these habitats will not have a significant impact on the availability of similar habitat in a bioregional context (Coffey Environment, 2008). Coffey Environments (2008) believe that on a regional scale the proposed clearing is unlikely to result in a significant loss of fauna habitat.

Outback Ecology Services (2007) report that no weed species were recorded within the application areas. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. The risk of spreading weed species can be mitigated by imposing a condition for the purpose of weed management.

The landform features, floristic diversity and vegetation communities that have been recorded within the application areas are considered widespread and typical within the Murchison region (Outback Ecology Services, 2007). The proposed clearing of 1,170 hectares within an application area of approximately 2,340 hectares is unlikely to impact on an area that comprises of a high level of biological diversity, or significantly impact on the biological diversity of the Murchison region.

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

Methodology

Coffey Environments (2008)
Cowan (2001)
Outback Ecology Services (2007)
Shepherd et al. (2001)
GIS Database:
- Interim Biogeographic Regionalisation of Australia (subregions)
- Interim Biogeographic Regionalisation of Australia
- Pre-European Vegetation

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

Comments

Proposal is not likely to be at variance to this Principle

A level 2 fauna assessment for the Duketon Gold Project application areas was undertaken by Coffey Environments (Coffey Enviornments, 2008). The objectives of the level 2 fauna assessment were to (Coffey Enviornments, 2008):

- Identify and assess the values and significance of the vertebrate fauna assesmblage in the project area and to describe these values in a local and regional context;
- Describe and assess the potential direct and indirect impacts that may result from any proposed use or development on the vertebrate fauna assemblage and species of conservation significance in the project area;
- If conservation significance vertebrate fauna and fauna assemblages will be impacted, then describe measures to be implemented to ensure that the abundance, diversity, geographic distribution and productivity of these fauna are maintained.

Coffey Environments carried out the following scope of works in order to achieve the abovementioned objectives (Coffey Enviornments, 2008):

- A search of the Western Australian Museum (FaunaBase) to develop a list potential vertebrate fauna in the area. The search area was bounded by the latitude 26.5^{o} to 28.5^{o}S and longitude 121.5^{o} to 123^{o}E (Coffey Environments, 2008);
- A search of the Commonwealth Government's Department of Environment, Water, Heritage and the Arts (DEWHA) *Environment Protection and Biodiversity Conservation Act 1999* on-line database to identify potential vertebrate fauna in the area. The search area was also bounded by the latitude 26.5^{o} to 28.5^{o}S and longitude 121.5^{o} to 123^{o}E (Coffey Environments, 2008);
- A review of the Department of Environment and Conservation's (DEC) Threatened and Priority species database for species of conservation significance likely to be in the area;
- A review of published and unpublished literature that Coffey Environments could access to provide a list of fauna that have potential to occur in the region;
- A field survey incorporating trapping, spotlighting, bat echolocation recordings and opportunistic observations;
- An inventory of vertebrate fauna species recorded in the project area during the survey period, including conservation significant species;
- Comparison of the fauna assemblage in the project area within other survey sites in the region;
- Discussion of the potential impacts of the development on fauna and fauna habitat; and
- Management recommendations to minimise potential impacts of the development on the fauna.

Based on the review of existing information and the results of the database searches, the following species of conservation significance have the potential to occur within the application areas (Coffey Environments, 2008).

- Mulgara (*Dasycercus cristicauda*): Schedule 1 (Fauna that is rare or is likely to become extinct) of the *Wildlife Conservation (Specially Protected Fauna) Notice 2008*; listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Numbat (*Myrmecobius fasciatus*): Schedule 1 (Fauna that is rare or is likely to become extinct) of the *Wildlife Conservation (Specially Protected Fauna) Notice 2008*; listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Bilby (*Macrotis lagotis*): Schedule 1 (Fauna that is rare or is likely to become extinct) of the *Wildlife Conservation (Specially Protected Fauna) Notice 2008*; listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Malleefowl (*Leipoa ocellata*): Schedule 1 (Fauna that is rare or is likely to become extinct) of the *Wildlife Conservation (Specially Protected Fauna) Notice 2008*; listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Great Desert Skink (*Egernia kintorei*): Schedule 1 (Fauna that is rare or is likely to become extinct) of the *Wildlife Conservation (Specially Protected Fauna) Notice 2008*; listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Banded Hare-wallaby (*Lagostrophus fasciatus fasciatus*): Schedule 1 (Fauna that is rare or is likely to become extinct) of the *Wildlife Conservation (Specially Protected Fauna) Notice 2008*; listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*. The DEC Threatened species database lists *Lagostrophus fasciatus fasciatus* as being seen near Laverton, but no data provided (Coffey Environments, 2008). This species, as well as the mainland species *Lagostrophus fasciatus albipilis* is extinct on the mainland (Coffey Environment, 2008; Department of the Environment, Water, Heritage and the Arts, 2009a);
- Peregrine Falcon (*Falco peregrinus*): Schedule 4 (Other specially protected fauna) of *the Wildlife Conservation (Specially Protected Fauna) Notice 2008*;
- Australian Bustard (*Ardeotis australis*): Priority 4 on the DEC's Priority Fauna List;
- Slender-billed Thornbill (western) (*Acanthiza iredalei iredalei*): 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Princess Parrot (*Polytelis alexandrae*): Priority 4 on the DEC's Priority Fauna List;
- Rainbow Bee-eater (*Merops ornatus*): 'Migratory' under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Oriental Plover (*Charadrius veredus*): 'Migratory' under the *Environment Protection and Biodiversity Conservation Act 1999*; and
- Fork-tailed Swift (*Apus pacificus*): 'Migratory' under the *Environment Protection and Biodiversity Conservation Act 1999*.

A search across the entire Duketon Gold project area identified three major fauna habitats (Coffey Environments, 2008). These are (Coffey Environments, 2008):

1. **Mulga woodland with a sparse under storey of grasses on a sandy-clay substrate;**
2. **Spinifex with an over storey of shrubs and small trees on a sandy substrate; and;**
3. **Spinifex with an over storey of eucalypts and shrubs.**

No threatened fauna communities were identified within any of the project application areas (Coffey Environments, 2008).

Coffey Environments (2008) highlight that within each of these broad fauna habitat types there is likely to be numerous variations, however, the fauna survey by Coffey Environments (2008) provided specific focus on major fauna habitats that were identified within the application areas.

The Assessing Officer notes that the fauna habitats were identified when the Duketon Gold Project application area included a proposed bore field area which originally extended north from the current application area by approximately 30 kilometres, and encompassed an area totalling approximately 17,181 hectares (Regis Resources Limited had previously submitted a clearing permit application (CPS 2486/1) which encompassed this area, however, the application was withdrawn on 19 September 2008) (Regis Resources Limited, 2008; GIS Database). Regis Resources Limited has subsequently modified their proposed disturbance footprint and has significantly reduced the size of the proposed bore field (Regis Resources Limited, 2008; GIS Database). The current bore field application area (which Regis Resources Limited have applied to clear under clearing permit application CPS 2801/1) encompasses a total area of approximately 444 hectares and extends north of this application area by approximately 1.5 kilometres (GIS Database).

Assessment of the vegetation mapping provided by Outback Ecology Services (2007) indicates that the spinifex dominated vegetation communities are located approximately 1 kilometres north-west of the Moolart Well project application area at the closest point, and extend in a northerly direction away from the proposed disturbance areas (Outback Ecology Services, 2007; GIS Database). Given the absence of vegetation communities that comprise of spinifex grasslands within the application areas, the fauna habitats 'Spinifex with an over storey of shrubs and small trees on a sandy substrate' and 'Spinifex with an over storey of eucalypts and shrubs' are not likely to occur with the application areas. It is considered that the vast majority of the Moolart Well, Dogbolter and Erlistoun project application areas comprise of the fauna habitat 'Mulga woodland with a sparse under storey of grasses on a sandy-clay substrate'.

Coffey Environments (2008) consider that the fauna habitats within the application areas and adjoining areas are abundant throughout surrounding areas. Shepherd et al. (2001) vegetation statistics indicate that approximately 100% of the pre-European vegetation extent remains within the Murchison Interim Biogeographic Regionalisation for Australia (IBRA) region. It is considered that the destruction of the habitat within the application areas will not have a significant impact on the availability of similar habitat in a regional context (Coffey Environments, 2008). Coffey Environments (2008) believe that on a regional scale the proposed clearing is unlikely to result in a significant loss of fauna habitat.

A trapping program was undertaken between 8 and 16 December 2007, and repeated between 8 and 17 January 2008 (Coffey Environments, 2008). In addition to the trapping program, avifauna and bat surveys were undertaken, as well as spotlighting surveys in order to target nocturnal reptiles, mammals and birds that often are not readily captured or seen by other means (Coffey Environments, 2008).

Five survey sites were selected as representative areas to be impacted (Coffey Environments, 2008). The survey sites have been described as (Coffey Environments, 2008):

1. **Spinifex with an over storey of shrubs (SS):** In most places the spinifex was mature, shrubs were up to 2 metres and there were scattered Eucalypts on a red sandy soil.
2. **Spinifex with an over storey of Eucalypts and shrubs (ES):** This habitat was quite variable, with patches of grasses in the under storey. The larger trees were old well established Eucalypts, but there were areas with shrubs and small trees to 3 metres, often in localised dense patches.
3. **Open Spinifex with sparsely distributed shrubs (OS):** This was a hard, flat sandy area vegetated with hummocks of spinifex and a few scattered small shrubs. The spinifex in this area was mature enough to have seeded after the last substantial rains.
4. **Mulga woodland with a sparse under storey of grasses - Moolart Well (MW):** The substrate was sandy-clay, often with a layer of scattered small stones. The sparse understorey consisted mainly of small shrubs and occasional patches of dead annual grasses, with an over storey of Mulga.
5. **Mulga woodland with a sparse under storey of grasses - Dogbolter (DB):** This habitat was generally similar to the Mulga woodland at Moolart Well.

No survey sites were selected within the Erlistoun project application area (Coffey Environments, 2008). Coffey Environments inspection of the Erlistoun area indicated that this area had been extensively disturbed by mining and pastoral activities, and the undisturbed fauna assemblages would have been similar to those found in the Mulga woodland represented in the Moolart Well and Dogbolter project application areas (Coffey Environments, 2008).

As the fauna habitats were identified when the Duketon Gold Project application area included a proposed bore field (see detailed description provided above), survey sites **SS**, **ES** and **OS** are located outside of the clearing application areas (Coffey Environments, 2008; GIS Database). The Moolart Well, Dogbolter and Erlistoun project application areas comprise of the fauna habitat 'Mulga woodland with a sparse under storey of grasses on a sandy-clay substrate' (Coffey Environments, 2008). Survey sites **MW** and **DB** were located within the clearing application areas.

A total of four trapping sites were established at each of the survey sites (Coffey Environments, 2008). Each trapping site contained four trap lines. Each trap line contained three 20 litre PVC buckets, three 150 by 500 millimetre deep PVC pipes as pit-traps and three pairs of funnel traps evenly spaced along a 30 metre fly-wire drift fence (Coffey Environments, 2008). Three Elliot traps were set adjacent to each drift fence (Coffey Environments, 2008). Coffey Environments (2008) report that the trapping effort used during the survey generally far exceeded that accepted adequate by the Environmental Protection Authority, and that adequate trapping was undertaken to represent the terrestrial fauna assemblage for this purpose.

A summary of the types of herpetofauna assemblages and the number of species recorded during the trapping program for the application areas is provided (Coffey Environments, 2008):

- Sixty one species of reptile were recorded within the project application areas including six agamids, 14 geckoes, 22 skinks, three legless lizards, six goannas, three blind snakes and seven front-fanged snakes (Coffey Environments, 2008). Reptiles were species rich and abundant in areas that had an understorey of spinifex (Coffey Environments, 2008). In Mulga woodlands reptiles were less abundant and species rich (Coffey Environments, 2008);
- Forty seven avifauna species were recorded during the surveys (Coffey Environments, 2008). Birds were most abundant in the Eucalypt over an under storey of spinifex habitat (Coffey Environments, 2008). Species richness was high in both the Eucalypt over an under storey of spinifex and the Mulga woodland habitats, especially around the proposed Moolart Well accommodation camp site (Coffey Environments, 2008);
- Fourteen species of mammals including six species of bats and one introduced species were trapped within the application areas (Coffey Environments, 2008). In addition, the Euro (*Macropus robustus*) and Red Kangaroo (*M. rufus*) were frequently seen throughout the application areas, and feral cats were observed during the spotlight searches (Coffey Environments, 2008). The majority of the species were present in the Open spinifex with sparsely distributed shrubs habitat, with the least number of species found in the Mulga Woodland with a sparse understorey of grasses habitat; and
- At least three amphibian species were recorded from callings from a 'turkeys nest' near the proposed Moolart Well accommodation camp (Coffey Environments, 2008). Coffey Environments (2008) report

that these were most probably *Neobatrachus sutor*, *Cyclorana maini* and possibly *N. kunapalari*. All three species have a widespread distribution and are abundant (Coffey Environments, 2008).

The following outlines the likelihood of conservation significance fauna occurring within the application areas.

The Mulgara inhabits the arid regions of Australia and is most commonly found on sandy soils vegetated with spinifex (Coffey Environments, 2008). Individual Mulgara are mostly solitary, utilising 3 to 5 burrows each night within an activity area of 1.0 to 14.4 hectares (Masters, 2003; Coffey Environments, 2008). One Mulgara was caught during the survey in the open spinifex with sparsely distributed shrubs site (**OS**), and a recently active burrow was found in the spinifex with an over storey of shrubs site (**SS**). These two survey sites are outside of the proposed clearing application areas. Coffey Environments (2008) consider that the Mulgara is likely to occur in any of the sand plain habitats that have a relatively dense cover of spinifex. Vegetation mapping by Outback Ecology Services (2007) demonstrates that spinifex dominated vegetation communities are located approximately 1 kilometres north-west of the Moolart Well project application area at the closest point, and extend in a northerly direction (Outback Ecology Services, 2007; GIS Database). Given that vegetation mapping indicates that there is unlikely to be suitable vegetation types that may provide habitat for the Mulgara, the proposed clearing is not likely to impact on habitat for the Mulgara.

The Numbat was originally widespread across southern semi-arid and arid Australia (Coffey Environments, 2008). There are currently two remnant native populations at Dryandra and Perup and several reintroduced populations including Boyagin Nature Reserve, Tutanning Nature Reserve, Batalling block and Karroun Hill Nature Reserve (Coffey Environments, 2008). There are no recent records of the Numbat in the general area (Coffey Environment, 2008). It is considered that the Numbat is unlikely to occur within the application areas (Coffey Environments, 2008).

Bilbies are largely restricted to the inland sandy deserts in two broad habitat types; Mulga woodlands with lateritic red earth and spinifex grassland with high fire frequency with red earth (Coffey Environments, 2008). Bilbies are omnivorous with their diet including termites, insects, seeds, vegetation and fungi (Coffey Environments, 2008). Bilby burrows observed in the Gibson desert were located in a raised mound not unlike a large rabbit warren on red sandy soils in a spinifex meadow with the occasional tree (Coffey Environments, 2008). Bilbies were not identified in the search of the DEHWA or DEC databases, however, there is anecdotal evidence that Bilbies are present in the sand plains vegetated with spinifex approximately 90 kilometres north of Moolart Well (Coffey Environments, 2008). There is the potential for this species to occur in the mature spinifex habitat in the proposed borefield (Coffey Environments, 2008). However, given that vegetation mapping by Outback Ecology Services (2007) demonstrates that there is an absence of spinifex dominated vegetation communities within the application areas, the proposed clearing is not likely to impact on habitat for the Bilby.

Malleefowl have been found in mallee regions of southern Australia, however, are now only found throughout these regions in fragmented patches due to clearing of habitat for agriculture, increased fire frequency, competition with exotic herbivores (sheep, rabbits, cattle, goats) and predation by foxes and cats (Coffey Environments, 2008). Malleefowl prefer mainly scrubs and thickets of mallee; *Eucalyptus* spp., *Melaleuca lanceolata* and *Acacia linophylla*, and also other dense litter forming shrublands (Johnstone and Storr, 1998). The breeding habitat of the Mallefowl is characterised by light soil and an abundant leaf litter, which is used in the construction of nesting mounds (Frith, 1959; Marchant and Higgins, 1993; Department of Environment, Water, Heritage and the Arts, 2009b). Coffey Environments (2008) state that there are few sites within the Duketon Gold Project area where the habitat was suitable for Mallefowl, and DEC records show the only recorded observation was near Leonora in 1998. During the survey of the Duketon Gold Project area Coffey Environments (2008) found no evidence of recent mound building activity and none were seen in the area. Coffey Environments (2008) consider that the Malleefowl is unlikely to occur within the application areas, or wider Duketon Gold project area.

The Great Desert Skink is a large burrowing lizard that can grow up to 44 centimetres long and weigh up to 350 grams (Department of Environment, Water, Heritage and the Arts, 2009c). The species is found in the sandy desert regions of Western Australia, Northern Territory and South Australia and is found on sand-flats and clay, or loamy soils vegetated with spinifex (*Triodia basedowii*, *T. pungens* and *T. schinzii*) (Coffey Environments, 2008; Department of Environment, Water, Heritage and the Arts, 2009c). The DEC Threatened species database shows a record for the species in Laverton in 1967, so it is possible that this species may occur in the vicinity of the project area. The Great Desert Skink was not recorded during the survey of the application areas, or within the surrounding vegetation (Coffey Environmnets, 2008). Given the absence of spinifex dominated vegetation communities within and adjoining the application areas, the proposed clearing is not likely to impact on habitat for the Great Desert Skink.

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution (Coffey Environments, 2008). Its preferred habitat includes cliffs along coasts, rivers and ranges and within wooded watercourses and lakes (Johnstone and Storr, 1998; Coffey Environments, 2008). Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species (Coffey Environments, 2008). Coffey Environments (2008) assessment is that the Peregrine Falcon may infrequently utilise the habitat within the application area. The proposed clearing activities are unlikely to significantly impact on this species as the Peregrine Falcon would be able to move away to other areas outside of the disturbed areas (Coffey Environments, 2008). Given the widespread habitat and distribution of the Peregrine Falcon, the proposed clearing is unlikely to impact on significant habitat for this species.

The Australian Bustard is known to occur within open rangeland habitats such as *Triodia* hummock grassland, grassy woodland, sandplains with spinifex, chenopod flats and low shrublands (Johnstone and Storr, 1998). During their breeding season the species can show preference for open grassland areas which border protective shrubland or woodlands (Australian Wildlife Conservancy, 2008). The species is known to be nomadic, with irregular widespread movements over long distances (Johnstone and Storr, 1998; Department of Environment and Climate Change NSW, 2008). This species was recorded within the application area by Coffey Environments (2008), and has been recorded in the bioregion in numerous other surveys (Coffey Environments, 2008). Coffey Environments (2008) report that this species will readily move to other areas if they are disturbed, and as a result are unlikely to be impacted by the proposed clearing activities given the abundance of similar and high quality habitat in areas outside of the application area (Coffey Environments, 2008).

The Slender-billed Thornbill is sparsely distributed across semi-arid southern Western Australia and western South Australia (Coffey Environments, 2008). The species preferred habitat includes chenopod shrub steppe, treeless or sparsely wooded flatlands and saline flats associated with salt lakes (Coffey Environments, 2008; Johnstone and Storr, 1998). The Slender-billed Thornbill populations are under threat because of habitat reduction due to sheep grazing and ringbarking of trees by rabbits (Coffey Environments, 2008). This species was not seen during the surveys of the application areas and adjacent areas (Coffey Environments, 2008). Coffey Environments (2008) consider that the Slender-billed Thornbill is unlikely to occur within the application areas, largely due to the lack of large salt lakes and the adjacent saline flats. The proposed clearing is not likely to impact on habitat for this species.

The Princess Parrot is thought to be nomadic, and is scarce or uncommon and patchily distributed throughout the central desert regions of Australia (Coffey Environments, 2008; Johnstone and Storr, 1998). The species occupies arid shrub lands, particularly those dominated by Mulga, Desert Oak and spinfex (Coffey Environments, 2008). It is likely that this species is threatened by habitat loss to agricultural practices and altered fire regimes (Coffey Environments, 2008). The Princess Parrot has been sighted in the Wanjarri Nature Reserve which is located approximately 20 kilometres north-east of the application area (Coffey Environments, 2008). Coffey Environments (2008) report that the species may occasionally be seen in the general area. Given the large expanses of similar habitat surrounding the application area the Princess Parrot is likely to move away to other areas with the onset of any disturbance (Coffey Environments, 2008).

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

It is considered that the destruction of the habitat within the application areas will not have a significant impact on the availability of similar habitat in a regional context (Coffey Environments, 2008). Coffey Environments (2008) believe that on a regional scale the proposed clearing is unlikely to result in a significant loss of fauna habitat.

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

Methodology

Australian Wildlife Conservancy (2009)
Coffey Environments (2008)
Department of Environment and Climate Change NSW (2009)
Department of Environment, Water, Heritage and the Arts (2009)
Department of Environment, Water, Heritage and the Arts (2009b)
Department of Environment, Water, Heritage and the Arts (2009c)
Frith (1959)
Johnstone and Storr (1998)
Marchant and Higgins (1993)
Masters (2003)
Outback Ecology Services (2007)
Regis Resources Limited (2008)
Shepherd et al. (2001)
GIS Database:
- Clearing Instruments

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

Comments

Proposal may be at variance to this Principle

According to available datasets there are no known records of Declared Rare Flora (DRF) or Priority Flora species within the application area (GIS Database).

Outback Ecology Services were commissioned by Regis Resources NL to undertake a desktop study and a botanical field survey of the vegetation and flora of the Moolart Well, Dogbolter and Erlistoun project application areas in September 2006 (Outback Ecology Services, 2007). In September 2007, a second round of surveying was undertaken across the proposed borefield to the north and east of the Moolart Well project area, along proposed haul road locations and across proposed disturbance footprints at each of the three project areas (Outback Ecology Services, 2007).

Prior to the field survey, Outback Ecology Services (2007) conducted a search of the Western Australian Herbarium Specimen database and the Department of Environment and Conservation's Threatened (Declared Rare) Flora database in order to identify DRF and Priority Flora species which have the potential to occur within application areas. The database searches were undertaken within a radius of approximately 110 kilometres from the Moolart Well project application area (Outback Ecology Services, 2007).

Based on the results of the database search a total of two DRF and 33 Priority Flora species may potentially occur within the application areas (Outback Ecology Services, 2007).

Outback Ecology Services (2007) indicate that the species *Acacia eremophila* numerous-nerved variant (A.S. George 11924), *Baeckea* sp. Great Victoria Desert (As Weston 1481), *Conospermum todii*, *Dampiera eriantha*, *Daviesia purpurascens*, *Dicrastylis nicholasii*, *Eucalptus nigrifunda*, *Goodenia lyrata*, *Lechenaultia aphylla*, *Olearia arida* and *Triglochin protuberans* have the potential to occur within the borefield (located in the north of the project area) in areas which are characterised by the Bullimore Land System. Following the flora and vegetation survey, Regis Resources Limited has significantly reduced the size of borefield area and as a result, the Bullimore Land System is located outside of the clearing application area (GIS Database). Whilst there is potential for these species to occur within areas characterised by the Bullimore Land System (Outback Ecology Services, 2007), it is considered unlikely that these species would occur within the application areas given the likely lack of preferred habitat.

Cowan (2001) lists an additional DRF species, *Eucalyptus articulata*, which occurs within the East Murchison Interim Biogeographic Regionalisation for Australia (IBRA) subregion. *Eucalyptus articulata* has been described as a low, straggly mallee up to 3 metres high that is found on red sand, sandy loam and arkose rubble (Western Australian Herbarium, 1998 - 2009). The Western Australian Herbarium's Florabase has 10 records for this species, all located within the Great Victoria Desert IBRA region (Western Australian Herbarium, 1998 - 2009). Based on the species preferred habitat type and given that Florabase records indicate that it has only been recorded within the Great Victoria Desert IBRA region, it is considered unlikely that *Eucalyptus articulata* would be located within the application areas.

Within the Moolart Well and Dogbolter project areas (including the haul road and the bore field) a total of 143 floristic survey sites were selected to represent the various geographical, geomorphologic and floristic variations within the project areas (Outback Ecology Services, 2007). At the Erlistoun site, twenty sites were assessed during the botanical field survey (Outback Ecology Services, 2007). The flora and vegetation surveys encompassed the vegetation within the clearing application areas, as well as the surrounding vegetation.

No species of DRF were recorded within the application areas, or surrounding vegetation (Outback Ecology Services, 2007).

Four Priority Flora species were recorded during the flora and vegetation survey of the application areas and surrounding vegetation (Outback Ecology Services, 2007). The Priority Flora species were recorded within the application areas for the Moolart Well and Dogbolter project areas. These are (Outback Ecology Services, 2007):

- *Phyllanthus baeckeoides* (Priority 3);
- *Baeckea* sp. Melita Station (Priority 4);
- *Calytrix praecipua* (Priority 3); and
- *Eremophila pungens* (Priority 4).

Phyllanthus baeckeoides

Phyllanthus baeckeoides is shrub species that grows between 0.5 to 1.5 metres high, favours red lateritic and sandy clay soils as well as granite outcrops and flowers between July and September (Western Australian Herbarium, 1998 - 2009; Outback Ecology Services, 2007). Florabase reveals that there are 20 records for this species and these are distributed throughout the Great Victoria Desert and Murchison IBRA regions (Western Australian Herbarium, 1998 - 2009). A single population of *Phyllanthus baeckeoides* which totalled approximately 2 individuals was identified during the September 2007 survey at Moolart Well. This population was located on the southern face of a low hill covered with ironstone and lateritic gravel (Outback Ecology Services, 2007). At the time of the survey, it was proposed that the accommodation camp would be located to

the west of this hill, necessitating an access road within the vicinity of the population (Outback Ecology Services, 2007). However, Regis Resources Limited has relocated the camp adjacent to the proposed airstrip and as a result, this population is located outside of the application area and will not require disturbance (Outback Ecology Services, 2007).

***Baeckea* sp. Melita Station**

Baeckea sp. Melita Station is an upright shrub growing between 2.2 to 2.5 metres with a distinctive hooked leaf (Western Australian Herbarium, 1998 - 2009). The species preferred habitat is dark red rocky soil over ironstone amongst Mulga shrubland (Western Australian Herbarium, 1998 - 2009; Outback Ecology Services, 2007). Florabase reveals that there are 49 records for this species and these are distributed throughout the Murchison and Yalgoo IBRA regions (Western Australian Herbarium, 1998 - 2009). *Baeckea* sp. Melita Station was identified within or near six floristic sites across three vegetation associations at Moolart Well and Dogbolter, with a further eight populations recorded opportunistically (Outback Ecology Services, 2007). Outback Ecology Services (2007) estimate the total number of individuals of *Baeckea* sp. Melita Station to be in excess of 300. The largest of the recorded populations was estimated to contain in excess of 100 individuals, and this population was located outside of the proposed disturbance area (GIS Database).

Baeckea sp. Melita Station has been recorded during other surveys that have occurred throughout the locality. The species was recorded from four populations totalling 61 plants during the Rosemount survey in 1998, and this included one population within the Duketon Gold Project survey area and a further three that were located as a result of a targeted search (Outback Ecology Services, 2007). In total approximately 480 individual plants were recorded (Outback Ecology Services, 2007). Previous survey work in 1999 within the vicinity of the Bronzewing mine site, which is located approximately 135 kilometres west of the Moolart Well project application area, identified between 1500 and 2000 plants (Outback Ecology Services, 2007).

Outback Ecology Services (2007) report that approximately 29 individual plants may require removal during the upgrade of the road from Moolart Well to the airstrip and accommodation camp, and for the road between the Dogbolter and Moolart Well project areas. The possible removal of 29 plants represents approximately 10% of the known population within the immediate vicinity of the clearing application areas (Outback Ecology Services, 2007). Given *Baeckea* sp. Melita Station has a wide ranging distribution across two IBRA regions, is known to occur across a variety of vegetation associations and has been recorded in relatively high numbers during the survey by Outback Ecology Services (2007), the proposed disturbance to these individuals is not likely to significantly impact on the conservation status of this species.

Calytrix praecipua

Calytrix praecipua is a flowering (June to November) shrub species that grows from 0.3 to 0.7 metres high and is found on skeletal sandy soils over granite or laterite, and also on breakaways and outcrops (Western Australian Herbarium, 1998 - 2009). Two populations of *Calytrix praecipua* were identified during the September 2007 survey (Outback Ecology Services, 2007). One population of 12 plants was identified within the Dogbolter Project application area in an area that has been severely disturbed by exploration drilling activities, and Outback Ecology Services (2007) has confirmed that this area will require clearing during the development of the Dogbolter open pit. A second population of approximately 30 plants was identified adjacent to the Moolart Well Project application area, however, this population is located outside of the clearing application area and will not be impacted on by the proposed clearing activities (Outback Ecology Services, 2007).

Florabase reveals there are 22 records for *Calytrix praecipua*, and these are distributed throughout the Gascoyne, Great Victoria Desert, Little Sandy Desert and Murchison IBRA regions (Western Australian Herbarium, 1998 - 2009). Given the relatively widespread distribution of these records, the species does not appear restricted to the application area, or the local area. It is considered that the proposed clearing of 12 plants of *Calytrix praecipua* is not likely to impact on the conservation status for this species (Outback Ecology Services, 2007).

Eremophila pungens

Eremophila pungens is described as an erect viscid shrub, 0.5 -1.5 metres in height which is found on sandy loam, clayey sand over laterite and also on plains, ridges and breakaways (Western Australian Herbarium, 1998 - 2009). Given its preferred habitat, the species has the potential to be located across a diverse range of landform features.

Eremophila pungens was recorded within or near twelve survey sites across six vegetation associations at the Moolart Well and Dogbolter project areas, and in addition 46 populations were identified opportunistically (Outback Ecology Services, 2007). *Eremophila pungens* was recorded on soil types which ranged from sandy loam to clayey sand with most areas containing a cover of ironstone or lateritic gravel (Outback Ecology Services, 2007). Many of the populations were recorded alongside various vehicle tracks that are to be upgraded to haul roads, as well as along a number of drainage lines, on low hills and undulating plains (Outback Ecology Services, 2007). Outback Ecology Services (2007) note that the number of plants and the variety of habitats it occurred across made counting this species difficult. However, Outback Ecology Services (2007) have estimated the total number of individuals of *Eremophila pungens* within the application area and adjoining areas to be in the thousands.

Florabase reveals there are 35 records for this species and these are distributed throughout the south-eastern Gascoyne and north-eastern Murchison IBRA regions (Western Australian Herbarium, 1998 - 2009). In addition, previous survey work around the Bronzewing mine site, which is located approximately 135 kilometres to the west of Moolart Well project application area, indicate a population size well in excess of 5000 individuals (a conservative estimate) (Outback Ecology Services, 2007).

Outback Ecology Services (2007) estimate that approximately 717 individual *Eremophila pungens* plants may be cleared during mine site development. Approximately 535 individuals occur within a proposed stockpile site, 34 within the proposed processing plant site, with the remainder (approximately 148) located along various haulage routes (Outback Ecology Services, 2007). Outback Ecology (2007) state that the number of plants of this species is estimated to be in the thousands within the surrounding area outside of the proposed mine site disturbance footprint. Both the high number of plants and the variety of habitats it occurred across made counting this species difficult (Outback Ecology Services, 2007).

The proposed clearing for the development of the Moolart Well and Dogbolter mine sites will result in the total removal of several populations of *Eremophila pungens*, and their habitat. Regis Resources Limited has advised that the removal of any populations will be restricted to areas that are required for mine site infrastructure, therefore, any populations that are outside of the mine infrastructure area, but within the application area, are unlikely to be impacted on by the proposed clearing. The Assessing Officer acknowledges that the final disturbance to *Eremophila pungens* may be somewhat higher than the estimated figure, due to any changes which may arise during mine site infrastructure planning. However, Outback Ecology Services (2007) have demonstrated that *Eremophila pungens* has been recorded in relatively large numbers and across a range of vegetation communities outside of the application area. Given that *Eremophila pungens* has been recorded in high numbers (both populations and individuals) across a variety of vegetation associations outside of the application areas, and has a broad distribution that encompasses two IBRA regions (Outback Ecology Services, 2007; Western Australian Herbarium, 1998 - 2009), it is considered that the proposed clearing is not expected to have a significant impact on the conservation status of the species (Outback Ecology Services, 2007). Although the proposed clearing is unlikely to impact on the conservation status of *Eremophila pungens,* given that a large number of individuals will be directly impacted on by the proposed clearing activities, the proposal may be at variance to this Principle.

The proposed clearing activities are unlikely to significantly impact on the conservation status of the Priority Flora species outlined above given the distribution of the species in the local and regional area. Regis Resources Limited has developed the following rare flora management objectives in order to minimise disturbance to any DRF or Priority Flora during mine site development. These are (Coffey Natural Systems, 2008a):

- To limit the loss of native vegetation and plant habitats;
- To protect Priority Flora species occurring within the project area; and
- To prevent, where possible, the introduction and spread of noxious weeds within the project area.

Regis Resources aim to meet these objectives by implementing and adhering to the following procedures (Coffey Natural Systems, 2008a):

- Vegetation clearance and disturbance protocols will be developed and implemented;
- Vegetation clearing will be minimised, with the preferential use of previously disturbed or degraded areas where possible;
- Priority Flora located within the mine site but not authorised for disturbance will be clearly delineated and protected from direct or inadvertent impacts;
- Removal and fragmentation of minor areas of vegetation associated with watercourses will be avoided where possible;
- Site inductions will ensure that personnel have an awareness of conservation significant flora, and where these flora occur or may be expected to occur within the project area; and
- Vegetation and flora monitoring will be undertaken where required as a component of the Department of Industry and Resources (now Department of Mines and Petroleum) annual environmental reporting procedure.

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

Methodology

Coffey Natural Systems (2008a)
Outback Ecology Services (2007)
Western Australian Herbarium (1998 - 2009)
GIS Database:
- Clearing Instruments
- Declared Rare and Priority Flora List

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

Comments

Proposal is not likely to be at variance to this Principle

There are no known Threatened Ecological Communities (TEC's) within the application areas (GIS database).

The nearest known TEC is located approximately 225 kilometres west, south-west of the Moolart Well project application area (GIS database). Given the distance between the proposal and the nearest known TEC, the proposed clearing is not likely to impact on the conservation of that TEC.

Whilst there are no TEC's within the East Murchison subregion, Cowan (2001) has identified eighteen ecosystems that are classified as 'other ecosystems at risk'. Based on the vegetation communities that have been recorded within the application area, Outback Ecology Services (2007) consider that three of these 'other ecosystems at risk' occur within the application area. These are:

1. **Plain mixed halophyte low shrublands of the north-east Goldfields (PXHS);**
2. **Stony bluebush (*Maireana* spp.) mixed shrublands of the north-east Goldfields (SBMS); and**
3. **Stony ironstone mulga (*Acacia aneura*) shrublands of the north-east Goldfields (SIMS).**

PXHS occurs across five land systems and is considered distinctive of the inland region of Western Australia (Outback Ecology Services, 2007). Substantial areas of **PXHS** remain undeveloped for grazing on pastoral leases, and small areas have been recorded within Goongarrie National Park which is located approximately 223 kilometres south-west of the Moolart Well project application area (Outback Ecology Services, 2007; GIS Database). Outback Ecology Services (2007) consider that vegetation types **A2**, **A5** and **C1** are representative of the **PSHS** ecosystem type. Vegetation mapping of the application areas indicates that vegetation types **A2** and **A5** have been recorded within the Erlistoun project application area (southern most application area). Outback Ecology Services (2007) has recorded large areas of these vegetation types outside of the application area. Vegetation type **C1** has not been recorded within the application area (Outback Ecology Services, 2007). Given that the **PXHS** ecosystem is relatively widespread across the north-eastern Goldfields, the proposed clearing is not likely to impact on vegetation that is considered necessary for the on-going maintenance of the **PXHS** ecosystem.

SBMS occurs across eight land systems and is represented in Wanjarri Nature Reserve which is located approximately 148 kilometres west, north-west of the Moolart Well project application area (Outback Ecology Services, 2007; GIS Database). However, the small areas within Wanjarri Nature Reserve are considered to be in a degraded state due to its extensive use by the pastoral and mining industries (Outback Ecology Services, 2007). Outback Ecology Services (2007) consider that vegetation types **A7** and **A8** are representative of the **SBMS** ecosystem type. Vegetation types **A7** and **A8** have been recorded within the Erlistoun project application area (southern most application area) (Outback Ecology Services, 2007). Vegetation mapping indicates that considerable sized areas of vegetation types **A7** and **A8** have been recorded immediately adjacent to the application area (Outback Ecology Services, 2007). Given that the **SBMS** ecosystem is considered to have a wide ranging distribution throughout the north-eastern Goldfields, the proposed clearing is not likely to impact on vegetation that is considered necessary for the on-going maintenance of the **SBMS** ecosystem.

SIMS occurs across seven land systems through-out the north-eastern Goldfields area and is found in Wanjarri Nature Reserve, however, is considered to be in poor condition (Outback Ecology Services, 2007). Outback Ecology Services (2007) consider that vegetation types **H1**, **H2**, **H4**, **H5** and **H6** are representative of the **SIMS** ecosystem type. Although vegetation mapping indicates that small portions of these vegetation types are located within the Moolart Well and Dogbolter project areas, the **SIMS** ecosystem type is considered relatively widespread across the north-eastern Goldfields. The proposed clearing is not likely to impact on vegetation that is considered necessary for the on-going maintenance, or conservation of the **SIMS** ecosystem.

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

Methodology

Cowan (2001)
Outback Ecology Services (2007)
GIS Database:
- Threatened Ecological Communities
- CALM Managed Lands and Waters

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

Comments

Proposal is not at variance to this Principle

The clearing application area falls within the Murchison Interim Biogeographic Regionalisation for Australia (IBRA) region in which approximately 100% of the pre-European vegetation remains (GIS database; Shepherd et al., 2001).

The vegetation of the clearing application area has been mapped as Beard Vegetation Association 18: Low woodland; Mulga (*Acacia aneura*) (GIS Database, Shepherd et al., 2001). According to Shepherd et al., (2001) approximately 100% of Beard Vegetation Association 18 remains at both the state and regional level (see table).

According to the Bioregional Conservation Status of Ecological Vegetation Classes, the conservation status for the Murchison Bioregion and Beard Vegetation Association 18 is of “Least Concern” (see table) (Department of Natural Resources and Environment, 2002).

Only a small percentage of Beard Vegetation Association 18 is protected within conservation reserves, however, the bioregion remains largely uncleared. As a result, the conservation of the vegetation associations within the bioregion is not likely to be impacted on by this proposal.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-european % in IUCN Class I-IV Reserves
IBRA Bioregion – Murchison	28,120,558	28,120,558	~100	Least Concern	1.1
Beard veg assoc. – State					
18	19,892,437	19,890,348	~100	Least Concern	2.1
Beard veg assoc. – Bioregion					
18	12,403,248	12,403,248	~100	Least Concern	0.4

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

The vegetation under application is not a remnant of vegetation in an area that has been extensively cleared.

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

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

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

Comments

Proposal is at variance to this Principle

There are no permanent wetlands or watercourses within or adjoining any of the clearing application areas (Outback Ecology Services, 2007; GIS Database).

Outback Ecology Services (2007) report that several drainage lines pass through the application areas for the Moolart Well, Dogbolter and Erlistoun project application areas, including the haul roads. One of these drainage lines is a larger feature that traverses the length of the Moolart Well project application area. Geographic Information System (GIS) hydrography data indicates that a single drainage line intersects the Erlistoun application area (southern most application area) (GIS Database). The drainage lines that intercept the application areas are shallow and ephemeral in nature and support Mulga Woodland (Outback Ecology Services, 2007). Given that the application areas receive approximately 232.5 millimetres of rainfall per year and experience mean annual evaporation of approximately 3,600 millimetres (Bureau of Meteorology, 2009; GIS Database), it is likely that these drainage lines would only flow, or support water for short periods following significant rainfall events.

The Assessing Officer notes that all of the drainage lines are considered common drainage features throughout the Murchison IBRA region (GIS Database).

Vegetation mapping, as well as aerial imagery, indicates that there is a relatively large drainage line located within the northern most application area (Moolart Well project area) (Outback Ecology Services, 2007; GIS Database). Outback Ecology Services (2007) have described the drainage line as shallow but wide (approximately 400 metres). This drainage line begins approximately 4 kilometres south of the Moolart Well application area, traverses the entire length of the application area, and is situated within approximately 150 metres to 800 metres of the western boundary of the application area (Outback Ecology Services, 2007; GIS Database). This drainage line dissipates into a broad undulating plain immediately north of the application area (GIS Database).

The proposed mine site layout for the Moolart Well project area indicates that the pit bund and waste landform have been designed to minimise the disturbance to this drainage line (Coffey Natural Systems, 2008a Outback Ecology Services, 2007). The proposed mine site plan illustrates that the waste dump is situated immediately west, whilst the open pit and topsoil stockpiles are located immediately east of the drainage line (Coffey Natural Systems, 2008a. Regis Resources Limited has committed to maintaining a minimum separation distance of 50 metres between disturbance areas and all drainage lines. As a result, this drainage line is not expected to

be significantly impacted by the proposed clearing activities (Coffey Natural Systems, 2008a).

The drainage line that is located within the Erlistoun project application area is considered a feature that is common and widespread throughout the Murchison IBRA region. This drainage line does not flow into any significant watercourse or wetland (GIS Database). The proposed clearing within the Erlistoun project application area is not considered to impact on any significant drainage features.

Vegetation mapping by Outback Ecology Services (2007) as well as aerial imagery indicates that several drainage lines intercept the proposed haul roads. The drainage lines that were identified within the narrow application areas for the haul roads are considered common and widespread throughout the Murchison IBRA region.

The proposed clearing within these drainage lines will be restricted to narrow corridors at locations where the haul roads intercept where the drainage lines cross. The proposed clearing for the construction of the haul roads is not considered to impact on any significant drainage features.

The Assessing Officer notes that all of the drainage lines that have been identified within the application areas are common and widely distributed landform features throughout much of the Murchison IRBA region (GIS Database). The proposed clearing activities for mine site development is not likely to adversely impact any significant drainage features.

The vegetation growing in association with these drainage lines has been described by Outback Ecology Services (2007) as:

- **D1** - Mulga Low Forest A over Mixed Open Scrub to Dwarf Scrub over Mixed Open Low Grasses.

Vegetation Association **D1** occurred within drainage lines in the survey area and displayed a mid-dense upper storey of *Acacia aneura* var. *aneura* and *A. aneura* var. *intermedia*, as well as less common *Acacia* species including *A. craspedocarpa* and *A. ramulosa* var. *linophylla*. Mid-storey shrub species varied in density and diversity across the sites with cover generally being very sparse to sparse. Dominant species included *Eremophila punctata, E. spectabilis* ssp. *brevis*, *E. forrestii* ssp. *forrestii, E. pungens* and *Sida calyxhymenia*. A very sparse to mid-dense cover of grasses was recorded with dominant species including *Eragrostis eriopoda*, *Aristida contorta, Eriachne pulchella* and *E. flaccida*, the latter occurring in the larger drainage lines (Outback Ecology Services, 2007).

Vegetation association **D1** is considered common and widespread within similar drainage features throughout the Murchison IBRA region. Outback Ecology Services (2007) note that the drainage line vegetation is likely to have a distribution across five land systems and is present in Wanjarri Nature Reserve. Vegetation association **D1** is not considered to represent a vegetation association of conservation significance.

During the September 2007 flora and vegetation survey of the wider project area, Outback Ecology Services (2007) identified an area of vegetation **'Claypan/Drainage Areas'**. Two vegetation associations were identified within this area and have been described as (Outback Ecology Services, 2007):

- **C1** - *Maireana pyramidata* and *Cratystylis subspinescens* Heath B over *Frankenia pauciflora* and *Halosarcia pergranulata* Dwarf Scrub D; and
- **C2** - *Muehlenbeckia florulenta* Heath to Low Scrub A.

Vegetation association **C1** was present in a drainage flat with a small amount of quartz and ironstone gravel on the soil surface. Vegetation was dominated by *Maireana pyramidata* with *Cratystylis subspinescens* also present at a lower density. *Halosarcia pergranulata* and *Frankenia pauciflora* dominated the understorey. The drainage flat was interspersed with small clumps of *Acacia aneura* var. *intermedia* and *A. burkittii* (Outback Ecology Services, 2007). Vegetation association **C2** occurs on drainage flats of red clay loam within the northern half of the proposed borefield. *Muehlenbeckia florulenta* dominates the vegetation at both sites with *Rhaghodia* sp. also featuring prominently at the site adjacent to Warren Road. These areas are likely to be ephemerally inundated drainage depressions (Outback Ecology Services, 2007).

Vegetation associations **C1** and **C2** are located outside of the clearing application area, and as a result will not be impacted on by the proposed clearing activities.

As Outback Ecology Services (2007) has identified drainage lines within the application area, the proposed clearing is at variance to this Principle. However, all of these drainage lines are minor and ephemeral natural drainage channels that are common widespread throughout the Murchison IBRA region. In addition, the vegetation communities growing in association within these drainage lines are considered common and widespread. The proposed clearing is not likely to impact on any significant wetland, watercourse or drainage feature in the local area.

Methodology

Bureau of Meteorology (2009)
Coffey Natural Systems (2008a)
Outback Ecology Services (2007)
GIS Database:
- Hydrography, linear_1

- Hydrography, linear (hierarchy)
- Evaporation Isopleths

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

Comments

Proposal is at variance to this Principle

Regis Resources Limited has applied to clear up to 1,170 hectares within an application area totalling approximately 2,386 hectares (Regis Resources Limited, 2008; Coffey Natural Systems, 2008a). Table 1 below outlines the proposed disturbance against the size of the application areas for the Moolart Well, Dogbolter and Erlistoun application areas (Coffey Natural Systems, 2008a). It is noted that the distance between the Moolart Well and Dogbolter application areas is approximately 8.3 kilometres, whilst the distance separating the Dogbolter and Erlistoun application areas is approximately 26 kilometres.

Table 1: Proposed Area of Disturbance (Coffey Natural Systems, 2008a).

Project Area	Proposed Disturbance (hectares)	Project Application Area (hectares)
Moolart Well	870	1,988
Dogbolter	110	167
Erlistoun	120	231
Other disturbance – borefield infrastructure and access roads	70	
Total	1,170	2,386

The Environmental Protection Authority Guidance Statement Number 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2004) sets out criteria in order to determine the size, scale and impact of development proposals. Based on the criteria set out within this document (EPA, 2004), the proposed clearing for the purpose of mineral production is considered high impact.

According to the Department of Agriculture's Technical Bulletin No. 87 "An inventory and condition survey of the north-eastern Goldfields, Western Australia", the application areas are characterised by the Ararak, Bevon, Nubev, Felix, Hootanui, Steer and Violet Land Systems (Pringle et al., 1994).

- The Ararak Land System is characterised by broad plains with mantles of ironstone gravel supporting mulga shrublands with wanderrie grasses (Pringle et al., 1994). The land system comprises of extensive level to gently undulating plains subject to very diffuse sheet flow, more concentrated flow zones, isolated rises within Limonite (<5 metre relief) and higher plains with pebble mantles (Pringle et al., 1994). This land system was recorded across half of the Moolart Well project application area (Outback Ecology Services, 2007), and occurs within the northern-most section of the haul road (for a distance of approximately 400 metres) to the Dogbolter project application area (GIS Database). As a result of the low slopes, protective soil mantles and very diffuse sheet flow, this land system is generally not susceptible to soil erosion, although it is considered mildly susceptible to water starvation problems (Pringle et al., 1994). Although the Ararak Land System comprises of protective soil materials that are resilient to erosion, it is considered that the clearing of native vegetation and the disturbance of the protective surface mantles has the potential to increase the risk of soil erosion (DAFWA, 2009).

- The Bevon Land System is characterised by irregular low ironstone hills with stony lower slopes supporting Mulga shrublands (Pringle et al., 1994). The land system comprises of irregular low hills capped with limonite, plateaux, and small breakaways with short footslopes, extensive lower colluvial, very gently inclined plains with mantles of ferruginous gravel and narrow drainage tracts (Pringle et al., 1994). This land system occurs across the south-east corner of the Moolart Well project application area, across the south-eastern half of the Dogbolter project application area and over the majority of the haul road to the Dogbolter project application area (Outback Ecology Services, 2007; GIS Database). Most of the vegetation communities identified within this land system occur on undulating plains or low hills that comprise of a sparse to dense cover of ironstone gravel with some small amounts of quartz gravels (Outback Ecology Services, 2007). Given the flat topography and stony surface mantles for these areas (GIS Database; Outback Ecology Services, 2007; Pringle et al., 1994), there is likely to be low risk of erosion for these areas. Whilst most of the land within the application area (characterised by the Bevon Land system) comprise of surface mantles that are resilient to soil erosion, the proposed clearing of native vegetation for mineral production will cause a significant disturbance to the surface mantles which usually provide protection against soil erosion (DAFWA, 2009). As a result, there is likely to be a moderate risk of soil erosion in areas where clearing occurs. Minor areas on breakaways and narrow drainage tracts are susceptible to soil erosion, particularly if perennial shrub cover is cleared or the soil surface is disturbed (Pringle et al., 1994; DAFWA, 2009).

- The Nubev Land System is characterised by gently undulating stony plains, minor limonitic low rises and drainage floors, supporting Mulga and halophytic shrublands (Pringle et al., 1994). Outback Ecology Services (2007) report that this land system was recorded across the eastern side of the Erlistoun project application

area. Pringle et al. (1994) indicate that the drainage zones are moderately susceptible to soil erosion and that any disturbance of the protective stone mantles on saline stony plains is likely to initiate water erosion. A single ephemeral drainage line begins east of this application area and traverses through the application area in a west, south-westerly direction, and a saline plain is located within the south-east portion of the application (Outback Ecology Services, 2007). There is a moderate risk of soil erosion occurring if native vegetation is cleared within the drainage zones, or within the saline plain (DAFWA, 2009).

- The Felix Land System is described as plains with quartz mantles, supporting shrublands locally with wanderrie grasses (Pringle et al., 1994). An approximate 750 metre section of the proposed haul road from Bandya Road into the Erlistoun project application area occurs on this land system (GIS Database). Pringle et al. (1994) report that the stone mantles provide effective protection against erosion.

- The Hootanui Land System is characterised by breakaways, hills and ridges with extensive saline gravely and stony lower plains, supporting scattered halophytic low shrublands (Pringle et al., 1994). A small area in the north and west of the Erlistoun project application area intercepts this land system (GIS Database). Narrow drainage tracts and breakaway footslopes are susceptible to water erosion in areas where perennial shrub cover is substantially reduced or if the soil surface is disturbed (Pringle et al., 1994). The vegetation units identified within these land units occur on depositional plains characterised by shallow red earths and red sandy soils, and frequently with surface layer of quartz stones (Outback Ecology Services, 2007). These areas are generally very gently inclined to level plains which are subject to sheet flow (Pringle et al., 1994). It is considered that there is a moderate risk of water erosion in areas where native vegetation is cleared and where surface mantles are disturbed.

- The Steer Land System is characterised by gravely alluvial plains with halophytic shrublands (Pringle et al., 1994). This land system is located across the majority of the Erlistoun project application area (GIS Database; Outback Ecology Services, 2007). The vegetation units identified within this land system include **A1**, **A2**, **A5**, **A7** and **A8** (Outback Ecology Services, 2007). A single ephemeral drainage line intercepts the Erlistoun project application area and satellite imagery indicates that the drainage line is quite vegetated (GIS Database). Based on the vegetation units identified within the application area, it is likely that the vegetation adjoining the drainage line would be located within the land system units 'alluvial plains' , 'saline alluvial plains' and 'stony plains' (Pringle et al., 1994; Outback Ecology Services, 2007). The Steer Land System is generally not susceptible to erosion, partly due to protective stone and gravel mantles (Pringle et al., 1994). However, unprotected areas on alluvial plains, and more particularly drainage floors, are susceptible to water erosion (Pringle et al., 1994; DAFWA, 2009). The proposed clearing of native vegetation for mineral production is likely to cause significant disturbance to the surface mantles which would usually provide protection against soil erosion. It is considered that the proposed clearing of native vegetation within the drainage line and adjoining the 'alluvial plains' , 'saline alluvial plains' and 'stony plains' land system units is likely to increase the possibility for water erosion to occur (DAFWA, 2009).

- The Violet Land System is characterised by extensive, gently undulating to level plains and low rises with mantles of ironstone pebbles and level to very gently inclined plains subject to sheet flow within mantles of fine ironstone gravel (Pringle et al., 1994). This land system has been recorded in the north-east and south-west corner of the Moolart Well project application area, western half of the Dogbolter application area, and within two sections of the Dogbolter haul road application area (Outback Ecology Services, 2007; GIS Database). The vegetation communities identified within this land system occur on undulating plains or low hills that comprise of a sparse/mid to dense cover of ironstone gravel with some occasional quartz gravels (Outback Ecology Services, 2007). Abundant mantles provide effective protection against soil erosion over most of the land system, except where the soil surface has been disturbed in which case the soil becomes moderately susceptible to water erosion (Pringle et al., 1994). Narrow drainage tracts are mildly susceptible to water erosion (Pringle et al., 1994). Most of the land within the areas characterised by the Violet Land System comprise of surface mantles which are resilient to soil erosion. The proposed clearing of native vegetation for mineral production will cause a significant disturbance to the surface mantles which usually would provide protection against soil erosion. As a result, there is considered to be a moderate risk of soil erosion in areas where clearing occurs. Outback Ecology Services (2007) recorded three small areas within the Erlistoun project area as vegetation type '**D1**', and these areas are likely to be at least moderately susceptible to water erosion if the native vegetation is cleared (DAFWA, 2009).

(Pringle et al., 1994) have outlined that the Ararak, Bevon and Felix Land Systems, and the stony mantles of the Steer and Violet Land Systems comprise of surface mantles that are fairly resilient to erosion. However, the clearing of native vegetation and the disturbance of the protective surface and soil materials has the potential to expose underlying materials that may be susceptible to water and/or wind erosion (Pringle et al., 1994).

Pringle et al. (1994) outline that the Nubev and Hootanui Land Systems, as well as the drainage tracts and saline and alluvial plains of the Violet and Steer Land Systems are susceptible to erosion, especially in areas where the native vegetation has been cleared or in areas where the soil surface is disturbed (Pringle et al., 1994).

The proposed clearing of up to 1,170 hectares of native vegetation within three disjunct project application areas for the purpose of establishing the Moolart Well, Dogbolter and Erlistoun mine sites which includes supporting infrastructure (open pits, waste dumps, accommodation village, contractor yards, ore stockpiles, processing plant, ROM pad, tailings storage facility, topsoil stockpiles), is likely to permanently impact on large areas across the three project application areas. It appears likely that the clearing of native vegetation may

increase the risk of soil erosion occurring, particularly in areas identified by Pringle et al. (2004) as susceptible to erosion. However, the majority of the clearing is for the purpose of establishing mine site infrastructure that is likely to become permanent or long-term features of the landscape within the application areas. As the cleared areas will be utilised by various pieces of large-scale mine infrastructure, the risk of erosion occurring on these particular land units as a direct result from clearing native vegetation will be minimised. It is most likely that the cleared areas will be particularly susceptible to erosion immediately after the native vegetation has been cleared, and during the period that the cleared areas are left exposed. The Assessing Officer recommends should a permit be granted, that a condition is placed on the permit for the purpose of progressive clearing in order to stop areas being cleared and unutilised and retaining topsoil and vegetation. A progressive clearing approach will reduce the time cleared areas are exposed, unvegetated or unutilised thereby minimising the risk of wind or water erosion occurring.

Any adverse environmental impacts associated with the construction, or on-going operation of mine site infrastructure will be managed under the *Mining Act 1978*.

The Duketon Gold project application areas are located within the Leemans Sandplain Soil-Landscape Zone of the Murchison Province as described by Tille (2006) (cited within Coffey Natural Systems, 2008a; Coffey Natural Systems, 2008b). Soils of this zone are typically either red sandy or red loamy earths and generally have low nutrient content, low electrical conductivity and slightly acidic to neutral pH (Coffey Natural Systems, 2008a; Coffey Natural Systems, 2008b). Three broad land types occur across the three disjunct project application areas: flats and plains, hills and slopes and drainage lines (Outback Ecology Services, 2007; Coffey Natural Systems, 2008a). Table 2 below outlines the physical and chemical characteristics of the soils found within the Moolart Well project application area. Given that similar land types and vegetation communities have been recorded throughout the Dogbolter and Erlistoun project application areas, it could be expected that these areas may experience similar soil physical and chemical properties.

Table 2: Soil physical and chemical characteristics of the Moolart Well project application area (Coffey Natural Systems, 2008b).

	Land Types		
Characteristic	**Flats and Plains**	**Hills and Slopes**	**Drainage Lines**
Depth to hardpan (cm)	50 to greater than 100	10 to 80	60 to 80
Soil texture	Loamy sand (5% clay) to sandy clay (25% clay)	Sand (less than 5% clay) to sandy clay loam (25% clay)	Loamy sand (5% clay) to clay loam, sandy (30% clay)
Soil structure	Single grained to strong aggregates	Single grained to very strong aggregates	Single grained to moderate aggregates
Coarse Material (%)	5 to 90	5 to 90	5 to 75
Soil pH	5.0 to 6.4	5.1 to 8.1	5.4 to 6.8
Electrical conductivity (dS/m)	0.01 to 0.17 non-saline	Non-saline to slightly saline	Non-saline to slightly saline

Based on the data obtained within the Moolart Well project application are, soil pH across the application areas is likely to be within the range of 'slightly acidic' to 'neutral'. Soil acidity has the potential to impact on land capability and heightens the risk of land degradation. None of the land types recorded within the application areas are likely to demonstrate pH levels less than 4.5, which would otherwise restrict clearing activities due to the presence of soil acidity.

The average annual rainfall of Laverton, which is situated approximately 60 kilometres south of the Erlistoun project application area and approximately 105 kilometres south of the Moolart Well and Dogbolter application areas, is 232.5 millimetres and the areas experience mean annual evaporation of approximately 3600 millimetres (Bureau of Meteorology, 2009; GIS Database). Monthly rainfall data indicates that rainfall is sporadic, and that the area is infrequently subject to significant rainfall events (Bureau of Meteorology, 2009).

The Assessing Officer notes that no permanent wetlands or watercourses occur within the application areas, however, several ephemeral drainage lines pass through the Moolart Well, Dogbolter and Erlistoun project application areas (Outback Ecology Services, 2007; GIS Database). These ephemeral drainage lines are shallow and common drainage features throughout the Murchison region, and none are associated with any low-lying drainage basins or valley floors (GIS Database; Outback Ecology Services; 2007). Analysis of Geographic Information System (GIS) topographic information for the application areas and surrounding landscape indicates that the application areas are located on a broad, undulating flat plain which is characterised by an overall topographic gradient of less than approximately 2% (GIS Database).

Coffey Natural Systems (2008a) and Coffey Natural Systems (2008b) report that groundwater levels within the application areas vary between 15 metres to 20 metres below the surface. Groundwater salinities within the application area have been measured in the range between 1,000 and 3,000 milligrams per litre Total Dissolved Solids (TDS) (GIS Database; Coffey Natural Systems, 2008b). Given the relatively high sand content and the average depth to hardpan of the soils across each of the three broad land types (see table 2 above), the majority of the soils are likely to be considered as well, or moderately draining soils under normal rainfall events. Areas on 'hills and slopes' may be characterised by shallow depth to hardpan, however, these areas are generally not associated with flooding or water-logging. The broad undulating plain which characterises the application areas is likely to assist to evenly diffuse any surface water that may result during rainfall events. The absence of low-lying drainage basins or valley floors within the application areas is likely to

minimise the risk that groundwater recharge may cause localised flooding or water-logging in low lying areas.

Water logging occurs when the soil surface area becomes saturated, and has the potential to occur during periods of heavy rainfall, with poor drainage, and/or a rising watertable. With consideration to the depth to groundwater, absence of low-lying areas and low rainfall to high evaporation rate, the proposed clearing of 1,170 hectares of native vegetation within an application area of approximately 2,386 hectares is not likely to significantly increase groundwater recharge which could otherwise lead to significant rises in ground water levels. The proposed clearing is not likely to lead to water logging or salinisation occurring within or adjacent to the application areas.

The proposed clearing activities will involve significant disturbance to a large area of native vegetation, and in addition the proposed clearing is likely to disturb the structure of surface soils and the underlying mantles. The use of heavy machinery, and also light vehicles, during clearing activities is likely to cause some degree of soil compaction.

The proposed clearing has the potential to cause or increase the incidence of water logging in localised hardpan environments, especially in areas where vegetation once assisted infiltration. Soil compaction caused by clearing machinery may also adversely impact soil structure.

Based on the above, the proposed clearing is at variance to this Principle. However, in order to minimise the disturbance to native vegetation, which would thereby minimise the risk of land degradation, Regis Resources Limited have developed the following management objectives (Coffey Natural Systems, 2008a):

- To avoid the clearing of native vegetation where possible;
- To limit the amount of vegetation cleared;
- To undertake project activities in a manner that minimises adverse impact to vegetation communities;
- To conserve and re-use cleared vegetation and stripped topsoil (which contains seeds, nutrients, organic matter, and micro-organisms) in site rehabilitation;
- To encourage the re-establishment of self-sustaining ecosystems compatible with the surrounding undisturbed areas; and
- To meet all legislative requirements relating to the rehabilitation of disturbed areas and to liaise closely with Government bodies to ensure compliance.

Methodology

Bureau of Meteorology (2009)
Coffey Natural Systems (2008a)
Coffey Natural Systems (2008b)
DAFWA (2009)
Outback Ecology Services (2007)
EPA (2004)
Pringle et al. (1994)
Regis Resources Limited (2008)
GIS Database:
- Evaporation Isopleths
- Groundwater Salinity, Statewide
- Hydrography, linear_1
- Rangeland Land System Mapping
- Topographic Contours, Statewide

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

Comments

Proposal is not likely to be at variance to this Principle

The application areas are not located within a Department of Environment and Conservation managed conservation area (GIS Database). The nearest conservation area is De La Poer Range Nature Reserve which is situated approximately 20 kilometres north-east of the Moolart Well project application area at its closest point (GIS database). Based on the distance between the proposal and the nearest conservation area, the proposed clearing is not likely to impact on the conservation values of De La Poer Range Nature Reserve.

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

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

Comments

Proposal is not likely to be at variance to this Principle

There are no permanent wetlands or watercourses within or adjoining any of the clearing application areas (GIS Database). Outback Ecology Services (2007) report that several drainage lines pass through the

application areas for the Moolart Well, Dogbolter and Erlistoun project application areas, including the proposed haul roads. One of these drainage lines is a larger feature that traverses the length of the Moolart Well project application area. Geographic Information System (GIS) hydrography data indicates that a single drainage line intersects the Erlistoun application area (southern most application area) (GIS Database). The drainage lines that intercept the application areas are shallow and ephemeral in nature and support Mulga woodland (Outback Ecology Services, 2007).

All of the drainage lines are considered common drainage features throughout the Murchison IBRA region. Given that the application areas receive approximately 232.5 millimetres of rainfall per year and experience mean annual evaporation of approximately 3,600 millimetres (Bureau of Meteorology, 2009; GIS Database), it is likely that these drainage lines would only flow, or support water for short periods following significant rainfall events (Outback Ecology Services, 2007). However, as there are no permanent or semi-permanent surface water features within the vicinity of the application areas, the proposed clearing activities are not likely to cause deterioration in the quality of surface water.

The application is not located within a Public Drinking Water Source Area (GIS Database). The nearest PDWSA is the Laverton Water Reserve which is located approximately 43 kilometres south of the Erlistoun project application area (southern most project application area). Given the distance separating the project application areas and the Laverton Water Reserve, the proposed clearing is unlikely to impact on the water quality of the Laverton Water Reserve.

The application areas are characterised by two hydrographic catchment areas (GIS Database). The Moolart Well project application area, which includes the proposed Moolart Well mine site, airstrip, camp site, borefield and portions of several haul roads, is situated within the Lake Carnegie catchment which covers a total area of approximately 6,867,525 hectares (GIS Database). The Dogbolter and Erlistoun project application areas, which include the proposed mines sites and haul roads, are situated within the Lake Carey catchment which covers a total area of approximately 11,378,213 hectares (GIS Database).

Coffey Natural Systems (2008a) and Coffey Natural Systems (2008b) report that groundwater levels within the application areas vary between 15 metres to 20 metres below the surface. Groundwater salinities within the application area have been measured in the range between 1,000 and 3,000 milligrams per litreTotal Dissolved Solids (TDS) (GIS Database; Coffey Natural Systems, 2008b). With consideration to the depth to groundwater, absence of low-lying areas and low rainfall to high evaporation rate, the proposed clearing of 1,170 hectares of native vegetation within an application area of approximately 2,386 hectares is not likely to significantly increase groundwater recharge which could otherwise lead to significant rises in ground water levels. The proposed clearing is not likely to cause deterioration in the quality of groundwater in the local area.

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

Methodology

Coffey Natural Systems (2008a)
Coffey Natural Systems (2008b)
Outback Ecology Services (2007)
GIS Database:
- Hydrography, linear_1
- Hydrography, linear (hierarchy)
- Rainfall, Mean Annual
- Evaporation Isopleths
- Public Drinking Water Source Areas (PDWSAs)
- Hydrographic Catchments - Catchments

(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 may be at variance to this Principle

The application areas are located within a region described as an arid zone (Outback Ecology Services, 2007). The average annual rainfall of Laverton, which is situated approximately 60 kilometres south of the Erlistoun project application area and approximately 105 kilometres south of the Moolart Well and Dogbolter application areas, is 232.5 millimetres and the areas experience mean annual evaporation of approximately 3,600 millimetres (Bureau of Meteorology, 2009; GIS Database). Laverton climate statistics indicate that rainfall in the region is sporadic and is not confined to certain seasons or months (Bureau of Meterology, 2009). The application area is not located in a region that is subject to regular or significant rainfall events.

The application areas are characterised by two hydrographic catchment areas (GIS Database). The Moolart Well project application area, which includes the proposed Moolart Well mine site, airstrip, camp site, borefield and portions of several haul roads, is situated within the Lake Carnegie catchment which covers a total area of approximately 6,867,525 hectares (GIS Database). The Dogbolter and Erlistoun project application areas, which include the proposed mines sites and haul roads, are situated within the Lake Carey catchment which covers a total area of approximately 11,378,213 hectares (GIS Database).

Shepherd et al. (2001) vegetation statistics indicate that approximately 100% of the pre-European vegetation extent remains within the Murchison Interim Biogeographic Regionalisation for Australia (IBRA) region. The

proposed clearing of up to 1,170 hectares of native vegetation constitutes only a very small proportion of the size of these catchments (less than approximately 0.02% of the total catchment areas) which remain largely uncleared (GIS Database; Shepherd et al., 2001). Vegetation is considered an important ground cover as it slows surface water flows, and enables rainwater to infiltrate the soil to depths where it can be utilised by vegetation. Given that the Murchison, as well as the surrounding regions, remain largely uncleared (Shepherd et al., 2001), the proposed clearing is not likely to impact on the drainage characteristics of either the Lake Carnegie or Lake Carey catchment areas.

The proposed mine site layouts for the Moolart Well, Dogbolter and Erilstoun mine sites indicates that clearing for the mine infrastructure will be spread across three disjunct application areas which total approximately 2,386 hectares (Coffey Natural Systems, 2008a). Table 1 below outlines the proposed disturbance against the size of the application areas for the Moolart Well, Dogbolter and Erlistoun application areas (Coffey Natural Systems, 2008a).

Table 1: Proposed Area of Disturbance (Coffey Natural Systems, 2008a).

Project Area	Proposed Disturbance (hectares)	Project Application Area (hectares)
Moolart Well	870	1,988
Dogbolter	110	167
Erlistoun	120	231
Other disturbance – borefield infrastructure and access roads	70	
Total	1,170	2,386

The distance between the Moolart Well and Dogbolter application areas is approximately 8.3 kilometres, whilst the distance separating the Dogbolter and Erlistoun application areas is approximately 26 kilometres. The broad distribution and disjunct application areas demonstrates that clearing will not be concentrated within a single large clearing area. However, the Assessing Officer considers the clearing of up to 870 hectares within the Moolart Well application area has the potential to create a localised catchment area that may cause or exacerbate local flooding within or adjacent to the cleared area, mainly following significant rainfall events.

Outback Ecology Services (2007) recorded various landform characteristics of each of the survey sites during the flora and vegetation assessment which included topography and slope. The Assessing Officer notes that the majority of the survey sites occurred on slopes classed as 'Flat' (0^o - 5^o), with some classed as 'Gentle' (5^o - 15^o) (Outback Ecology Services, 2007). Several localised areas associated with outcrops or breakaways were classed as 'Moderate' (15^o - 45^o) (Outback Ecology Services, 2007). Analysis of Geographic Information System (GIS) topographic information for the application areas and surrounding landscape indicates that the application areas are located on a broad and relatively flat plain which is characterised by an overall topographic gradient of less than approximately 2% (GIS Database). There is no evidence of any extensive hills or range systems which could otherwise cause increased runoff which may increase the risk of local flooding in lower lying, downstream or adjacent areas (GIS Database; Outback Ecology Services, 2007).

Given the low rainfall to high evaporation ratio of the application areas and considering the infrequency of significant rainfall events in the region (Bureau of Meteorology, 2009; GIS Database), it would be expected that any normal rainfall would quickly evaporate or infiltrate the soil. The proposed clearing of 870 hectares within the Moolart Well project application area is unlikely to cause or exacerbate flooding during normal rainfall events. The Assessing Officer considers that any localised flooding is only likely to occur as a result of any infrequent significant rainfall events. However, the broad and flat plain that characterises the application area and surrounding landscape may assist to evenly diffuse any surface water that may result following significant rainfall events.

The proposed clearing of 110 and 120 hectares of native vegetation within the Dogbolter and Erlistoun project application areas respectively, is not considered to create a localised catchment area that may cause or exacerbate flooding based on the size of the Lake Carey catchment, the broad and flat topography that is likely to assist to evenly diffuse any surface water and the infrequency of significant rainfall events in the region.

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

Methodology

Bureau of Meteorology (2009)
Coffey Natural Systems (2008a)
Outback Ecology Services (2007)
Shepherd et al. (2001)
GIS Database:
- Evaporation Isopleths
- Hydrographic Catchments – Catchments
- Topographic Contours, Statewide

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

Comments

There are two native title claim over the area under application; (WC99/001 and WC99/010) (GIS Database). These claims have been registered with the National Native Title Tribunal on behalf of the claimant groups (GIS Database). However, the tenements have been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are three registered Sites of Aboriginal Significance (Site ID: 16999, 17000 and 19982) within the area applied to clear (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

Regis Resources Limited referred the proposal to the Environmental Protection Authority (EPA) on 21 September 2007. The EPA provided the following recommendation on 1 November 2007 - "Not Assessed – Managed under Part V of the *Environmental Protection Act 1986*".

No submissions were received in relation to the proposal.

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

Clearing Permit CPS 2799/1 was granted on 19 March 2009. On 6 July 2010 Regis Resources Limited requested that the Permit be amended for the purpose of changing the date on which the annual clearing report is due. The proponent has requested that the due date for the clearing report be changed from 31 July 2011 to 31 March 2011 and annually on 31 March each year thereafter.

Methodology

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

4. Assessor's comments

Comment

The application has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the Environmental Protection Act 1986, and the proposed clearing is at variance to Principles (f) and (g), may be at variance to Principles (c), and (j), is not likely to be at variance to Principles (a), (b), (d), (h), and (i), and is not at variance to Principle (e).

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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.
DMP	Department of Mines and Petroleum
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.