



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2638/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Tiwest Pty Ltd

1.3. Property details

Property: Exploration Licence 70/2345
Exploration Licence 70/2346
Local Government Area: Shire of Dandaragan
Colloquial name: Cooljarloo West Exploration Drilling Programme

1.4. Application

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

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description The area applied to clear has been broadly mapped at a scale of 1:250,000 as:

Beard Vegetation Association 1030: Low woodland; *Banksia attenuata* & *B. menziesii* (comprising a majority of the proposed clearing area); and

Beard Vegetation Association 1026: Mosaic: Shrublands; *Acacia rostellifera*, *A. cyclops* (in the south) & *Melaleuca cardiophylla* (in the north) thicket / Shrublands; *Acacia lasiocarpa* & *Melaleuca acerosa* heath.

Rockwater Pty Ltd (2008) undertook a targeted floristic survey for Declared Rare Flora (DRF), Priority Flora and undescribed taxa in the Cooljarloo West area over 28 days between 30 October 2007 and 7 December 2007. A 10 metre wide corridor was surveyed along the 43.3 kilometres of proposed drill lines and 73.8 kilometres of existing access tracks along historical cleared lines, firebreaks and sand tracks. Approximately 117 hectares was surveyed in total, with most of the nominated existing access routes surveyed from a slow moving vehicle. New proposed drill lines were typically surveyed on foot. Broad habitat descriptions of areas likely to be impacted were made, however systematic flora surveying using quadrats was not employed. Rockwater Pty Ltd (2008) note that vegetation mapping was outside the scope of the flora survey, and detailed floristic data was not used to characterise each of the vegetation communities described. Notwithstanding, the flora and vegetation of the local area has been well documented by the numerous botanical surveys commissioned by Tiwest Pty Ltd, including Mattiske Consulting Pty Ltd (1997), Western Botanical (2002), Landcare Services (2002; 2004) and Woodman Environmental Consulting Pty Ltd (2006; 2007). Notably, a detailed flora and vegetation survey conducted over the Mullering 3D survey area by Woodman Environmental Consulting Pty Ltd (2006) overlaps 11 proposed drill lines subject to this clearing permit application.

Vegetation descriptions of the proposed clearing area, provided by Rockwater Pty Ltd (2008) are summarised below:

Falcon West Woodland 1 (FWW1) - Open Low Woodland or Low Woodland to 5 metres of *Banksia menziesii* and *B. attenuata* over Low Scrub to 1.8 metres dominated by either *Adenanthos cygnorum* or *Xanthorrhoea preissii* over Dwarf Scrub to 1 metre dominated by *Acacia pulchella* var. *glaberrima*, *Jacksonia nutans*, *Bossiaea eriocarpa* and *Hibbertia hypericoides* over Open Low Herbs of *Dasyopogon obliquifolius* on fine to medium grained grey sand within a low flat plain;

FWW2 - Low Woodland to 3 metres of *Banksia attenuata*, *B. menziesii*, occ. *Eucalyptus todtiana* over Low Scrub to 1.2 metres dominated by *Eremaea pauciflora*, *Hibbertia* sp. *Gnangara*, *H. hypericoides*, *Petrophile linearis*, *Allocasuarina humilis*, *Astroloma xerophyllum* and *Conospermum stoechadis* subsp. *stoechadis* over Open Low Sedges of *Alexgeorgea nitens*, *Blancoa canescens* and *Mesomelaena pseudostygia* on fine to medium grained grey/white sand;

Falcon West Heath 1 (FWH1) - Heath to 1.5 metres dominated by *Pericalymma ellipticum* var. *ellipticum*, *Banksia telmatiaea*, *Melaleuca seriata*, *Hibbertia crassifolia*, *Calytrix aurea*, *Regelia ciliata*, *Dryandra nivea* subsp. *nivea*, *Verticordia blepharophylla*, *Isopogon* sp. *Badgingarra* over Open Low Sedges of *Chordifex reseminans* on fine grained cream/yellow sand in a depression. Scattered *Nuytsia floribunda* to 5.5 metres also occur in this community;

FWH2 - Heath to 0.8 metres of mixed species including *Banksia telmatiaea*, *Calothamnus hirsutus*, *Acacia*

lasiocarpa var. *lasiocarpa*, *Dryandra lindleyana* subsp. *lindleyana*, *Hakea sulcata*, *Daviesia decurrens*, *Regelia ciliata*, *Conospermum stoechadis* subsp. *stoechadis* on fine to medium grained orange sandy loam in broad low-lying flat areas. (*Viminaria juncea*, *Melaleuca lateriflora* subsp. *acutifolia* and *Melaleuca brevifolia* over Very Open Sedges dominated by *Gahnia trifida* occupy narrow drainage lines within this Heath community);

FWH3 - Low Scrub of *Viminaria juncea* and *Melaleuca raphiophylla* (shrub-form) over Dense Low Heath dominated by *Acacia lasiocarpa* var. *lasiocarpa*, *Banksia telmatiaea* and *Hakea varia* on fine to medium grained yellow sand with some iron-staining within depressions;

FWH4 - Low Scrub of *Viminaria juncea* and *Melaleuca raphiophylla* over Heath of *Regelia ciliata*, *Melaleuca viminea* ssp. *viminea* and *Melaleuca raphiophylla* over Open Dwarf Scrub of *Frankenia ?glomerata* and *Dryandra nivea* ssp. *nivea* on medium grained light brown sandy clay of with cracking clay;

Woolka Road Woodland 1 (WKW1) - Low Woodland to 3.5 metres of *Banksia attenuata*, *B. menziesii* and *Eucalyptus tottiana* over Heath dominated by *Conospermum stoechadis* subsp. *stoechadis*, *Bossiaea eriocarpa*, *Hibbertia hypericoides*, *Acacia pulchella* var. *glaberrima*, *Eremaea pauciflora*, *Melaleuca clavifolia*, *Synaphea spinulosa*, *Jacksonia nutans* to 1.5 metres over Very Open Low Sedges to 0.4 metres dominated by *Mesomelaena pseudostygia* and *Schoenus clandestinus* on fine to medium grained grey/brown sand on gently undulating terrain. *Nuytsia floribunda*, *Adenanthos cygnorum* and *Allocasuarina humilis* can become a part of this community also;

WKW2 - Low Woodland of *Banksia attenuata*, *Banksia menziesii* and *Banksia prionotes* over Low Scrub of *Banksia prionotes* and *Acacia spathulifolia* over Low Heath of *Eremaea pauciflora*, *Xanthorrhoea preissii*, *Eremaea asterocarpa*, *Stirlingia latifolia*, *Jacksonia hakeoides* and *Calothamnus quadrifidus* over Dwarf Scrub of *Melaleuca clavifolia*, *Melaleuca leuropoma*, *Gyrostemon sessilis* and *Dryandra lindleyana* ssp. *lindleyi* on fine to medium grained yellow to brown consolidated sand in gently sloping terrain;

Woolka Road Scrub Heath 1 (WKSH1) - Open Dwarf Scrub of *Gastrolobium oxylobioides*, *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Calothamnus sanguineus*, *Hibbertia hypericoides*, *Astroloma glaucescens* over Open Low Sedges of *Mesomelaena pseudostygia*, *Schoenus clandestinus* on on fine grained terracotta coloured sand to clay with lag gravel and some surface crusting on broad flat terrain. Occasional *Nuytsia floribunda* to 3.5 metres (2-10%) present;

WKSH2(A) - Drainage Line on WK18 access. Heath of *Acacia saligna*, *Melaleuca teretifolia*, *Melaleuca lateritia* and *Viminaria juncea* over Low Heath of *Grevillea thelemanniana* ssp. *Cooljarloo*, *Baeckea* sp. Perth region, *Darwinia pinifolia*, *Verticordia densiflora* ssp. *densiflora*, *Verticordia plumose* var. *brachyphylla*, *Verticordia amphigia* and *Thryptomene hyporhytis*, over Low Sedges of *Chorizandra enodis*. The taller heath of *Melaleuca* species occupies the drainage channel whilst the Low Heath of myrtaceous species occurs in areas of slightly higher relief;

WKSH2(B) - Open Low Scrub of *Melaleuca teretifolia*, *Melaleuca raphiophylla* and *Melaleuca viminea* ssp. *viminea* over Dense Low Sedges of *Chorizandra enodis* over Open Herbs of *Angianthus prostratus*, *Eryngium pinnatifidum* ssp. *palustre* and *Myriocephalus appendiculatus*. On the margin of an extensive wetland;

WKSH3 - Low Heath to 0.8 metres dominated by *Hakea obliqua* subsp. *parviflora*, *Verticordia densiflora* var. *densiflora*, *Calothamnus hirsutus*, *Melaleuca brevifolia*, *Banksia telmatiaea* and occasional *Melaleuca raphiophylla* (shrub-form) on fine to medium grained orange sand with some surface crusting in low-lying terrain;

WKSH3 - Open Low Scrub of *Hakea obliqua* ssp. *parviflora*, over Low Heath of *Banksia telmatiaea*, *Beaufortia squarrosa*, *Acacia lasiocarpa*, *Daviesia decurrens*, *Eremaea pauciflora* and *Jacksonia hakeoides* over Open Herbs of *Dasygogon obliquifolius* and *Anarthria laevis*;

WKSH4 - Scrub to 2.3 metres of *Melaleuca raphiophylla* (shrub-form), *Viminaria juncea* over Low Heath dominated by *Hakea varia* and *Banksia telmatiaea*. This community occurs in islands of water flow channels in the area;

WKSH4 - Heath of *Viminaria juncea* and *Melaleuca raphiophylla* (shrub form) over Low Heath of *Banksia telmatiaea*, *Calothamnus quadrifidus*, *Grevillea thelemanniana* ssp. *Cooljarloo*, *Calytrix aurea*, *Verticordia densiflora* ssp. *densiflora*, *Scaevola lanceolata*;

WKSH5 - Open Low Scrub to 1.8 metres of *Xanthorrhoea preissii* over Low Heath to 0.3 metres dominated by *Banksia telmatiaea* and *Eremaea pauciflora* over Very Open Herbs dominated by *Patersonia occidentalis* and *Dasygogon obliquifolius* on fine to medium grained grey sand. This community was burnt two years ago and *Anigozanthos viridis* ssp. *terraspectans* recorded at this location;

WKSH6 - Heath to 1.2 m dominated by *Banksia telmatiaea*, *Beaufortia squarrosa* and *Xanthorrhoea preissii* over Open Low Sedges to 0.3 metres dominated by *Tricostularia neesii* var. *neesii* and *Chordifex reseminans*;

WKSH7 - Dense Low Heath dominated by *Banksia telmatiaea*, *Regelia ciliata*, *Conostylis angustifolia*, *Dryandra platycarpa*, *Olax scalariformis*, *Melaleuca seriata*, *Verticordia densiflora* var. *densiflora* and *Conospermum stoechadis* subsp. *stoechadis* on fine to medium grained orange sand commonly on low-lying broad flat depressions. *Eucalyptus decipiens* subsp. *decipiens* grew in this heath on WK15 drill line with occasional *Banksia prionotes*;

WKSH8 - Regrowth Dwarf Scrub to 0.8 metres dominated by *Melaleuca viminea* subsp. *viminea*, *Tecticornia peltata*, *Frankenia ?glomerata* over herbs dominated by *Angianthus micropodioides*, *Goodenia pulchella* subsp. *Coastal Plain A* and *Centrolepis aristata* on fine grained grey sand;

Wongonderrah Road Area Drill Line 1 (WGDL1) - Low Woodland of *Melaleuca preissiana*, *M. viminea*, *M. raphiophylla* (shrub form) and *Eucalyptus rudis* over Scrub dominated by *Acacia saligna* subsp. *lindleyi* ms, *Jacksonia sternbergiana* and *Alyogyne hakeifolia* over Low Scrub dominated by *Xanthorrhoea preissii*, *Hypocalymma angustifolia* and *Pimelea imbricata* var. *piligera* over Open Low Sedges of *Lepidosperma longitudinale* and Very Open Herbs dominated by *Centrolepis polygyna* and *Siloxerus humifusus* on metallic grey fine loamy sand (25% clay) with high organic matter. Occasional *Jacksonia furcellata* and *Melaleuca leuropoma* also occur in this community;

WGDL2 - *Eucalyptus rudis* Forest to 22 metres over Scrub of *Acacia cyclops*, *Spyridium globulosum* and *Kunzea ericifolia* over Open Low Scrub of *Rhagodia baccata* ssp. *baccata* and *Myoporum insulare*. Heavily degraded understorey in creekline. The area is part of an old stock route;

WGDL4 - Woodland of *Corymbia calophylla* over Low Woodland of *Melaleuca preissiana* and *Banksia attenuata*, over Scrub of *Xanthorrhoea preissii*, *Viminaria juncea* and *Jacksonia sternbergiana*, over Low Scrub of *Hakea varia* and *Xanthorrhoea preissii* over Open Dwarf Scrub of *Hypocalymma angustifolium*, *Acacia lasiocarpa*, *Gyrostemon sessilis*, and *Hibbertia hypericoides*;

WGDL4 - Low Forest of *Corymbia calophylla* over Open Low Woodland of *Banksia littoralis*, *Melaleuca raphiophylla* and *Nuytsia floribunda* over Open Scrub of *Viminaria juncea* and *Allocasuarina lehmanniana* ssp. *lehmanniana* over Heath of *Banksia telmatiaea*, *Acacia lasiocarpa*, *Regelia ciliata* and *Xanthorrhoea preissii* over Dwarf Scrub of *Darwinia pinifolia*;

WGDL5 - Open Low Woodland to 6 metres of *Melaleuca preissiana*, *Banksia littoralis* and *Eucalyptus rudis* over Scrub to 2.5 metres of *Jacksonia sternbergiana* and *Viminaria juncea* over Low Scrub to 1.6 metres of *Xanthorrhoea preissii* over Open Dwarf Scrub to 1.2 metres dominated by *Banksia telmatiaea*, *Hypocalymma angustifolia* and *Hakea varia* over Open Low Sedges dominated by *Lepidosperma longitudinale* on fine grained dark grey sand to clay. Drainage area flat. Burnt approximately four years ago;

Wongonderrah Road Area Scrub Heath 1 (WGS1) - Regenerating Low Heath to 1m dominated by *Acacia lasiocarpa* var. *lasiocarpa*, *Banksia telmatiaea*, *Regelia ciliata*, *Daviesia decurrens*, *Beaufortia squarrosa* and *Melaleuca leuropoma* on fine to medium grained orange/brown sand on broad flat terrain. Occasional *A. spathulifolia* and *Hakea obliqua* subsp. *parviflora* occurs in this community. Site looks to be reasonably high in the landscape regionally. Burnt approximately two years ago;

WGS2 - Low Scrub to 1.2 metres of *Melaleuca brevifolia* over Low Heath to 0.5 metres dominated by *Banksia telmatiaea*, *Melaleuca seriata*, *Calothamnus hirsutus*, *Verticordia densiflora* var. *densiflora*, *Grevillea thelemanniana* subsp. *Cooljarloo* and *Petrophile seminuda* over Open Herbs dominated by *Stirlingia abrotanoides*, *Siloxerus humifusus* and *Stylidium dichotomum*. Occasional *Daviesia decurrens*, *Hakea sulcata* and *Santalum acuminatum* also occur in this community;

WGS3 - Open Scrub to 2.5 metres dominated by *Melaleuca raphiophylla* (shrub-form) over Low Heath to 0.5 metres dominated by *M. leuropoma*, *Acacia cochlearis* over Low Sedges of *Lomandra maritime* on medium grained cream/yellow sand on strongly undulating mobile low sand dunes. Occasional *Nuytsia floribunda*, *Allocasuarina lehmanniana* subsp. *lehmanniana* and *Anthocoercis littorea* also occur in this community;

WGS4 - Regrowth on track adjacent to Open Scrub to 2.3 metres of *Viminaria juncea*, over Low Scrub to 1.6 metres dominated by *Melaleuca brevifolia*, *M. lateriflora* subsp. *acutifolia* and *M. raphiophylla* (shrub-form) over Dwarf Scrub to 0.6 metres dominated by *Banksia telmatiaea*, *Regelia ciliata*, *Dryandra nivea* subsp. *nivea*, *Petrophile seminuda*, *Grevillea thelemanniana* subsp. *Cooljarloo* and *Verticordia densiflora* var. *densiflora* over Very Open Herbs of *Angianthus micropodioides* on fine to medium grained grey/white sand with some iron staining in a drainage area. Occasional *Calothamnus hirsutus* also occurs in this community. Regrowth species on the track include *Banksia telmatiaea*, *Calothamnus hirsutus*, *Petrophile seminuda*, *Angianthus micropodioides*, *Regelia ciliata* and occasional *Melaleuca lateriflora* subsp. *acutifolia*. Area burnt approximately three years ago;

WGS4 - Thicket to 3 metres of *Melaleuca raphiophylla* (shrub-form), *M. viminea* subsp. *viminea* over Open Scrub to 1.8 metres over Tall Sedges dominated by *Gahnia trifida* and *Baumea* sp. And Herbs dominated by *Angianthus micropodioides*, *Triglochin* sp. C in a well incised drainage line;

WGS5 - Heath to 1.6 metres dominated by *Melaleuca brevifolia*, *Dryandra nivea* subsp. *nivea*, *Regelia ciliata*, *Tecticornia indica* subsp. *bidens* and *Frankenia glomerata* over weedy Herbs dominated by **Heliophila pusilla*. Occasional *Melaleuca viminea* subsp. *viminea* and *M. raphiophylla* (shrub-form) occur on the western edge of the community. (WG12 area is a broad drainage line where the water flow has eroded scattered gullies. Vegetation changes from *M. viminea*/*M. raphiophylla*, *Hakea varia*, *Acacia saligna* to *Regelia ciliata*, *Banksia telmatiaea*, *Verticordia densiflora* var. *densiflora* to *Melaleuca brevifolia* and *Tecticornia* sp. as soil & moisture availability & topography (local) changes;

WGS5 - Low Heath to 0.6 metres dominated by *Tecticornia indica* subsp. *bidens*, *Frankenia glomerata*, *Verticordia densiflora* var. *densiflora* and *Lawrenzia squamata* over Herbs dominated by *Angianthus micropodioides*, *Siloxerus humifusus*, *Triglochin* sp. C, *Isolepis cernua* var. *setiformis* and *Villarsia capitata* and Very Open Low Sedges dominated by *Schoenus subfascicularis* on fine sand and clay on a low-lying flat area. This is a saline wetland. Occasional *Regelia ciliata* occurs within this community. Some disturbance from farming activities;

Wongonderrah Road Area Woodland 1 (WG1) - Low Woodland to 8 metres of *Banksia prionotes*, *B. menziesii* over Heath to 1.6 metres dominated by *Acacia spathulifolia*, *Xanthorrhoea preissii*, *Melaleuca leuropoma*, *Hibbertia hypericoides*, *Calothamnus quadrifidus* and *Acacia pulchella* var. *pulchella* over Dwarf Scrub dominated by *Hibbertia racemosa*, *Dryandra lindleyi* subsp. *lindleyi*, *Allocasuarina humilis* and *Stenanthemum notiale* subsp. *chamelum* to 0.8 metres over Very Open Herbs dominated by *Scaevola repens* on fine to medium grained cream/yellow sand. Occasional *Stirlingia latifolia*, *Hakea prostrata*, *Anigozanthos humilis* and *Petrophile macrostachya* also occur in this community;

WGW2 - Low Forest to 6 metres of *Banksia attenuata*, *B. menziesii* and *B. prionotes* over Open Scrub to 2.5 metres of *Adenanthos cygnorum* over Heath to 1.2 metres dominated by *Eremaea pauciflora*, *E. asterocarpa*, *Acacia lasiocarpa* var. *lasiocarpa*, *Stirlingia latifolia*, *Hypocalymma* sp. *Nambung*, *Bossiaea eriocarpa*, *Daviesia podophylla* and *Petrophile linearis* over Very Open Tall Sedges dominated by *Mesomelaena pseudostygia* and *Schoenus clandestinus* on fine to medium grained cream/yellow sand on rise of low sand dune. Occasional *Eucalyptus todtiana* also occurs within this community;

Heath (White Property) - Low Heath dominated by *Banksia telmatiaea*, *Regelia ciliata*, *Stirlingia latifolia*, *Jacksonia hakeoides*, *Acacia saligna* subsp. *lindleyi* ms, *Melaleuca viminea* subsp. *viminea*, *Acacia spathulifolia* and *Verticordia densiflora* var. *densiflora*;

White West 1 (WW1) - Dense Low Forest to 6 metres of *Banksia prionotes*, over Low Scrub dominated by *Allocasuarina humilis*, *Calothamnus quadrifidus*, *Acacia spathulifolia*, *Hakea trifurcata*, *Anthocoercis littorea*, over Open Sedges dominated by *Mesomelaena pseudostygia* on single grained fabric yellow sand on rise of dune. Limestone outcropping? in small patches;

Scrub (S) - *Melaleuca viminea* subsp. *viminea* and *Gahnia trifida* in cleared paddocks on deeper sand areas higher in the landscape;

OR

Whole area grazed by cattle.

Remnants and regrowth of *Juncus acutus*, *Regelia ciliata*, *Xanthorrhoea preissii*, *Gahnia trifida*, *Acacia cyclops*, *Baumea juncea* and *Lepidosperma longitudinale* at varying densities.

* = introduced flora species

Clearing Description

This clearing permit application is for a Purpose Permit to clear up to 12 hectares of native vegetation within a boundary of approximately 455 hectares (GIS Database). Tiwest Pty Ltd (Tiwest) are proposing to undertake the Cooljarloo West Exploration Drilling Project on Exploration Licences 70/2345 and 70/2346, situated immediately west of the existing Cooljarloo Mine.

Vegetation clearing will be undertaken using a rubber-tyred front end loader with a raised bucket (minimum 200 millimetres from the ground surface). Vegetation will be flattened, but will remain in situ. Drill lines will be approximately 2.6 metres wide (the width of the front end loader blade), however, an area double this width will be cleared at drilling locations and at the end of each line to provide sufficient working and turning areas for vehicles. Where practical, existing cleared firebreaks, drill lines and sand tracks will be used to access drilling locations, thereby reducing the amount of native vegetation to be cleared. In some areas it may be possible to drive over vegetation without mechanically clearing. Vegetation density will dictate where this method will be able to be employed.

Vegetation Condition

Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).

to

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

Comment

The vegetation condition rating is derived from information provided by Rockwater Pty Ltd (2008). The central and eastern parts of the application area are in excellent condition, whilst the two western most drill lines are located on White's property, which is described as degraded. Paterson's Curse is known from a paddock in the eastern section of the Wedge property (located north of Woolka Road).

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 at variance to this Principle

The proposed clearing area is located approximately 20 kilometres south-east of Cervantes in the Swan Coastal Plain 2 subregion of the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). The Swan Coastal Plain 2 subregion is characterised by *Banksia* and *Tuart* on sandy soils, *Casuarina obesa* on outwash plains and paperbark in swampy areas. The subregion is a part of the South West Botanical Province, an area which has a very high degree of species diversity. The subregion is comprised of a complex series of seasonal wetlands, with more than 25% of the Swan Coastal Plain land area between Wedge Island and Dunsborough being wetland (Mitchell et al, 2002).

The proposed clearing area is of very high conservation value as recognised by the Environmental Protection Authority's (EPA) Red Book recommendation that the area be added to Western Australia's formal conservation reserve system as a wetland reserve of the Northern Swan Coastal Plain (DEC, 2008). The area contains a very high floristic diversity and provides critical habitat for Declared Rare Flora (DRF), Priority Flora and undescribed taxa (DEC, 2008). Rockwater Pty Ltd (2008) recorded 30 conservation significant flora taxa in the Cooljarloo West area, including four Declared Rare Flora taxa, 22 Priority Flora taxa and four undescribed taxa. It is estimated that 24 of these taxa will be subject to varying levels of impact should the proposal proceed (Rockwater Pty Ltd, 2008).

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

The proposed clearing and subsequent drilling activities have the potential to significantly impact upon the biodiversity values of the local area, should adequate avoidance, mitigation and management measures not be implemented. Major threats to biodiversity from the proposal include:

- destruction of DRF, Priority Flora and undescribed taxa individuals and populations;
- destruction of winter wet depressions and drainage lines which provide critical habitat for DRF, Priority Flora and undescribed taxa;
- spread and introduction of weed species;
- introduction of *Phytophthora cinnamomi* disease (an assessment for the presence of the disease caused by *Phytophthora cinnamomi* was undertaken by Glevan Consulting (2008), with no infestation of *Phytophthora cinnamomi* recorded);
- introduction of feral animals;
- increased risk of fire; and
- encouraging undesirable public access into the area along new and re-opened drill lines and access tracks. Such access increases the risk of introducing *Phytophthora cinnamomi* disease and is likely to hamper the natural regeneration of cleared areas post exploration.

Tiwest Pty Ltd (2009) has an Exploration Environmental Management Plan (EEMP) which is adhered to for all exploration drilling programs. The EEMP addresses the management of key biodiversity threats such as loss of significant flora, vegetation disturbance, weeds, *Phytophthora* and bushfires. The EEMP has been reviewed by the assessing officer and the Department of Environment and Conservation's (DEC) Environmental Management Branch (EMB), with the latter stating that "the EMP is considered acceptable to DEC" (DEC, 2009).

Key management actions outlined in the EEMP include (Tiwest Pty Ltd, 2009):

- using existing roads and tracks wherever possible for both access and drill lines to minimise disturbance to native vegetation;
- driving around vegetation where practical to do so. Where vegetation is too dense, low impact clearing techniques are employed using the raised bucket of a rubber tyred front end loader. Aside from the obvious benefits of promoting natural regeneration of vegetation and minimising the potential for soil erosion, leaving vegetation in situ is also likely to deter 4WD recreators using accessways. Notwithstanding, measures will still be implemented to obscure the entrance to drill lines and new tracks to prevent access by other vehicles;
- trees and thick vegetation are avoided wherever possible;
- to minimise the risk of weed and disease introduction and spread, no soil or vegetation is introduced from outside the Cooljarloo West tenements and the movement of soil and vegetation within the tenements is minimised. Vehicles and equipment are to present to Tiwest clean and will be inspected prior to entering work areas to determine if vehicles and equipment require washdown. Default hygiene measures will be followed based on the dieback status of work areas to determine the washdown requirements upon exit from the tenements;
- locations of DRF and other significant flora species will be flagged and avoided wherever possible. Where impacts to DRF are unavoidable, an application for a permit to take DRF will be lodged with the Department of Environment and Conservation; and
- all vehicles are fitted with fire extinguishers, and the drill support vehicle is to carry 1,000 litres of water, hose and hand tools to extinguish any occurrences of fire.

Should a clearing permit be granted, it is recommended that suitable conditions be imposed for the purposes of avoiding, minimising and managing impacts to conservation significant flora and their habitat. Strict hygiene conditions should be imposed to minimise the risk of weeds and *Phytophthora cinnamomi* being introduced and spread throughout the local area.

Methodology DEC (2008).
DEC (2009).
Glevan Consulting (2008).
Mitchell et al (2002).
Rockwater Pty Ltd (2008).
Tiwest Pty Ltd (2009).

(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

Fauna studies have been undertaken at the Cooljarloo mine site area since 1986, with a majority of work conducted by Bamford Consulting Ecologists. Terrestrial vertebrates and aquatic macro-invertebrates have been sampled using a variety of techniques such as bird censusing, mist netting and pitfall, funnel, Elliot and cage trapping (Tiwest Pty Ltd, 2008). Baseline surveys have confirmed that significant species are present on the Cooljarloo tenements (Tiwest Pty Ltd, 2008). It is inferred that the fauna assemblages of the Cooljarloo tenements would be the same as that of the Cooljarloo west tenements subject to this clearing permit application.

The Cooljarloo West Exploration Drilling Programme will involve low impact, non-contiguous clearing of 12 hectares of native vegetation within a 455 hectare purpose permit boundary. The area proposed for disturbance (12 hectares) equates to approximately 2.6% of the purpose permit boundary (455 hectares). Localised impacts to fauna species would be expected to be of a minor nature and are likely to include:

- direct mortality of fauna during vegetation clearing or vehicle strike;
- temporary loss of habitat for foraging, shelter and/or nesting;
- localised displacement;
- increased competition for resources in adjacent habitat;
- introduction of feral animals;
- noise pollution; and
- increased risk of fire.

Vehicles travelling along drill lines will be slow moving, thereby reducing the potential for animal deaths. Vehicles travelling on existing access tracks will be moving slightly faster, however the risk of fauna mortality from vehicle strike is still considered low (Tiwest Pty Ltd, 2008). In accordance with the Exploration Environmental Management Plan (EEMP), low impact vegetation flattening techniques will be employed and large trees and thick vegetation will be avoided wherever possible (Tiwest Pty Ltd, 2009). Impacts of the proposal on fauna habitat are therefore unlikely to be significant.

Control of fires inadvertently started by vehicles or drilling equipment is addressed in the EEMP. Provided that these measures are implemented, the risk of fire to indigenous fauna is likely to be acceptable. Should the exploration program result in a detectable increase in feral fauna, appropriate measures should be implemented to control feral species.

Flattening of vegetation in corridors which will be 2.6 metres wide (with the exception of drilling locations and the end of lines which will be approximately double this width) is unlikely to result in a loss of significant habitat for any fauna species indigenous to Western Australia.

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

Methodology Tiwest Pty Ltd (2008).
Tiwest Pty Ltd (2009).

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

Comments Proposal is at variance to this Principle

Rockwater Pty Ltd (2008) was commissioned by Tiwest Pty Ltd to undertake a botanical survey of nominated drill lines and access tracks proposed for the Cooljarloo West Exploration Programme. A desktop study was conducted prior to field work to identify all of the conservation significant flora species known from the area, and to determine whether there was suitable habitat for those species within the proposed clearing area. The field survey involved traversing a 10 metre wide corridor centred on the 43.3 kilometres of proposed drill lines (which will typically be 2.6 metres in width). Approximately 73.8 kilometres of existing access tracks along cleared seismic lines, firebreaks and sand tracks will be used as part of the drilling program, and these were mostly surveyed from a slow moving vehicle. Where significant flora was encountered, counts of populations and plants were made to allow an impact assessment to be undertaken (Rockwater Pty Ltd, 2008).

Four Declared Rare Flora (DRF) taxa, 22 Priority Flora taxa and four undescribed taxa were recorded by Rockwater Pty Ltd (2008) during the botanical survey of the proposed clearing area (see Table 1 below):

Table 1: Impact Table (Local Context) for Flora of Conservation Significance recorded within the proposed Cooljarloo West Exploration Drilling Programme

Species Name	Conservation status	No. of populations	No. of populations impacted (%)	Minimum No. of plants recorded	No. of plants impacted (%)
<i>Andersonia gracilis</i>	R	9	5 (56)	576	31 (5.4)
<i>Anigozanthos viridis</i> subsp. <i>terraspectans</i>	R	1	0 (0)	1	0 (0)
<i>Eremophila glabra</i> subsp. <i>chlorella</i>	R	1	0 (0)	1	0 (0)
<i>Macarthuria keigheryi</i>	R	11	9 (81.81)	796	422 (53.02)
<i>Chordifex resminans</i>	P1	5	2 (40)	33	16 (48.48)
<i>Melaleuca clavifolia</i>	P1	92	68 (73.91)	6,514	3,040 (46.67)
<i>Schoenus pennisetis</i>	P1	19	13 (68.42)	637	493 (77.39)
<i>Schoenus griffinianus</i>	P2	3	3 (100)	13	13 (100)
<i>Stylidium hymenocraspedum</i>	P2	5	2 (40)	92	36 (39.13)
<i>Verticordia blepharophylla</i>	P2	44	28 (63.64)	2,151	340 (15.81)
<i>Angianthus micropodioides</i>	P3	20	11 (55)	19,008	1,815 (9.55)
<i>Baeckea</i> sp. <i>Perth Region</i>	P3	28	15 (53.57)	1,421	186 (13.09)
<i>Conospermum scaposum</i>	P3	43	30 (69.77)	3,265	1,511 (46.28)
<i>Dryandra lindleyana</i> subsp. <i>pollostia</i>	P3	1	1 (100)	1	1 (100)
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i>	P3	2	1 (50)	41	12 (29.27)
<i>Frankenia glomerata</i>	P3	14	0 (0)	1,047	0 (0)
<i>Hensmania stoniella</i>	P3	16	11 (68.75)	60	29 (48.33)
<i>Jacksonia carduacea</i>	P3	7	6 (85.71)	20	12 (60)
<i>Lasiopetalum lineare</i>	P3	3	2 (66.66)	18	17 (94.44)
<i>Myriocephalus appendiculatus</i>	P3	2	1 (50)	5,001	500 (10)
<i>Olax scalariformis</i>	P3	47	30 (63.83)	1,382	579 (41.90)
<i>Onychosepalum nodatum</i>	P3	8	3 (37.5)	19	10 (52.63)
<i>Verticordia amphigia</i>	P3	1	0 (0)	2,000	0 (0)
<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	P4	1	1 (100)	200	10 (5)
<i>Dryandra platycarpa</i>	P4	40	32 (80)	3,852	668 (17.34)
<i>Thysanotus glaucus</i>	P4	4	2 (50)	10	3 (30)
<i>Anigozanthos viridis</i> subsp. <i>Cataby</i>	Undescribed	3	0 (0)	3	0 (0)
<i>Grevillea thelemanniana</i> subsp. <i>Cooljarloo</i>	Undescribed	35	20 (57.14)	768	162 (21.09)
<i>Isopogon</i> sp. <i>Badgingarra</i>	Undescribed	28	21 (75)	2,867	527 (18.38)
<i>Hypocalymma</i> sp. <i>Nambung</i>	Undescribed	-	-	-	-

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

Two of the DRF species, *Anigozanthos viridis subsp. terraspectans* and *Eremophila glabra subsp. chlorella*, fall outside of the proposed drill lines and will therefore not be directly impacted by this clearing proposal. Tiwest Pty Ltd have made several modifications to the proposed drilling programme to avoid impacts to DRF species *Andersonia gracilis* and *Macarthuria keigheryi*, however, some individuals of these species will be impacted should the proposal proceed. It is estimated that 31 and 422 individual plants of these species will be impacted respectively. In accordance with section 23F of the *Wildlife Conservation Act 1950*, Tiwest Pty Ltd has lodged applications for permits to take DRF (*Andersonia gracilis* and *Macarthuria keigheryi*). Applications to take DRF are assessed by the Species and Communities Branch of the Department of Environment and Conservation, with the final decision to grant or refuse a permit to take DRF made by the Minister for the Environment.

Table 1 (above) is sourced from Rockwater Pty Ltd (2008). The table details the number of populations and plants of conservation significant flora taxa which were recorded by Rockwater Pty Ltd (2008) during their botanical survey of proposed drilling and access lines for the Cooljarloo West Exploration Drilling Programme. Importantly, Rockwater Pty Ltd (2008) note that the nature of the botanical survey (along narrow exploration corridors) means that the data presented in Table 1 misconstrues the impacts to significant flora populations. Local scale impacts presented in the table do not incorporate additional plants or populations that are likely to occur in the same widespread vegetation communities outside of the disturbance corridor. The number of individual plants within each population is likely to have been grossly underestimated given that only a narrow corridor within a broader population was surveyed. Furthermore, the number of plants to be impacted has been calculated as all plants within the 10 metre corridor being surveyed. Given the 2.6 metre wide clearing footprint along each exploration line, direct impacts to conservation significant taxa are overstated (Rockwater Pty Ltd, 2008). Should a clearing permit be granted, it is recommended that a condition be imposed restricting the maximum width of clearing to 10 metres, corresponding to the width of the corridor flora surveyed by Rockwater Pty Ltd (2008). Such a condition would allow impacts to conservation significant flora to be quantified based on population counts from the pre-works flora survey.

Rockwater Pty Ltd (2008) recommends that the Priority 1 status of *Melaleuca clavifolia* be reviewed. Approximately 6,500 plants were recorded in the survey corridor, and a conservative estimate of plant numbers in the surrounding area would be many tens of thousands (Rockwater Pty Ltd, 2008).

The presence of *Schoenus pennisetis* in the Cooljarloo area represents a range extension. During Spring 2007, Helena Holdings undertook a targeted survey for *Schoenus pennisetis*, locating some 2,469 plants from 38 populations (Rockwater Pty Ltd, 2008). Previously, this species was known from the Wongan Hills and from Perth southwards (Rockwater Pty Ltd, 2008). Information available on the Western Australian Herbarium's 'Florabase' indicates that this species is typically found in swamps and winter wet depressions (Western Australian Herbarium, 2009). A specific survey targeting this species was undertaken in conjunction with this drill line survey. Twenty five new populations were identified, 19 of these within the drill line survey area. The species was predominantly recorded growing on existing firebreaks and tracks, and it is likely that disturbance by the proposed exploration programme will stimulate germination of additional plants of *Schoenus pennisetis* (Rockwater Pty Ltd, 2008).

Impacts to *Chordifex reseminans* presented in Table 1 are considered high as this species is poorly represented in historical records (Rockwater Pty Ltd, 2008). No dedicated regional surveys have been undertaken for this species, but given the local extent of heath vegetation in which it was recorded, the species is likely to be more widespread than current records indicate (Rockwater Pty Ltd, 2008).

A specific survey targeting *Schoenus griffinianus* was undertaken in conjunction with the drill line survey area. Ten populations were located, three of which were in the drill line survey area. The species would appear to be a disturbance opportunist, given that most of the populations were found on vehicle tracks or well used animal tracks (Rockwater Pty Ltd, 2008).

Table 1 presents impacts of 50-100% of the populations surveyed at Cooljarloo West for a number of Priority 3 species, including: *Baeckea sp. Perth Region*, *Conospermum scaposum*, *Hensmania stoniella*, *Dryandra lindleyana subsp. Pollostia*, *Eryngium pinnatifidum subsp. Palustre*, *Jacksonia carduacea*, *Lasiopetalum lineare* and *Olx scalariformis* (Rockwater Pty Ltd, 2008). At least 18 regional populations of each taxon are known from historical records, and most either occur in high numbers in widespread habitats or are disturbance opportunists (Rockwater Pty Ltd, 2008).

Two of the four undescribed species were not recorded on the proposed drill lines and will therefore not be directly impacted by this clearing proposal (see Table 1). A large number of individuals of *Isopogon sp. Badgingarra* were located during the survey, mostly within winter wet damplands. Up to 18.38% of individuals located during the survey may be impacted by the proposed clearing. The species is currently not threatened (Rockwater Pty Ltd, 2008). *Grevillea thelemanniana subsp. Cooljarloo* currently has no conservation status, however, Rockwater Pty Ltd (2008) note that the species may be considered for a Priority level status in the near future. Up to 21.09% of individuals located during the survey may be impacted by the proposed clearing. Rockwater Pty Ltd (2008) located a population of *Grevillea thelemanniana subsp. Cooljarloo* in a wetland drainage heath where the western most drill hole is proposed on line FW6W. A deviation was flagged to the north, with the alternate route skirting around the margin of the wetland to avoid impacts to a population of *Grevillea thelemanniana subsp. Cooljarloo*. Tiwest Pty Ltd (2008) are committed to minimising impacts to *Grevillea thelemanniana subsp. Cooljarloo* wherever possible, and are committed to implementing the deviation flagged by Rockwater Pty Ltd (2008).

DEC (2008) note that the conservation significant flora in the proposed clearing area tend to be associated with winter wet areas and drainage lines. These wet areas provide critical habitat for at least two DRF and 24 Priority listed flora taxa. Should a clearing permit be granted, it is of paramount importance that winter wet areas and drainage lines are avoided wherever possible.

Tiwest Pty Ltd are aware of the significance of winter wet areas and drainage lines, and are committed to avoiding such habitat wherever possible. No clearing will be undertaken in any permanently wet areas, and no drilling will be undertaken in Frederick Smith Creek (Tiwest Pty Ltd, 2008). Two existing sandy access tracks cross Frederick Smith Creek and will be used for access only. A condition that restricts clearing within the above areas is recommended for endorsement on the permit should it be granted.

Low impact clearing techniques will be employed to minimise impacts to native vegetation, including conservation significant taxa (Tiwest, 2009). Appropriate planning should be conducted prior to the exploration to avoid impacts to DRF and Priority Flora wherever possible.

DEC (2008) have requested that Tiwest Pty Ltd provide a close out report at the completion of the exploration program, outlining impacts to Priority Flora taxa. Tiwest make a commitment within the EEMP to undertake a post-drilling audit within six months of the completion of the program which will cover at least 20% of the program (Tiwest Pty Ltd, 2009). This audit will allow for the determination of the scale of impact to significant species based on numbers removed against pre-works flora surveys. The Department of Mines and Petroleum supports this approach as a mechanism for monitoring impacts to Priority Flora, as it would assist in cumulative impact assessment should Tiwest Pty Ltd lodge applications to undertake any future exploration and mining development proposals in the Cooljarloo West area.

Methodology DEC (2008).
Rockwater Pty Ltd (2008).
Tiwest Pty Ltd (2008).
Tiwest Pty Ltd (2009).

(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 proposed clearing area (GIS Database). The nearest known TEC is located approximately 15 kilometres north-west of the proposed clearing area (GIS Database).

Rockwater Pty Ltd (2008) did not record any TEC's or Priority Ecological Communities (PEC's) during a flora and vegetation survey of the proposed drill lines.

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

Methodology Rockwater Pty Ltd (2008).
GIS Database:
- Threatened Ecological Communities.

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

Comments **Proposal is not at variance to this Principle**
The area applied to clear is within the Interim Biogeographic Regionalisation for Australia (IBRA) Swan Coastal Plain bioregion (GIS Database). According to Shepherd et al (2001) there is approximately 38.1% of the pre-European vegetation remaining in the Swan Coastal Plain bioregion. At the subregional level, there is approximately 41.2% of the pre-European vegetation remaining in the Swan Coastal Plain subregion.

The vegetation of the proposed clearing area is classified as Beard Vegetation Association 1026: Mosaic: Shrublands; *Acacia rostellifera*, *A. cyclops* (in the south) & *Melaleuca cardiophylla* (in the north) thicket / Shrublands; *Acacia lasiocarpa* & *Melaleuca acerosa* heath; and Beard Vegetation Association 1030: Low woodland; *Banksia attenuata* & *B. menziesii*. There is approximately 90.8% and 71.7% of the pre-European vegetation remaining of Beard Vegetation Associations 1026 and 1030 in the Swan Coastal Plain subregion respectively (Shepherd et al, 2001). Approximately 51.5% and 9.9% of Beard Vegetation Associations 1026 and 1030 are represented in conservation reserves within the Swan Coastal Plain subregion respectively (see table below). The area proposed to clear does not represent a significant remnant of vegetation in the wider regional area. The proposed clearing will not reduce the extent of Beard Vegetation Associations 1026 or 1030 below current recognised threshold levels, below which species loss increases significantly.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves (and current %)
IBRA Bioregion – Swan Coastal Plain	1,501,457***	571,759***	~38.1	Depleted	10.4 (24.2)
IBRA subregion – Swan Coastal Plain	1,117,991***	460,919***	~41.2	Depleted	11.5 (24.1)
Shire of Dandaragan	668,507***	326,283***	~48.8	Depleted	No information available
Beard veg assoc. – State					
1026	70,705	63,069	~89.2	Least concern	50.3 (52.4)
1030	139,021	91,059	~65.5	Least concern	9.8 (14.6)
Beard veg assoc. – Subregion					
1026	58,407	53,013	~90.8	Least concern	51.5 (52.6)
1030	114,293	81,921	~71.7	Least concern	9.9 (13.4)

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

*** Area within the Intensive Landuse Zone

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 Databases:
- Interim Biogeographic Regionalisation of Australia.
- Pre-European Vegetation.

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

Comments Proposal is at variance to this Principle

The proposed clearing area includes a number of seasonal wetlands and watercourses, including Frederick Smith Creek, Cooljarloo Swamp and Coonmadodo Swamp (GIS Database). A number of permanently wet depressions also exist.

Seminiuk (1994) cited in Woodman Environmental Consulting Pty Ltd (2006) undertook an ecological assessment and evaluation of system 5 wetlands, including the proposed clearing area and surrounds. The proposed clearing area is a part of the Mullering Wetlands chain, forming part of the Minyulo Suite; consisting of microscale sumplands, damplands and creeks. Water ranges from fresh to hypersaline and is maintained in wetlands through ponding and groundwater rise (Seminiuk, 1994; cited in Woodman Environmental Consulting Pty Ltd, 2006). Vegetation throughout forms complete cover or is a mosaic with open water. The Minyulo Suite consists of diverse habitats, serving a number of important ecological functions such as the provision of habitat for conservation significant flora, sediment transportation, acting as a pathway and habitat for fauna and acting with a flushing mechanism to basin wetlands, floodplains/palusplains (Seminiuk, 1994; cited in Woodman Environmental Consulting Pty Ltd, 2006).

Rockwater Pty Ltd (2008) acknowledges that the regional extent of saline drainage areas found in the western portion of the survey area is not known. Whilst not unique in their own right, several range extensions were recorded within the heath communities of the saline drainage areas, including two Priority Flora taxa. The regional representation of similar saline drainage communities needs to be investigated further if any development proposals are to proceed beyond the exploration phase at Cooljarloo West (Rockwater Pty Ltd, 2008).

DEC (2008) note that the winter wet areas, depressions and drainage lines of the proposed clearing area provide critical habitat for at least two DRF and 24 Priority Flora taxa.

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

It is acknowledged that only 2.6% of the purpose permit boundary will be cleared should a clearing permit be granted. Tiwest Pty Ltd (2008) are committed to avoiding winter wet depressions and other drainage areas wherever possible, and have adjusted their proposed drilling programme to avoid a number of wet depressions. No clearing will be undertaken in any permanently wet areas, and no drilling will occur within the Frederick Smith Creek. Two existing sandy access tracks cross this creek and will be used for access only.

Stringent hygiene protocols will be adhered to, thereby minimising the risk of introducing *Phytophthora cinnamomi* disease and/or weed species into the proposed clearing area. Both dieback and weeds have the potential to significantly impact upon the environmental values of the wetlands within the proposed clearing area should adequate management measures not be put in place.

Should a clearing permit be granted, it is recommended that suitable conditions be imposed to ensure that impacts to wetland environments within the proposed clearing area be avoided, minimised and managed appropriately. Strict hygiene conditions should be imposed to minimise the risk of weeds and *Phytophthora cinnamomi* being introduced and spread throughout the local area.

Methodology DEC (2008).
Rockwater Pty Ltd (2008).
Tiwest Pty Ltd (2008).
Woodman Environmental Consulting Pty Ltd (2006).
GIS Database:
- Hydrography, linear.

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

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

The proposed clearing area is located on the Swan Coastal Plain and occurs within the Bassendean Land System. This land system is characterised by a series of low vegetated dunes with interdunal seasonal wetlands and swamps. Soils are typically yellow to grey quartz sands (Tiwest Pty Ltd, 2008).

Tiwest Pty Ltd (2008) will implement low impact vegetation clearing techniques to minimise the potential for land degradation. For example, vegetation will be flattened using a rubber tyred front end loader using a raised bucket, as opposed to total clearing. This technique will leave vegetation in situ, thereby preserving rootstock and minimising disturbance to topsoil. Wheel rutting and the creation of preferential flow paths for surface water run-off will also be reduced, minimising the potential for soil erosion. Other management strategies to be implemented during the proposed vegetation clearing include (Tiwest Pty Ltd, 2009):

- all vehicle movements will be restricted to defined tracks and survey lines;
- all vehicles will engage four wheel drive mode to minimise the potential for wheel rutting;
- all vehicles used during the proposed clearing and exploration drilling are relatively light, thereby reducing the potential for soil compaction;
- large trees and thick vegetation will be avoided; and
- each drill line is generally passed over once, thereby reducing the potential for soil compaction (Tiwest Pty Ltd, 2009).

Provided that the management strategies as outlined above are implemented, the proposed clearing is unlikely to cause appreciable land degradation.

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

Methodology Tiwest Pty Ltd (2008).
Tiwest Pty Ltd (2009).

(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 may be at variance to this Principle

The proposed clearing area is of very high conservation value, as recognised by the EPA's Red Book recommendation that the area be added to Western Australia's formal conservation reserve system as a wetland reserve of the Northern Swan Coastal Plain (DEC, 2008). This recommendation has not been carried out.

None of the proposed clearing is within Western Australia's current conservation reserve system, however, it is located in close proximity to a number of conservation areas, namely:

- An un-named 'A Class' Nature Reserve (located approximately 50 metres from the nearest proposed drill line);
- Nambung National Park (located approximately 80 metres from the nearest proposed drill line);
- The 'C Class' Wongonderrah Nature Reserve (located approximately 2.8 kilometres north of the nearest proposed drill line);
- The 'C Class' Wanagarren Nature Reserve (located approximately 5.5 kilometres south-west of the nearest proposed drill line);

- Badgingarra National Park (located approximately 10 kilometres to the north-east); and
- The 'C Class' Southern Beekeepers Nature Reserve (located approximately 12.5 kilometres to the north-west).

The proposed clearing has the potential to impact upon the conservation values of the local area in a number of ways, including:

- destruction of DRF, Priority Flora and undescribed taxa individuals and populations;
- destruction of winter wet depressions and drainage lines which provide critical habitat for DRF, Priority Flora and undescribed species;
- spread and introduction of weed species;
- introduction of *Phytophthora cinnamomi* disease;
- introduction of feral animals;
- increased risk of fire; and
- encouraging undesirable public access into the area along new and re-opened drill lines and access tracks. Such access increases the risk of introducing *Phytophthora cinnamomi* disease and is likely to hamper the natural regeneration of cleared areas post drilling.

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

Tiwest Pty Ltd (2009) have committed to obscuring entry points to drill lines and new access tracks at the cessation of the drilling programme to discourage undesirable public access. Should a clearing permit be granted, it is recommended that suitable conditions be imposed for the purposes of avoiding, mitigating and managing impacts to conservation significant flora and their habitat. Conditions minimising the risk of introduction and spread of weeds and dieback within the local area should also be implemented.

Methodology DEC (2008).
Tiwest Pty Ltd (2009).
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

The proposed clearing area includes winter wet depressions, swamps, damplands, ephemeral creeklines and some permanently wet areas (GIS Database; Tiwest Pty Ltd, 2008; DEC, 2008). There is a limited potential for surface water quality to be impacted by vegetation clearing given the low impact clearing techniques which will be employed. Vegetation will be flattened by a raised bucket (minimum 200 millimetres off the ground) of a rubber tyred front end loader. Rootstock and topsoil will remain intact (Tiwest Pty Ltd, 2008). Surface water run-off from cleared areas is therefore unlikely to result in sedimentation of surface water features on site or off site.

The proposed clearing area is not located within a Public Drinking Water Source Area (GIS Database). The groundwater of the local area consists of a superficial aquifer (three to fifteen metres below surface, to a depth typically less than 50 metres) which is charged by winter rains (Tiwest Pty Ltd, 2008). Apart from some hand clearing at drilling locations, low impact clearing techniques will be employed which include driving over vegetation and flattening vegetation with a raised blade of a front end loader. No significant impacts to groundwater are expected as a result of clearing.

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

Methodology DEC (2008).
Tiwest Pty Ltd (2008).
GIS Database:
- Hydrography, linear.
- Public Drinking Water Source Areas.

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

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

The proposed clearing area consists of seasonally wet depressions and creeklines which form part of the Mullering Wetlands chain. Some permanently wet depressions also exist. The proposed clearing area is located in the Nambung River catchment, an area of approximately 295,000 hectares (GIS Database). The

scale and nature of the proposed clearing render the proposal unlikely to exacerbate the incidence or intensity of natural flood events.

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

Methodology GIS Database:
- Hydrographic Catchments - Catchments.

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

Comments

One public submission was received when the clearing permit application was advertised for public comment. The submission raised concerns that the proposed clearing may impact upon Native Title Rights and Sites of Aboriginal Significance.

There is one native title claim over the area under application (GIS Database). This claim (WC97/071) has been registered with the National Native Title Tribunal on behalf of the claimant group (GIS Database). However, the mining 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 two registered Aboriginal Sites of Significance within the proposed clearing area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

On 15 October 2008, the Department of Industry and Resources (DoIR) referred the Cooljarloo West Exploration Drilling Program to the Environmental Protection Authority (EPA) under section 38 of the *Environmental Protection Act 1986*. On 17 November 2008, the EPA advertised its level of assessment on the Cooljarloo West Exploration Drilling Program as 'Not Assessed - Managed under Part V of the EP Act (Clearing)'. Whilst the proposal raises a number of environmental issues, the EPA did not consider the overall environmental impact of the proposal to be significant enough to warrant formal assessment and the subsequent setting of conditions by the Minister for the Environment. Nevertheless, the EPA expects that the proponent and the relevant decision-making authorities will ensure the proposal is environmentally acceptable.

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

Methodology GIS Databases:
- Aboriginal Sites of Significance.
- Native Title Claims.

4. Assessor's comments

Comment

The proposal has been assessed against the Clearing Principles, and the proposed clearing is at variance to Principles (a), (c) and (f), may be at variance to Principle (h), is not likely to be at variance to Principles (b), (d), (g), (i) or (j) and is not at variance to Principle (e).

Should a clearing permit be granted, it is recommended that conditions be imposed on the permit for the purposes of avoiding, mitigating and managing impacts to conservation significant flora taxa and their associated habitat, particularly drainage areas. Management of weeds and Phytophthora cinnamomi disease also warrants the imposition of permit conditions. Similarly, record keeping and permit reporting conditions should be imposed.

5. References

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6. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government.
CALM	Department of Conservation and Land Management, Western Australia.
DAFWA	Department of Agriculture and Food, Western Australia.
DA	Department of Agriculture, Western Australia.
DEC	Department of Environment and Conservation
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DoE), Western Australia.
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia.
DMP	Department of Mines and Petroleum, Western Australia.
DoE	Department of Environment, Western Australia.
DoIR	Department of Industry and Resources, Western Australia.
DOLA	Department of Land Administration, Western Australia.
DoW	Department of Water
EP Act	Environment Protection Act 1986, Western Australia.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System.
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
RIWI	Rights in Water and Irrigation Act 1914, Western Australia.
s.17	Section 17 of the Environment Protection Act 1986, Western Australia.
TECs	Threatened Ecological Communities.

Definitions:

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1** **Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2** **Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3** **Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under

consideration for declaration as 'rare flora', but are in need of further survey.

- P4** **Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R** **Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X** **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-

- Schedule 1** **Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
- Schedule 2** **Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
- Schedule 3** **Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.
- Schedule 4** **Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

{CALM (2005). *Priority Codes for Fauna*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1** **Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P2** **Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P3** **Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P4** **Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- P5** **Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of threatened species (*Environment Protection and Biodiversity Conservation Act 1999*)

- EX** **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.
- EX(W)** **Extinct in the wild:** A native species which:
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- CR** **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- EN** **Endangered:** A native species which:
(a) is not critically endangered; and
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- VU** **Vulnerable:** A native species which:
(a) is not critically endangered or endangered; and
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

CD

Conservation Dependent: A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.