Government of Western Australia
Department of Mines and Petroleum

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 3525/1

Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **Tiwest Pty Ltd**

1.3. Property details

Property: Exploration Licences 70/2345 & 70/2346

Local Government Area: Shire of Dandaragan

Colloquial name: Cooljarloo West Exploration Drilling Programme – Phase 2

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
25		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	Clearing Description	Vegetation Condition	Comment
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 (GIS Database). Woodman Environmental Consulting Pty Ltd carried out structural plant community mapping of the Cooljarloo West area in November 2008. Mapping was undertaken using aerial photography, various Department of Environment and Conservation databases and data collected from numerous flora and vegetation surveys undertaken in the Cooljarloo West area between 2005 and 2008 (Woodman Environmental Consulting Pty Ltd, 2009a). A total of 22 structural plant communities were described and mapped within the Cooljarloo West area, 16 of which occur in the area subject to this clearing permit application: **Forests** **F1d** – Disturbed F1 community: Low Forest of *Casuarina obesa* and *Melaleuca* spp. over scattered low shrubs on brown sandy loam on lowerslopes and drainage flats; **Heaths** **H2** – Heath to Thicket of a mix of species including *Allocasuarina lehmanniana* subsp. *lehmanniana*, *Acacia cyclops*, *Melaleuca viminea* subsp. *viminea* and *Regelia ciliata* on brown or grey clay in basins;	Tiwest Pty Ltd has applied to clear up to 25 hectares of native vegetation within an application area of approximately135 hectares to undertake Phase 2 of the Cooljarloo West Exploration Drilling Programme. Clearing will consist of 87 kilometres of new drill lines and access tracks at an approximate width of 2.6 metres. Additional clearing (up to 4 metres width) will be required at drilling locations and at the end of drill lines to allow for sufficient work and turning area (Tiwest Pty Ltd, 2009a). Aircore drilling will be undertaken along drill lines for the purpose of mineral sands exploration. Drill lines will typically be spaced 250 - 500 metres apart, with a smaller number of regional lines of variable spacing. Drill holes will typically be of 80 metre spacing (Tiwest Pty Ltd, 2009a). Native vegetation clearing will consist of driving over vegetation with a landcruiser and light Mitsubishi canter type truck. In areas where vegetation is too dense to employ this clearing technique a rubber tyred front end loader will flatten vegetation using a raised bucket (Tiwest Pty Ltd, 2009a).	Pristine: No obvious signs of disturbance (Keighery, 1994); to Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994).	The vegetation condition rating is derived from information provided by Woodman Environmental Consulting Pty Ltd (2009a; 2009b; 2009c) and Tiwest Pty Ltd (2009a). The assessing officer, DMP, visited the Cooljarloo West area on 19 January 2010. Observations made during this visit facilitated assessment of this clearing permit application.

H3 – Heath to Thicket dominated by *Allocasuarina lehmanniana* subsp. *lehmanniana* or *Melaleuca systena* on yellow or white sand on dunes;

H4 – Heath dominated by a mix of species including *Banksia telmatiaea, Regelia ciliata and Melaleuca seriata* with occasional Scrub or Open Scrub of *Hakea obliqua* subsp. *parviflora* on grey or brown sand on lowerslopes, flats and drainage basins;

H5 – Heath dominated by *Allocasuarina humilis* and *Melaleuca seriata* with emergent *Eucalyptus todtiana* and *Nuytsia floribunda* on brown sand on midslopes;

H6 – Heath of *Allocasuarina microstachya* and *Banksia armata* var. *armata* on brown silty sand over laterite on low rises;

H7 – Low Heath dominated by *Gastrolobium oxylobioides* and *Hakea* spp. on brown sand over laterite on midslopes and low rises;

Thickets

T1 – Scrub to Thicket dominated by *Melaleuca lateriflora* subsp. *acutifolia* on brown or grey clay or loamy clay in basins;

T2 - Thicket of *Allocasuarina lehmanniana* subsp. *lehmanniana* over Open Low Sedges on grey clay in basins;

T3 - Scrub to Thicket dominated by *Acacia saligna, Viminaria juncea* and *Melaleuca rhaphiophylla* (stunted form) on grey or brown sand over clay on lowerslopes, drainage lines and minor basins;

T4 – Scrub to Thicket dominated by *Melaleuca rhaphiophylla* and *Melaleuca viminea* subsp. *viminea* on brown or grey sand over clay in basins;

Woodlands

W1 – Low Woodland to Dense Low Forest of *Melaleuca rhaphiophylla* over Low Sedges on brown sand over clay in basins;

W2 – Low Woodland to Low Forest of *Eucalyptus rudis* or *Corymbia calophylla* and *Melaleuca* spp. over Low Scrub or Scrub on grey or brown sand or clay on lowerslopes, drainage lines and basins;

W3 – Low Woodland to Low Forest of *Banksia attenuata* and *Banksia menziesii* with occasional *Eucalyptus todtiana* over Heath dominated by *Eremaea pauciflora* and/or *Hibbertia hypericoides* on brown or grey sand on lower to midslopes;

W3d –Disturbed W3 community;

W5 - Low Woodland to Low Forest of *Banksia prionotes* over Low Scrub or Heath dominated by *Acacia spathulifolia* on brown over yellow sand on low rises;

W7 – Open Low Woodland of *Banksia ilicifolia*, *Banksia menziesii* and *Banksia attenuata* over Heath on brown sand on lowerslopes; and

CL – Cleared areas (Woodman Environmental Consulting Pty Ltd, 2009a).

In addition, Woodman Environmental Consulting Pty Ltd has undertaken Floristic

Community Type (FCT) mapping in the Falcon area which includes proposed drill lines in the northern portion of this clearing permit application. A total of 11 FCT's were mapped for the Falcon area, of which five occur in the proposed clearing area:

FCT 2 - Heath dominated by a mix of species including *Melaleuca brevifolia*, *M. rhaphiophylla* and *M. lateriflora* subsp. *acutifolia* interspersed with stands of *Viminaria juncea* on grey or brown sandy clay on lowerslopes, flats and basins;

FCT 4 - Scrub of *Viminaria juncea* over Heath of *Banksia telmatiaea* and *Regelia ciliata* on grey or brown sand in wet basins;

FCT 5 – Species rich Heath dominated by *Banksia telmatiaea* and various other species including *Beaufortia squarrosa*, *Kingia australis* and *Regelia ciliata* on brown or grey sand on lowerslopes, flats and depressions;

FCT 9a - Low Woodland of *Banksia attenuata*, *B. menziesii* and *Eucalyptus todtiana* with occasional *Banksia ilicifolia* over Heath on grey or white sand on mid to upperslopes; and

FCT 11 – Low Heath dominated by *Calothamnus sanguineus*, *Hakea incrassata*, *H. lissocarpha* and *Hibbertia* spp. on grey or brown sandy clay with lateritic gravel on midslopes and swales (Woodman Environmental Consulting Pty Ltd, 2009a).

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 Cooljarloo West area contains very high floristic diversity, with Woodman Environmental Consulting Pty Ltd recording 617 flora taxa (including 4 Declared Rare Flora taxa and 39 Priority Flora taxa) at Cooljarloo West between 2005 and 2008 (Woodman Environmental Consulting Pty Ltd, 2009a). A total of 22 plant communities were identified in the Cooljarloo West area through structural plant community mapping, 16 of which will be impacted to some degree by the proposed clearing. Importantly, restricted communities W4, W8 T5 and FCT 1 will not be impacted by clearing as they do not occur within the proposed clearing area. It is acknowledged that Tiwest Pty Ltd (2009a) made modifications to the proposed drilling programme to avoid impacts to these communities. Three other restricted communities (H7, T2 and T3) do occur in the proposed clearing area. Impacts to these communities were considered unavoidable as deviations to the proposed drill lines would have resulted in a considerable amount of additional clearing (Tiwest Pty Ltd, 2009a). Impacts to these communities will be 0.09, 0.12 and, 0.06 hectares respectively, representing less than 0.5% of the known area of each community (Tiwest Pty Ltd, 2009a).

Woodman Environmental Consulting Pty Ltd (2009b) undertook a weed and dieback risk assessment and associated risk mapping at Cooljarloo West on behalf of Tiwest Pty Ltd. The risk assessment and map incorporated results of previous flora surveys by Woodman Environmental Consulting Pty Ltd and dieback surveys conducted in the Cooljarloo West area by Glevan Consulting in March 2008 and December 2009. The hygiene risk assessment and map were developed for use in conjunction with the Exploration Environmental Management Plan.

In summary, no occurrences of *Phytophthora cinnamomi* have been confirmed in the proposed clearing area. Only a few small areas subject to this clearing permit application have known weed occurrences (Woodman Environmental Consulting Pty Ltd, 2009b). To minimise the risk of clearing and exploration activities spreading and introducing weeds and dieback to non-infested areas, a procedure was developed whereby certain

hygiene practices need to be undertaken when moving between the four hygiene categories:

- 'Dieback Infested' - Clean on exit to all other categories;
- 'Weed Infested' - Clean on exit to all other categories;
- 'High Risk' - Clean on entry and clean on exit to 'Low Risk' areas; and
- 'Low Risk' - Clean on entry.

Risk mapping and associated hygiene practices were developed on the basis of the following factors:

- High risk activities for spreading dieback include access from unsealed public roads, vehicular travel through wet or seasonally wet areas, vehicular travel through 'dieback infested' areas and through all areas downslope or downstream of identified 'dieback infested' areas;
- All areas identified through plant community mapping as one of the following plant communities were mapped as 'High Risk' areas: F1, W1, W2, W4, T1, T2, T3, T4, T5, H1, H2, H4, S1, FCT 1, FCT 2, FCT 3, FCT 4, FCT 5, FCT 6, FCT 7, FCT 8;
- All areas identified through plant community mapping as one of the following plant communities were mapped as 'Weed Infested' areas: F1d, W1d, W3d, W8d, T2d, CL, PP (Private Property);
- All areas identified through plant community mapping as one of the following plant communities were mapped as 'Low Risk' areas: FCT 9a, FCT 9b, FCT 10, FCT 11, H3, H5, H6, H7, W3, W5, W6, W7 and W8; and
- Soil and vegetative material must not be transported across hygiene boundaries at any time.

On the basis of risk mapping and risk assessment, 97 'Clean on Entry Control Points' have been established in the Cooljarloo West area where vehicles must stop and check for soil and vegetation. These control points are demarcated in the field by flagging tape. Under dry soil conditions vehicles will require a brushdown to remove soil and vegetation (this does not include dust). Under wet soil conditions where mud is present, vehicles will require a washdown with high water pressure (Tiwest Pty Ltd, 2009c). Vehicle washdown will be via the mobile washdown procedure whereby a purpose built trailer mounted water tank and high pressure cleaner accompanies drilling crew in the field. All vehicles are washed down at designated control points using the water and chlorine solution housed in the trailer-mounted water tank (Tiwest Pty Ltd, 2009c).

Provided that the risk-based hygiene control is implemented, the risk of clearing activity spreading weeds and dieback is considered manageable. Nevertheless, it is recommended that conditions be imposed on the permit (if issued) for the purposes of preventing the introduction and spread of weeds and dieback.

From a faunal perspective, 253 vertebrate fauna species (including 36 species of conservation significance) may occur in the Cooljarloo West area (Tiwest Pty Ltd, 2009a). More than 20,000 hectares of uncleared native vegetation is present on Exploration Licences 70/2345 and 70/2346 (Tiwest Pty Ltd, 2009a), and numerous conservation estates are located in close proximity to the proposed clearing area (GIS Database). It is considered unlikely that the linear areas applied to clear would support a higher level of faunal diversity than surrounding uncleared areas of native vegetation.

Given the high level of floristic diversity in the Cooljarloo West area (including an abundance of conservation significant flora) the proposed clearing is at variance to this Principle.

Impacts to biodiversity will be minimised by employing low impact clearing techniques and adhering to weed and dieback hygiene protocols as outlined in the weed and dieback risk assessment, Exploration Environmental Management Plan (EEMP) and Mobile Washdown Procedure (Woodman Environmental Consulting Pty Ltd, 2009b; Tiwest Pty Ltd, 2009b; 2009c).

Methodology

Mitchell et al (2002).
Tiwest Pty Ltd (2009a).
Tiwest Pty Ltd (2009b).
Tiwest Pty Ltd (2009c).
Woodman Environmental Consulting Pty Ltd (2009a).
Woodman Environmental Consulting Pty Ltd (2009b).
GIS Database:
- DEC Tenure.
- IBRA WA (Regions - Sub Regions).

(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 censussing, mist netting, pitfall, funnel, Elliot and cage trapping (Tiwest Pty Ltd, 2009a). Baseline surveys have confirmed that significant species are present on the Cooljarloo tenements (Tiwest Pty Ltd, 2009a). 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.

Phase 2 of the Cooljarloo West Exploration Drilling Programme will involve low impact, non-contiguous clearing of 25 hectares of native vegetation. Localised impacts to fauna species would be expected to be of a minor nature and may 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;
- increased access for feral animals along cleared drill lines and access tracks; and
- noise pollution.

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, 2009b). In accordance with the EEMP, low impact vegetation flattening techniques will be employed and large trees and thick vegetation will be avoided wherever possible (Tiwest Pty Ltd, 2009b). Impacts of the proposal on fauna habitat are therefore unlikely to be significant.

Flattening of vegetation in corridors which will be 2.6 metres wide (with the exception of drilling locations and the end of drill lines which will be approximately 4 metres in 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 (2009a).
Tiwest Pty Ltd (2009b).

(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

Woodman Environmental Consulting Pty Ltd (2009c) undertook a significant flora assessment over three separate visits in September, October and December 2009. All proposed drill lines and access tracks comprising this clearing permit application were searched to a width of 4 metres for the following Declared Rare Flora (DRF) and Priority Flora species:

Andersonia gracilis (DRF);
*Macarthuria keigheryi (*DRF);
Anigozanthos viridis subsp. terraspectans (DRF);
Eremophila glabra subsp. chlorella (DRF);

Chordifex reseminans (P1);
Lyginia excelsa (P1);
?Malleostemon sp. Cooljarloo (P1);
Stylidium aceratum (P2); and
Lepidobolus densus ms (P3).

Whilst a total of 58 Priority Flora taxa are known from Cooljarloo West or in the vicinity of Cooljarloo West, Woodman Environmental Consulting Pty Ltd (2009c) notes that the proposed clearing is likely to cause minimal impact to the local and regional distribution to the majority of these taxa given the large ranges, extensive habitats and populations located within secure tenure. The linear nature of the proposed clearing and the minimal disturbance to topsoil was also taken into consideration when assessing potential impacts of this clearing proposal.

On this basis, Tiwest Pty Ltd (2009a) has adopted a risk-based approach to the management of Priority Flora during mineral exploration activities, commissioning Woodman Environmental Consulting Pty Ltd (2009c) to focus only on the poorly known Priority Flora taxa with restricted distributions during the significant flora assessment.

Results of Woodman Environmental Consulting Pty Ltd's (2009c) significant flora assessment are discussed below:

Three DRF taxa were recorded on or adjacent to the proposed drill lines (Tiwest Pty Ltd, 2009a; Woodman Environmental Consulting Pty Ltd, 2009c):

1. *Andersonia gracilis;*
2. *Macarthuria keigheryi;* and
3. *Anigozanthos viridis subsp. terraspectans*.

In accordance with Tiwest Pty Ltd's (2009b) Exploration Environmental Management Plan, Woodman Environmental Consulting Pty Ltd (2009c) has flagged all recorded locations of DRF for avoidance. However, an application to take DRF has been lodged in accordance with section 23F of the *Wildlife Conservation Act 1950* in the event that there are unavoidable impacts to DRF. The Species and Communities Branch of the Department of Environment and Conservation assesses applications to take DRF, with the final decision being made by the Minister for the Environment.

Andersonia gracilis was found on or adjacent to three proposed drill lines from a total of six locations. A maximum of 23 individual plants may be impacted by this clearing proposal. *Andersonia gracilis* is known from over 350 locations in the Cooljarloo West and Falcon areas, typically in winter wet areas. Regionally, the species has a range of approximately 360 kilometres, known from 4 localities between Kojonup and Wongonderrah. This includes records from the Birdwhistle Nature Reserve and the Wongonderrah Nature Reserve (Woodman Environmental Consulting Pty Ltd, 2009c).

Macarthuria keigheryi was found on two proposed drill lines from a total of five locations. A maximum of 5 individual plants may be impacted by this clearing proposal. *Macarthuria keigheryi* is known from 154 locations in the Cooljarloo West and Falcon areas. Regionally, the species is known from 7 localities between Perth and Wongonderrah Road, a range of approximately 165 kilometres. This includes a population of more than 100 plants in the Moore River National Park (Woodman Environmental Consulting Pty Ltd, 2009c).

Anigozanthos viridis subsp. terraspectans was found on one proposed drill line from one location. A maximum of one individual plant may be impacted by this clearing proposal. *Anigozanthos viridis subsp. terraspectans* is known from 36 locations in the Cooljarloo West and Falcon areas, preferring winter wet habitats. Regionally, the species has a range of approximately 80 kilometres, known from 11 localities between Boonanarring and Wongonderrah Road. This includes one record from the un-named 'A Class' Nature Reserve which lies over part of Exploration Licence 70/2346 (Woodman Environmental Consulting Pty Ltd, 2009c).

Woodman Environmental Consulting Pty Ltd (2009c) did not record any of the targeted Priority Flora species during the significant flora assessment. On this basis, it is unlikely that the proposed clearing will adversely affect the conservation status of these Priority Flora species.

Impacts of this clearing proposal to other Priority Flora taxa not searched for cannot be quantified. However, the assessing officer notes that structural plant community mapping, floristic community type mapping and targeted DRF and Priority Flora searches in the Cooljarloo area have taken place over a number of years (Western Botanical, 2004; Woodman Environmental Consulting Pty Ltd, 2006a; 2006b; 2007a; 2007b, 2009b; 2009c; 2009d; Rockwater Pty Ltd, 2008) and are likely to provide sufficient population and habitat data to justify the risk-based approach adopted by the proponent.

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

Whilst the proposed clearing area includes DRF, is likely to include Priority Flora and provides habitat for such flora, it is noted that the proposed clearing (25 hectares) represents a small portion of the ~20,000 hectares of uncleared native vegetation on Exploration Licences 70/2345 and 70/2346. Clearing will be via low impact techniques and will be linear in nature, further reducing the likelihood of significant impacts to DRF and Priority Flora species.

Methodology Tiwest Pty Ltd (2009a).
Tiwest Pty Ltd (2009b).
Woodman Environmental Consulting Pty Ltd (2009c).

(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**
According to available GIS Databases, there are no known Threatened Ecological Communities (TEC's) within the proposed clearing area (GIS Database).

None of the structural plant communities or floristic community types that occur in the Cooljarloo West and Falcon areas correspond with listed TEC's as defined by the Department of Environment and Conservation (Woodman Environmental Consulting Pty Ltd, 2009a).

Community W8 may be restricted, occupying approximately 11.6 hectares within the Cooljarloo West area (Woodman Environmental Consulting Pty Ltd, 2009a). This community is not located within the proposed clearing area and therefore is not expected to be impacted.

A potential underground mound spring was found in Community W4, adjacent to Woolka Road. It is considered that this area may be a separate community from W4, but further quadrat-based sampling would be needed to make this determination. Woodman Environmental Consulting Pty Ltd (2009a) report this community to be of high local and regional significance, and as such, recommend that no clearing occur in this community. Tiwest Pty Ltd (2009a) has implemented this recommendation, shortening proposed drill line 'WK52' to ensure this community is not located within the proposed clearing area.

Community T5 was mapped at a single location (Cooljarloo Swamp), occupying approximately 17.2 hectares and may be restricted (Woodman Environmental Consulting Pty Ltd, 2009a). It is considered that this community may correspond to the P1 Priority Ecological Community – 'Claypans with mid dense shrubs of *Melaleuca lateritia* over herbs', however further quadrat-based sampling would be needed to make this determination (Woodman Environmental Consulting Pty Ltd, 2009a). This community is not located within the proposed clearing area and therefore is not expected to be impacted.

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

Methodology

Tiwest Pty Ltd (2009a).
Woodman Environmental Consulting Pty Ltd (2009a).
GIS Database:
- Threatened Ecological Sites.

(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 (2007) 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, 2007). 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 (2007)
** 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 (2007).
GIS Database:
- IBRA WA (Regions - Sub Regions).
- 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 small swamps, areas subject to inundation and minor non-perennial watercourses (GIS Database). Named wetlands such as Frederick Smith Creek, Cooljarloo Swamp and Coonmadodo Swamp are not subject to this clearing permit application (GIS Database).

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).

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

Impacts to native vegetation growing in association with watercourses and wetlands will be minimised as far as practicable by avoiding drainage areas wherever possible, employing low impact clearing techniques and adhering to weed and dieback protocols as outlined in the Exploration Environmental Management Plan and weed and dieback risk assessment (Tiwest Pty Ltd, 2009b; Woodman Environmental Consulting Pty Ltd, 2009b).

Methodology Tiwest Pty Ltd (2009b).
Woodman Environmental Consulting Pty Ltd (2006).
Woodman Environmental Consulting Pty Ltd (2009b).
GIS Database:
- Hydrography, lakes (course scale).
- Hydrography, lakes (medium scale).
- Hydrography, linear.
- Natmap 250K Series Mapping.

(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, 2009a).

Tiwest Pty Ltd (2009b) will implement low impact vegetation clearing techniques to minimise the potential for land degradation. For example, vegetation will be driven over or flattened using a rubber tyred front end loader using a raised bucket, as opposed to blade-down 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, 2009b):

- 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; and
- large trees and thick vegetation will be avoided where possible.

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 (2009a).
Tiwest Pty Ltd (2009b).

(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

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

- An un-named 'A Class' Nature Reserve (located approximately 4 metres from the nearest proposed drill line);
- The 'C Class' Wongonderrah Nature Reserve (located approximately 2.6 kilometres north-east of the nearest proposed drill line);
- The 'C Class' Wanagarren Nature Reserve (located approximately 5 kilometres south of the nearest proposed drill line);
- Nambung National Park (located approximately 5.5 kilometres west of the nearest proposed drill line);
- An un-named Conservation Park (located approximately 6.5 kilometres east of the nearest proposed drill line); and
- Badgingarra National Park (located approximately 10 kilometres to the north-east) (GIS Database).

The proposed vegetation clearing has the potential to impact on the environmental values of adjacent and nearby conservation areas through weed and dieback invasion, especially at a distance of 4 metres from the nearest Nature Reserve. Other conservation reserves located several kilometres from the proposed clearing are far less likely to be impacted.

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

Woodman Environmental Consulting Pty Ltd (2009b) undertook a weed and dieback risk assessment on behalf of Tiwest Pty Ltd to produce a hygiene risk map for the Cooljarloo West area, to identify high-risk activities associated with the proposed clearing and exploration and to propose a number of strategies to manage the risks. Provided that the risk assessment recommendations are strictly adhered to, the risk of spreading weeds and dieback into adjacent and nearby conservation areas is considered manageable.

It is recommended that weed and dieback management conditions be imposed, should a clearing permit be granted.

Methodology Woodman Environmental Consulting Pty Ltd (2009b).
GIS Database:
- DEC Tenure.

(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 and ephemeral creeklines (GIS Database; Tiwest Pty Ltd, 2009a). 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, 2009a). Surface water run-off from cleared areas is therefore unlikely to result in sedimentation or turbidity 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, 2009b). 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 bucket 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 Tiwest Pty Ltd (2009a).
Tiwest Pty Ltd (2009b).
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 (Woodman Environmental Consulting Pty Ltd, 2006). 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 Woodman Environmental Consulting Pty Ltd (2006).
GIS Database:
- Hydrographic Catchments - Catchments.

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

Comments

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 then Department of Industry and Resources (DoIR) referred Phase 1 of the Cooljarloo West Exploration Drilling Programme 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 Phase 1 of the Cooljarloo West Exploration Drilling Programme as 'Not Assessed - Managed under Part V of the EP Act (Clearing)'. Whilst the proposal raised 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. On this basis, Phase 2 of the Cooljarloo West Exploration Drilling Programme was not referred to the EPA.

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.

No submissions were received from direct interest parties or members of the public when the clearing permit application was advertised for comment.

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 for the purposes of weed management, dieback management, record keeping and permit reporting.

5. References

Department of Natural Resources and Environment (2002) Biodiversity Action Planning. Action planning for native biodiversity at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.

Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Mitchell, D., Williams, K., & Desmond, A. (2002) Swan Coastal Plain 2 (SWA2 - Swan Coastal Plain subregion) in 'A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002'. Department of Conservation and Land Management, Western Australia.

Shepherd, D.P. (2007). Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth. Includes subsequent updates for 2006 from Vegetation Extent dataset ANZWA1050000124.

Tiwest Pty Ltd (2009a) Cooljarloo West Exploration Drilling: Clearing Permit Application (December 2009).

Tiwest Pty Ltd (2009b) Exploration Environmental Management Plan - Cooljarloo West Tenements (E70/2345, E70/2346, E70/2490, E70/2491). 26 February 2009.

Tiwest Pty Ltd (2009c) Mobile Washdown Procedure. Environment Department. May 2009.

Woodman Environmental Consulting Pty Ltd (2006) Empire Oil & Gas NL - Mullering Onshore 3D Seismic Survey. Flora, Vegetation and *Phytopthora cinnamomi* Assessment. December 2006.

Woodman Environmental Consulting Pty Ltd (2009a) Tiwest Pty Ltd: Cooljarloo West Project: Flora and Vegetation Assessment. September 2009.

Woodman Environmental Consulting Pty Ltd (2009b) Tiwest Pty Ltd: Exploration drilling risk assessment - Cooljarloo West. *Phytophthora cinnamomi* and weed hygiene risk. May 2009.

Woodman Environmental Consulting Pty Ltd (2009c) Tiwest Pty Ltd: Cooljarloo West Drilling Program 2010: Significant Flora Assessment. December 2009.

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.