



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 8175/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Pilgangoora Operations Pty Ltd

1.3. Property details

Property:
Mining Lease 45/78
Mining Lease 45/333
Mining Lease 45/511
Mining Lease 45/1256
Miscellaneous Licence 45/388
Miscellaneous Licence 45/402
Miscellaneous Licence 45/411
Miscellaneous Licence 45/413
Miscellaneous Licence 45/414
Miscellaneous Licence 45/417
Miscellaneous Licence 45/426
Miscellaneous Licence 45/430

Local Government Area: Shire of East Pilbara
Colloquial name: Pilgangoora Lithium-Tantalum Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
1,330.1		Mechanical Removal	Mineral production and associated activities

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 11 October 2018

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description The vegetation of the application area is broadly mapped as the following Beard vegetation associations:
82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*; and
93: Hummock grasslands, shrub steppe; kanji over soft spinifex (GIS Database).

A Level 2 flora and vegetation survey was undertaken over the majority of the application area (covering M 45/333, M 45/78, M 45/511 and M 45/1256) by MMWC Environmental Pty Ltd. A total of eleven vegetation communities were identified within the application area (MMWC, 2016a):

- **Vegetation code 1a:** Scattered low trees of *Corymbia hamersleyana* over open shrubland of *Acacia acradenia*, *Acacia inaequilatera* and *Acacia ancistrocarpa* over low open shrubland of *Tephrosia* sp. Bungaroo Creek (M.E. Trudgen 11601) over open hummock grassland of *Triodia wiseana* and *Triodia epactia*;
- **Vegetation code 2a:** Scattered low trees of *Corymbia hamersleyana* over scattered tall shrubs of *Acacia inaequilatera* over low open shrubland of *Acacia stellaticeps* and *Corchorus parviflorus* over open hummock grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) and *Triodia wiseana*;
- **Vegetation code 3a:** Scattered tall shrubs of *Acacia inaequilatera* over scattered shrubs of *Acacia acradenia* over hummock grassland of *Triodia wiseana*, *Triodia brizoides* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835);
- **Vegetation code 3b:** Scattered shrubs of *Acacia inaequilatera* over hummock grassland of *Triodia wiseana* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835);
- **Vegetation code 3c:** Scattered low trees of *Corymbia hamersleyana* over high shrubland of *Acacia orthocarpa* over hummock grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) and *Triodia wiseana*;
- **Vegetation code 4a:** Low woodland of *Eucalyptus victrix* over high open shrubland of *Acacia tumida* var. *pilbarensis*, *Melaleuca glomerata* and *Acacia bivenosa* over open hummock grassland of *Triodia epactia* over open tussock grassland of *Cenchrus ciliaris* and *Cymbopogon ambiguus*;
- **Vegetation code 5a:** Low open woodland of *Corymbia hamersleyana* and *Corymbia candida* subsp. *dipsodes* over high shrubland of *Acacia ampliceps*, *Acacia acradenia*, *Melaleuca glomerata*, *Acacia*

- pyrifolia* and *Petalostylis labicheoides* over very open hummock grassland of *Triodia epactia* over open tussock grassland of **Cenchrus ciliaris*, **Cenchrus setiger* and *Cymbopogon ambiguus* over scattered sedges of *Cyperus vaginatus*;
- **Vegetation code 5b:** Low open woodland of *Eucalyptus victrix* and *Corymbia hamersleyana* over high shrubland of *Acacia acradenia* over scattered shrubs of *Acacia bivenosa* over open hummock grassland of *Triodia epactia* over very open tussock grassland of **Cenchrus ciliaris* and *Cymbopogon ambiguus*;
 - **Vegetation code 6a:** Scattered low trees of *Corymbia hamersleyana* over high open shrubland of *Acacia acradenia* and *Grevillea wickhamii* subsp. *hispidula* over scattered shrubs of *Acacia bivenosa* and *Cajanus cinereus* over open hummock grassland of *Triodia epactia* and *Triodia wiseana* over very open tussock grassland of *Eriachne mucronata* and *Cymbopogon ambiguus*;
 - **Vegetation code 6b:** Scattered low trees of *Corymbia hamersleyana* over high shrubland of *Acacia acradenia* over open shrubland of *Acacia bivenosa* over open hummock grassland of *Triodia epactia*; and
 - **Vegetation code 6c:** Scattered low trees of *Corymbia hamersleyana* over high shrubland of *Acacia tumida* var. *pilbarensis* and *Petalostylis labicheoides* over open hummock grassland of *Triodia epactia* and *Triodia angusta* over very open tussock grassland of *Eriachne benthamii*.

The Pilgangoora Access Road (L 45/388) was not surveyed; however 14 relevés were surveyed along the length of L 45/388 at nine proposed borrow pit locations, which provide information on the likely habitat types present throughout the length of L45/388. The following twelve vegetation communities were identified (MMWC, 2016b):

1. Scattered low trees of *Corymbia hamersleyana* over open hummock grassland of *Triodia wiseana* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835);
2. Low open woodland of *Corymbia hamersleyana* over high open shrubland of *Acacia bivenosa* over hummock grassland of *Triodia angusta* and *Triodia wiseana* over scattered tussock grasses of *Eragrostis eriopoda*;
3. Scattered low trees of *Corymbia hamersleyana* over open shrubland of *Acacia acradenia* and *Acacia bivenosa* over *Triodia wiseana*;
4. Scattered low trees of *Corymbia hamersleyana* over open shrubland of *Acacia ancistrocarpa* over open hummock grassland of *Triodia epactia* and *Triodia brizoides*;
5. Open shrubland of *Acacia ancistrocarpa* over open hummock grassland of *Triodia brizoides* and *Triodia epactia*;
6. Scattered low trees of *Eucalyptus victrix* and *Corymbia hamersleyana* over open shrubland of *Acacia acradenia* over low open shrubland of *Acacia stellaticeps* over open hummock grassland of *Triodia wiseana* over very open tussock grassland of **Cenchrus sp*;
7. Low open woodland of *Corymbia hamersleyana* over high open shrubland of *Acacia orthocarpa* over open hummock grassland of *Triodia wiseana*;
8. Scattered low trees of *Corymbia hamersleyana* over low open heath of *Acacia stellaticeps* over open hummock grassland of *Triodia brizoides*;
9. Low open woodland of *Melaleuca argentea* over open heath of *Melaleuca argentea* and *Acacia trachycarpa* over very open hummock grassland of *Triodia epactia* over scattered herbs of *Cassytha capillaris*;
10. Low open woodland of *Eucalyptus victrix* over high shrubland of *Acacia amplexiceps* and *Melaleuca glomerata* over open hummock grassland of *Triodia angusta* and *Triodia epactia* over scattered tussock grasses of *Eriachne benthamii*;
11. Scattered low trees of *Corymbia hamersleyana* and *Corymbia zygophylla* over open scrub of *Acacia tumida* var. *pilbarensis* and *Acacia acradenia* over hummock grassland of *Triodia wiseana*; and
12. Scattered low trees of *Corymbia hamersleyana* over high open shrubland of *Acacia trachycarpa* and *Hakea lorea* subsp. *lorea* over open hummock grassland of *Triodia wiseana*.

No survey data is available for areas within L 45/413 and L45/414. The survey information provided for the other tenements and adjacent areas (totalling in excess of 1,600 ha) is considered sufficient as a means of predicting likely vegetation communities within L 45/413 and L 45/414.

* Denotes weed species

Clearing Description	Pilgangoora Lithium-Tantalum Project. Pilgangoora Operations Pty Ltd proposes to clear up to 1,330.1 hectares of native vegetation within a total boundary of approximately 2,251 hectares, for the purpose of mineral production and associated activities. The project is located approximately 90 kilometres south-southeast of Port Hedland in the Shire of East Pilbara.
Vegetation Condition	Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994); To: Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).
Comment	The vegetation condition was derived from a vegetation survey conducted by MMWC Environmental Pty Ltd (2016a; 2016b).

Clearing permit 7449/1 was granted by the Department of Mines, Industry Regulation and Safety (DMIRS) on 23 March 2017. The clearing permit authorised the clearing of 1,217 hectares of native vegetation within a total boundary of 1,217 hectares for the purpose of mineral production. CPS 7449/1 was amended twice, once on 3 August 2017, for the purpose of increasing the permit boundary and the amount of authorised clearing by 113.1 hectares, and to include Miscellaneous Licence 45/417. The second amendment was granted on 29 March 2018. Clearing permit CPS 7449/3 authorised the clearing of 1,300.1 hectares of native vegetation within a total boundary of approximately 2,251 hectares, for the purpose of mineral production. The permit holder for CPS

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 may be at variance to this Principle**

The proposed clearing of up to 1,330.1 hectares of native vegetation will allow for the development of the Pilgangoora Mining Project. The application area occurs within the Chichester subregion of the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). This subregion is characterised by plains which support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* (formerly *Triodia pungens*) hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges (CALM, 2002).

The majority of the vegetation within the application area is considered to be in "Excellent" condition, although there are areas of "Completely Degraded" vegetation as a result of historic mining disturbance throughout the application area (MMWC, 2016a).

MMWC Environmental Pty Ltd (2016a) conducted a Level 2 flora and vegetation survey over M 45/333, M 45/78, M 45/511 and M 45/1256 and identified 195 species of flora from 101 genera and 39 families. Surveys within L 45/388 identified 76 species from 46 genera and 23 families (MMWC, 2016b). The number of flora species recorded during the flora survey is comparable to similar sized flora surveys conducted in the local area (MMWC, 2016a; MMWC, 2016b). Twenty three vegetation associations were identified during the flora surveys, none of which are considered to be analogous to any known Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) (MMWC, 2016a; MMWC, 2016b). However, six vegetation associations (vegetation codes 4a, 5a and 5b and vegetation communities 6, 9 and 10) may represent Groundwater Dependent Ecosystems (GDEs) based on the key species they support and pre-existing groundwater levels (MMWC, 2016a; MMWC 2016b). Species that are known to indicate GDEs include *Eucalyptus victrix* and *Melaleuca glomerata*. One or both of these species occur within the above mentioned vegetation associations, in areas where the static ground water level allows for access and utilisation (MMWC, 2016a).

Four fauna habitats were identified within the application area during a Level 1 fauna survey, all of which are widespread and common in the Pilbara region and locally in the surrounding area (MMWC, 2016a).

Suitable habitat is present within parts of the application area for *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4.), which is a Threatened flora species. However, no Threatened flora species were recorded within the application area during the flora survey and all known records are situated more than 19 kilometres from the application area (MMWC, 2016a).

Fourteen Priority flora species were considered to have the potential to occur within the application area, five of which were annuals: *Eragrostis crateriformis* (P3), *Gomphrena leptophylla* (P3), *Nicotiana umbratica* (P3), *Bulbostylis burbridgeae* (P4) and *Goodenia nuda* (P4). Given the rainfall in the three months prior to the August survey was above average, these annual species are likely to have been present at the time of survey, should they occur in the area. The remaining nine species, with the possibility of occurring within the application area were perennials, all of which could reasonably have been expected to be present during the flora survey but were not recorded. This being considered, impacts to the annual and perennial Priority flora species are not likely.

One Priority flora species was recorded within the application area during the flora survey; *Heliotropium muticum* (P3). Preferred habitat for this species appears to be restricted to sand plains around the Port Hedland area and extending to approximately 200 km south of Port Hedland (MMWC, 2016a). All recorded occurrences of *Heliotropium muticum* within the application area were recorded in vegetation community 1a. Based on survey data, it is estimated that this species is well represented in the local area. The majority of the population occurs on the south-west side of the old airstrip (and extends to areas outside the proposed clearing area), where 651 individuals were recorded from 73 locations. Department of Parks and Wildlife (DPaW, now the Department of Biodiversity, Conservation and Attractions) (2017a) advised that the majority of previously recorded population sizes of *Heliotropium muticum* have been comparatively small, therefore the population occurring within the study area is significant in terms of the number of individuals recorded. It may also be locally significant given that no other records exist within 15 kilometres (DPaW, 2017a). However, *Heliotropium muticum* is likely to be a disturbance opportunist that also appears to respond to fire (DPaW, 2017a). The conservation status of this species is unlikely to be impacted by the proposed clearing (DPaW, 2017a). The proponent should explore opportunities to relocate infrastructure to minimise disturbance to *Heliotropium muticum*, as the relocation of the proposed Village Spray Farm will reduce impacts to a significant number of individuals (DPaW, 2017a).

Eight species of introduced flora (weeds) were recorded within the application area (MMWC, 2016a). Of these, one (*Tamarix aphylla*) is registered as a Weed of National Significance and is also listed as a Declared Plant under the *Biosecurity and Agriculture Management Act 2007*. Weeds have the potential to significantly change

the dynamics of a natural ecosystem and lower the biodiversity of an area. Potential impacts to the biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

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

Methodology CALM (2002)
DPaW (2017a)
MMWC (2016a)

GIS Database:
- IBRA Australia
- Pre-European vegetation
- Threatened Ecological Sites Buffered

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

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

A Level 1 fauna survey was conducted over the majority of the application area in June 2015 by MMWC Environmental Pty Ltd. The same area was again subject to a single phase Level 2 terrestrial vertebrate survey in February 2016 by 360 Environmental Pty Ltd. Areas within L 45/388, L 45/414 and L 45/413 were not included in fauna surveys. Given the size of areas surveyed in the vicinity (over 1,600 hectares), it is reasonable to suggest that areas not covered by the fauna survey will offer similar habitat types.

Four fauna habitat types were identified (MMWC, 2016a; 360 Environmental, 2016): Hills; Drainage Lines; Stony Plain; and Sand Plain. All four habitats are widespread and common in the Pilbara region and the local area (MMWC, 2016a), although the Drainage Line habitat was considered to be of high fauna value (360 Environmental, 2016). Potential impacts to the Drainage Line habitat as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition. It must be noted that aerial imagery shows Drainage Line habitat occurs within areas not surveyed, although Drainage Line habitat occurs extensively in areas adjacent to the application area and throughout the local area (GIS Database). The linear nature of proposed impacts in unsurveyed areas (required for access and a borefield pipeline), is likely to reduce the overall impact on Drainage Line habitat, provided standard management measures (e.g. culverts) are implemented.

Pilbara Leaf-nosed Bat (*Rhinioncteris aurantia* – VU) and Western Pebble-mound Mouse (*Pseudomys chapmani* – P4) were species of conservation significance recorded within the study area during the fauna survey. The Ghost Bat (*Macroderma gigas* – VU) was considered likely to occur (MMWC, 2016a) and a further ten species were identified as having the potential to occur within the study area, but were not recorded during the fauna survey (MMWC, 2016a; 360 Environmental, 2016).

The fauna survey concluded that the Pilbara Leaf-nosed Bat was widespread throughout the range of hills associated with the local area. No roost sites were recorded within the application area, the nearest recorded roost site was discovered approximately 3 kilometres north of the northern boundary of the application area (MMWC, 2016a). It appears as though the Pilbara Leaf-nosed Bat is utilising the clearing area as foraging habitat, of which there are vast amounts remaining in the local area and region.

The application area contains suitable habitat for Western Pebble-mound Mouse, and two disused mounds were recorded at separate locations within the application area (MMWC, 2016b). This species is found across much of the Pilbara and any localised loss of habitat within the proposed clearing area is unlikely to result in significant impacts (MMWC, 2016a).

DPaW (2017b) reviewed the fauna survey information provided by the proponent and advised that impacts to the abovementioned vertebrate fauna species are unlikely to be significant. However it is important that fauna management measures be implemented to minimise potential impacts to local fauna species (DPaW, 2017b).

Short Range Endemic (SRE) fauna species were also considered. A Level 1 SRE survey was conducted over the application area and surrounds which recorded at least 23 species belonging to eight SRE groups. No listed and no confirmed SRE species were collected. There were eleven species collected within the study area that were classed as potential SREs, all of which were collected in areas outside the proposed disturbance and are not of conservation concern (Bennelongia, 2016). Three species were collected from impact areas only, but these are in the SRE category "Data deficient", which is a category applied to species with unknown ranges for which SRE status cannot be assessed (Bennelongia, 2016). These three species were collected from habitats that are not restricted at a local, sub-regional or regional level (Bennelongia, 2016). Significant impacts to SRE fauna are not anticipated (Bennelongia, 2016).

Impacts to local fauna species may be reduced by a staged clearing condition. Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology 360 Environmental (2016)
Bennelongia (2016)
DPaW (2017b)
MMWC (2016a)

GIS Database:
- Imagery

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

Comments Proposal may be at variance to this Principle

According to available databases, the only Threatened flora species known from the local area (20 kilometre radius) is *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4.) (DPaW, 2017c; GIS Database).

Suitable habitat is present for *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4.) within the application area, however no occurrences were recorded during the flora survey and all known occurrences are known from records situated more than 19 kilometres from areas of the application area that have been surveyed (MMWC, 2016a).

Pityrodia sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4.) is a distinctive species that is easily identified and although the flora survey was not intense enough to conclusively state that the species does not occur within surveyed areas, if this species was present within the surveyed areas, it would have likely been recognised (MMWC, 2016a).

Based on available information, the presence or absence of *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4.) within areas not covered by flora surveys cannot be accurately determined or inferred. There are only 10 recorded occurrences of *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4.), all of which have been collected from the Chichester IBRA subregion. The largest recorded population consists of 50 plants (Western Australian Herbarium, 1998-). This species is mostly found in granite or conglomerate cliff/slope habitats within skeletal red, brown clay loam or sand, or associated with sandstone, and areas not yet surveyed (L 45/413 and L 45/414), that contain suitable habitat should be surveyed prior to clearing. Potential impacts to Threatened flora as a result of the proposed clearing may be minimised by the implementation of a flora management condition, requiring that a targeted flora survey be undertaken within L 45/413 and L 45/414 prior to the commencement of clearing.

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

Methodology DPaW (2017c)
MMWC (2016a)
Western Australian Herbarium (1998-)

GIS Database:
- Threatened and Priority Flora

(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 databases, there are no known Threatened Ecological Communities (TECs) within the application area (GIS Database) and no communities analogous to any known TECs were recorded during the flora survey (MMWC; 2016a, MMWC, 2016b). The nearest known TEC is located approximately 100 kilometres from the application area (MMWC, 2016a; MMWC, 2016b; GIS Database).

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

Methodology MMWC (2016a)
MMWC (2016b)

GIS Database:
- Threatened and Priority Ecological Communities Boundaries
- Threatened and Priority Ecological Communities Buffers

(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 application area occurs within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, in which approximately 99% of the pre-European vegetation remains (see table below) (Government of Western Australia, 2018; GIS Database).

The vegetation within the application area has been mapped as Beard vegetation associations 82 and 93 (GIS Database). As the below table illustrates, both Beard vegetation associations are well represented, retaining at least 99% of pre-European vegetation within the State and the bioregion (Government of Western Australia, 2018). Given the amount of vegetation remaining in the local area and bioregion, the vegetation proposed to be cleared is not considered to represent a remnant within an extensively cleared area.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DBCA managed lands
IBRA Bioregion – Pilbara	17,808,657	17,733,583	~99	Least Concern	10.12
Beard vegetation associations – WA					
82	2,565,901	2,553,217	~99	Least Concern	11.52
93	3,044,309	3,040,640	~99	Least Concern	1.96
Beard vegetation associations – Pilbara Bioregion					
82	2,563,583	2,550,898	~99	Least Concern	11.53
93	3,042,114	3,038,471	~99	Least Concern	1.96

* Government of Western Australia (2018)

** Department of Natural Resources and Environment (2002)

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

Methodology Department of Natural Resources and Environment (2002)
Government of Western Australia (2018)

GIS Database:
- IBRA 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

A number of creek lines and gullies run through the application area and six vegetation communities that may represent Groundwater Dependent Ecosystems (GDEs), based on the key species they support, have also been identified (MMWC, 2016a).

Areas of drainage line habitat are considered to be of high fauna value (360 Environmental, 2016). The proposed clearing is likely to have some impact to areas of riparian vegetation throughout the application area. Impacts to drainage lines that intersect areas of linear clearing (required for access roads or pipelines) can be managed by standard management measures such as culverts, and are not of particular concern. One of the creek lines located within the application area is within the proposed pit disturbance area and will be significantly impacted. Disturbance to creek flows will be assessed and managed under other approvals, however the clearing of vegetation associated within creek lines and/or watercourses should be avoided where possible and existing flow patterns maintained. Potential impacts to riparian vegetation may be minimised through the implementation of a vegetation management condition.

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

Methodology 360 Environmental (2016)
MMWC (2016a)

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 may be at variance to this Principle

The application area is mapped as occurring on the Talga, Macroy, River, Uaroo, Platform and Satirist land systems (MMWC, 2016a; MMWC, 2016b; GIS Database). Approximately 95% of the proposed clearing falls within the Talga and Macroy land systems, which are not prone to erosion (Van Vreeswyk et al., 2004; GIS Database). Very little clearing is proposed within the River, Uaroo, Platform and Satirist land systems.

The Uaroo, Platform and Satirist land systems are generally not prone to erosion, however the Uaroo land system shows signs of erosion along drainage tracts (Van Vreeswyk et al., 2004). The River land system is largely stabilised by buffel and spinifex and accelerated erosion is uncommon, however susceptibility to erosion is high or very high if vegetative cover is removed (Van Vreeswyk et al., 2004).

The proposed clearing of up to 1,330.1 hectares of native vegetation has the potential to result in land degradation issues, as there are many drainage lines throughout the application area. Land degradation issues associated with clearing in the vicinity of drainage lines, can be mitigated through revegetation and rehabilitation of areas after they are no longer required, and/or by implementing standard management measures along areas of linear clearing (i.e. installing culverts along access roads). Potential erosion impacts as a result of the proposed clearing may be further minimised by the implementation of a staged clearing condition and a watercourse management condition.

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

Methodology MMWC (2016a)
MMWC (2016b)
Van Vreeswyk et al. (2004)

GIS Database:
- Landsystem Rangelands

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

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

There are no conservation areas in the vicinity of the application area. The nearest DBCA (formerly DPaW) managed land is the Mungaroona Range Nature Reserve which is located more than 50 kilometres northwest of the application area (GIS Database). The proposed clearing is unlikely to impact on the environmental values of any conservation area.

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

Methodology GIS Database:
- DPaW 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 application area is not located within a Public Drinking Water Source Area (GIS Database). The application area is located within the proclaimed Pilbara Groundwater Area under the *Rights in Water and Irrigation Act 1914* (GIS Database). Any groundwater extraction and/or taking or diversion of surface water for the purposes other than domestic and/or stock watering is subject to licence by the Department of Water.

The application area is located within a Semi-desert-tropical environment (CALM, 2002); with an average annual rainfall of 315 millimetres (data taken from Port Hedland recording station) and an evaporation rate that far exceeds this figure (BoM, 2018). Any surface water within the application area is likely to only remain for short periods following significant rainfall events. Clearing of native vegetation may temporarily cause excess runoff and sedimentation to enter drainage lines (depending on rainfall occurrence). However, with appropriate management actions, impacts on hydrology and drainage should be manageable (MMWC, 2016a). Surface water quality is not expected to deteriorate as a result of the proposed clearing.

The application area has a groundwater salinity that is marginal (500 to 1,000 milligrams/Litre Total Dissolved solids) (GIS Database). With high annual evaporation rates and low annual rainfall (BoM, 2018), there is likely to be limited groundwater recharge throughout large portions of the year. The proposed clearing is unlikely to result in measurable impacts to the quality of groundwater (GIS Database).

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

Methodology BoM (2018)
CALM (2002)
MMWC (2016a)

GIS Database:
- Groundwater Salinity, Statewide
- Hydrography, linear
- Public Drinking Water Source Areas (PDWSAs)
- RIWI Act, Groundwater 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**

Two main soils types are mapped over the total application area; Oc63 and Gf1 (GIS Database). A third soil type (Oc64) is mapped over a very small section of the southern part of the application area, where the borefield pipeline is to be constructed (Northcote et al. 1960-68; GIS Database). Chief soils mapped within the application area are either hard alkaline red soils (a characteristic of soil types Oc63 and Oc64) or are brown loams along with significant areas of earthy loam (Gf1 soil characteristics). Gf1 is also characterised by soils which are shallow and stony, and there are large areas without soil cover (Northcote et al. 1960-68).

Shallow stony soils, or areas where soil cover is absent, are unlikely to hold significant amounts of water, given the landscape setting. Surface water flows will likely report to nearby drainage lines. It is possible that areas of hard alkaline soils may hold water for short periods following significant rainfall events, although with an average annual rainfall of 315 millimetres and an average annual evaporation rate exceeding 3,000 millimetres (BoM, 2018), waterlogging and flooding are not considered to be major concerns. While large rainfall events may result in isolated flooding, this is a feature of a Semi-desert-tropical environment and the proposed clearing is not likely to lead to an increase in incidence or intensity.

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

Methodology BoM (2018)
Northcote et al (1960-68)

Planning Instrument, Native Title, previous EPA decision or other matter.

Comments

The clearing permit application was advertised on 10 September 2018 by the Department of Mines, Industry Regulation and Safety (DMIRS), inviting submissions from the public. No submissions were received in relation to this application.

There are two native title claims, WC1999/008 and WC1999/003, over the area under application (DPLH, 2018). However, the mining tenure has 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 no registered Aboriginal Sites of Significance within the application area (DPLH, 2018). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Water and Environmental Regulation and the Department of Biodiversity Conservation and Attractions, 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 DPLH (2018)

4. References

- 360 Environmental (2016) Pilgangoora Baseline Vertebrate Fauna Survey. Report prepared for Pilbara Minerals Ltd by 360 Environmental Pty Ltd, May 2016.
- Bennelongia (2016) Pilgangoora Project: Level 1 Short-Range Endemic Fauna Assessment. Report prepared for Pilbara Minerals Ltd, by Bennelongia Environmental Consultants, June 2016.
- BoM (2018) Climate Statistics for Australian Locations. A Search for Climate Statistics for Port Hedland Airport, Australian Government Bureau of Meteorology. http://reg.bom.gov.au/climate/averages/tables/cw_004032.shtml (Accessed 5 October 2018).
- CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management.
- Department of Natural Resources and Environment (2002) Biodiversity Action Planning. Action planning for native biodiversity

at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.

Department of Planning, Lands and Heritage (2018) Aboriginal Heritage Inquiry System, Department of Planning, Lands and Heritage, Western Australia. <http://maps.dia.wa.gov.au/AHIS2/> (Accessed 5 October 2018).

DPaW (2017a) Flora advice received in relation to Clearing Permit CPS 7449/1. Department of Parks and Wildlife, Western Australia, March 2017.

DPaW (2017b) Fauna advice received in relation to Clearing Permit CPS 7449/1. Department of Parks and Wildlife, Western Australia, March 2017.

DPaW (2017c) NatureMap. Department of Parks and Wildlife, <http://naturemap.dec.wa.gov.au> (Accessed 10 July 2017).

Government of Western Australia (2018) 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions. <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>

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

MMWC (2016a) Pilgangoora Project Area Flora, Vegetation and Fauna Assessment V2. Report prepared for Pilbara Minerals Ltd by MMWC Environmental Pty Ltd, June 2016.

MMWC (2016b) Pilgangoora Access Road Borrow Pits Flora and Vegetation Assessment. Report prepared for Pilbara Minerals Ltd by MMWC Environmental Pty Ltd, July 2016.

Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68): 'Atlas of Australian Soils, Sheets 1 to 10, with explanatory data'. CSIRO and Melbourne University Press: Melbourne.

Van Vreeswyk, A M, Leighton, K A, Payne, A L, and Hennig, P. (2004) An inventory and condition survey of the Pilbara region, Western Australia. Department of Agriculture and Food, Western Australia. Technical Bulletin 92.

Western Australian Herbarium (1998–). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <https://florabase.dpaw.wa.gov.au/> (Accessed 10 July 2017) .

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
DBCA	Department of Biodiversity Conservation and Attractions, Western Australia
DEC	Department of Environment and Conservation, Western Australia (now DBCA and DWER)
DEE	Department of the Environment and Energy, Australian Government
DER	Department of Environment Regulation, Western Australia (now DWER)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia
DMP	Department of Mines and Petroleum, Western Australia (now DMIRS)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DPLH	Department of Planning, Lands and Heritage, Western Australia
DRF	Declared Rare Flora
DoE	Department of the Environment, Australian Government (now DEE)
DoW	Department of Water, Western Australia (now DWER)
DPaW	Department of Parks and Wildlife, Western Australia (now DBCA)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DEE)
DWER	Department of Water and Environmental Regulation, Western Australia
EPA	Environmental Protection Authority, Western Australia
EP Act	<i>Environmental Protection Act 1986</i> , Western Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
PEC	Priority Ecological Community, Western Australia
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i> , Western Australia
TEC	Threatened Ecological Community

Definitions:

{DPaW (2017) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia}:-

T	Threatened species: Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i> , listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife
----------	--

Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the *Wildlife Conservation Act 1950*.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the *Wildlife Conservation Act 1950*.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

- CR Critically endangered species**
Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
- EN Endangered species**
Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
- VU Vulnerable species**
Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
- EX Presumed extinct species**
Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.
- IA Migratory birds protected under an international agreement**
Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.
- CD Conservation dependent fauna**
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.
- OS Other specially protected fauna**
Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.
- P Priority species**
Species which are poorly known; or
Species that are adequately known, are rare but not threatened, and require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.
- P1 Priority One - Poorly-known species:**
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
- P2 Priority Two - Poorly-known species:**
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature

reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority Three - Poorly-known species:

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority Four - Rare, Near Threatened and other species in need of monitoring:

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.