Government of **Western Australia**
Department of **Mines and Petroleum**

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 7427/1
Permit type: Purpose

1.2. Proponent details

Proponent's name: **Horseshoe Manganese Pty Ltd**

1.3. Property details

Property: Mining Lease 52/1048
Miscellaneous Licence 52/128
Local Government Area: Shire of Meekatharra
Colloquial name: Horseshoe Range Project

1.4. Application

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

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 2 March 2017

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description

Beard vegetation associations have been mapped for the whole of Western Australia and are useful to look at vegetation in a regional context.

The following Beard vegetation associations have been mapped within the application area (Government of Western Australia, 2015; GIS Database):

- 18: Low Woodland; mulga (*Acacia aneura*)
- 39: Shrublands; mulga scrub

Two flora and vegetation surveys have been undertaken on the Horseshoe Range project area. Pilbara Flora and Outback Ecology Services (Outback Ecology, 2010) conducted a one season Level 2 equivalent flora and vegetation survey on 27-28 January 2010. This survey covered the areas proposed for bulk sample sites over 66.15 hectares within the application area.

MBS Environmental (MBS) conducted a Level 1 (Reconnaissance) survey of the entire Exploration Licence 52/1561 on 7-11 June 2010, with a follow up visit conducted on 6-9 September 2010 (MBS, 2010).

The application area covers Mining Lease 52/1048 and Miscellaneous Licence 52/128 which covers the northern section of Exploration Licence 52/1561.

The following vegetation communities have been identified within the application area (MBS, 2016):

- Open scrub of *Acacia aneura* var. *tenuis* and *Acacia pruinocarpa* over *Eremophila jucunda* subsp. *jucunda*, *Eremophila spectabilis* subsp. *spectabilis* and *Ptilotus obovatus* on flats.
- Very open scrub of *Acacia aneura* var. *tenuis* and *Acacia citrinoviridis* with scattered *Ptilotus obovatus*, *Senna glutinosa* subsp. *glutinosa* and Poaceae sp. on flats.
- Scrub to patches of Thicket of *Grevillea berryana*, *Acacia aneura* var. *tenuis*, *Acacia pruinocarpa*, *Acacia citrinoviridis* and *Acacia marramamba* over mixed low shrubs including *Eremophila jucunda* subsp. *jucunda*, *Eremophila spectabilis* subsp. *spectabilis*, *Eremophila latrobei* subsp. *latrobei, Sida* sp. Golden calyces glabrous (H.N. Foote 32), *Ptilotus obovatus* and *Dodonaea pachyneura* along drainage lines.
- (Open) Scrub of *Acacia aneura* var. *tenuis* and *Acacia citrinoviridis* with scattered *Acacia pruinocarpa, Grevillea berryana* and *Corymbia ferriticola* over mixed low shrubs including *Eremophila jucunda* subsp. *jucunda, Eremophila spectabilis* subsp. *spectabilis, Eremophila latrobei* subsp. *latrobei, Ptilotus obovatus, Thryptomene decussata* and *Dodonaea pachyneura* on outcropping manganese rich ironstone ridge tops.
- Open scrub of *Acacia rhodophloia* with scattered *Acacia aneura* var. *aneura, Acacia pruinocarpa, Grevillea berryana* and *Acacia aneura* var. *tenuis* over mixed low shrubs including *Eremophila fraseri* subsp. *fraseri, Tribulus suberosus* and *Eremophila latrobei* subsp. *latrobei* on north facing shale rich slopes.

- Scrub of *Eucalyptus semota* (P1) over *Acacia pruinocarpa, Acacia aneura* var. *intermedia, Acacia aneura* var. *tenuis, Acacia wanyu* and *Acacia marramamba* over mixed low shrubs including *Eremophila jucunda* subsp. *jucunda, Thryptomene decussata* and *Senna artemisioides* subsp. x *artemisioides* on low manganese rich hills.

- Scattered scrub of *Acacia aneura* var. *tenuis, Acacia citrinoviridis* and *Grevillea berryana over l*ow shrubland of *Aluta maisonneuvei* subsp. *auriculata* with *Eremophila jucunda* subsp. *jucunda* and *Eremophila spectabilis* subsp. *spectabilis* on flats.

- Scrub of *Acacia aneura* var. *tenuis, Grevillea berryana, Acacia citrinoviridis* and *Acacia aneura* var. *intermedia* over mixed low shrubs including *Thryptomene decussata* and *Eremophila pendulina* on outcropping quartz.

- Open scrub of *Acacia aneura* var. *tenuis, Acacia pruinocarpa* and *Acacia aneura* var. *aneura* over mixed low shrubs including *Eremophila jucunda* subsp. *jucunda, Mirbelia rhagodioides, Senna artemisioides* subsp. x *artemisioides* over *Maireana ?georgei* on massive lateritic outcrops.

- Scrub patches of *Grevillea berryana, Acacia aneura* var. *tenuis, Acacia pruinocarpa, Acacia citrinoviridis* and *Acacia marramamba* over mixed low shrubs including *Eremophila jucunda* subsp. *jucunda, Eremophila spectabilis* subsp. *spectabilis, Eremophila latrobei* subsp. *latrobei, Sida* sp. Golden calyces glabrous (H.N. Foote 32), *Ptilotus obovatus* and *Dodonaea pachyneura* in low-lying outwash areas.

- Scrub of *Acacia aneura* var. *tenuis*, *Acacia aneura* var. *aneura* and *Acacia citrinoviridis*, *Acacia pruinocarpa* and *Grevillea berryana* over mixed low shrubs including *Eremophila jucunda* subsp. *jucunda*, *Eremophila fraseri* subsp. *fraseri*, *Ptilotus obovatus, Senna artemisioides* subsp. x *artemisioides* and *Dodonaea pachyneura* on ridges and north facing ironstone slopes.

- Cleared Lands (e.g. existing roads and access tracks).

Clearing Description

Horseshoe Range Project
Horseshoe Manganese Pty Ltd (Horseshoe Manganese) has applied to clear up to 93.9 hectares of native vegetation, within a total boundary of approximately 798.38 hectares for the purpose of mineral production. The proposed clearing is located approximately 123 kilometres north of Meekatharra, within the Shire of Meekatharra.

Vegetation Condition

Good: Structure significantly altered by multiple disturbances; retains basic structure/ability to regenerate (Keighery, 1994).

To

Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994).

Comment

The vegetation condition and description is based on the flora and vegetation survey conducted by MBS (2010). This was assessed utilising Trudgen's vegetation condition scale and was converted to the Keighery scale.

3. Assessment of application against clearing principles

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

Comments

Proposal is not likely to be at variance to this Principle

The application area lies within the Augustus (GAS3) sub-region of the Gascoyne Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). This sub-region is characterised by rugged low Proterozoic sedimentary and granite ranges divided by broad flat valleys (CALM, 2002).

During the flora and vegetation surveys of the application area, a total of 63 flora taxa from 35 genera and 23 families were recorded (MBS, 2016). One Priority species, *Eucalyptus semota* (Priority 1) was observed at one location in the application area with a population of twelve individuals (MBS, 2010). *Eucalyptus semota* occurs in clays soils on quartz outcrops and is not widespread (Western Australian Herbarium, 2017). Potential impacts to this species as a result of the proposed clearing may be minimised by the implementation of a flora management condition.

The application area falls within the buffer zone of the Robinson Range vegetation complexes (banded ironstone formation), Priority Ecological Community (PEC) (GIS Database). The Robinson Range PEC is located approximately four kilometres south of the application area (MBS, 2016). It is considered unlikely that this PEC would occur within the application area as the geology is not typically the banded ironstone formation that is a major characteristic of the Robinson Range PEC (Outback Ecology, 2010).

No introduced species or Declared Plants were recorded during the flora and vegetation surveys conducted across the application area (MBS, 2010; Outback Ecology, 2010). Potential impacts from the spread of weeds as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

From the fauna desktop assessments of the application area, based on distribution alone, eight amphibians, 64 reptiles, 140 birds and 26 mammal species have the potential to occur within the application area (MBS, 2010). Of these, it was assessed that nine conservation significant birds, three conservation significant mammals and one conservation significant reptile could occur within the application area (MBS, 2010; Outback Ecology, 2010). The habitats present are not likely to support a high level of faunal diversity.

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

Methodology

CALM (2002)
MBS (2010)
MBS (2016)
Outback Ecology (2010)
Western Australian Herbarium (2017)

GIS Database:
- IBRA Australia

(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 may be at variance to this Principle

The following seven fauna habitats have been identified within the application area (MBS (2016):

- Disturbed drainage
- Drainage tract mulga
- Massive Lateritic outcrop
- Mixed Acacia shrubland
- North facing slopes
- Rocky ironstone ridge
- Wash plain and flats

None of these represented significant fauna habitats however, several habitats, such as the Drainage Tract Mulga Habitat and the Massive Lateritic Outcrop are likely to support conservation significant species and be of greater significance for local fauna (MBS, 2010). Outback Ecology (2010) noted that approximately ten caves were found within an area called Rocky Ironstone Ridge located in the northern section of the application area. The majority of these caves were less than two metres in depth; however several were more than three metres (Outback Ecology, 2010).

The Drainage Tract Mulga habitat areas are reasonably well vegetated and could provide good refuges for numerous birds, mammals and reptiles (MBS, 2010; Outback Ecology, 2010). The Drainage Tract Mulga habitat is widespread regionally, however, effort will be taken to minimise clearing within this habitat (MBS, 2016).

The Massive Lateritic Outcrop habitat is located within the middle of the application area which covers 33.59 hectares and consists of approximately two metre high *Acacia incurvaneura* over a mixed shrub layer with some leaf litter and coarse woody debris over gravel (MBS, 2010; Outback Ecology, 2010). Caves and hollows were recorded on the northern side where the outcrop is described as eroded with a slight gradient into a minor drainage line (MBS, 2010). Within one cave, observations of an unidentified reptile and bird scats were recorded (MBS, 2010). Other observations in this habitat included several old nests from the conservation significant Stick-nest Rat (species not known), unidentified reptile burrows, remains of dead Euros in caves and dog/dingo scats (MBS, 2010). It is not known how common this habitat is in the local area and exactly which species could utilise the area. As a precaution it is recommended that impacts to this potentially significant fauna habitat be minimised by implementing a condition which prevents clearing in this area until further studies of this area have been conducted.

The Rocky Ironstone Ridge habitat consists of an open canopy of *Acacia* spp. scrub over gravel and is considered moderate to excellent habitat for reptiles and may also provide suitable habitat for the Long-tailed Dunnart (*Sminthopsis longicaudata* – Priority 4) (MBS, 2010; Outback Ecology, 2010). The caves recorded in the Rocky Ironstone Ridge habitat could provide shelter and habitat for mammals as evidenced by scats and tracks from the Short-beaked Echidna (*Tachyglossus aculeatus*) and several types of wallabies (Outback Ecology, 2010). The conservation significant species, the Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* - Vulnerable) has the potential to occur in the area (MBS, 2010), however it is unlikely that it would utilise these caves as this species needs deep, moist/humid caves (Department of the Environment and Energy, 2017).

The Mixed Acacia Shrubland is widespread across the application area covering approximately 697 hectares (MBS, 2010). Inactive mounds of the Western Pebble-mound Mouse (*Pseudomys chapmani* – Priority 4*)* have been recorded in this type of habitat in the north eastern vicinity of the application area (MBS, 2010). MBS (2010) determined during the fauna survey that the mounds have been inactive for a long period of time and it is unlikely that this species currently resides in the application area. The proposed clearing is therefore unlikely to impact upon habitat significant to the Western Pebble-mound Mouse.

Two inactive Rainbow Bee-eater (*Merops ornatus* - Migratory) nesting burrows were recorded in a disturbed area located in the north eastern section of the application area (MBS, 2010). Nesting areas are often re-used, however, the pairs usually excavate a new nesting burrow for each breeding season (Department of the Environment and Energy, 2017). Rainbow Bee-eaters are known to create nests in flat or sloping ground, in the banks of rivers, creeks or dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces (Department of the Environment and Energy, 2017). The vegetation associations mapped for the application area are represented widely in the local area, therefore should the Rainbow Bee-eater occur in the vicinity of the application area, it is likely that it could utilise undisturbed habitat outside of the application area.

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

Methodology Department of the Environment and Energy (2017)
MBS (2010)
MBS (2016)
Outback Ecology (2010)

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

Comments **Proposal is not likely to be at variance to this Principle**
According to available databases, there are no records of any Threatened flora within the application area (GIS Database). The flora survey over the application area did not record any Threatened flora species (MBS, 2010).

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

Methodology MBS (2010)

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 Threatened Ecological Communities (TECs) within the application area or within 50 kilometres of the application area (GIS Database). The vegetation survey of the application area did not identify any TECs (MBS, 2010).

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

Methodology MBS (2010)

GIS Database:
- Threatened and Priority Ecological Communities

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

Comments **Proposal is not at variance to this Principle**
The application area lies within the Gascoyne Interim Biogeographical Regionalisation of Australia (IBRA) bioregion in which approximately 99.96% of the pre-European vegetation remains (Government of Western Australia, 2015; GIS Database).

The vegetation of the application area has been broadly mapped as Beard vegetation associations 18 and 39 (GIS Database). These vegetation associations have not been extensively cleared as over 99% remains at both a state and bioregional level (Government of Western Australia, 2015). The application area is not a remnant nor does it form part of any remnants within the local area (GIS Database).

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

Methodology Government of Western Australia (2015)

GIS Database:
- IBRA Australia
- Imagery
- Pre-European Vegetation

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

Comments **Proposal is at variance to this Principle**
There are no permanent watercourses or wetlands within or in close proximity to the application area (GIS Database). The nearest significant water body is the Yarlarweelor Creek which is located 1.8 kilometres south of the application area. There are several minor ephemeral watercourses that pass through the application area (GIS Database). It is expected that these watercourses will only flow during significant rainfall. These areas correspond with the Drainage Tract Mulga habitat described by MBS (2010). The following management strategies are proposed to ensure that the natural flow of drainage lines within the application area is maintained to prevent impacts to the habitat (MBS, 2016):

- use of existing haul roads, tracks and disturbed areas;
- clearly delineating clearing areas with survey pegs and flagging tape;
- ensuring clearing activities do not alter the natural flow of drainage lines unless diversions are required around operational areas;
- locating infrastructure outside of drainage lines and associated vegetation communities where possible;
- constructing roads at right angles to drainage lines; and
- installing culverts, flood ways or otherwise ensuring road construction does not alter or impede the natural flow of water.

The vegetation community recorded along the drainage lines consisted of *Grevillea berryana*, *Acacia aneura* var. *tenuis*, *Acacia pruinocarpa*, *Acacia citrinoviridis* and *Acacia marramamba* over mixed low shrubs (MBS, 2016). Approximately 66.9 hectares of this vegetation community occurs within the application area (MBS, 2016) and it is also common throughout the region. Whilst the proposed clearing will remove vegetation growing in association with a watercourse, is unlikely to cause a significant impact on the environment associated with these drainage lines.

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

Methodology MBS (2010)
MBS (2016)
Outback Ecology (2010)

GIS Database:
- Hydrograpgy, linear

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

Comments **Proposal is not likely to be at variance to this Principle**
The application area falls within the Horseshoe, Beasley and Peak Hill land systems of the Murchison River Catchment (Curry *et al*., 1994; GIS Database).

The Beasley Land system is described as low ridges, hills and laterised residuals above stony footslopes and broad, stony lower plains supporting scattered Mulga and Snakewood dominated shrubland (Curry *et al*., 1994). This land system is mostly resistant to erosion, however drainage tracts are susceptible to minor erosion (Curry *et al*., 1994). There are some minor drainage lines within the application area, however, there is only likely to be localised erosion in these areas.

The Horseshoe land system is described as undulating stony plains and low rounded hills based on Proterozoic metamorphic rocks, with somewhat saline drainage foci and alluvial tracts; supports scattered Mulga and Wait-a-while shrublands with halophytes (Curry *et al*., 1994). This land system is generally not susceptible to erosion (Curry *et al*., 1994).

The Peak Hill land system is described as rugged, sinuous ranges and rounded hills of Proterozoic banded ironstone and hematitic shale, supporting stunted Mulga and Cottonbush shrublands. This land system is generally not susceptible to erosion as it has dense stony mantles and skeletal soils (Curry *et al*., 1994).

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

Methodology Curry et al. (1994)

GIS Database:
- Rangeland Landsystems

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

Comments **Proposal is not likely to be at variance to this Principle**
The application area is not located within any conservation areas or Department of Parks and Wildlife managed lands (GIS Database).

The application area is located approximately 20 kilometres north-west of the former Doolgunna Pastoral Lease which is managed by Department of Parks and Wildlife for conservation purposes (GIS Database).

At this distance, it is not likely that the vegetation within the application area would act as a buffer or be important as an ecological linkage to this 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). Generally, groundwater in the area is near neutral and fresh to brackish (the aquifers are saline-free and have a minimal content of Total Dissolved Solids (TDS) (MBS, 2016). The application area has low salinity levels of between 500-1,000 milligrams per litre of TDS (GIS Database). Salinity within this range is considered acceptable for most uses with acceptable drinking water between 500 to 750 milligrams per litre TDS and acceptable irrigation water between 500 to 1,200 milligrams per litre TDS. It is not likely that the proposed clearing of 93.9 hectares will have an impact on the local and regional groundwater quality.

The application area contains no permanent water bodies, however there are several minor, ephemeral drainage lines located within the application area (GIS Database). With an average annual rainfall of approximately 239.1 millimetres (BoM, 2017) and an annual evaporation rate of 3,800 millimetres (GIS Database) it is expected that there would be little surface flow during normal seasonal rains. It is only during major rainfall events (summer and autumn) that there is any significant surface flow and during these events it tends to be relatively fresh (MBS, 2016).

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

Methodology

BoM (2017)
MBS (2016)

GIS Database:
- Groundwater Salinity, Statewide
- Hydrography, linear

(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 application area is located within the Gascoyne River catchment which covers an area of approximately 2,000,000 hectares (GIS Database). Aquifer recharge generally takes place during the first half of the year (January to July) when seasonal thunderstorms, occasional cyclones and strong cold fronts pass through the area (MBS, 2016).

There are several minor, ephemeral drainage lines located within the application area (GIS Database) which are expected to be dry throughout the summer months. Also during normal seasonal rains there is little surface flow, as surface runoff occurs during and immediately following significant rainfall events (MBS, 2016). To mitigate any potential flooding event, MBS (2016) reported that Horseshoe Manganese propose that the open pits will be located along the ridge, while the waste rock landforms and proposed infrastructure are to be located on the gently sloping plains, away from local drainage lines.

There are two large rivers, the Murchison and Gascoyne rivers that are located north and south of the application area. The Gascoyne River is closest at approximately 25 kilometres north of the application area (GIS Database). These rivers flood during brief high rainfall summer storm or cyclonic events (MBS, 2016). At this distance away from the application area, the proposed vegetation clearing will not exacerbate any flooding.

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

Methodology

MBS (2016)

GIS Database:
- Hydrography, linear
- Hydrographic Subcatchments

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

Comments

There is one native title claim over the application area (WC1999/013) (Department of Aboriginal Affairs, 2017). 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 Sites of Aboriginal Significance located in the area applied to clear (Department of Aboriginal Affairs, 2017). 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.

It is the proponent's responsibility to liaise with the Department of Environment Regulation, the Department of

Parks and Wildlife 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.

The clearing permit application was advertised on 16 January 2017 by the Department of Mines and Petroleum inviting submissions from the public. There were no submissions received.

Methodology Department of Aboriginal Affairs (2017)

4. References

BoM (2017) Bureau of Meteorology Website - Climate Data Online, Meekatharra Airport. Bureau of Meteorology. http://www.bom.gov.au/climate/averages/tables/cw_007045.shtml (Accessed 28 February 2017)

CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions (Gascoyne 3 (GAS3 – Augustus subregion). Department of Conservation and Land Management, Bentley.

Curry, P.J., Payne, A.L., Leighton, K.A., Hennig, P. and Blood, D.A. (1994) An Inventory and Condition Survey of the Murchison River Catchment and Surrounds, Western Australia.

Department of Aboriginal Affairs (2017) Aboriginal Heritage Enquiry System. Department of Aboriginal Affairs. http://maps.dia.wa.gov.au/AHIS2/ (Accessed 28 February 2017).

Department of the Environment and Energy (2017) *Merops ornatus* – Rainbow Bee-eater, Species Profile and Threats Database. Department of the Environment and Energy http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=670 (Accessed 28 February 2017)

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.

Government of Western Australia (2015) 2015 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of June 2015. WA Department of Parks and Wildlife, Perth.

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

MBS (2010) Reconnaissance (Level 1) Flora and Fauna Survey Exploration Tenement 52/1561 Horseshoe Range. Report prepared for Auvex Resources Ltd, by MBS Environmental, November 2010.

MBS (2016) Purpose Permit Application, Horseshoe Range Project, Assessment of Clearing Principles M52/1048. Report prepared for Horseshoe Manganese Pty Ltd, by MBS Environmental, December 2016.

Outback Ecology (2010) Flora and Fauna Survey of the Proposed Manganese Bulk Sample Sites at Horseshoe Range on E52/1561. Report prepared for Auvex Resources Ltd, by Outback Ecology, 23 March 2010.

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia (now DPaW and DER)
DEE	Department of the Environment and Energy, Australian Government
DER	Department of Environment Regulation, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DRF	Declared Rare Flora
DoE	Department of the Environment, Australian Government (now DEE)
DoW	Department of Water, Western Australia
DPaW	Department of Parks and Wildlife, Western Australia
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DEE)
EPA	Environmental Protection Authority, Western Australia
EP Act	*Environmental Protection Act 1986*, Western Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (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	*Rights in Water and Irrigation Act 1914*, Western Australia
TEC	Threatened Ecological Community

Definitions:

{DPaW (2015) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia}:-

T **Threatened species:**
Published as Specially Protected under the *Wildlife Conservation Act 1950,* 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.

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.

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.