



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 2883/1
Permit Holder:	BHP Billiton Iron Ore Pty Ltd
Duration of Permit:	2 May 2009 – 2 May 2014

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

PART I – CLEARING AUTHORISED

1. Purpose for which clearing may be done

Clearing for the purpose of railway construction and maintenance and associated works.

2. Land on which clearing is to be done

Crown Lease 3114/1047, Lots 53, 114, 115, 218 on Deposited Plan 220376, Lots 10, 11 on Deposited Plan 221013;
Special Lease for Mining Operations 3116/4028, Lots 24, 25, 26, 92, 93, 94, 95, 96 on Deposited Plan 241430;
Special Lease for Mining Operations 3116/6038, Document I 123402 L, Lot 135 on Deposited Plan 48926; and
Iron Ore (Mount Newman) Agreement Act 1964, Special Lease for Mining Operations 3116/3687, Document I 154279 L, Lot 19 on Deposited Plan 48921, Lot 65 on Deposited Plan 48920.

3. Area of Clearing

The Permit Holder must not clear more than 366 hectares of native vegetation within the area hatched yellow on attached Plans 2883/1a, 2883/1b, 2883/1c, 2883/1d, 2883/1e and 2883/1f.

4. Application

This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

5. Compliance with Assessment Sequence and Management Procedures

Prior to clearing any native vegetation under conditions 1, 2 and 3 of this Permit, the Permit Holder must comply with the Assessment Sequence and the Management Procedures set out in Part II of this Permit.

PART II – ASSESSMENT SEQUENCE AND MANAGEMENT PROCEDURES

6. Avoid, minimise etc clearing

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

- avoid the clearing of native vegetation;
- minimise the amount of native vegetation to be cleared; and
- reduce the impact of clearing on any environmental value.

7. Weed control

When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

8. Regeneration

The Permit Holder shall retain the vegetative material and topsoil removed by clearing authorised under this Permit.

- (a) Vegetative material and topsoil must be stockpiled in an area that has been cleared under this Permit; and
- (b) At an *optimal time* within 12 months of clearing under this Permit, the Permit Holder shall lay the vegetative material and topsoil on the cleared areas once those areas are no longer required for the purpose for which they were cleared under this Permit.

PART III - RECORD KEEPING AND REPORTING

9. Records must be kept

(a) The Permit Holder must maintain the following records for activities done pursuant to this Permit in relation to the clearing of native vegetation authorised under this Permit:

- (i) the species composition, structure and density of the cleared area;
- (ii) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
- (iii) the date that the area was cleared; and
- (iv) the size of the area cleared (in hectares).

(b) In relation to the *regeneration* of areas pursuant to condition 8 of this Permit:

- (i) the location of any areas *regenerated*, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
- (ii) a description of the *regeneration* activities undertaken;
- (iii) the size of the area *regenerated* (in hectares); and
- (iv) the species composition, structure and density of *regeneration*.

10. Reporting

(a) The Permit Holder must provide to the CEO, on or before 30 June of each year, a written report of records required under condition 9 of this Permit and activities done by the Permit Holder under this Permit between 1 January and 31 December of the preceding year.

(b) Prior to 2 February 2014, the Permit Holder must provide to the CEO a written report of records required under condition 9 of this Permit where these records have not already been provided under condition 10(a) of this Permit.

Definitions

The following meanings are given to terms used in this Permit:

fill means material used to increase the ground level, or fill a hollow;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

optimal time means the period from November to December for undertaking *direct seeding*;

regenerate/ed/ion means *revegetation* that can be established from in situ seed banks contained either within the topsoil or seed-bearing *mulch*;

weed/s means a species listed in Appendix 3 of the "Environmental Weed Strategy" published by the Department of Conservation and Land Management (1999), and plants declared under section 37 of the *Agricultural and Related Resources Protection Act 1976*.

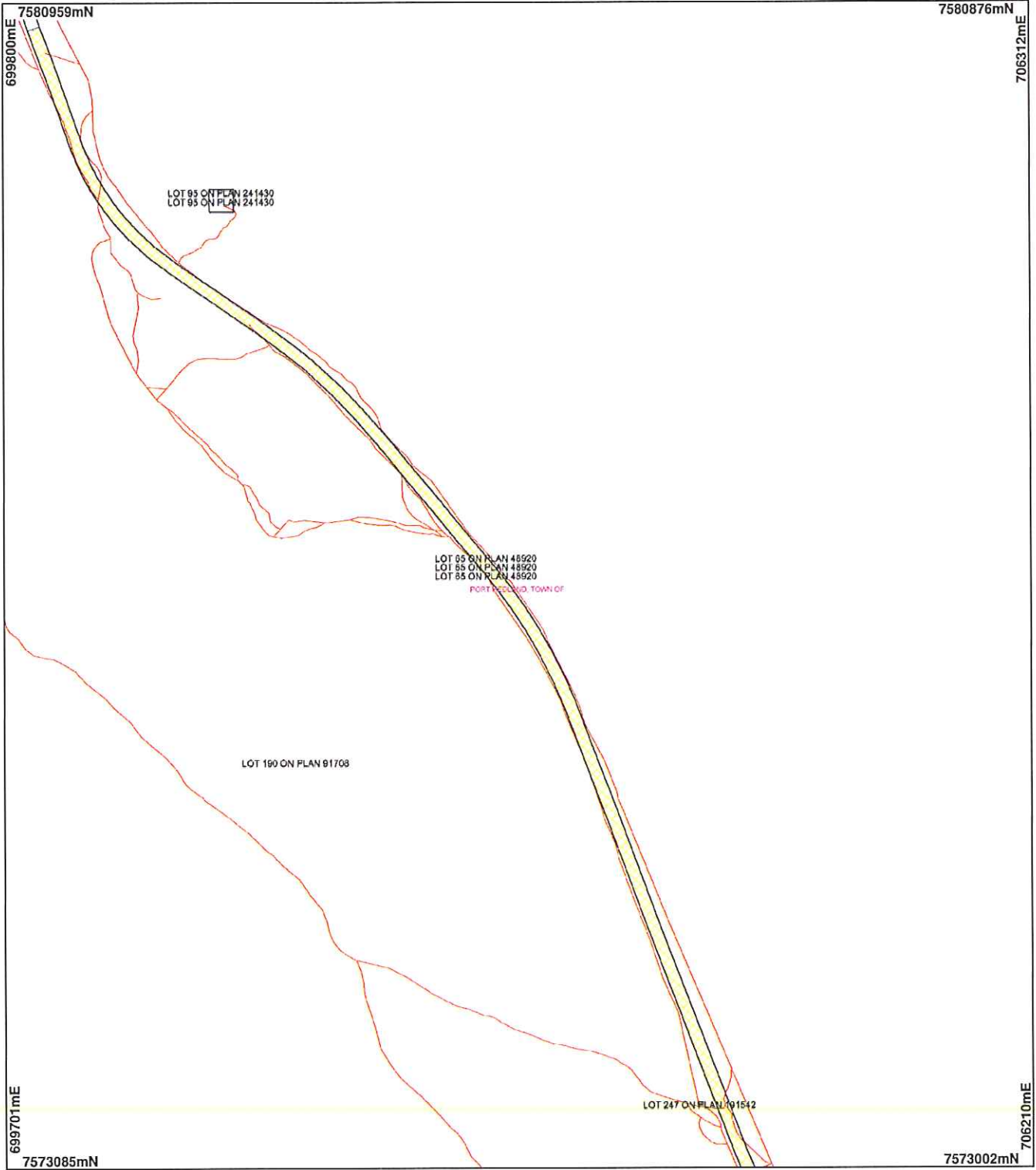


Keith Claymore
A /ASSISTANT DIRECTOR
NATURE CONSERVATION DIVISION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

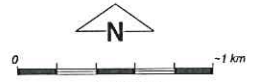
2 April 2009

Plan 2883/1a



LEGEND

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(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

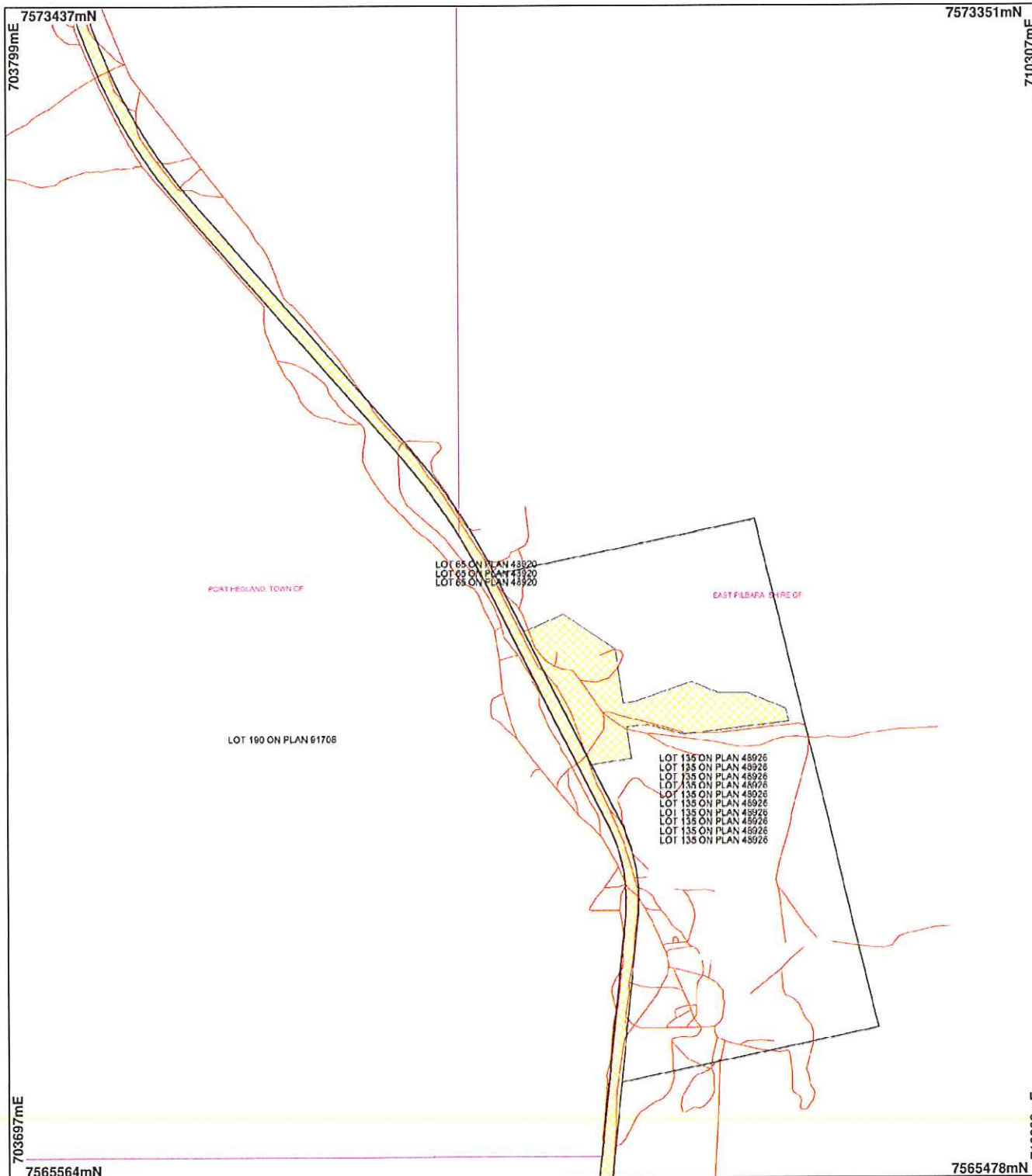
Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Kevin Dew Date *2/4/09*
K Claymore

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

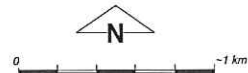
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

Plan 2883/1b



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Scale 1:36049
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

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Karl Claymore
K Claymore Date 2/4/09

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

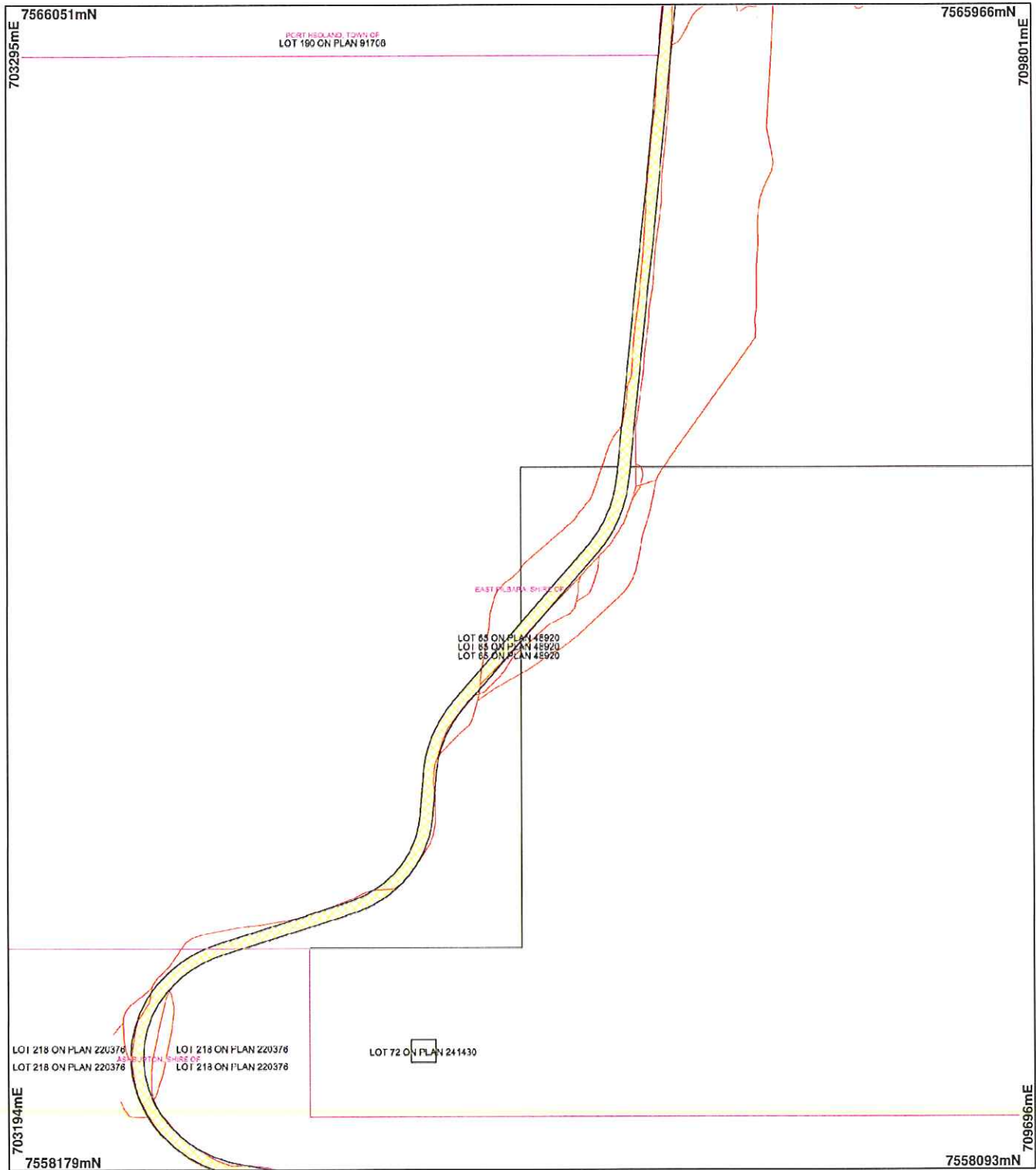
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



Department of Environment and Conservation

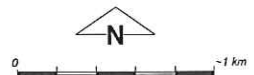
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Plan 2883/1c



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Scale 1:36039

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

K Claymore Date 2/12/09
K Claymore

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

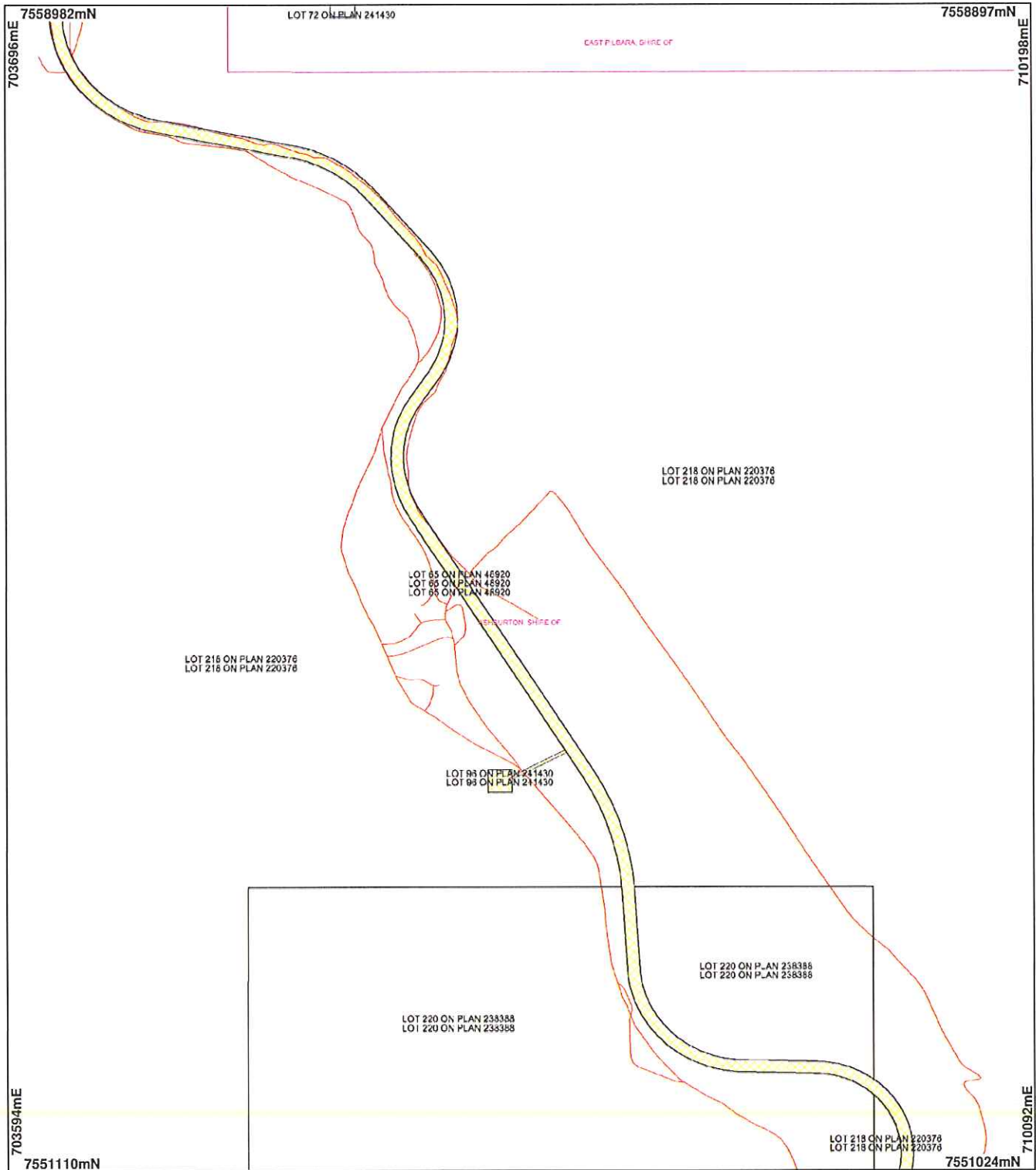
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



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Plan 2883/1d



LEGEND

Clearing Instruments

- Areas Approved to Clear
- Road Centrelines
- Cadastre

Local Government Authorities



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Scale 1:36030

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

K Claymore Date *2/4/09*

K Claymore

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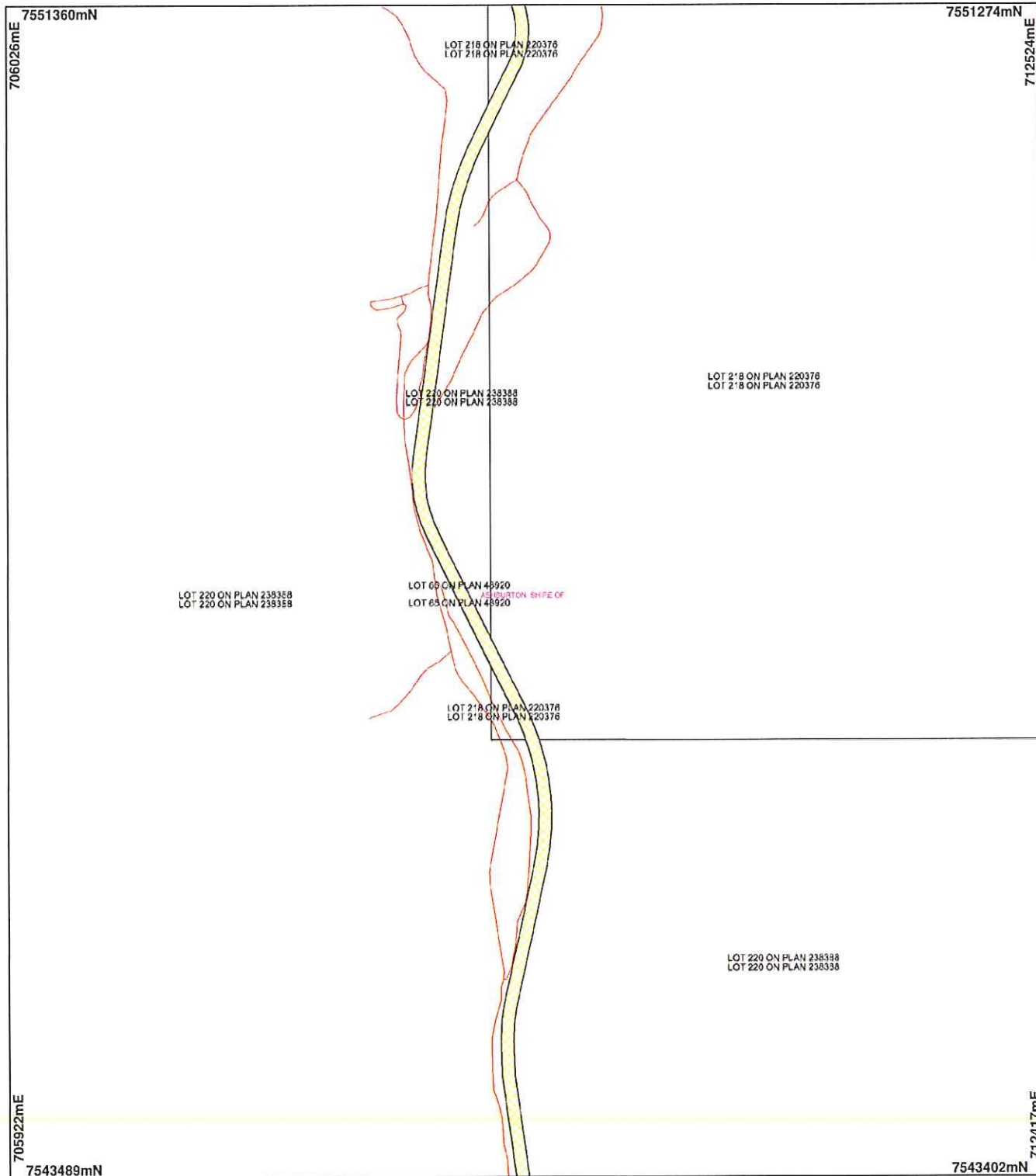
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



Department of Environment and Conservation

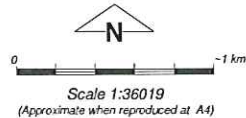
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Plan 2883/1e



LEGEND

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| Clearing Instruments | Local Government Authorities |
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| <input type="checkbox"/> Road Centrelines | |
| <input type="checkbox"/> Cadastre | |



Geocentric Datum Australia 1994

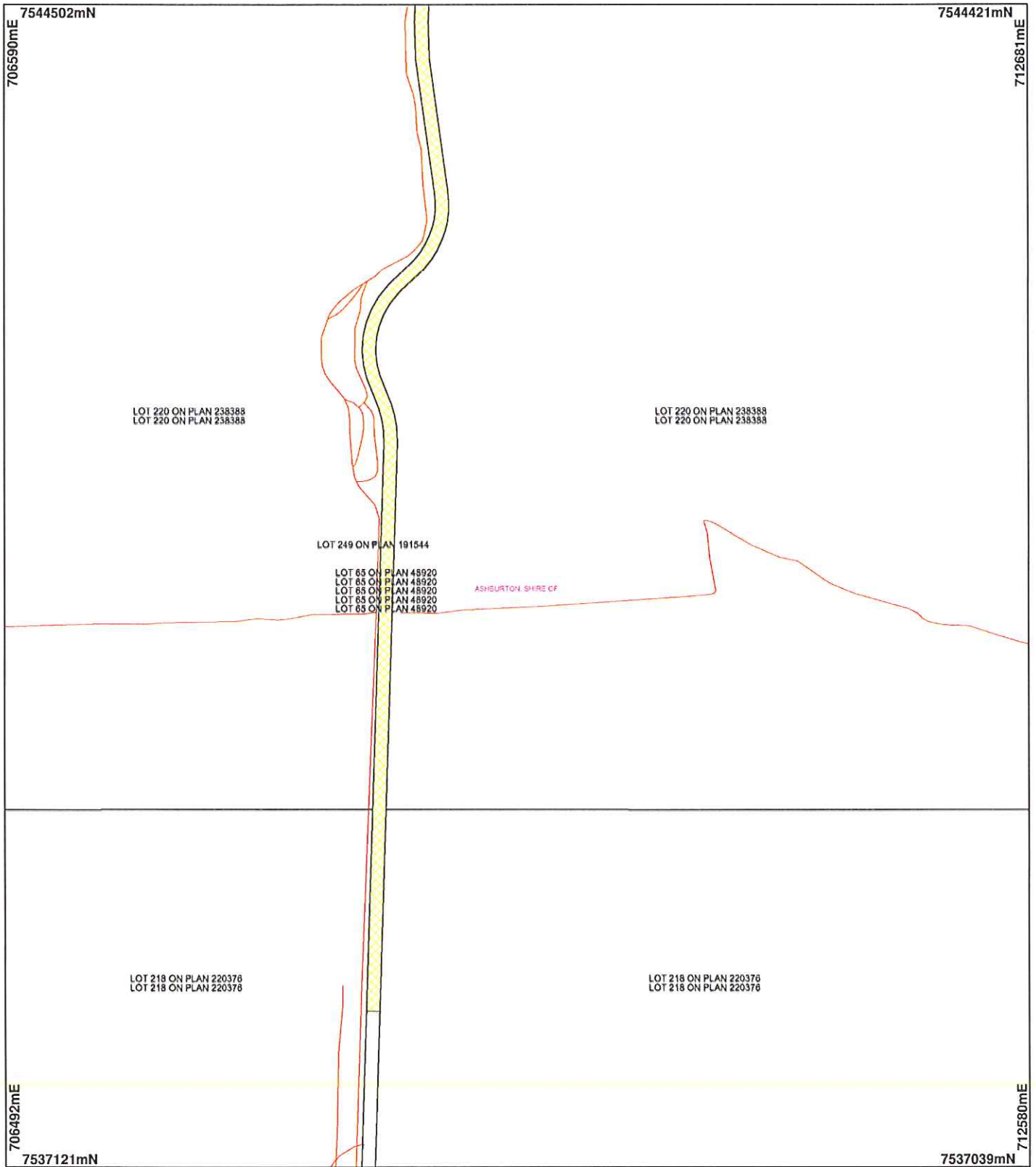
Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

K Claymore Date *2/4/07*

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

Plan 2883/1f



LEGEND

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 (Approximate when reproduced at A4)
 Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

K. Claymore Date 2/4/09

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



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1. Application details

1.1. Permit application details

Permit application No.: 2883/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Iron Ore Pty Ltd

1.3. Property details

Property: Crown Lease 3114/1047, Lots 53, 114, 115, 218 on Deposited Plan 220376, Lots 10, 11 on Deposited Plan 221013; *Iron Ore (Mount Newman) Agreement Act 1964*, Special Lease for Mining Operations 3116/3687, Document I 154279 L, Lot 19 on Deposited Plan 48921, Lot 65 on Deposited Plan 48920; Special Lease for Mining Operations 3116/4028, Lots 24, 25, 26, 92, 93, 94, 95, 96 on Deposited Plan 241430; Special Lease for Mining Operations 3116/6038, Document I 123402 L, Lot 135 on Deposited Plan 48926

Local Government Area: Shire Of Ashburton & Shire Of East Pilbara & Town Of Port Hedland
Colloquial name: Spring Siding to Hesta Siding Rail Duplication Project

1.4. Application

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

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

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

Beard Vegetation Association 29: Sparse low woodland; Mulga, discontinuous in scattered groups;

Beard Vegetation Association 93: Hummock grasslands, shrub steppe; kanji over soft spinifex;

Beard Vegetation Association 173: Hummock grasslands, shrub steppe; kanji over soft spinifex & *Triodia wiseana* on basalt;

Beard Vegetation Association 175: Short bunch grassland - savanna/grass plain (Pilbara); and

Beard Vegetation Association 562: Mosaic: Low woodland; Mulga in valleys / Hummock grasslands, open low tree-steppe; Snappy Gum over *Triodia wiseana*.

Ecologia Environment Pty Ltd (2008b) conducted a Level 1 flora and vegetation survey of the proposed rail duplication area on 9 October 2007 and between 30 March and 2 April 2008, in order to describe finer scale vegetation types than those described by Beard vegetation mapping.

Mainline Lease

The flora and vegetation survey of the proposed rail duplication area consisted of 34 quadrats, each 50 metres x 50 metres (the standard size for surveys carried out in the Pilbara) (Ecologia Environment Pty Ltd, 2008b). In addition, 13 transects were walked through different vegetation types along the length of the proposed rail duplication to ensure that a representative species list was produced for the survey area. The following vegetation units (and associated landforms) were described from the proposed rail duplication area (Ecologia Environment Pty Ltd, 2008b):

Creepline

1a - Moderately dense *Eucalyptus camaldulensis* var. *obtusa*, *E. victrix* and *Melaleuca argentea* low to medium trees, over moderately dense mixed *Melaleuca glomerata*, *M. argentea*, *M. bracteata*, *Acacia coriacea* subsp. *pendens*, *A. trachycarpa*, *A. ampliceps* and *Atalaya hemiglauc* low trees to high shrubs, over sparse *Crotalaria cunninghamii* and *Stemodia grossa* low shrubs, over open mixed *Cyperus cunninghamii* subsp. *cunninghamii*, *C. blakeanus* and *C. difformis* sedges, *Typha domingensis* rushes, and sparse mixed **Cenchrus ciliaris*, *Chrysopogon fallax*, *Cymbopogon ambiguus* tussock and *Triodia epactia* hummock grasses;

1b - Sparse to moderately dense *Eucalyptus victrix* medium trees, sometimes over *Atalaya hemiglauc*, *Acacia coriacea* subsp. *pendens* and *Flueggea virosa* subsp. *melanthesoides* low trees to high shrubs, over open *Acacia bivenosa*, *Petalostylis labicheoides*, *Acacia trachycarpa* and *Acacia pyriformis* high to medium shrubs, over open **Cenchrus ciliaris* tussock grasses and sparse to open *Cyperus blakeanus* and *Cyperus vaginatus* sedges;

Minor creekline/channel

2a - Open *Corymbia hamersleyana* medium to low trees, over moderately dense to dense varying *Acacia* spp. high shrubs (*Acacia trachycarpa*, *A. ancistrocarpa*, *A. bivenosa*, *A. tumida* var. *tumida*, *A. inaequilatera* and *A. ligulata*), over sparse *Senna artemisioides* subsp. *oligophylla* low shrubs, over open to moderately dense **Cenchrus ciliaris*, *Themeda triandra* and *Cymbopogon ambiguus* tussock grass, with open *Triodia epactia* hummock grass and scattered *Cyperus blakeanus* sedges;

2b - Sparse to open *Acacia coriacea* subsp. *pendens* medium trees, over sparse **Vachellia farnesiana* high shrubs, over open *Enneapogon caerulescens* tussock and sparse *Triodia wiseana* hummock grasses;

Drainage line in cracking clay

3 - Open to moderately dense *Acacia xiphophylla* high to medium shrubs, over sparse *Senna sericea*, *Senna artemisioides* subsp. *oligophylla* and *Sida* aff. *fibulifera* low shrubs, over open to moderately dense *Aristida inaequiglumis* and *Astrebla pectinata* tussock grasses;

Cracking clay plain

4 - Isolated *Senna artemisioides* subsp. *oligophylla*, *S. artemisioides* subsp. *helmsii*, *Acacia synchronicia*, *A. tetragonophylla* and **Vachellia farnesiana* medium shrubs, over sparse *Streptoglossa bubakii* and *Sida* aff. *fibulifera* low shrubs, over moderately dense mixed *Aristida latifolia*, *Acrachne racemosa*, *Eragrostis desertorum*, **Cenchrus ciliaris* and *Cymbopogon ambiguus* tussock grasses;

Plain

5 - Scattered *Acacia pruinocarpa* low trees, over sparse to moderately dense *Acacia aneura* var. *microcarpa* and var. *aneura* high shrubs to low trees, over sparse to open *Acacia xiphophylla* high shrubs, over sparse patches of *Acacia synchronicia* medium shrubs, over open *Senna artemisioides* subsp. *oligophylla* and *Sclerolaena cornishiana* low shrubs, over open to moderately dense **Cenchrus ciliaris*, *Aristida contorta*, *A. latifolia* tussock and *Triodia epactia* hummock grasses;

Low hill slope/undulating plain

6a - Scattered *Corymbia hamersleyana* low trees, over sparse to moderately dense *Acacia orthocarpa* high shrubs, over sparse *Acacia maitlandii* medium shrubs, over moderately dense *Triodia angusta*, *T. basedowii*, *T. lanigera* and *T. epactia* hummock grasses, with scattered *Fimbristylis rara* sedges and sparse *Cymbopogon ambiguus* and *Chrysopogon fallax* tussock grasses;

6b - Scattered *Corymbia hamersleyana* low trees, sometimes with scattered *Eucalyptus leucophloia* subsp. *leucophloia* low trees, over sparse *Acacia inaequilatera* and *Hakea lorea* subsp. *lorea* high to medium shrubs, over sparse to open varying *Acacia ancistrocarpa*, *A. bivenosa*, *A. trudgeniana*, *A. orthocarpa*, *Senna glutinosa* subsp. *glutinosa* and *Senna artemisioides* subsp. *oligophylla* medium shrubs, over open to moderately dense *Triodia wiseana*, *T. epactia* and *Triodia lanigera* hummock grass, with sparse **Cenchrus ciliaris*, *Aristida contorta* and *Chrysopogon fallax* tussock grasses;

Rocky hillslope

7a - Sparse to open *Eucalyptus leucophloia* subsp. *leucophloia*, sometimes with *Corymbia hamersleyana* low trees, over sparse to open *Acacia inaequilatera*, *A. ancistrocarpa* and *A. bivenosa* medium to high shrubs, over varying sparse to open *Acacia hilliiana*, *Acacia arida*, *Goodenia stobbsiana* and *Corchorus lasiocarpus* low shrubs, over moderately dense *Triodia epactia* and *T. basedowii* hummock grass, with sparse *Cymbopogon ambiguus* tussock grass;

7b - Sparse *Eucalyptus leucophloia* subsp. *leucophloia*, *Acacia pruinocarpa* and *Acacia aneura* var. *microcarpa* low trees, over open *Grevillea wickhamii* subsp. *hispidula*, subsp. *aprica* and *Acacia marramamba* tall shrubs, over open *Triodia epactia* hummock grass, with sparse *Eriachne lanata* and *Cymbopogon ambiguus* tussock grasses.

Rail Repeater Station Five Lease

Ecologia Environment Pty Ltd (2008b) undertook a Rare and Priority Flora survey of the Rail Repeater Station Five lease area on 5 April 2008. Foot traverses and grid searches were undertaken over an area measuring 150 metres x 150 metres (2.25 hectares). A 40 metre wide strip of vegetation was also surveyed along a distance of approximately 370 metres where BHP Billiton Iron Ore Pty Ltd are proposing to construct an access track and install fibre optic cable from the Mainline lease to Rail Repeater Station Five. One vegetation type, associated with one distinct landform was described for the Rail Repeater Station Five lease area:

Cracking clay plain

1 - Open *Sida* aff. *fibulifera* very low shrubs, over a dense mixed tussock grassland dominated by *Aristida latifolia* grass.

Quarry Four Lease

Ecologia Environment Pty Ltd (2008c) undertook a Level 1 flora and vegetation survey at the Quarry Four lease area on 29 – 30 March 2008. The survey consisted of systematic sampling using 30 quadrats (50 metres x 50 metres) which allowed a broad scale vegetation map to be produced for a majority of the Quarry Four lease area (approximately 436.8 hectares of the 507 hectares). This was adequate given that only 61 hectares of the Quarry Four lease is subject to this clearing permit application. The following ten vegetation units were described from five landform types within the Quarry Four lease area:

Major creekline

1 - Moderately dense *Eucalyptus victrix* and *E. camaldulensis* var. *obtusa* medium trees, over moderately dense mixed *Melaleuca glomerata*, *Acacia coriacea* subsp. *pendens*, *A. trachycarpa* and *Alectryon oleifolius* subsp. *oleifolius* low trees, over moderately dense *M. glomerata* high to medium shrubs, over open *Cyperus blakeanus* and *C. cunninghamii* subsp. *cunninghamii* sedges, with sparse **Cenchrus ciliaris* tussock grass (whilst recorded on the Quarry Four lease, this vegetation unit does not occur within the proposed clearing area);

Minor creekline/channel

2 - Scattered *Eucalyptus victrix*, *Corymbia hamersleyana* and *Alectryon oleifolius* subsp. *oleifolius* low trees, over moderately dense *Acacia trachycarpa* and *Acacia bivenosa* high to medium shrubs, over open *Chrysopogon fallax*, **Cenchrus ciliaris* tussock grasses and sparse *Triodia epactia* hummock grass;

Floodplain

3a - Scattered *Corymbia hamersleyana* low trees, over moderately dense *Acacia bivenosa*, *A. ancistrocarpa*, *A. trachycarpa*, *A. pyrifolia* and *Eremophila longifolia* medium to high shrubs, over moderately dense *Cullen leucanthum*, *Gossypium australe*, *Indigofera monophylla* and *Pluchea ferdinandi-muelleri* low to medium shrubs, over open *Triodia epactia* hummock grass, with sparse **Cenchrus ciliaris* tussock grass;

3b - Open *Corymbia hamersleyana* low trees, over sparse to open *Acacia trachycarpa* and *Acacia coriacea* subsp. *pendens* tall shrubs, over open *Acacia bivenosa* medium to low shrubs, over sparse *Pluchea ferdinandi-muelleri* low shrubs, over moderately dense *Triodia wiseana*, *Triodia angusta* hummock grasses, with sparse **Cenchrus ciliaris* tussock grass;

3c - Sparse *Corymbia hamersleyana* low trees, over dense *Acacia bivenosa*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia pyrifolia* high to medium shrubs, over open *Scaevola acacioides* low shrubs, over sparse *Triodia epactia* hummock grass;

Plain/rocky rise

4a - Scattered *Corymbia hamersleyana* low trees, over sparse *Acacia inaequilatera* and *Hakea lorea* subsp. *lorea* high shrubs to low trees, over sparse to open patches of *Acacia bivenosa* medium shrubs, over sparse *Indigofera monophylla* low shrubs, over moderately dense *Triodia epactia* hummock grass, with sparse *Cymbopogon ambiguus* and *Themeda triandra* tussock grasses;

4b - Scattered *Acacia inaequilatera* low trees, over open to moderately dense *Acacia orthocarpa* high to medium shrubs, over moderately dense *Triodia epactia* hummock grass, with numerous *Fimbristylis rara* sedges;

4c - Scattered *Corymbia hamersleyana* low trees, over scattered mixed *Acacia orthocarpa*, *A. bivenosa*, *A. ancistrocarpa* and *Senna glutinosa* subsp. *glutinosa* medium to high shrubs, over open *Acacia stellaticeps* low shrubs, over moderately dense *Triodia epactia*, sometimes with *Triodia angusta* hummock grasses, with sparse *Fimbristylis dichotoma*, *Cyperus squarrosus* sedges and *Chrysopogon fallax* tussock grass;

4d - Scattered *Acacia inaequilatera* low trees to high shrubs, over open *Acacia bivenosa* high, medium and low shrubs, over sparse *Pluchea ferdinandi-muelleri* and *Acacia stellaticeps* low shrubs, over moderately dense *Triodia angusta* and *T. wiseana* hummock grasses, with scattered *Fimbristylis dichotoma* sedges; and

Midslope/ridgetop

5 - Scattered *Grevillea pyramidalis* subsp. *leucadendron* and *Acacia inaequilatera* low trees to high shrubs, over sparse to open *Acacia maillandii* and *G. pyramidalis* subsp. *leucadendron* medium to low shrubs, over moderately dense *Triodia epactia* hummock grass, with scattered *Cyperus squarrosus* sedges and *Eriachne lanata* tussock grass.

* = introduced flora species

Clearing Description

BHP Billiton Iron Ore Pty Ltd (BHP Billiton) have applied for a Purpose Permit to clear up to 366 hectares of native vegetation within a boundary of approximately 467 hectares (GIS Database). The proposed clearing involves duplicating a 50 kilometre section of the Newman to Port Hedland rail line between Spring Siding and Hesta Siding, located approximately 188 - 238 kilometres south of Port Hedland. Associated works will include upgrading signalling infrastructure, installation of power and communications cabling, establishment of access roads, borrow pits, temporary construction site office facilities and laydown areas. In addition, three new dual track railway bridges will be constructed where the proposed rail duplication crosses Coonarie Creek. A majority of the proposed vegetation clearing is within the existing rail lease (Mainline - Special Lease 3116/3687) which is approximately 80 metres wide. Immediately adjacent to the Mainline lease, a quarry lease (Special Lease 3116/6038) will be used to source borrow material and will accommodate the temporary construction site office facilities. The quarry lease will also act as a laydown area for construction materials and machinery due to the limited space available within the narrow rail corridor. Upgrades to Rail Repeater Station Five (located approximately 220.5 kilometres south of Port Hedland), located on Special Lease 3116/4028, are also a part of this clearing permit application. Vegetation clearing will be undertaken using mechanical means.

Vegetation Condition

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

To

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

Comment

The vegetation condition rating was determined by Ecologia Environment Pty Ltd (2008b; 2008c;) during Level 1 flora and vegetation surveys of the proposed rail duplication area, Rail Repeater Station Five and Quarry Four lease. Factors taken into consideration when determining the vegetation condition were: weeds, grazing, litter and ground disturbance (tracks and other cleared areas).

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 proposed clearing area is located 188 - 238 kilometres south of Port Hedland, occurring largely within the Chichester subregion of the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). The Chichester subregion is characterised by undulating granite and basalt plains with significant areas of basalt ranges. Plains support shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, whilst *Eucalyptus leucophloia* tree steppes occur on ranges (Kendrick and McKenzie, 2002). Approximately 9.5 kilometres of the proposed rail duplication (southern portion extending to Hesta Siding) falls within the boundary of the Fortescue Plains subregion. The Fortescue Plains subregion is characterised by alluvial plains and river frontage (Kendrick, 2002). Extensive salt marsh, bunch grass and short grass communities on alluvial plains are dominant features in the east of the subregion, whilst deeply incised gorges exist in the lower west (Kendrick, 2002). Large permanent wetlands supporting river gum communities are a feature of the central Fortescue (Kendrick, 2002).

Ecologia Environment Pty Ltd (2008a) recorded 272 flora taxa from 46 families and 124 genera during a flora and vegetation survey of the rail corridor between Spring Siding and Hesta Siding. No rare flora, Priority Flora or Threatened Ecological Communities (TEC's) were recorded (Ecologia Environment Pty Ltd, 2008a). Floristic richness was slightly higher than other areas along the Mainline lease, as suggested by a comparison to other vegetation and flora surveys conducted by Ecologia Environment Pty Ltd (see Table 1 below). This is most likely attributed to the many different habitats encountered as this section of the proposed rail duplication traverses 10 land systems (Ecologia Environment Pty Ltd, 2008a). Eleven vegetation units were described from seven landform types during the Spring Siding to Hesta Siding survey, all of which are typical of vegetation units previously described for the Pilbara bioregion. Vegetation condition of the proposed rail duplication area was rated as 'degraded' to 'good' as a result of disturbance in the form of existing access tracks either side of the existing rail formation, large numbers of introduced flora species and grazing by cattle (Ecologia Environment Pty Ltd, 2008a).

Table 1: Floristic richness of the Spring Siding to Hesta Siding survey area in comparison to other sections of the proposed rail duplication surveyed by Ecologia Environment Pty Ltd.

Area surveyed	No. of flora taxa recorded	No. of quadrats surveyed (& quadrat area in hectares)	No. of transects surveyed	Date surveyed
Turner Camp to Spring Siding	217	31 (7.75ha)	6	30/03/08 – 04/04/08
Walla Siding to Turner Camp	205	28 (7.0ha)	15	04/04/08 – 08/04/08
Walla Siding to Bing Siding	153	16 (4.0ha)	10	06/04/08 – 08/04/08
Cowra Siding to Kurrajura Siding	206	36 (9.0ha)	6	05/10/07 – 09/10/07
Spring Siding to Hesta Siding	272	34 (8.5ha)	13	09/10/07, 30/03/08 – 02/04/08

Ecologia Environment Pty Ltd (2008b) recorded 42 flora taxa from 18 families and 34 genera during a flora and vegetation survey of the Rail Repeater Station Five lease area. No rare flora, Priority Flora or Threatened Ecological Communities (TEC's) were recorded (Ecologia Environment Pty Ltd, 2008b). Floristic richness was considered lower than other Rail Repeater Stations along the Mainline lease, as suggested by comparison to other vegetation and flora surveys conducted by Ecologia Environment Pty Ltd (see Table 2 below). One vegetation unit was described from one distinct landform type at Repeater Station Five. This vegetation unit is typical of vegetation units previously described for the Pilbara bioregion. Vegetation condition of the Rail Repeater Station Five lease area was rated as 'degraded', with a high level of grazing and some weed outbreaks observed (Ecologia Environment Pty Ltd, 2008b).

Table 2: Floristic richness of the Rail Repeater Station Five survey area in comparison to other rail repeater stations surveyed by Ecologia Environment Pty Ltd.

Area surveyed	No. of flora taxa recorded	Area surveyed (ha)	Track length surveyed (m)	Date surveyed
Repeater One	70	2.25	310	05/04/08
Repeater Two	69	2.25	310	05/04/08
Repeater Three	76	2.25	630	03/04/08
Repeater Four	77	2.25	550	28/03/08
Repeater Five	42	2.25	370	05/04/08

Ecologia Environment Pty Ltd (2008c) recorded 142 flora taxa from 32 families and 74 genera during a flora and vegetation survey of the Quarry Four lease area. No rare flora, Priority Flora or Threatened Ecological Communities (TEC's) were recorded (Ecologia Environment Pty Ltd, 2008c). Floristic richness was comparable to other Quarry leases in the local area, as suggested by comparison to other vegetation and flora surveys conducted by Ecologia Environment Pty Ltd (see Table 3 below). Ten vegetation units were described from five distinct landform types at Quarry Four, however most of the proposed clearing at Quarry Four is on existing disturbed areas or plain/rocky rise vegetation units. No clearing is proposed in major creekline vegetation and only a small amount of clearing will be undertaken in minor creekline/channel vegetation units. All of the vegetation units recorded at Quarry Four are typical of the Pilbara bioregion (Ecologia Environment Pty Ltd, 2008c).

Table 3: Floristic richness of the Quarry Four lease in comparison to other quarry leases and proposed rail duplication areas surveyed by Ecologia Environment Pty Ltd.

Area surveyed	No. of flora taxa recorded	No. of quadrats (and area) surveyed (ha)	Date surveyed
Turner Camp to Spring Siding	217	31 (7.75)	30/03/08 – 04/04/08
Walla to Turner Camp	205	28 (7.0)	04/04/08 – 08/04/08
Quarry Three lease	142	13 (3.25)	03/04/08
Quarry Four lease	142	30 (7.5)	29-30/03/08
Quarry Two lease	94	8 (2.0)	08/04/08
Quarry Eight lease	88	9 (2.25)	02/04/08
Quarry One lease	71	9 (2.25)	08/04/08
Redmont Camp lease	82	6 (1.5)	23/10/07

Thirteen introduced flora species were recorded by Ecologia Environment Pty Ltd (2008b; 2008c) during flora and vegetation surveys of the proposed rail duplication area, Rail Repeater Station Five and Quarry Four lease areas. These included: Buffel Grass (*Cenchrus ciliaris*), Kapok Bush (*Aerva javanica*), Mimosa Bush (*Vachellia farnesiana*), Bipinnate Beggartick (*Bidens bipinnata*), Spiked Malvastrum (*Malvastrum americanum*), Pigweed (*Portulaca oleracea*), Ruby Dock (*Acetosa vesicaria*), Colocynth (*Citrullus colocynthis*), Ulcardo Melon (*Cucumis melo*), Purpletop Chloris (*Chloris barbata*), Burrgrass (*Cenchrus echinatus*), Puncture Vine (*Tribulus terrestris*) and Mexican Poppy (*Argemone ochroleuca subsp. ochroleuca*). Buffel Grass, Kapok Bush and Mimosa Bush were the most commonly recorded weed species, occurring as isolated plants in some areas (less than 10 plants), yet forming dominant components of the vegetation communities in other locations (30%, 70% and in the case of Buffel Grass, more than 70% coverage in some areas). The remaining weed species were generally recorded at few locations with isolated plants or low coverage (Ecologia Environment Pty Ltd, 2008b; 2008c).

The presence of introduced species diminishes the biodiversity value of the proposed clearing areas. Care needs to be taken to ensure that vehicles and machinery brought onto the rail lease, Repeater Station Five and Quarry Four lease do not introduce weeds to non-infested areas. The most effective way of achieving this is to ensure that all vehicles and machinery are thoroughly cleaned to remove soil, plant matter and propagules prior to entering and leaving the leases subject to this clearing permit application. Conditions will be imposed to minimise the risk of clearing operations spreading or introducing weeds to non-infested areas.

Ecologia Environment Pty Ltd (2008d; 2008e) identified 323 fauna taxa that may occur within the proposed clearing area during three Level 1 vertebrate fauna assessments of the proposed Spring Siding – Hesta Siding rail duplication, Rail Repeater Station Five and Quarry Four lease areas. Fauna diversity was slightly higher than other areas along the Mainline lease, as suggested by a comparison to other fauna surveys conducted by Ecologia Environment Pty Ltd (2008e). This is most likely attributed to the many different habitats encountered, as this section of the proposed rail duplication traverses 10 land systems (Ecologia Environment Pty Ltd, 2008b). Ecologia Environment Pty Ltd (2008e) report that no significant impacts to biodiversity are anticipated.

Conservation significant fauna are unlikely to rely on the numerous fauna habitats within the rail lease, which are generally degraded, subject to regular traffic from vehicles and secondary impacts such as dust and noise (Ecologia Environment Pty Ltd, 2008e).

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

Methodology Ecologia Environment Pty Ltd (2008a).
Ecologia Environment Pty Ltd (2008b).
Ecologia Environment Pty Ltd (2008c).
Ecologia Environment Pty Ltd (2008d).
Ecologia Environment Pty Ltd (2008e).
GIS Database:
- Interim Biogeographic Regionalisation for Australia (Subregions).

(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

Ecologia Environment Pty Ltd (2008d; 2008e) undertook Level one vertebrate fauna assessments of the proposed Spring Siding – Hesta Siding rail duplication, Rail Repeater Station Five and Quarry Four lease areas subject to this clearing permit application in May 2008. The assessments involved desktop database searches and literature reviews prior to field reconnaissance in order to compile potential species inventories for the study sites. The following databases and references were consulted:

- Western Australian Museum Faunabase;
- Birds Australia Birddata;
- Department of Environment and Conservation (DEC) Threatened Fauna database;
- Department of Environment and Water Protected Matters database;
- field guides for birds, mammals, reptiles and amphibians; and
- other vertebrate fauna assessments in the local area, including several of the Newman – Port Hedland Mainline rail lease.

Desktop studies revealed that 323 vertebrate fauna species may potentially occur in the proposed rail duplication area, and 219 vertebrate fauna species may potentially occur in the Quarry Four lease (Ecologia Environment Pty Ltd, 2008d, 2008e).

Field reconnaissance of the proposed Spring Siding – Hesta Siding rail duplication and Rail Repeater Station Five lease areas was undertaken between 11 and 14 May 2008. The main objectives of the field reconnaissance included:

- to provide a description of the main habitat types;
- to look for species of conservation significance;
- to undertake a risk assessment to determine likely impacts and threatening processes on vertebrate fauna; and
- to make recommendations to minimise impacts to fauna (Ecologia Environment Pty Ltd, 2008d).

The field reconnaissance survey involved undertaking opportunistic '30 minute' surveys at 25 locations along the proposed rail duplication area and included the following methods:

- using the ANABAT detector to record bat echolocation calls at different locations each evening of the survey. The presence of roosting habitat or water were pre-requisites in determining where the ANABAT detector was left to record overnight;
- opportunistic sightings of fauna;
- hand searching opportunistic sites. This involved searching for cryptic fauna by over-turning logs and stones, breaking open old logs and dead free-standing trees and searching burrows;
- looking for secondary evidence of fauna such as scats, tracks, diggings and burrows; and
- spotlighting using vehicle-mounted spotlights and head torches to record nocturnal fauna (Ecologia Environment Pty Ltd, 2008d).

Four major fauna habitats were identified from the proposed rail duplication area:

1. Creepline - This habitat type was characterised by sandy substrates, relatively dense vegetation along the riparian fringe and large trees that potentially provide suitable roosting habitat for numerous bird species. Some sites consisted of flooded streams whilst others were small remnant pools of water. The presence of water means that fauna species may travel large distances to access these habitats. Many fauna species are attracted to creepline habitat given the dense vegetation cover, presence of water and variety of substrates present (banks, stream beds and rocky areas) (Ecologia Environment Pty Ltd, 2008d).

2. Spinifex Plain – This habitat type was characterised by Spinifex hummocks on rocky loam plains. Spinifex hummocks provide fauna habitat by allowing animals to take refuge in the hummocks themselves, or to build burrows beneath the hummocks. Soil structure and age post fire are important factors affecting fauna

distribution in this habitat type. Some soil types are conducive for burrowing species whilst others are not. Fire affects the size and density of Spinifex hummocks, which in turn influences which species use the hummocks as habitat (Ecologia Environment Pty Ltd, 2008d).

3. Cracking Clay – This habitat type was characterised by heavy clay-based soils which crack into segments when dry. Small, specialised fauna species take refuge in the large crevices that form when the soil dries and cracks. Planigales and the conservation significant Northern Short-tailed Mouse (*Leggadina lakedownensis*) are examples of fauna likely to utilise this habitat type (Ecologia Environment Pty Ltd, 2008d).

4. Rocky Slopes - This habitat type was characterised by skeletal soils over rocky hill slopes with rock piles. Spinifex dominates the vegetation in this habitat type, although other vegetation assemblages can form in small drainage gullies. Ecologia Environment Pty Ltd (2008d) notes that this habitat type is dominated by reptile species given the abundance of refuge and basking sites. Deeper rocky overhangs provide bat roosting sites (Ecologia Environment Pty Ltd, 2008d).

Ecologia Environment Pty Ltd (2008d) concluded that that the proposed rail duplication and Rail Repeater Station Five lease areas are largely comprised of land systems and vegetation types that are well represented both locally and regionally. There will be an unavoidable loss of fauna habitat as a result of vegetation clearing for the proposed rail duplication. Loss of local vertebrate communities, loss of ecological function, displacement of local fauna into surrounding areas (where they will face increased competition), mortality (during clearing or vehicle strike), noise, dust, accidental fire, and increases in feral fauna are all likely impacts of the proposed vegetation clearing and subsequent construction activities.

Fauna most likely to be impacted by the proposed vegetation clearing include highly territorial species which are unlikely to leave the impact footprint even if the habitat is cleared, young mammals and birds still under parental care and species relying on a specialised habitat type where there is no suitable habitat nearby (Ecologia Environment Pty Ltd, 2008d). Young individuals of ground breeding birds such as the Australian Bustard (*Ardeotis australis*) or the Bush Stone-curlew (*Burhinus grallarius*) may be present at most times of the year as these species lay eggs from March to September and July to January respectively. Burrowing animals are also vulnerable to direct mortality during clearing operations, in addition to habitat loss, as they may be unlikely to vacate burrows if disturbed. Nocturnal snakes such as the Woma Python (*Aspidites ramsayi*) shelter in hollow logs, animal burrows or thick vegetation during the day and may also remain sheltered in response to clearing, thereby facing direct mortality (Ecologia Environment Pty Ltd, 2008d).

However, potential impacts to fauna are limited due to the linear nature of the proposed clearing, proximity to existing railway, associated infrastructure, access tracks and borrow pits (Ecologia Environment Pty Ltd, 2008d). Impacts of vegetation clearing in any given area will be localised to a relatively small area, not extending more than 40 metres from the existing railway line (Ecologia Environment Pty Ltd, 2008d). In addition, many fauna species have the ability to vacate the proposed clearing area at the onset of disturbance, especially transient bird species (Ecologia Environment Pty Ltd, 2008d).

Field reconnaissance of the Quarry Four lease area was undertaken on 12 May 2008. Six major habitats were identified during field reconnaissance of the Quarry Four lease area:

1. Major creekline – Whilst present on the Quarry Four lease, this habitat type does not occur within the proposed clearing area.

2. Minor creekline/channel – Such habitats exist in the northern half of the lease, some of which occur within the proposed clearing area. All creeklines were dry at the time of the fauna survey, however it is expected that these areas would support water at various times of the year. Minor creeklines are not unique to the local area (GIS Database) and it is therefore unlikely that the proposed clearing at Quarry Four will result in a loss of significant creekline habitat for indigenous fauna species.

3. Floodplain – This habitat type is the equivalent of the 'Spinifex Plain' habitat identified by Ecologia Environment Pty Ltd (2008d). Whilst it provides habitat for a number of species utilising the Spinifex hummocks, it is not restricted at the local or bioregional level (Ecologia Environment Pty Ltd, 2008e).

4. Plain/rocky rise – This habitat type constitutes low groundcovers which provides habitat for secretive skinks and ground dwelling birds. This type of habitat is generally common through out the Pilbara bioregion (Ecologia Environment Pty Ltd, 2008e).

5. Midslope/ridgetop – This habitat type constitutes cracks and crevices within and between rocks which provides habitat for various reptiles. This type of habitat is generally common throughout the Pilbara bioregion (Ecologia Environment Pty Ltd, 2008e).

6. Quarry – This 'man-made' habitat is unique in the Pilbara bioregion. It is very disturbed and consists largely of bare ground, jumbled rocky scree, sandy soil, and a 'man made' semi-permanent pool of water with a shallow gradient shoreline (Ecologia Environment Pty Ltd, 2008d). Rock piles may provide denning sites for mammals and reptiles, whilst the pool of water could attract migratory bird species. Wading birds are also likely to use the semi-permanent pool given the presence of a shoreline (Ecologia Environment Pty Ltd, 2008e).

The Northern Quoll (*Dasyurus hallucatus*) has been known to inhabit disused quarry sites (Ecologia Environment Pty Ltd, 2008e). During a targeted Northern Quoll survey conducted by Ecologia Environment Pty

Ltd (2008e), Northern Quoll scats and tracks were identified within the quarry lease, however, no probable denning sites were identified during the targeted survey. Therefore, while the species does not appear to be a resident within the Quarry Four lease it may utilise the lease transiently. For this reason the quarry habitat is not recognised as significant habitat for this species.

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

Methodology Ecologia Environment Pty Ltd (2008d).
Ecologia Environment Pty Ltd (2008e).
GIS Database:
-Hydrography, linear.

(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 GIS Databases, there are no known records of rare flora taxa within the proposed clearing areas (GIS Database). Ecologia Environment Pty Ltd (2008a) report that there are two rare flora species taxa known from the Pilbara bioregion: *Lepidium catapycnon* and *Thryptomene wittweri*. Neither species were recorded by Ecologia Environment Pty Ltd (2008b; 2008c) during the Level 1 flora and vegetation surveys of the proposed clearing areas. Both species are restricted to steep rocky slopes and ridges, and their potential to occur in the proposed clearing areas is considered low (Ecologia Environment Pty Ltd, 2008a).

Ecologia Environment Pty Ltd (2008b) report that 155 Priority Flora taxa are recorded as occurring in the Pilbara bioregion (as of November 2008). Based on habitat preferences and known distributions, Ecologia Environment Pty Ltd (2008b) note that 21 of these taxa could potentially occur in the proposed clearing areas. However, no Priority Flora taxa were located during Level 1 flora and vegetation surveys of the Mainline lease between Spring and Hesta Siding, Rail Repeater Station Five or at Quarry Four (Ecologia Environment Pty Ltd, 2008b; 2008c).

Hibiscus brachysiphonius was recorded within the Mainline lease, and this taxon was listed as Priority 3 at the time Ecologia Environment Pty Ltd (2008b) released the 'Spring Siding to Hesta Siding and Repeater Five Flora and Vegetation Report' to BHP Billiton Iron Ore Pty Ltd. A search of the Western Australian Herbarium's 'Florabase' confirms that this species has since been removed from the Priority Flora list, and is listed as 'not threatened' (Western Australian Herbarium, 2009).

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

Methodology Ecologia Environment Pty Ltd (2008a).
Ecologia Environment Pty Ltd (2008b).
Ecologia Environment Pty Ltd (2008c).
Western Australian Herbarium (2009).
GIS Database:
- Declared Rare and Priority Flora List.

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

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

According to available GIS Databases, there are no known Threatened Ecological Communities (TEC's) within the proposed clearing areas (GIS Database). Ecologia Environment Pty Ltd (2008b; 2008c) did not record any TEC's within the proposed clearing areas, despite conducting level one flora and vegetation surveys. However, one Priority 3 Priority Ecological Community (PEC) was recorded within the proposed rail duplication area and Rail Repeater Station 5 lease area (Ecologia Environment Pty Ltd, 2008b). Priority 3 PEC's are defined as "Communities made up of large, and/or widespread occurrences that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic stock and/or feral stock, and inappropriate fire regimes" (Ecologia Environment Pty Ltd, 2008b).

The Priority 3 PEC within the proposed clearing areas is "Plant assemblages of the Wona Land System". Ecologia Environment Pty Ltd (2008b) report that the Wona Land system has a relatively small total area (approximately 181,500 hectares), occurring west of the midpoint between Marble Bar and Newman, to Pannawonica. Despite being segmented, the Wona Land System is well represented locally (Ecologia Environment Pty Ltd, 2008b).

Ecologia Environment Pty Ltd (2008b; 2008c) note that the implementation of the Spring - Hesta Siding rail duplication project is unlikely to have a significant impact upon the Priority 3 PEC given that the maximum disturbance area to the PEC is 50.9 hectares within the Mainline lease and 3 hectares at Rail Repeater Station Five (which equates to less than 0.03% of the total area of the Wona Land System). In addition, the level of disturbance present within the proposed clearing areas (weeds, cattle grazing and proximity to rail infrastructure) means that the conservation value of that part of the Wona Land System to be lost as part of the proposed clearing is likely to have been compromised already.

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

Methodology Ecologia Environment Pty Ltd (2008b).
Ecologia Environment Pty Ltd (2008c).
GIS Database:
- Threatened Ecological Communities.

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

Comments Proposal is not at variance to this Principle

The area applied to clear is within the Interim Biogeographic Regionalisation for Australia (IBRA) Pilbara bioregion (GIS Database). According to Shepherd et al (2007) there is approximately 99.9% of the pre-European vegetation remaining in the Pilbara bioregion. The vegetation of the application area is classified as Beard Vegetation Association 29: Sparse low woodland; Mulga, discontinuous in scattered groups; Beard Vegetation Association 93: Hummock grasslands, shrub steppe; kanji over soft spinifex; Beard Vegetation Association 173: Hummock grasslands, shrub steppe; kanji over soft spinifex & *Triodia wiseana* on basalt; Beard Vegetation Association 175: Short bunch grassland - savanna/grass plain (Pilbara); and Beard Vegetation Association 562: Mosaic: Low woodland; Mulga in valleys / Hummock grasslands, open low tree-steppe; Snappy Gum over *Triodia wiseana* (GIS Database; Shepherd et al, 2007).

There is approximately 100% of the pre-European vegetation remaining of Beard Vegetation Associations 29, 93, 173, 175 and 562 in the Pilbara bioregion (Shepherd et al, 2007). These vegetation types are poorly represented within conservation reserves at both the state and bioregional level (see table below). However, 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 29, 93, 173, 175 or 562 below current recognised threshold levels, below which species loss increases significantly.

It is acknowledged that iron ore mining activities in the Pilbara have resulted in an increase of native vegetation clearing at the bioregional scale in recent years. This trend is expected to continue with proposed BHP Billiton and Rio Tinto expansion projects. It will therefore become increasingly important in the future to consider the cumulative impacts of native vegetation clearing both locally and regionally.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804,164	17,794,651	~99.9	6.3
Beard vegetation association – State				
29	7,904,064	7,904,064	~100	0.3
93	3,044,326	3,044,267	~100	0.4
173	1,753,116	1,753,116	~100	7.5
175	526,208	524,863	~99.7	4.2
562	103,607	103,607	~100	0.0
Beard vegetation association – Bioregion				
29	1,133,228	1,133,228	~100	1.9
93	3,042,131	3,042,082	~100	0.4
173	1,752,533	1,752,533	~100	7.5
175	507,038	507,008	~100	4.4
562	103,607	103,607	~100	0.0

* Shepherd et al. (2007)

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

Methodology Shepherd et al (2007).
GIS Databases:
- Interim Biogeographic Regionalisation of Australia.
- Pre-European Vegetation.

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

Comments Proposal is at variance to this Principle

According to available databases, there are no known Directory of Important Wetlands, RAMSAR wetlands or Wild Rivers within the proposed clearing area (GIS Database). The proposed rail duplication will involve the construction of three new dual track bridges to cross Coonarrie Creek. Eighty three existing culverts will be

extended beneath the proposed rail duplication at areas of minor drainage and sheet flow (Ecologia Environment Pty Ltd, 2008a). Vegetation associated with watercourses will inevitably be impacted, should a clearing permit be granted.

The following vegetation units associated with watercourses were identified by Ecologia Environment Pty Ltd (2008b) during a flora and vegetation survey of the proposed rail duplication area:

Creekline

1a - Moderately dense *Eucalyptus camaldulensis* var. *obtusa*, *E. victrix* and *Melaleuca argentea* low to medium trees, over moderately dense mixed *Melaleuca glomerata*, *M. argentea*, *M. bracteata*, *Acacia coriacea* subsp. *pendens*, *A. trachycarpa*, *A. ampliceps* and *Atalaya hemiglauca* low trees to high shrubs, over sparse *Crotalaria cunninghamii* and *Stemodia grossa* low shrubs, over open mixed *Cyperus cunninghamii* subsp. *cunninghamii*, *C. blakeanus* and *C. difformis* sedges, *Typha domingensis* rushes, and sparse mixed **Cenchrus ciliaris*, *Chrysopogon fallax*, *Cymbopogon ambiguus* tussock and *Triodia epactia* hummock grasses;

1b - Sparse to moderately dense *Eucalyptus victrix* medium trees, sometimes over *Atalaya hemiglauca*, *Acacia coriacea* subsp. *pendens* and *Flueggea virosa* subsp. *Melanthesoides* low trees to high shrubs, over open *Acacia bivenosa*, *Petalostylis labicheoides*, *Acacia trachycarpa* and *Acacia pyrifolia* high to medium shrubs, over open **Cenchrus ciliaris* tussock grasses and sparse to open *Cyperus blakeanus* and *Cyperus vaginatus* sedges;

Minor creekline/channel

2a - Open *Corymbia hamersleyana* medium to low trees, over moderately dense to dense varying *Acacia* spp. high shrubs (*Acacia trachycarpa*, *A. ancistrocarpa*, *A. bivenosa*, *A. tumida* var. *tumida*, *A. inaequilatera* and *A. ligulata*), over sparse *Senna artemisioides* subsp. *oligophylla* low shrubs, over open to moderately dense **Cenchrus ciliaris*, *Themeda triandra* and *Cymbopogon ambiguus* tussock grass, with open *Triodia epactia* hummock grass and scattered *Cyperus blakeanus* sedges;

2b - Sparse to open *Acacia coriacea* subsp. *pendens* medium trees, over sparse **Vachellia farnesiana* high shrubs, over open *Enneapogon caerulescens* tussock and sparse *Triodia wiseana* hummock grasses; and

Drainage line in cracking clay

3 - Open to moderately dense *Acacia xiphophylla* high to medium shrubs, over sparse *Senna sericea*, *Senna artemisioides* subsp. *oligophylla* and *Sida* aff. *fibulifera* low shrubs, over open to moderately dense *Aristida inaequiglumis* and *Astrebla pectinata* tussock grasses.

Ecologia Environment Pty Ltd (2008a) report that a total of approximately 55 hectares of these vegetation units will be cleared to implement the project, should a clearing permit be granted. None of these vegetation associations are listed as TEC's, and all are well represented across the Pilbara bioregion (Ecologia Environment Pty Ltd, 2008a). It is acknowledged that the clearing includes non-native species such as Buffel Grass (a component of the ground layer in vegetation units 1a, 1b and 2a) and Mimosa Bush (present in vegetation unit 2b). The proximity of the riparian vegetation to the existing rail formation, access tracks and associated infrastructure (in addition to grazing pressure) is also likely to have impacted upon the condition of the riparian vegetation, and subsequently on its ecological and conservation value.

With respect to the Rail Repeater Station Five lease area, there are no watercourses present (GIS Database) and no distinct wetland vegetation associations were recorded by Ecologia Environment Pty Ltd (2008b).

Major creeklines are present on the Quarry Four lease area, however none of these are within that portion of the lease that is subject to this clearing permit application (GIS Database; Ecologia Environment Pty Ltd, 2008c). Some minor creeklines/channels are present at Quarry Four which will be impacted by the proposed clearing. Minor creeklines/channels are characterised by:

Minor creekline/channel

2 - Scattered *Eucalyptus victrix*, *Corymbia hamersleyana* and *Alectryon oleifolius* subsp. *oleifolius* low trees, over moderately dense *Acacia trachycarpa* and *Acacia bivenosa* high to medium shrubs, over open *Chrysopogon fallax*, **Cenchrus ciliaris* tussock grasses and sparse *Triodia epactia* hummock grass (Ecologia Environment Pty Ltd, 2008c).

Like those riparian vegetation units described for the proposed rail duplication, the Quarry Four creekline vegetation unit is not listed as a TEC and is well represented throughout the Pilbara bioregion (Ecologia Environment Pty Ltd, 2008c). Buffel Grass is present, thereby reducing the conservation value of the vegetation.

Given the above, the proposal is at variance to this principle. However, the proponent has received from the Department of Water a Section 17 permit under the Rights in Water and Irrigation Act 1914, for interference with the beds and banks of water courses (BHP Billiton, 2008). DoW has set conditions under this licence pertaining to watercourse vegetation management and therefore, a watercourse vegetation management condition is not required on this permit.

Methodology Ecologia Environment Pty Ltd (2008a).
Ecologia Environment Pty Ltd (2008b).
Ecologia Environment Pty Ltd (2008c).
GIS Database:
- ANCA Wetlands.
- Hydrography, linear.
- RAMSAR Wetlands. - Wild Rivers (Priority).

(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

Land system mapping by the Department of Agriculture Western Australia has mapped a variety of land systems for the Pilbara bioregion. Land systems are mapped based on biophysical features such as soil and landform type, geology, geomorphology and vegetation type (Van Vreeswyk et al, 2004). The proposed clearing areas include ten different land systems (GIS Database). A broad description of each land system is given below:

1. Macroy - The Macroy land system is characterised by stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands. This land system has low or very low erosion hazard (Van Vreeswyk et al, 2004). The Macroy land system comprises a majority of the proposed clearing area (Ecologia Environment Pty Ltd, 2008b; 2008c).
2. McKay - The McKay land system is characterised by hills, ridges, plateaux remnants and breakaways supporting hard spinifex grasslands. Relief can be up to 100 metres. This land system is not prone to degradation or soil erosion (Van Vreeswyk et al, 2004). More than 8 kilometres of the proposed rail duplication occurs through the McKay land system (Ecologia Environment Pty Ltd, 2008b; 2008c).
3. Wona - The Wona land system is characterised by basalt upland Gilgai plains supporting tussock grasslands and minor hard spinifex grasslands. Relief can be up to 30 metres. This land system is not susceptible to erosion, except where the stony mantle is removed (Van Vreeswyk et al, 2004). Approximately 53.9 hectares of the proposed clearing area is within the Wona land system (Ecologia Environment Pty Ltd, 2008b; 2008c).
4. Rocklea - The Rocklea land system is characterised by basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands. Relief can be up to 110 metres. This land system has a very low erosion hazard (Van Vreeswyk et al, 2004). Approximately 4 kilometres of the proposed rail duplication occurs through the Rocklea land system (Ecologia Environment Pty Ltd, 2008b; 2008c).
5. Newman - The Newman land system is characterised by hills and ranges, supporting hard spinifex grasslands. Relief can be up to 450 metres. The Newman land system is generally not prone to erosion (Van Vreeswyk et al, 2004). Approximately three kilometres of the proposed rail duplication occurs through the Newman land system (Ecologia Environment Pty Ltd, 2008b; 2008c).
6. Granitic – The Granitic land system is characterised by rugged granitic hills supporting shrubby hard and soft spinifex grasslands. Relief can be up to 100 metres, with dominant landforms in this land unit consisting largely of hills, ridges, domes on granitic rocks and associated rocky hill slopes. Beneath these landforms there are restricted lower stony plains; and narrow, widely spaced tributary floors and channels. This land system is not susceptible to erosion (Van Vreeswyk et al, 2004). Small sections of the proposed rail duplication traverse the granitic land system, whilst a majority of the proposed clearing at Quarry Four is within this land system (Ecologia Environment Pty Ltd, 2008b; 2008c).
7. River - The River land system is characterised by active flood plains and major rivers supporting grassy Eucalypt woodlands, tussock grasslands and soft spinifex grasslands. This land system is largely stabilised by Buffel Grass and spinifex, therefore 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 rail duplication crosses the River Land System in two small areas (Ecologia Environment Pty Ltd, 2008b; 2008c).
8. Christmas – The Christmas land system is characterised by stony alluvial plains supporting Snakewood and Mulga shrublands with sparse tussock grasses. Stony plains are subject to sheet flow and are characterised by numerous small drainage foci and groves. Larger drainage tracts are sparse or rare in this land system. A majority of this land system is resistant to erosion, whilst rare drainage tracts are moderately to highly susceptible to erosion (Van Vreeswyk et al, 2004). The proposed rail duplication crosses the Christmas Land System in one small area near Hesta Siding (Ecologia Environment Pty Ltd, 2008b; 2008c).
9. Capricorn – The Capricorn land system is characterised by hills and ridges of sandstone and dolomite supporting shrubby hard and soft Spinifex grasslands. Relief can be up to 180 metres. Ranges, hills, slopes and plains in this land system are very stony, conferring resistance to erosion (Van Vreeswyk et al, 2004). The proposed rail duplication crosses the Capricorn Land System in one small area approximately two – three kilometres south of Rail Repeater Station Five (Ecologia Environment Pty Ltd, 2008b; 2008c).
10. Jamindie - The Jamindie land system is characterised by stony hardpan plains and rises supporting groved

Mulga shrublands, occasionally with spinifex understorey. Relief can be up to 30 metres, with plains and low rises dominating the land system. Drainage tracts are moderately susceptible to erosion, some hardpan plains are slightly susceptible, however, a majority of the land system is resistant (Van Vreeswyk et al, 2004). The proposed rail duplication crosses the Jamindie Land System in one small area near Hesta Siding (Ecologia Environment Pty Ltd, 2008b; 2008c).

Based on the above, the proposed clearing may be at variance to this Principle. The proponent will implement the following strategies to minimise land degradation risks associated with vegetation clearing:

- All cleared vegetation will be stockpiled for later use in rehabilitation. To minimise disturbance, stockpiles will be located on already cleared or disturbed areas where practicable;
- Topsoil will be stripped to a depth of 50 - 100 millimetres and stockpiled to a height no greater than 1.5 metres for later use in rehabilitation. To minimise disturbance, stockpiles will be located on already cleared or disturbed areas where practicable;
- Approximately 263 hectares of the 366 hectares proposed for disturbance will be of a temporary nature. Borrow pits will be rehabilitated progressively, whilst laydown areas will be rehabilitated post construction;
- Surface water run-off from work areas shall be contained in sumps to prevent pollution and erosion. Sumps shall be filled and rehabilitated upon completion of works. Bunding will also be used where necessary to prevent sediment releases off site;
- Where the potential for erosion is high, appropriate methods for erosion control will be used (such as gabions, rip rap rock protection and reno mattresses). Designers for the civil works will determine erosion potential based on floodway reports and standard engineering experience. Rock protection is provided as a general specification in culvert design, and will be used in all culverts installed during construction. Post construction quality assurance monitoring will identify any additional erosion control which may be required (Ecologia Environment Pty Ltd, 2008a).

Regeneration conditions will be imposed on the permit to ensure that all areas not required for ongoing operations are progressively rehabilitated. This includes approximately 263 of the 366 hectares applied to clear.

Methodology Ecologia Environment Pty Ltd (2008a).
Ecologia Environment Pty Ltd (2008b).
Ecologia Environment Pty Ltd (2008c).
Van Vreeswyk et al (2004).
GIS Database:
- Rangeland land system mapping.

(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 reserves in close proximity to the proposed clearing areas (GIS Database). The nearest known conservation reserve is the Karijini National Park, located approximately 120 kilometres north-east of the proposed rail duplication area at its closest point (Ecologia Environment Pty Ltd, 2008a; GIS Database).

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

Methodology Ecologia Environment Pty Ltd (2008a).
GIS Database:
- CALM Managed Lands and Waters.

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

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

A number of ephemeral drainage lines dissect the proposed rail duplication area, including three tributaries of Coonarrie Creek (Ecologia Environment Pty Ltd, 2008a). It is proposed that three new dual track rail bridges will be constructed to cross these drainage lines, whilst 83 existing culverts will be extended beneath the proposed rail duplication at areas of minor drainage and concentrated sheetflow. Engineering structures such as bridges and culverts will be used to ensure natural surface water flow regimes are reinstated following duplication of the railway line. The culverts used for the rail duplication project will replicate the location, size and type of those already in place along the existing rail line (Ecologia Environment Pty Ltd, 2008a).

During clearing, there is a potential for surface water quality to be impacted by sedimentation should adequate management measures not be put in place. BHP Billiton will implement the following strategies to avoid, minimise and mitigate impacts to surface water quality (Ecologia Environment Pty Ltd, 2008a):

- Surface water run-off from work areas shall be contained in sumps. Bunding will also be used where necessary to prevent sediment releases off site;
- Where the potential for erosion is high, appropriate methods for erosion control will be used (such as gabions, rip rap rock protection and reno mattresses). Designers for the civil works will determine erosion potential based on floodway reports and standard engineering experience. Rock protection is provided as a general specification in culvert design, and will be used in all culverts installed during construction. Post construction quality assurance monitoring will identify any additional erosion control which may be required;
- Topsoil and cleared vegetation shall be stockpiled away from watercourses; and
- Vegetation disturbance shall maintain a minimum 50 metre set back from drainage lines unless otherwise approved.

The proposed clearing area is not located within a Public Drinking Water Source Area (GIS Database). A majority of the proposed vegetation clearing is within a linear, 80 metre wide rail corridor spanning some 50 kilometres. It is unlikely that vegetation clearing would result in any significant changes to local groundwater levels or quality.

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

Methodology Ecologia Environment Pty Ltd (2008a).
GIS Database:
- Public Drinking Water Source Areas (PDWSAs).

(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 is located in the Pilbara bioregion, an arid environment characterised by two distinct seasons; a hot Summer from October to April and a mild Winter from May to September. Peak rainfall typically occurs in the Summer months and is associated with tropical cyclones. A smaller rainfall peak is experienced between May and June and is associated with cold fronts. Annual evaporation rates in the Pilbara bioregion greatly exceed average annual rainfall (Ecologia Environment Pty Ltd, 2008a).

A number of ephemeral drainage lines dissect the proposed clearing area, including Coonarrie Creek. It is proposed that three new dual track railway bridges will be constructed where the proposed rail duplication crosses this drainage line. The new bridges have a reduced number of piers in comparison to the existing bridges, and this is likely to have a number of benefits with respect to flood risk reduction. These include:

- a less restricted waterway opening, resulting in lower backwater levels, low flow velocities and an increase in the capacity of the bridge to discharge larger flood events; and
- less ponding of water upstream (Ecologia Environment Pty Ltd, 2008a).

In addition, 83 culverts will be duplicated at numerous minor drainage lines and areas of sheet flow along the 50 kilometre length of the proposed rail duplication (Ecologia Environment Pty Ltd, 2008a). Bridge and culvert installation will ensure that the proposed vegetation clearing and subsequent construction activities do not impede natural surface water flow.

It is acknowledged that the clearing of native vegetation will increase run-off (Ecologia Environment Pty Ltd, 2008a), however this is not expected to increase the incidence or intensity of flood events given the size of the area to be cleared (366 hectares) in relation to the size of the Yule River, Shaw River and Fortescue River catchments (886,078 hectares; 790,203 hectares and 1,860,784 hectares respectively) in which clearing is proposed (GIS Database).

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

Methodology Ecologia Environment Pty Ltd (2008a).
GIS Database:
- Hydrographic Catchments - Catchments.
- Hydrography, linear.

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

Comments

There are two native title claims over the areas under application (GIS Database). These claims (WC99-016 and WC98-062) have been registered with the National Native Title Tribunal on behalf of the claimant groups (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*.

According to available databases, there are a number of Aboriginal Sites of Significance within, and in close proximity to, the proposed clearing areas (GIS Database). Aboriginal Sites of Significance are protected under the *Aboriginal Heritage Act 1972*. The proponent is committed to the management and protection of Aboriginal heritage sites (BHP Billiton, 2005). BHP Billiton has an internal process; the Project Environment and Aboriginal Heritage Review (PEAHR), which is designed to prevent inadvertent disturbance of Aboriginal heritage sites within BHP Billiton operations. Prior to the commencement of any land disturbance activity, a PEAHR must be completed and submitted to BHP Billiton's Aboriginal Affairs Department, for assessment. All land disturbance activities must be approved by BHP Billiton's Environment and Aboriginal Heritage staff (BHP Billiton, 2005). BHP Billiton has consulted with the Native Title Claimants about the proposed rail duplication project and heritage surveys have been conducted over the project area (Ecologia Environment Pty Ltd, 2008a). All Aboriginal Sites of Significance will be avoided during implementation of the project (Ecologia Environment Pty Ltd, 2008a). 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 and Conservation and the Department of Water (DoW) to determine whether a Works Approval, or any other licences or approvals are required for the proposed works. BHP acquired licences to interfere with bed and banks from DoW.

Methodology BHP Billiton (2005).
Ecologia Environment Pty Ltd (2008a).
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 Principle (f), may be at variance to Principle (g), is not likely to be at variance to Principles (a), (b), (c), (d), (h), (i) or (j) and is not at variance to Principle (e).

Should a clearing permit be granted, it is recommended that conditions be imposed on the permit for the purposes of weed control, rehabilitation, record keeping and permit reporting.

5. References

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- Western Australian Herbarium (2009) Florabase - The Western Australian Flora. Department of Environment and Conservation. <http://florabase.calm.wa.gov.au/>

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.
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.