
Flora and Vegetation Survey of the new conveyor belts storage and laydown area, near Karratha.

Native Vegetation Clearing Permit Supporting Report



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Rio Tinto Iron Ore (RTIO) comprises wholly owned subsidiaries and joint venture initiatives including iron ore operations in the Pilbara region of Western Australia, owned by Hamersley Iron and Robe River, and managed by Pilbara Iron

Executive Summary

Rio Tinto proposes to clear 6.5 ha of native vegetation to accommodate a laydown and storage yard required for the short-long term storage of new conveyor belts for Dampier Port Operations. The proposed laydown area, which is an existing Land Administration Act lease; will be cleared of native vegetation, fenced and managed by Rio Tinto Iron Ore. The proposed laydown area (herein referred to as 'the study area') will clear more than 1 ha of native vegetation, and is subject to a Native Vegetation Clearing Permit (NVCP) application.

A botanical survey was conducted by Rio Tinto botanist Hanouska Bishop on the 30th of April, 2011. The aim of the survey was to investigate and record biological information including vegetation assemblages, flora species and fauna habitats to support an application for an NVCP under the *Environmental Protection Act 1986*. The proposal was assessed against the 10 Clearing Principles as defined in Schedule 5 (Principles for Clearing Native Vegetation) of the *Environmental Protection Act 1986*. The assessment (see Section 8) found the proposal was at variance with one of the clearing principles, which has been addressed in the recommendations section.

A total of 54 native and introduced vascular flora species from 38 genera representing 17 families were recorded from 3 vegetation units within the study area. These vegetation units characterise the broad coastal plain landform in which the study area comprises. All vegetation units are considered to be well represented within the Roebourne sub-region of the Pilbara bioregion. One priority ecological community is represented within the study area; the *Horseflat land system* PEC. The condition of the vegetation types within the study area ranged from Poor to Very Good due to historical disturbance associated with previous clearing and major weed infestation. The genera and families represented within the study area are characteristic of the flora within the Karratha locality. Of the species recorded, none are listed as Declared Rare Flora (DRF) or priority flora; nor were any significant range extensions noted.

Species richness was considered to be within the expected range for a study area of this size. This is attributed toward the optimal seasonal conditions at the time of the survey and the small spatial area which constitutes the study area. A portion of the study area has been subject to previous disturbance, which is a contributing factor also.

In addition to the field survey, a desktop analysis was undertaken on the 2nd of November, 2011 in order to identify known or potential environmental constraints within or surrounding the study area. The desktop analysis includes a review of existing published and unpublished reports pertaining to the locality, as well as searches of databases maintained by the WA Museum, Department of Environment and Conservation (DEC) and the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DWEWPC). The search coordinates used were at a central point within the study area at 116° 46' 24" E, 20° 48' 33" S (a 40 km radial search for the DEC and Rio Tinto GIS database searches, and 10 km radial search for the Protected Matters Search Tool was adopted). Results of searches undertaken are presented in Appendix 4.

No targeted fauna surveys have been undertaken within the study area, rather a fauna assessment was undertaken as a desktop study, utilising internal and external databases held by the WA Museum, Department of Environment and the Water, Heritage & the Arts (DEWHA). The databases revealed that several fauna species of conservation significance may occur within the Karratha locality. It is highly unlikely the vegetation and habitat within the study area would be deemed “core habitat” for any significant fauna species, and as such the small amount of proposed clearing would not be expected to diminish the conservation status of any fauna species.

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Introduction

1. Project Background

Rio Tinto proposes to clear 6.5 ha of native vegetation to accommodate a new laydown and storage yard required for the short-long term storage of conveyor belts for its Dampier port operations.

The proposed development area lies approximately 11 km south west of the township of Karratha, in the Shire of Roebourne (Figure 2.2). The proposed construction project will clear more than 1 ha of native vegetation, and requires an application for a Native Vegetation Clearing Permit under the *Environmental Protection Act 1986* and *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. This report is intended as a supporting document for Rio Tinto's NVCP application.

The purpose of the current report is to:

- Describe the local environment of the proposed clearing area including flora, vegetation, fauna habitats, geology, landforms, soils and hydrology.
- Identify any environmental constraints pertaining to the study area and describe any potential impacts to any features of conservation significance;
- Describe the potential impacts of the proposal on the local environment through application of the 10 Clearing Principles, as outlined in Schedule 5 of the *Environmental Protection Act 1986*.
- Recommend ways to avoid and/or mitigate impacts of the proposal on areas of conservation significance and on the local environment in general.

1.1 Description of Proposed Clearing

The study area covers 6.5 ha of partially disturbed ground and areas of native vegetation in varying condition. The study area consists of a single polygon approximately 260 m wide (east-west) and 250 m long (north-south) (Figure 2.3). Access to the study area is via the Karratha to Tom Price Road (Millstream Link).

1.2 Study area Location

The study area is located approximately 11 km south west of the township Karratha and 17.5 km south south-east of the township Dampier in the Shire of Roebourne, within the Pilbara region of WA (Figure 2.2). The southern boundary lies adjacent to the Tox Free waste facility yard, the eastern boundary lies adjacent to the Karratha to Tom Price Road and western boundary lies adjacent with Rio Tinto's Dampier to Tom Price rail line (Mainline).

1.3 Scope and Limitations

This report is intended as a supporting document to Rio Tinto's application for a NVCP. It has been prepared on the basis of a review of existing information for the vicinity of the

study area, combined with a site visit by botanist Hanouska Bishop on the 30th of April, 2011.

Limitations of the current study included that:

- The study area was assessed over a single period and was not seasonally assessed to capture short-lived and annual species.
- The survey was conducted following substantial summer rainfall events (Section 2.1), providing optimal conditions for recording ephemeral flora species. Some species may still have been overlooked. Therefore, the species list provided in this report is deemed representative rather than a comprehensive list of the flora within the study area;
- Fungi and non-vascular flora (algae, mosses and liverworts) were not sampled.
- The assessment of fauna and fauna habitats was based on a desktop review and field observations only, with no systematic trapping undertaken.

2. Review of the Physical and Non-Physical Aspects of the Study area

2.1 Climate

The closest Meteorological station providing climate data is the Karratha Airport; 1.5 km east of the study area. Weather data from the Bureau of Meteorology (BoM) for the Karratha airport is presented in Figure 2.1.

The regional climate is semi-arid to semi-tropical, with a summer rainfall season and a winter dry season; which varies in frequency and volume from year to year. The summer wet months extend from November to April when temperatures can exceed 47°C. The remainder of the year is moderate to warm with a continental effect resulting in low minimum temperatures below 15°C in June and July. Pan evaporation rates in Port Hedland average 3500mm per annum (Luke *et al.* 2003) exceeding annual rainfall averages.

Annual rainfall is variable with tropical lows producing large regional rainfall events (between 100mm and 200mm in a few days) to isolated thunderstorm events in the dry (winter) season. For Karratha; the average annual rainfall is 277.2 mm with most precipitation occurring between December and June. Rainfall for the 2010/2011 season in the December to May summer/autumn period was above average (Figure 2.1). A total of 748 mm of rainfall was recorded in the 6 month period from December to May 2011. The mean total rainfall for the same period from 1972 to 2011 is 223.9 mm (BoM, 2011).

Maximum temperatures reflected a moderately warm summer to winter period (BoM, 2011). Temperatures recorded at Karratha airport in the 6 months to May 2011 were generally within expected ranges and close to mean maximum temperatures (Figure 2.1).

This sporadic nature of rainfall events is typical of the Pilbara climate, where long dry periods during summer are often followed by massive rainfall events. The substantial rainfall period sustained over the summer cyclone period through to follow-up autumnal

rainfall has resulted in optimal conditions for the collection of a representative flora species list.

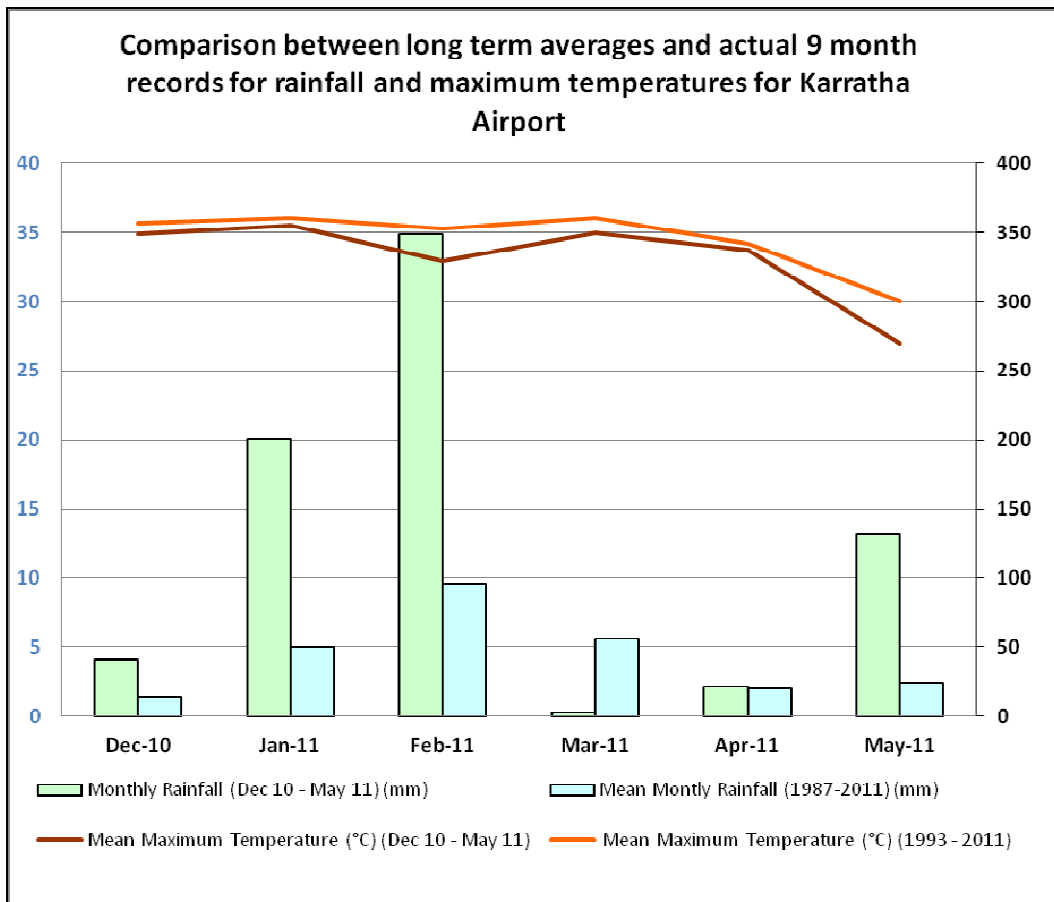


Figure 2.1: Comparison of actual mean monthly maximum temperatures and rainfall for Karratha Aero Site # 4083

2.2 Land Systems

The study area falls within the Horseflat land system as described in the rangeland surveys of Payne *et al.* (1988) and van Vreeswyk *et al.* (2004) (Figures 5.2, 5.3).

The Horseflat land system comprises gilgai clay plains which support tussock grasslands and minor grassy snakewood shrublands, and is ranked 91st of the 107 land systems (107 being the most common and widespread). The Horseflat land system is widespread through the Roebourne subregion, extending from just east of Onslow to the eastern boundary of the Pilbara bioregion, and comprises 328,122 ha. The study area intersects the non-gilgaid, stony plains land unit (van Vreeswyk *et al.* 2004). This land system comprises 2 Priority Ecological Communities (PECs); the *Roebourne plains coastal grasslands with gilgai microrelief on deep cracking clays* (priority 1), and the remainder of the *Horseflat land system* (priority 3) (Table 2.3). The conservation significance of these PECs is discussed further in Section 2.6.

Table 2.3: Land System occurring within the study area and their representation in the Pilbara bioregion (Department of Agriculture, 2002)

Land System (LS)	Extent in the Pilbara (ha)	Extent within Study Area (ha)	Extent within Study Area as % of total LS area
Horseflat	328,122	6.5	0.002%

2.3 Geology and Soils

The majority of the study area is comprised of quaternary alluvium overlain by depositional surfaces of gilgai and non-gilgai clay plains characteristic of the Horseflat Land System. Topography is a low relief, at only around 1-2 m above sea level.

The soils of the study area comprise shallow sandy clay-loams with sparse stony mantles. These soils are considered to be widely represented within the Pilbara region.

2.4 IBRA Bioregions and Subregions

The study area is located within the Pilbara (PIL) bioregion as defined in the most recent interim Bioregionalisation of Australia (IBRA) Report (Environment Australia 2000).

The Pilbara bioregion has been divided into 4 subregions; Chichester (PIL1), Fortescue Plains (PIL2), Hamersley (PIL3) and Roebourne (PIL4) (McKenzie *et al.* 2002). The study area falls within the (PIL4) Roebourne Subregion, and is described as; 'Quaternary alluvial and older colluvial coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, *Sporobolus* and mangal (mangroves) occur on marine alluvial flats and river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three. Climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually.'

The vegetation under consideration in this report is mainly of the type described in the Roebourne subregion (PIL4): short bunch grassland – savannah/grass plain with some additional hummock grasslands; shrub-steppe; kanji over *Triodia pungens* and snakewood & *Acacia victoriae* scrub/Hummock grasslands (Kendrick and Stanley (2001).

2.5 Vegetation

2.5.1 Beard's Regional Vegetation Mapping

The study area occurs within the Eremaean Botanical Province as defined by Beard, near the southern boundary of the Fortescue Botanical District and the northern boundary of the Ashburton Botanical District. The vegetation of this province is typical of arid landscapes; including bunch grasslands, spinifex, wattles and eucalypts. The study area

falls within a single vegetation mapping unit, which is described by Beard (1975) in a mapping project intended at a broad scale of the Pilbara region, of 1:1,000,000.

The study area is mapped by Beard (1975) as:

- **Abydos Plain/Roebourne – 589** - This is described as a mosaic of short bunch grassland - savanna / grass plain (Pilbara) / hummock grasslands, grass steppe; soft spinifex.

2.5.2 Pre-European Vegetation Extent

The pre-European and current extent of native vegetation associations in Western Australia has been interpreted by Shepherd *et al.* (2002) using data from Beard (1975) regional vegetation mapping and other vegetation mapping activities as well as satellite imagery and ortho-photo interpretation.

Shepherd *et al.* (2002) identified the Pilbara Bioregion as having native vegetation largely intact owing to the absence of intensive agricultural land use practices. Although the extent of both vegetation associations remain largely intact, their floristic composition and structural characteristics are likely to have been substantially altered since European settlement by grazing and inappropriate fire regimes (Shepherd *et al.* 2002). Table 2.5 presents the pre-European and current extent of the mapping unit (largely 100% of its original extent) across its range and the extent within the study area.

Table 2.5: Beard (1975) mapping units occurring within the Study area, their current and pre-European extent (following Shepherd *et al.* 2002) and their extent across the study area

Beard (1975) Mapping Unit	Pre-European extent (Shepherd <i>et al.</i> 2002)	Current extent within Hamersley subregions (Shepherd <i>et al.</i> 2002)	Extent within the Study area (% of current extent)
Abydos Plain/Roebourne 589	848,201 ha	848,201 ha	6.53 ha (0.00076%)

2.6 Conservation Areas and Environmentally Sensitive Areas (ESA)

The DEC online Native Vegetation Map Viewer was used to identify the location of environmentally sensitive areas as declared by a Notice under section 51B of the *Environmental Protection Act 1986*. There were no ESAs in the vicinity of the study area. The north--west corner of the Millstream-Chichester National Park is located approximately 46 km south east of the study area, being the nearest conservation area. The proposal is unlikely to directly or indirectly impact the Millstream-Chichester National Park. The Burrup National Heritage Listing Area lies approximately 14 km north of the study area and is also not expected to be impacted by the proposal (Figure 2.2).

Threatened Ecological Communities (TECs) are communities which have been found to fit into one of the following categories by the DEC; “presumed totally destroyed”, “critically endangered”, “endangered” or “vulnerable”. TECs are defined as ESAs within the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. There are

currently no TECs present within the Roebourne sub-region of the Pilbara bioregion. The closest TEC lies approximately 160 km south, being the *Themeda* grasslands of Pilbara Region (DEC 2009b).

Priority Ecological Communities (PECs) are possible threatened ecological communities that do not meet survey criteria or are not adequately defined for the TEC list, and are ranked in Priorities 1, 2 and 3 (1 being highest priority). Several PECs are associated with the Roebourne subregion, two of which are represented within the study area and/or surrounds:

- *Horseflat land system of the Roebourne plains* (P3) and
- *Roebourne plains coastal grasslands with gilgai microrelief on deep cracking clays* (P1).

The study area falls entirely within the *Horseflat land system* PEC, and has been subject to varying degrees of degradation resulting from historical clearing and weed invasion. It is described as 'the remainder of the Horseflat land system – not including the Roebourne Plains gilgai grasslands and the Chenopod association of the Roebourne Plains area' (DEC, 2011).

The *Roebourne plains coastal grasslands* unit occurs within the Karratha locality. No gilgai clay habitat or grasslands vegetation was identified within or near the study area and none would be expected to be impacted by the proposal.

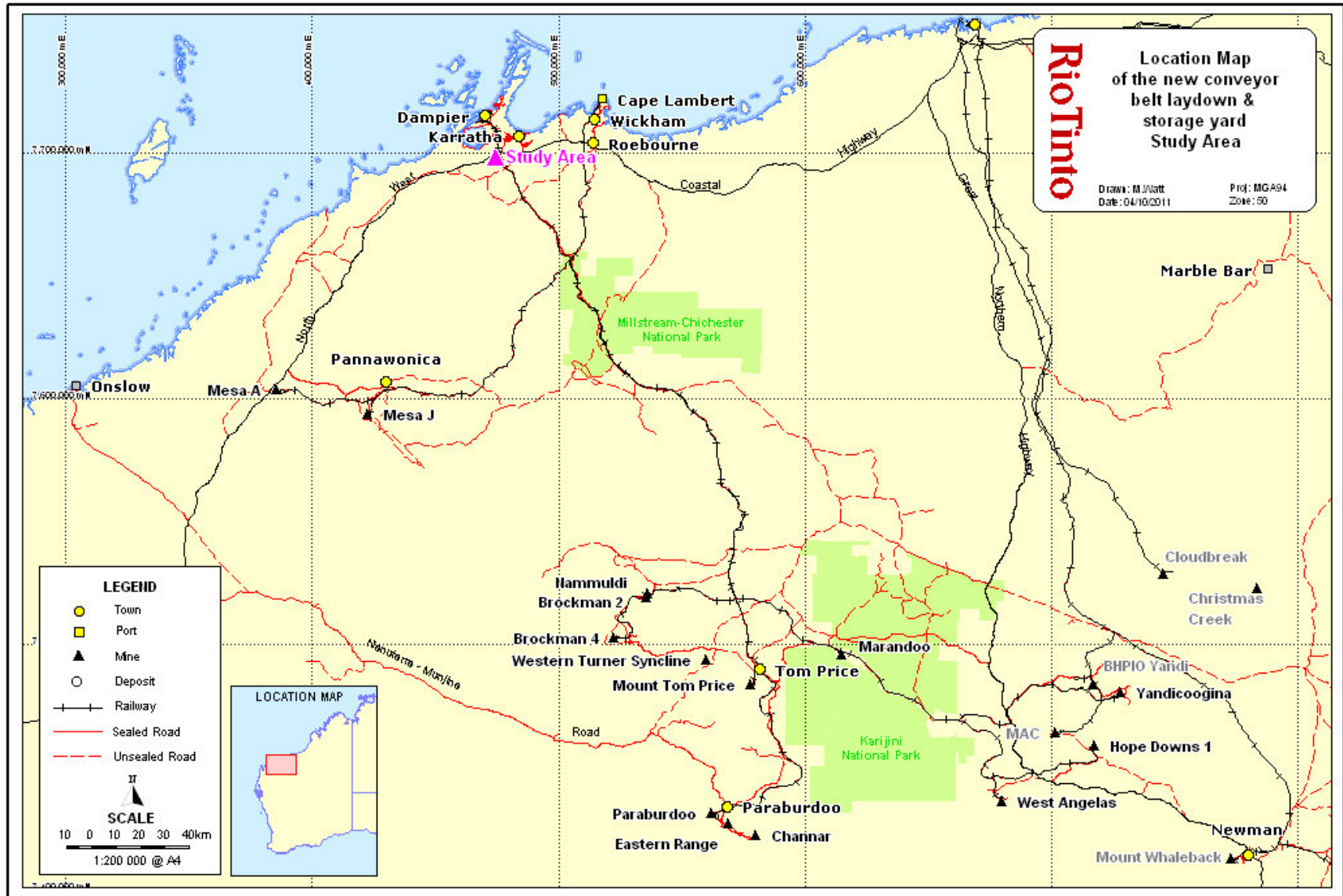


Figure 2.2: Location of the new conveyor belt laydown & storage yard study area.

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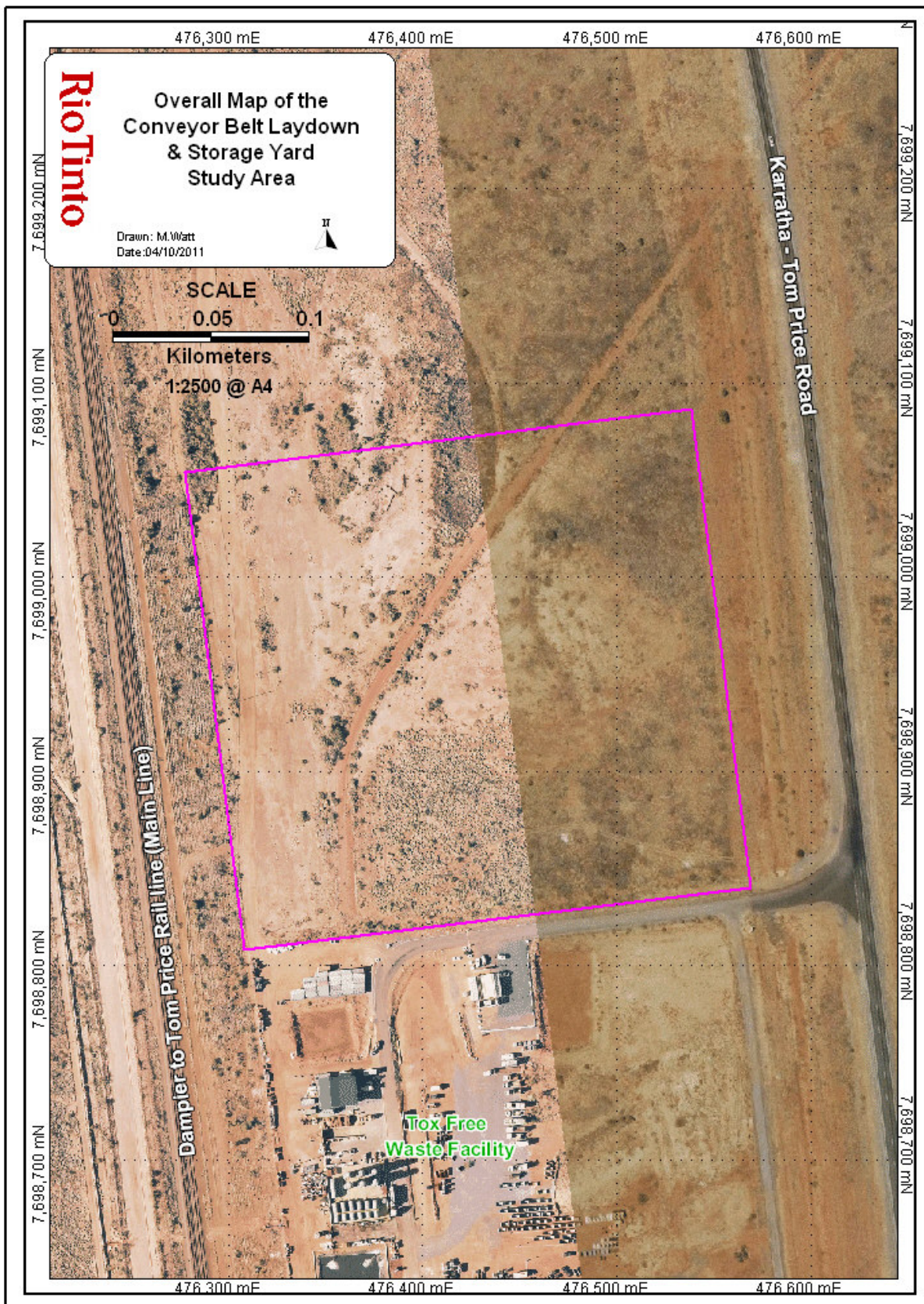


Figure 2.3: Overview of the conveyor belt laydown and storage yard study area.

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Methodology

3. Desktop Study

3.1 Literature review

Previous botanical surveys have been conducted within the Karratha locality by consultant botanists Biota Environmental Sciences and Rio Tinto botanists (Table 3.1 and Figure 3.1). These surveys were consulted for priority flora, vegetation communities of conservation significance, weeds and fauna habitats which may be inferred within the study area.

Table 3.1: Summary of prior flora, vegetation and fauna surveys within the vicinity of the study area.

Name	Project	Area (ha)
Biota (2008a)	Karratha to Cape Lambert Transmission Line Corridor: Native Vegetation Clearing Permit Report	108
Biota (2008b)	7 Mile Power Station and Ancillary Works NVCP	800
RTIO (2010)	Flora and Vegetation Survey of the 7 Mile Rail Yard Expansion	307
ENV (2011)	Mount Regal Borrow Flora and Vegetation Assessment	185

The total area covered by these surveys is 1,400 ha, within which no DRF flora were recorded and one priority 3 flora species was recorded; *Tephrosia bidwillii* (ENV 2011). The nearest population lies 2 km west of the study area, and is not expected to be impacted by the proposal.

No TECs were identified in the previous studies, and 2 PECs were identified; *Roebourne plains coastal grasslands* and the *Horseflat land system* PECs.

3.2 Database Searches

Databases maintained by the WA DEC, WA Herbarium and WA Museum were searched in September 2009 for Declared Rare and Priority Flora, Schedule and Priority Fauna, and Threatened Ecological Communities (Appendix 4).

The Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) administered *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act) Protected Matters Search Tool was searched in November 2011 for Matters of National Environmental Significance which may be impacted by the proposal (Appendix 4).

Spatial data for rare flora and fauna held and maintained by Rio Tinto Iron Ore was also searched as part of the desk top study. Any Ecologically Sensitive Areas (ESA),

Reserves and/or conservation areas within or surrounding the study area were also identified using relevant GIS layers held by Rio Tinto Iron Ore.

All database searches encompassed a search around the centre point 116° 46' 24" E, 20° 48' 33" S. A 40 km radial search area was adopted for the RTIO GIS database, and NatureMap searches, and a 10 km radial search on the EPBC Protected Matters Search Tool was adopted. The results of the database searches were used to create a list of flora, fauna and ecological communities of conservation significance recorded, or with the potential to occur, within the study area. The likelihood of a species or ecological community occurring within the study area was assessed through consideration of available habitats, recentness of occurrence and prevailing disturbance regimes operating in the study area (Sections 6.2, 7.2).

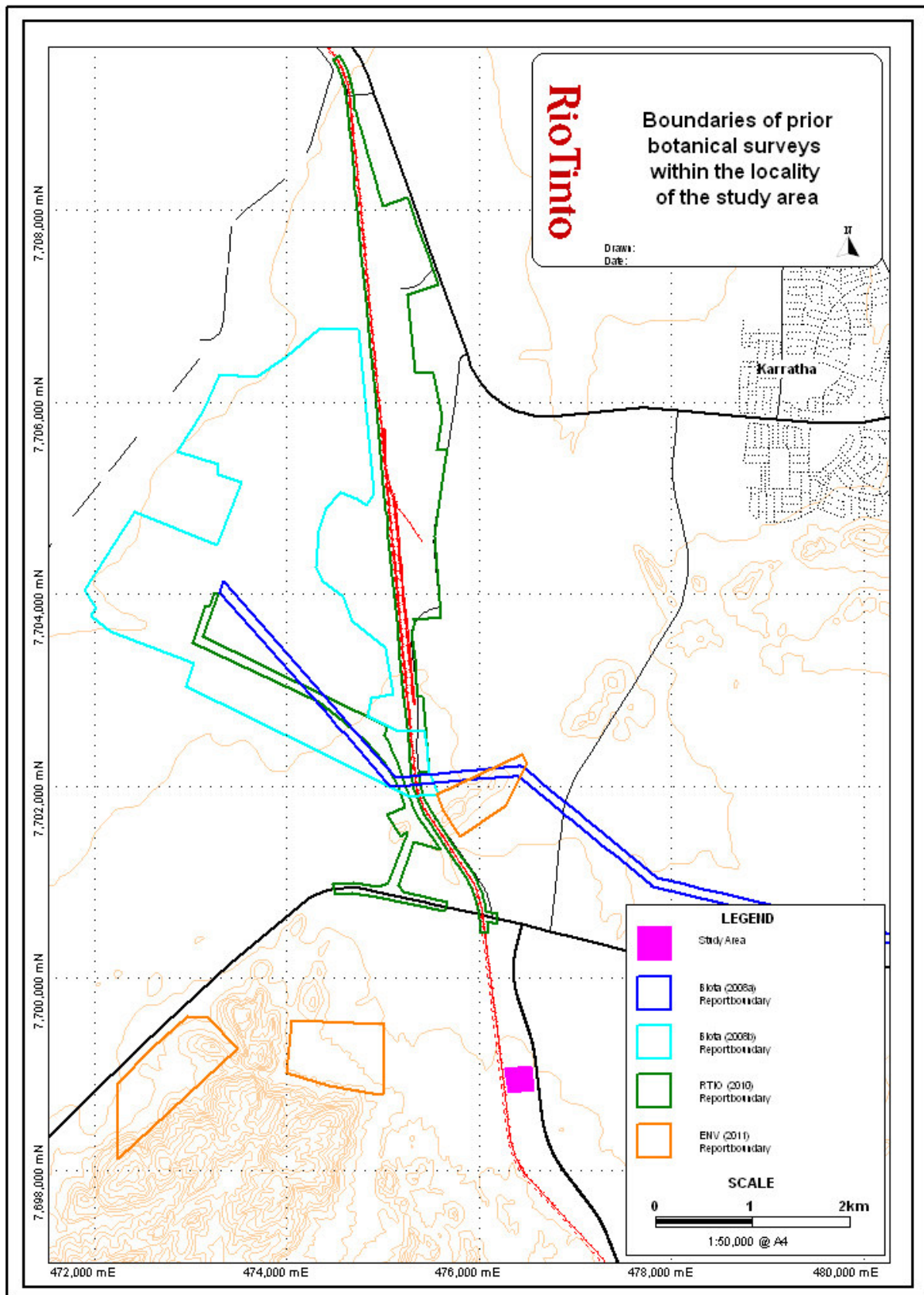


Figure 3.1: Boundaries of previous botanical surveys within the locality of the study area.

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4. Flora and Vegetation Field Survey

The entire study area was traversed on foot by Rio Tinto botanist Hanouska Bishop on the 30th of April, 2011. Recent orthorectified aerial photographs covering the study area were reviewed whilst in the field to determine boundaries of vegetation communities.

Locations of flora of conservation significance, flora of Special Interest, unknown flora, weeds and other observations including fauna sightings were recorded using a hand-held GPS (WGS 84 datum). Where conservation significant flora species were encountered; estimates of density or numbers of individuals, habitats and associated flora were recorded.

The location of each site where a vegetation record was taken was determined based on interpretation of aerial photography and a visit to the site for ground truthing. Determination of boundaries between vegetation units was also undertaken using aerial photography and ground truthing whilst in the field. Due to the fragmentation and level of disturbance within some areas of the study area, relevés were adopted to sample each vegetation type. A botanical relevé is described as a vegetation sample that describes the structure and floristics, and associated physical attributes, flora and opportunistic fauna sightings. In areas where a representative sample of a vegetation type could be obtained by establishing quadrats, this was the preferred method. All quadrats established were 50m by 50m dimensions. Locations of each relevé and quadrat are presented in Figure 5.1.

4.1 Vegetation Descriptions and Mapping

Vegetation descriptions for the study area were based on Specht (1970) with modification by Aplin (1979) and Trudgen (1988) (Appendix 1). Descriptions were taken during traverses where changes in the vegetation structure were observed. A photograph of each vegetation unit, and a location using a hand-held GPS (GDA 94 datum) was taken. Assessment of the overall condition of each vegetation unit was made based on Trudgen (1998) (Appendix 1).

The mapping notes gathered in the field were used to prepare a draft map of vegetation, utilising rectified 1:5,000 scale colour digital air photography as the background. The vegetation boundaries were digitised on-screen using MapInfo 11.1. The resulting polygons were attributed with the relevant information including the vegetation unit and vegetation description. Point locations of each quadrat and relevé recorded were also uploaded into MapInfo, together with visual photographs which were used to assist with the finalising of vegetation boundaries.

4.2 Flora Identification

An interim species list was compiled in the field covering common species identified with confidence by the botanist. Voucher samples of unknown and Priority flora were taken which were pressed and dried in the field. Each sample was assigned a reference identification sample number. Flora samples collected in the field were identified by DEC taxonomist Mr J. Hurter. Voucher quality specimens will be lodged with the WA Herbarium. Nomenclature was cross-checked using the DEC's FloraBase web facility and Max v3 flora database, and updated where required.

Results

5. Vegetation of the Conveyor Belt Laydown Area Study Area

The study area is comprised of 3 vegetation units on a single coastal plain landform. All vegetation units are associated with the Horseflat Landsystem may be considered to have elevated conservation significance due to this land system being included as a Priority 3 PEC. The overall condition of the vegetation within the study area was considered to be good, with significant clearing and weed invasion observed, thus reducing the conservation value of the PEC somewhat. The vegetation units are well represented on the coastal plains of the Roebourne subregion.

Table 5.1: Summary of the vegetation units within the study area.

Landform	Vegetation Code	Vegetation Description	Area (ha)
Stony plains	AbAaApyDeTwHmix	<i>Acacia bivenosa</i> , <i>A. ancistrocarpa</i> , <i>A. pyrifolia</i> shrubland over <i>Diplopeltis eriocarpa</i> scattered low shrubs over <i>Triodia wiseana</i> hummock grassland over scattered mixed herbs	2.7
Stony plains	AbCcIlHmix	<i>Acacia bivenosa</i> shrubland over <i>Cenchrus ciliaris</i> tussock grassland over scattered mixed herbs	0.2
Stony plains	AbAhHmix	<i>Acacia bivenosa</i> open shrubland over <i>Aristida holathera</i> tussock grassland over scattered mixed herbs	1
N/A	HD	Areas which are completely degraded	2.6
Total Area			6.5

5.1 Vegetation Units of the Study Area

AbAaApyDeTwHmix

Acacia bivenosa, *A. ancistrocarpa*, *A. pyrifolia* shrubland over *Diplopeltis eriocarpa* scattered low shrubs over *Triodia wiseana* hummock grassland over scattered mixed herbs.

This vegetation unit was the dominant vegetation recorded within the study area and occurred on stony plains habitat. The condition was good to very good away from existing cleared areas, where weed invasion was minimal however scattered weeds (*Cenchrus ciliaris*) were present throughout. Associated species include; *Indigofera monophylla*, *Trichodesma zeylanicum*, *Ptilotus auriculifolius*, *Tribulus hirsutus*, *Portulaca pilosa*, *Heliotropium chrysocarpum*, *Corchorus walcottii* and *Enneapogon caerulescens*.



Plate 5.1: Vegetation unit AbAaApyDeTwHmix. Photo taken 476548mE 7698878mN facing south-west.

AbCcilHmix

Acacia bivenosa shrubland over *Cenchrus ciliaris* tussock grassland over scattered mixed herbs.

This vegetation unit comprises re-growth along an existing track, which is structurally and floristically poorer from the surrounding vegetation. It was observed in poor condition, with the area being cleared and with significant weed invasion. Associated species include; *Corchorus walcottii*, *Acacia ancistrocarpa*, *Indigofera monophylla*, *Diplopeltis eriocarpa*, *Enneapogon caerulescens*, *Paraneurachne muelleri*, *Senna notabilis* and *Triodia wiseana*.



Plate 5.2: Vegetation unit AbCcilHmix. Photo taken 476360mE 7698927mN facing north east.

AbAhHmix

Acacia bivenosa open shrubland over *Aristida holathera* tussock grassland over scattered mixed herbs.

This vegetation unit occupied the centre of the study area. The relief is noticeably lower than the surrounding intact vegetation, which suggests historical clearing and rehabilitation, and was observed in poor condition. Associated species include; *Corchorus walcottii*, *Ptilotus exaltatus*, *Indigofera monophylla*, *Triodia wiseana*, *Goodenia microptera*, *Enneapogon caerulescens*, *Sclerolaena convexula*, *Ptilotus astrolasius* and *Abutilon lepidum*.



Plate 5.3: Vegetation unit AbAhHmix (foreground). Photo taken 476508mE 7698981mN facing west.

Disturbed Vegetation

A total of 2.6 ha (40%) of the study area comprises areas which are completely devoid of native vegetation or nearly so.



Plate 5.4: Disturbed areas. Photo taken 476338mE 7698846mN facing north.

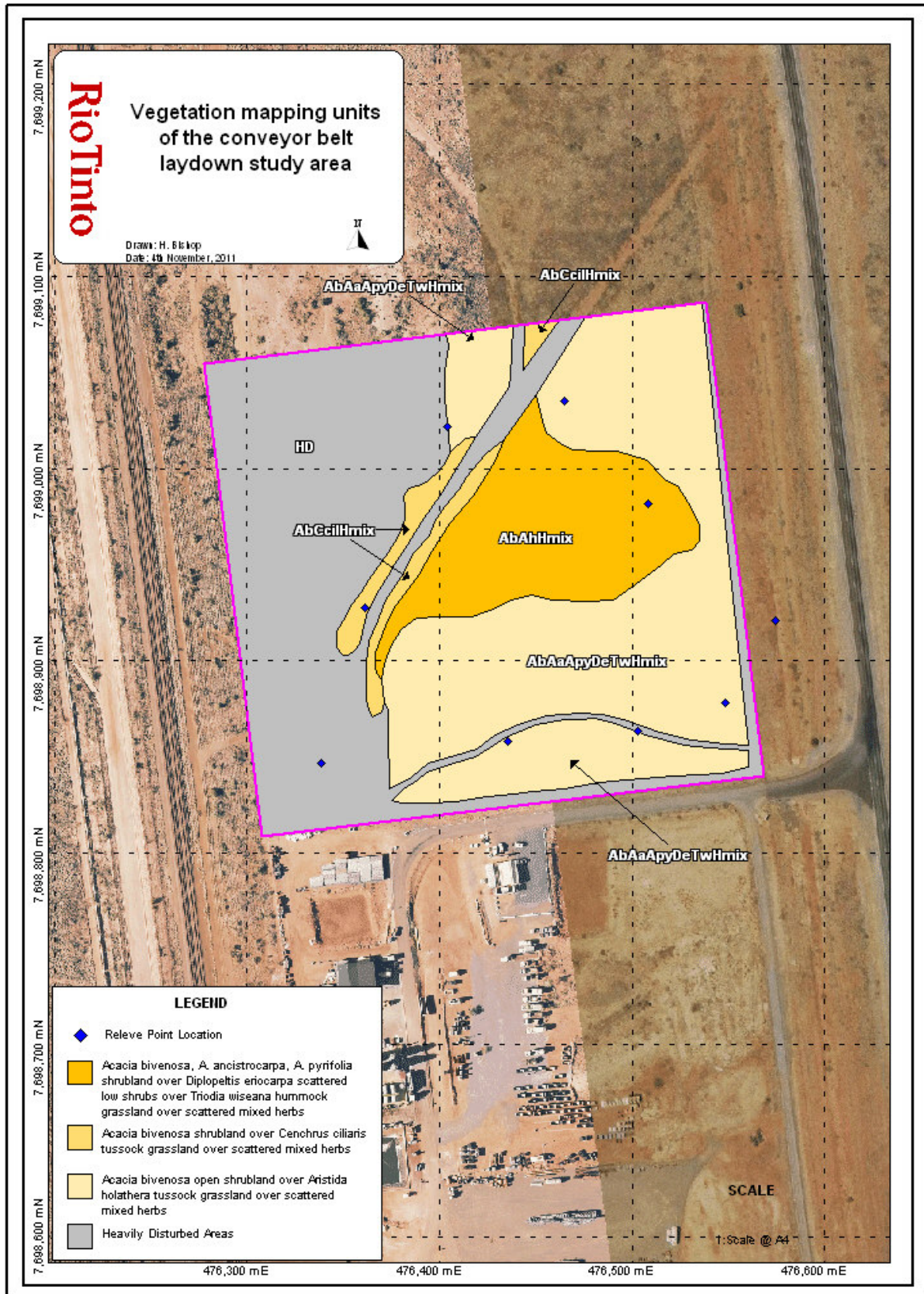


Figure 5.1: Vegetation mapping units of the conveyor belt laydown study area.

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6. Flora of the Study Area

6.1 Native flora within the Study Area

A total of 53 native vascular flora taxa from 37 genera representing 17 families were recorded in the study area (Appendix 2). No Declared Rare Flora (DRF) or priority flora species were recorded during the survey. In addition, 1 weed species was recorded throughout, *Cenchrus ciliaris* (Section 6.3).

Species richness was within expected ranges for study area of this size in the locality, which can be attributed to the significant portion of disturbed areas (40%). All vegetation types recorded were recorded were disturbed through fragmentation, historical clearing or weed infestation of Buffel grass (*Cenchrus ciliaris*). The relatively low species richness is also attributed toward the small spatial area covered and contained a single habitat type; stony plains.

6.2 Potential Conservation Significant Flora Known in the Locality

Searches of the DEC's Naturemap and EPBC's Protected Matters Search Tool databases confirm the DRF species; *Lepidium catapycnon* and *Thryptomene wittweri* occur in the Pilbara. Ideal habitat for *Thryptomene wittweri* is restricted to mountain crests in high altitude areas; such habitat is not represented within the survey area. It is not expected that this species would occur within or adjacent to the survey area. *Lepidium catapycnon* is known to occur on stony hills habitat in the Hamersley Ranges; such habitat is also not represented in the survey area. This species has a perennial growth habit and distinctive zig zag stems, and would therefore be unlikely to have been overlooked during the current survey. Both species have not been recorded from the Roebourne sub-region, and would not be expected to occur.

Rare flora database searches with the DEC and Rio Tinto Iron Ore's GIS database listed 16 Priority flora taxa potentially occurring in the area (Appendix 4). A desktop assessment on the likelihood of occurring within the study area is presented in Table 6.1.

No Priority flora species returned from the searches listed in Table 6.1 are considered likely to occur within the study area given that either:

- Available habitats within the study area are not suitable; or
- The species is perennial and readily identifiable in the field, and therefore unlikely to have been overlooked in the current or previous surveys within and adjacent to the study area.

Table 6.1: Priority flora returned by database searches for a 40km radius around the study area.

Scientific Name	Conservation Listing		Likelihood of Occurrence within the Study Area	Habitat and Discussion
	WCA	EPBCA		
<i>Acacia glaucocaesia</i>	P3	N/A	Low	Large shrub to small tree found on red loam, sandy loam and clay soils on floodplains. While suitable habitat exists, this species has not been recorded in the present survey and given its perennial nature,; it would not have been overlooked. Distribution extends from Mardie Station to 80 km south east of Port Hedland.
<i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>	P3	N/A	Low	Annual or short-lived perennial to 300 mm tall. Grows amongst salt bushes and <i>Tecticornia</i> spp on salt flats, saline soils and saline swamp edges. No suitable habitat exists for this species.
<i>Cucumis</i> sp. Barrow Island (D.W. Goodall 1264)	P2	N/A	Low	Trailing deciduous creeper recorded from hummock grassland and on limestone outcrops predominately from Barrow Island, with one record from the Dampier Salt lease, 10 km north of the study area. No suitable habitat exists for this species.
<i>Eragrostis surreyana</i>	P3	N/A	Low	Tussock grass currently only known from seasonally wet, shallow, grey alluvial soils over rock or seasonally wet creekline. No suitable habitat exists within the study area, and given the optimal seasonal conditions, it is unlikely to have been overlooked during the survey.
<i>Gomphrena cucullata</i>	P2	N/A	Low	A small annual herb which is known from disturbed grassland of open floodplains in clayey sands. Its distribution ranges between Karratha and Port Hedland in the Pilbara, and the Kimberleys. While suitable habitat may exist for this species, it was not recorded during the survey. Given the optimal seasonal conditions, it is unlikely to have been overlooked during the survey.
<i>Gomphrena leptophylla</i>	P3	N/A	Low	A prostrate compact herb recorded from sandy open flats in <i>Acacia</i> low open woodland, floodplains with <i>Eucalyptus camaldulensis</i> or sandy/clayey loam with <i>Melaleuca</i> and <i>Triodia</i> spp. on edges of salt pans and marshes. Its distribution extends from Karratha to Port Hedland and Marble Bar in the Pilbara, and the Kimberleys. No suitable habitat exists for this species, and it was not recorded during the survey.
<i>Goodenia pallida</i>	P1	N/A	Low	Small herb, the few species recorded as growing in <i>Acacia</i> scrub-steppe with annual grasses. Only known from the type collection collected west of Karratha, and a recent collection from Hamersley Station. While potentially suitable habitat exists for this species, it was not recorded during the survey. Given the optimal seasonal conditions, it is unlikely to have been overlooked during the survey.
<i>Gymnanthera cunninghamii</i>	P3	N/A	Low	Shrub to 2m, recorded surrounding areas of watercourses in sandy soils and amongst rockpiles of the Dampier Archipelago. This species was not recorded in the current survey, and no suitable habitat exists within the study area. Given its perennial nature, is unlikely to have been overlooked during the present survey.
<i>Rhynchosia bungarensis</i>	P4	N/A	Low	Twining herb or creeper with resinous, sticky glands. Occurs in large creeks/rivers, gorges and alluvial soils in shrubland or gallery woodland. While potentially suitable habitat exists, it was not recorded in the study area, and is unlikely to have been overlooked.
<i>Schoenus punctatus</i>	P3	N/A	Low	Small sedge growing in muddy creek habitat on the Burrup Peninsula. No similar habitat occurs within the study area.

Scientific Name	Conservation Listing		Likelihood of Occurrence within the Study Area	Habitat and Discussion
	WCA	EPBCA		
<i>Stackhousia clementii</i>	P3	N/A	Low	Broom-like shrub or perennial herb. It is regarded as a cryptic taxa, further work is required to understand its taxonomy. It has been recorded on saline soils in King Bay on the Burrup Peninsula. No suitable habitat exists for this species and it was not recorded during the present survey. Given its perennial nature, it is unlikely to have been overlooked.
<i>Tephrosia bidwillii</i>	P3	N/A	Low	Wispy upright shrub with dark orange flowers and compound leaves (leaflets thin and narrow). Recorded in the Karratha locality. No specimens have been recorded during the present survey and given its perennial form, is unlikely to have been overlooked during the survey.
<i>Terminalia supranitifolia</i>	P3	N/A	Low	Spreading, tangled tree or shrub growing among basalt rocks. Given its conspicuous form, it is highly unlikely to have been overlooked in the survey.
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431).	P3	N/A	Low	Robust perennial grass recorded from drainage lines, clay flats, crabhole flats and dark, self mulching clays. While potentially suitable habitat may exist for this species, it was not recorded during the survey and is unlikely to have been overlooked.
<i>Trianthema</i> sp. Python Pool (G.R. Guerin & M.E. Trudgen GG 1023)	P2	N/A	Low	Fleshy herb with pink flowers known only from near Python Pool in the Millstream-Chichester NP. Found on skeletal soils where it forms relatively large, scattered populations. This species was not recorded within the study area, and is unlikely to have been overlooked.
<i>Vigna</i> sp. rockpiles (R. Butcher et al. RB 1400)	P3	N/A	Low	Twining herb or climber, apparently restricted to rockpiles around Karratha, Dampier and Roebourne. No suitable habitat exists for this species in the study area.

6.3 Introduced Flora

One introduced flora species was recorded throughout the study area, favouring disturbed areas where it was observed in high numbers. No weeds listed as Declared Plants under the *Agriculture and Related Resources Protection Act 1976* were recorded from the study area. Records this species' locations are presented in Appendix 3.

- **Buffel Grass** **Cenchrus ciliaris* was observed throughout the survey area on previously disturbed ground; adjacent to the road verge and pipeline corridor, and scattered in low numbers throughout the study area. This species is regarded as a serious environmental weed in the Pilbara due to its widespread abundance and allelopathic (chemical release to inhibit the growth of other plants) qualities. As such; strict weed hygiene protocols are recommended to mitigate the spread of further plant material.

7. Fauna of the Study Area

No targeted fauna surveys were undertaken within the study area. Databases maintained by the WA Museum and the Department of Environment and Conservation (DEC) were searched for Schedule and Priority fauna (see Appendix 4). A search for Protected Matters in the locality according to the *EPBC Act 1999* was also conducted.

7.1 Fauna Habitats of the Study Area

The study area comprised a single fauna habitat; stony soils on coastal plains supporting *Acacia* shrublands over hummock grasslands.

This habitat has been subject to varying degrees of degradation as a result of historical clearing and weed invasion, and is well represented in the wider area in undisturbed condition. Given the degraded condition and proximity to an existing light industrial footprint on the southern border, the degraded habitat within the study area would offer limited opportunity for fauna within the area.

7.2 Desktop Fauna Survey Results

A review of databases held by the DEC, WA Museum, DSEWPaC and Rio Tinto Iron Ore identified 21 species of conservation significance as potentially occurring within the study area (Table 7.1). A number of species returned by the fauna database were not considered in the assessment. The proposed development within the study area would not be expected to have any indirect impacts on marine animals (including mammals, reptiles and birds) or on estuarine habitats (e.g. mudflats) supporting migratory shorebird species. Species belonging to these fauna groups are therefore not assessed further in this report. A full list of species returned by the database searches is presented in Appendix 4.

The habitat requirements of conservation significant fauna potentially occurring within the study area and their likelihood of occurrence within the study area are considered in Sections 7.2.1 to 7.2.5.

Table 7.1: Fauna of conservation significance returned by database searches utilising a 100km search radius (see Section 3.2) with the study area at the centre.

Species	Common Name	WC Act	EPBC Act
<i>Dasyurus hallucatus</i>	Northern Quoll	S 1	Endangered
<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	S 1	Vulnerable
<i>Dasyercus cristicauda</i>	Brush-tailed Mulgara	S1	Vulnerable
<i>Rhinoicteris aurantius</i>	Pilbara Orange Leaf-nosed Bat	S1	Vulnerable
<i>Falco peregrinus</i>	Peregrine Falcon	S 4	-
<i>Mormopterus loriae cobourgiana</i>	Little Northern Free-tail Bat	P 1	-
<i>Lerista quadrivincula</i>		P 1	-
<i>Notoscincus butleri</i>	Lined soil-crevice skink	P4	-
<i>Macroderma gigas</i>	Ghost bat	P 4	-
<i>Leggadina lakedownensis</i>	Short-tailed Mouse	P 4	-
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P 4	-
<i>Ardeotis australis</i>	Australian bustard	P 4	-
<i>Burhinus grallarius</i>	Bush stonecurlew	P 4	-
<i>Numenius madagascariensis</i>	Eastern curlew	P 4	-
<i>Phaps histrionica</i>	Flock bronzewing	P 4	-
<i>Haliaeetus leucogotser</i>	White-bellied sea eagle		Migratory terrestrial species
<i>Hirundo rustica</i>	Barn swallow		Migratory terrestrial species

Species	Common Name	WC Act	EPBC Act
<i>Merops ornatus</i>	Rainbow bee-eater		Migratory terrestrial species
<i>Charadrius veredus</i>	Oriental plover		Migratory wetland species
<i>Ardea alba</i>	Great egret		Migratory wetland species
<i>Ardea ibis</i>	Cattle egret		Migratory wetland species

7.2.1 Schedule 1 (WA Act) and Endangered (EPBC Act) Fauna

Northern Quoll

The Northern Quoll occurs in Northern Australia from the North-west Cape in Western Australia to south-east Queensland, but has declined in recent years. Its distribution is now restricted to six main areas including the northwest Kimberley and Pilbara regions of Western Australia (Menkhorst and Knight, 2001). This species is most abundant in substantial rocky habitat, gorges and near creeklines. Major creeks and gorges are absent from the study area, as is rocky habitat for denning and shelter. It is unlikely that disturbance to the vegetation will have a negative effect on the conservation status of this species, given the already degraded nature of the vegetation, scale of clearing, and the lack of suitable denning and shelter habitat available within or near the study area. While a small amount of potential foraging habitat may be lost under the proposed vegetation clearing, it is unlikely to impact the conservation status of this species.

7.2.2 Schedule 1 (WC Act) and Vulnerable (EPBC Act) Fauna

Pilbara Olive Python

The Pilbara Olive Python is known from throughout the Pilbara bioregion. This species typically shelters in logs, flood debris, caves, tree hollows and thick vegetation close to water and rock outcrops (Burbidge 2004). Given its preference for gorges and escarpments, it is unlikely the proposed clearing would have an impact due to lack of suitable habitat, both within the study area and in the immediate surrounds. The conservation status of this species is therefore unlikely to be impacted by the proposed clearing.

Brush-tailed Mulgara

This species, while a Priority 4 species in Western Australia, is currently recognised as the Vulnerable *D. cristicauda* under the EPBC Act. This species inhabits spinifex grasslands and is also associated with paleo-drainage channels or drainage lines (Maxwell et al 1996). While a portion of potential foraging habitat may exist within the

study area, the small amount of proposed vegetation clearing is unlikely to impact the conservation status of this species.

Pilbara Orange Leaf-nosed Bat

The Pilbara Orange Leaf-nosed Bat is found in a variety of habitats; monsoon rainforest, tall open forest, open savanna woodland and spinifex-covered hills (Churchill 1998). It is more influenced by the availability of suitable roost caves, which is not present within or adjacent to the study area. The proposal is therefore not expected to impact the conservation status of this species.

7.2.3 Schedule 4 (WC Act) Fauna

Peregrine Falcon

The Peregrine Falcon is a widespread but uncommon bird of prey preferring to inhabit areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land (Slater *et al.* 2003). This species probably occurs periodically in the Karratha locality. There is little potential for loss of “core habitat” for this highly mobile species. The proposed development is therefore unlikely to result in any negative impacts to the conservation status of this species.

7.2.4 Priority (WC Act) Fauna

Little Northern Free-tail Bat (Priority 1)

This species' range extends along coastal areas from Derby to the Exmouth Gulf (Churchill, 1998). It is a mangrove specialist which is restricted to mangrove forest and adjacent areas, and has been recorded on the Burrup Peninsula. As the study area and surrounds are devoid of “core” mangrove habitat, the proposed clearing is not expected to have any impact on the conservation status of this species.

***Lerista quadrivincula* (Priority 1)**

This species of skink has been recorded from a single location at the Maitland River on the coastal plain near Karratha (Wilson and Swan, 2008). Despite extensive pit trapping in the region, this species has not been recorded again and its status remains uncertain.

Lined Soil-crevice Skink (Priority 4)

This species has been recorded in spinifex dominated areas near creek and river margins of the Dampier district and Harding River Dam areas of the Pilbara (Wilson and Swan 2008). No suitable habitat exists for this species within or near the study area; therefore the proposed development is unlikely to impact the conservation status of this species.

Ghost Bat (Priority 4)

The Ghost bat, once previously widely distributed across most of inland and northern Australia, is now restricted to the tropical north of the continent (Churchill, 1998). The species roosts in large caves, mines and deep rock fissures and is known to form large maternity roosting colonies (Van Dycke and Strahan 2008). During the non-breeding

period, individuals disperse widely. The Ghost Bat hunts frogs, lizards, birds, small terrestrial mammals, large insects and even other smaller bats (bent-winged, horseshoe, leaf-nosed, and sheath-tailed bats). This species distribution is strongly influenced by the availability of suitable roost caves, of which none have been identified within the study area or surrounds. While some foraging habitat may be lost under this proposal, it is unlikely to impact the conservation status of this species

Short-tailed Mouse (Priority 4)

The Short-tailed Mouse inhabits coastal northern Australia from the Pilbara across to the Cape York Peninsula and favours cracking clay and adjacent habitats in the Pilbara (Menkhorst and Knight 2001). It is a nocturnal species which inhabits burrows during the day. This species was recorded from three sites within the Dampier Salt saltfield expansion area, including from *Eragrostis xerophila* tussock grassland habitat equivalent to the 7 Mile study area and correlating with Roebourne grasslands PEC habitat (Biota, 2008b). It is also worth noting populations on Thevenard Island appear to have been suppressed as a result from competition with the introduced house mouse, a common species in and around the Dampier/Karratha region (DEC, 2006). Cracking clay habitat does not occur within the study area; therefore the proposed vegetation clearing is unlikely to impact on any individuals of this species.

Western Pebble-mound Mouse (Priority 4)

This species' range extends from the McKay Range and south to the Collier Range (Menkhorst and Knight 2001). In the Pilbara, is particularly common in the eastern region of the Pilbara, and occurs from the Chichester to Hamersley subregions. It favours scree and stony plains habitat where it constructs conspicuous, extensive mounds of small stones. *P. chapmani* has been recorded in the Karratha and Burrup Peninsula region prior to 1986; however no recent records have been produced despite extensive pit trapping in the region. Additionally, no pebble-mounds were observed within the study area. The proposal is therefore not expected to impact the conservation status of this species.

Australian Bustard (Priority 4)

This species' range extends across much of Western Australia and favours open or lightly wooded grassland habitat (Slater *et al.* 2003). DEC records show it has been recorded from Mt Anketell in 2007 and also by Biota (2008b) near the Yurralyi Maya power station envelope, north of the study area. This species may occasionally utilise the habitat within the study area, however it is unlikely the proposed clearing would have an impact on the conservation status of this highly mobile species.

Bush Stonecurlew (Priority 4)

This species' range extends across Australia and southern New Guinea (Slater *et al.* 2003), and is relatively common in tropical Australia. Records in southern parts of Australia have shown this species has contracted significantly, which is correlated with clearing of woodland habitat (Schodde and Tidemann 2003). A single record of this species was taken from the Burrup Peninsula in 2006. While this species may utilise the habitats within the study area occasionally, the proposed clearing is not expected to have an impact on the conservation status of this species.

Eastern Curlew (Priority 4) and Migratory (EPBC Act)

The Eastern Curlew occurs throughout coastal Western Australia, south to Bunbury (Schodde and Tidemann 2003). This species inhabits tidal mudflats and on sandy beaches, of which is not represented within the study area. The proposed vegetation clearing is therefore not expected to affect the conservation status of this species.

Flock Bronzewing (Priority 4)

The Flock Bronzewing occurs on coastal riverine plains of north-west WA, extending from Carnarvon to the Kimberley and arid/semi arid north-eastern interior (Johnstone and Storr 1998). It inhabits sparsely wooded and grassy plains near to open water and has been recorded at Nickol Bay in 1968 and Warrambie in 1985. No sightings have since been recorded and the species is considered unlikely to occur in the study area.

7.2.5 EPBC Act Protected Matters Fauna

White-bellied Sea Eagle

The White-bellied Sea-eagle is widespread in coastal areas and larger inland waterways of Australia (Schodde and Tidemann 2003). In the Pilbara, this species is restricted to coastal areas. This species forages mainly over wide area of open water, and prefers closed scrub woodland habitat near wetland environments for breeding. The proposed development would not impact on preferred foraging or breeding habitat of the white-bellied sea eagle, and would therefore not be expected to have an impact on the conservation status of this species.

Barn Swallow

The Barn Swallow is a summer non-breeding migrant to the north west of Australia. The Barn Swallow spends much of its time from dawn to dusk on the wing where it forages over all types of country for flying insects (Schodde and Tidemann 2003). This species roosts communally on wires, buildings and bare tree branches (Schodde and Tidemann 2003). While this species may overfly the habitat from time to time, the proposed development would not be expected to impact its conservation status.

Rainbow Bee-eater

The Rainbow Bee-eater is a north to south breeding migrant which in Western Australia moves south of the Kimberley region to breed (Schodde and Tidemann 2003). In the Pilbara the species can be found in most habitats including in towns and suburban areas. This species nests in burrows excavated into sandy banks (Schodde and Tidemann 2003). Lack of suitable nesting habitat would make the proposed development unlikely to have an impact on the conservation status of this species.

Oriental Plover

The Oriental Plover is a non-breeding migrant to northern Australia. Its range is widespread, often dispersing to inland semi-arid and arid grasslands after spending an initial few weeks foraging on coastal mudflats and sandbanks (Schodde and Tidemann 2003). While the grassland habitat may present foraging opportunities for this species, it

is likely to be on a temporary basis only. Available foraging habitat for this species is widespread in the Karratha locality, and the proposed development is unlikely to have an impact on its conservation status.

Great Egret

The Great Egret inhabits waters of lakes, swamps, rivers and dams throughout Australia (Schodde and Tidemann 2003) where it hunts mostly fish and other small aquatic prey. In the Pilbara, this species may be found around permanent watercourses and at ephemeral wetlands following heavy rains. No suitable habitat is represented in the study area, and would therefore not require special consideration for management of this species.

Cattle Egret

The Cattle Egret is widespread across coastal areas of Australia and is most often found on wet pasture where it forages for invertebrates (Schodde and Tidemann 2003). While the proposal may impact on preferred foraging habitat for this species, it is unlikely to result in any impact to its conservation status given its widespread range and substantial portion of intact habitat in undisturbed habitat adjacent to the proposal.

Statement Addressing the 10 Clearing Principles

Under Part V Division 2 of the *Environmental Protection Act 1986*, clearing of 1 ha or more of native vegetation requires a permit except where an exemption applies under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, and it is not in an ESA.

The Department of Environment and Conservation has responsibility for the administration, assessment and approval of clearing permit applications relating to non-mineral and petroleum activities in Western Australia. The DEC is required to assess applications for clearing permits against the 10 “Clearing Principles”, as defined in Schedule 5 of the *Environmental Protection Act 1986*.

Section 8 provides an assessment of the proposed project against the “10 Clearing Principles” to determine whether it is at variance to the Principles. Assessment against the Principles identified clearing within the study area is unlikely to be at variance with any of the clearing principles.

8. Clearing Principles

8.1 Comprises a high level of biological diversity

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

The study area occurs within the Roebourne sub-region of the Pilbara bioregion. A total of 3 intact units comprise the vegetation within the study area (Section 5.1). Diversity of the landforms and habitats is considered low, however it is within expected range given the small spatial area covered within the study area (6.5 ha). No unique or range restricted habitats were observed, nor were any threatened or priority ecological communities identified within the study area.

The floristic composition and structure of the vegetation units are well represented in the surrounding coastal plains. The families and genera with the most number of species represented are typical of the flora found in the Pilbara region.

None of the vegetation units were considered especially important for supporting priority flora populations (Table 6.1), which may be a measure of biodiversity value (Dec 2009). Additionally, no priority flora species were recorded from the study area, and none would be expected to be impacted by the proposal. The proposed vegetation clearing is therefore not expected to impact any features of high diversity, at a local or regional scale.

8.2 Potential impact to any significant habitat for fauna indigenous to Western Australia

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

A single fauna habitat was observed within the study area:

- Stony soils on coastal plains supporting *Acacia* shrublands over hummock grasslands.

This habitat has been subject to varying degrees of degradation as a result of historical clearing and weed infestation. It is well represented in the wider area where historical disturbance has not taken place. No significant habitat for fauna, such as significant drainage features, caves or rockpiles were observed within or near the study area.

As assessment on the results from database searches yielded a number of conservation significant fauna potentially utilising the habitats within the study area. The assessment found that while some species may temporarily utilise the habitats within the study area, the degraded condition, proximity to an existing light industrial facility and lack of 'core' habitat for fauna is unlikely to support permanent populations. The proposed loss of foraging habitat is unlikely to impact the conservation status of any species (Section 7.2). The small amount of clearing is therefore unlikely to be at variance to this principle.

8.3 Potential impact to any rare flora

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

The entire study area was traversed by a Rio Tinto botanist on the 30th of April, 2011. No Declared Rare or Priority flora was recorded nor were any EPBC Act listed threatened flora observed within the study area, and none would be expected to occur. The proposal is therefore not at variance to this principle.

8.4 Presence of any Threatened Ecological Communities

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

There are no Threatened Ecological Communities (TECs) within the Chichester sub-region nor are any likely to be impacted. The proposal is therefore not at variance to this principle.

8.5 Significance as a remnant of native vegetation in the area that has been extensively cleared

Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared.

The study area occurs within the Eremaean Botanical Province as defined by Beard (1975), in the Fortescue Botanical District. The vegetation of this province is typical of arid landscapes; including bunch grasslands, spinifex, wattles and eucalypts. The study area falls within a single vegetation mapping unit (Beard, 1975):

- **Abydos Plain/Roebourne – 589** - This is described as a mosaic of short bunch grassland - savanna / grass plain (Pilbara) / hummock grasslands, grass steppe; soft spinifex.

The majority of original vegetation cover in the Chichester sub-region is considered as being intact (Shepherd *et al.* 2001). Although significant areas have been disturbed through weed invasions, bush fires, feral predators, grazing and the development of mines and infrastructure in some locations; this is negligible in comparison to the Pilbara-wide representation of Beard's vegetation unit. The vegetation types within the study area would not therefore represent remnant stands of extensively cleared vegetation.

8.6 Impact on any watercourses and/or wetlands

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

No significant watercourses or wetlands occur within the study area. The proposed vegetation clearing is not considered to be at variance to this principle.

8.7 Potential to cause appreciable land degradation

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

The study area lies within the Horseflat land system (Van Vreeswyk *et. al.*, 2004). The stony soils which comprise the study area are considered erosion resistant.

Where historical clearing has taken place, Buffel grass (*Cenchrus ciliaris*) has established, primarily restricted to existing cleared areas, however it was observed scattered throughout the study area. While clearing may exacerbate the spread of weeds, it is unlikely to cause any appreciable land degradation beyond the clearing envelope. This species is however regarded as a serious environmental weed in the Pilbara, and mitigation of the spread of weeds, and the introduction of new weed species is recommended through weed hygiene procedures during clearing and construction works.

8.8 Potential to impact on the environmental values of any adjacent or nearby conservation areas

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.

The nearest land-based, non-marine DEC conservation estate, Millstream-Chichester National Park is located approximately 46 km south east of the study area. The proposal would therefore not impact on the environmental values of the National Park, or any other conservation area.

8.9 Potential deterioration in the quality of surface or underground water

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.

The study area is not located within a Public Drinking Water Source Areas (PDWSA) (GIS Database). Additionally, there is no surface drainage features represented within the study area. The small amount of vegetation clearing is therefore not expected to impact surface or underground water in the locality.

8.10 Potential of clearing to cause, or exacerbate, the incidence or intensity of flooding

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

Local flooding occurs as a result of seasonal rainfall events triggered by cyclonic activity and sporadic thunderstorms. Clearing of the small amount of vegetation proposed is unlikely to exacerbate either the frequency or intensity of flooding in the region.

Conclusions

Rio Tinto proposes to establish a laydown area for the storage of new conveyor belts for its coastal operations in Dampier. The total area incorporated in this assessment is 4.6 ha.

A field survey was undertaken by a Rio Tinto botanist on the 30th of April, 2011, and together with a desktop assessment of previous biological surveys (Biota 2008a, 2008b, Rio Tinto 2010 and ENV 2011) and database searches, form the basis of the results. The environmental characteristics of the study area were assessed against the 10 Clearing Principles pursuant to Schedule 5 (Principle for Clearing Native Vegetation) of the *Environmental Protection Act 1986*. The assessment found the proposed laydown area is unlikely to be at variance with any of the clearing principles.

Recommendations for environmental management consideration include:

- Strict weed hygiene protocols are to be implemented during clearing of vegetation and subsequent earth works to minimise spread of weeds such as Buffel grass (*Cenchrus ciliaris*) throughout the survey area.
- Planning the preservation of topsoil prior to commencement of works in accordance with the Rio Tinto Soil Resource Management Procedure is recommended (Rio Tinto, 2007).
- Following best practice, disturbance to the vegetation should be kept to a minimum during the works phase.

References

- Aplin T.E.H. (1979). The Flora. Chapter 3 in O'Brien, B.J. (ed.) (1979). *Environment and Science*. University of Western Australia Press.
- Atkins (2008). Declared Rare and Priority Flora List for Western Australia. Prepared by the Department of Environment and Conservation, Perth, WA.
- Beard, J.S. (1975) Pilbara. Explanatory notes to Sheet 4, 1:1,000,000 Series Vegetation Survey of Western Australia. University of W.A. Press: Nedlands.
- Biota (2008a). Karratha to Cape Lambert Transmission Line Corridor: Native Vegetation Clearing Permit Report. Unpublished report prepared for Rio Tinto Iron Ore.
- Biota (2008b). 7 Mile Power Station and Ancillary Works NVCP. Unpublished report prepared for Rio Tinto Iron Ore.
- Braithwaite, R.W. and A. Griffiths (1994). Demographic variation and range contraction in the Northern Quoll *Dasyurus hallucatus* (Marsupialia: Dasyuridae). *Wildlife Research* **21**: 203-17.
- Burbidge, A.A. (2004) *Threatened Animals of Western Australia*. Department of Conservation and Land Management, Kensington, Western Australia.
- Bureau of Meteorology (2010) Climate Statistics for Australian Locations, Karratha Aero [Available Online] http://www.bom.gov.au/climate/averages/tables/cw_004083.shtml. Extracted May 2010.
- Churchill, S.K. (1998). *Australian bats*. Reed New Holland: Frenchs Forest, NSW.
- DEC (2006). Lakeland Downs Short-tailed Mouse, *Leggadina lakedownensis*. [Online] Available at: http://www.dec.wa.gov.au/component/option,com_docman/task,doc_details/Itemid,/gid,145/ (Accessed 5th November, 2011)
- DEC (2011). Priority Ecological Communities for Western Australia. [Online] Available at: [www.dec.wa.gov.au/component/option,com_docman/task,doc_download](http://www.dec.wa.gov.au/component/option,com_docman/task,doc_download/Itemid,/gid,145/) [Accessed November 2011].
- Department of Agriculture. Western Australia (Authors Unknown) (2002). Land Systems Mapping of the Pilbara Region, WA.
- ENV Australia (2011). Mount Regal Borrow Flora and Vegetation Assessment. Unpublished report prepared for Rio Tinto Iron Ore.
- Environment Australia (DEWHA) (2000) Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and development of Version 5.1 Summary Report. Environment Australia, November 2000.

- Geological Survey of WA (GSWA) 1:500 000 Interpreted bedrock geology of Western Australia. Geological Survey of Western Australia. DoIR Geobase.
- Hussey, B.M.J., Keighery, G.J., Dodd, J., Lloyd, S.G. and Cousens, R.D. (2007) *Western Weeds: a guide to the weeds of Western Australia (Second Edition)*. The Weeds Society of Western Australia (Inc.), Victoria Park, WA.
- Kendrick, P & Stanley, F. (2001). Bioregional A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002 – Pilbara Bioregion: Roebourne Sub-region (PIL4). Department of Conservation and Land Management, Perth.
- Luke, G., Burke, K. & O'Brien, T. *Evaporation Data for Western Australia*. Resource Management Technical Report No. 65. Department of Agriculture, Western Australia.
- Maxwell, S., A. A. Burbidge, and K. Morris (1996). The 1996 Action Plan for Australian marsupials and monotremes. Wildlife Australia, Canberra
- McKenzie, N.L., J.E. May and S. McKenna (2002). *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*. Department of Conservation and Land Management, Perth.
- Menkhorst, P. and F. Knight (2001). *A Field Guide to the Mammals of Australia*. Oxford University Press.
- Payne, P.L., A.A. Mitchell and W.F. Holman (1988). An inventory and condition survey of the rangelands in the Ashburton River catchment, Western Australia. Technical Bulletin No. 62. Western Australian Department of Agriculture.
- Rio Tinto (2010). Flora and Vegetation Survey of the 7 Mile Rail Yard Expansion. Unpublished internal report.
- Shepherd, D.P., Beeston, G.R., and A.J.M. Hopkins (2002) Native Vegetation in Western Australia – Extent, Type and Status. Resource Management Technical Report 249, Department of Agriculture, Western Australia.
- Schodde, R. and Tidemann, S.C. (Ed) (2003) Reader's Digest Complete Book of Australian Birds. Reader's Digest (Australia) Pty Ltd, Surrey Hills, NSW.
- Slater, P, Slater, P and Slater, R (2003). The Slater Field Guild to Australian Birds. New Holland Publishers (Australia) Pty Ltd, Sydney, NSW.
- Trudgen M.E. (1988). A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.
- Van Dyck, S. and Strahan, R. (Ed.) (2008) The Mammals of Australia. New Holland Publishers (Australia) Pty Ltd., Sydney, NSW.
- Van Vreeswyk, A. M. E, Payne, A. L, Leighton, K. A. and Hennig, P. (2004) Technical Bulletin, No 92, An inventory and condition survey of the Pilbara Region, Western Australia. Department of Agriculture.

Wilson, S. and G. Swan (2008). *A Complete Guide to Reptiles of Australia*. Reeds New Holland.

Appendix 1: Vegetation Structural Classification* and Condition Rating Scale

Vegetation Structural Classes*

Stratum	Canopy Cover (%)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / sedgeland /	Tussock grassland / sedgeland /	Open tussock grassland / sedgeland /	Very open tussock grassland / sedgeland /	Scattered tussock grasses /

*Based on (Muir 1977), and Aplin's (1979) modification of the vegetation classification system of Specht (1970):

Aplin T.E.H. (1979). The Flora. Chapter 3 In O'Brien, B.J. (ed.) (1979). *Environment and Science*. University of Western Australia Press; Muir B.G. (1977). Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of Bending Reserve. *Records of the Western Australian Museum, Suppl. No. 3*; Specht R.L. (1970). Vegetation. In *The Australian Environment*. 4th edn (Ed. G.W. Leeper). Melbourne.

Vegetation Condition Scale for use on Pilbara surveys*

E = Excellent (=Pristine of BushForever)

Pristine or nearly so; no obvious signs of damage caused by the activities of European man.

VG = Very Good (= Excellent of BushForever)

Some relatively slight signs of damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as **Ursinia anthemoides* or **Briza* spp., or occasional vehicle tracks.

G = Good (= Very Good of BushForever)

More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as **Ehrharta* spp.

P = Poor (= Good of BushForever)

Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as **Ehrharta* spp.

VP = Very Poor (= Degraded of BushForever)

Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species including very aggressive species.

D = Completely Degraded (= Completely Degraded of BushForever)

Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

* Based on Trudgen M.E. (1988). A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

Appendix 2: Flora Species Recorded from the Study area

Family: Amaranthaceae (106)

Gomphrena affinis subsp. *pilbarensis*
Ptilotus astrolasius
Ptilotus auriculifolius
Ptilotus exaltatus
Ptilotus helipteroides
Ptilotus incanus

Family: Boraginaceae (310)

Heliotropium chrysocarpum
Trichodesma zeylanicum

Family: Chenopodiaceae (105)

Sclerolaena convexula

Family: Convolvulaceae (307)

Bonamia media
Cuscuta victoriana
Evolvulus alsinoides

Family: Euphorbiaceae (185)

Euphorbia australis
Euphorbia biconvexa
Euphorbia boophthona

Family: Fabaceae (162)

Acacia ancistrocarpa
Acacia bivenosa
Acacia coriacea subsp. *pendens*
Acacia pyrifolia
Acacia synchronicia
Alysicarpus muelleri
Indigofera monophylla
Rhynchosia minima
Senna artemisioides subsp. *helmsii*
Senna glutinosa subsp. *glutinosa*
Senna glutinosa subsp. *pruinosa*
Senna notabilis
Tephrosia supina

Family: Goodeniaceae (341)

Goodenia microptera

Family: Malvaceae (221)

Corchorus walcottii
Gossypium australe
Hibiscus sturtii
Sida echinocarpa
Triumfetta clementii

Family: Phyllanthaceae (185A)

Notoleptopus decaisnei

Family: Plantaginaceae (329)

Stemodia grossa

Family: Poaceae (031)

Aristida contorta
Aristida latifolia
**Cenchrus ciliaris*

	<i>Dichanthium sericeum</i>
	<i>Enneapogon caerulescens</i>
	<i>Enneapogon lindleyanus</i>
	<i>Eriachne aristidea</i>
	<i>Eriachne pulchella</i>
	<i>Paraneurachne muelleri</i>
	<i>Sporobolus australasicus</i>
	<i>Triodia wiseana</i>
	<i>Yakirra australiensis</i>
Family: Portulacaceae (111)	
	<i>Portulaca pilosa</i>
Family: Rubiaceae (331)	
	<i>Oldenlandia crouchiana</i>
Family: Sapindaceae (207)	
	<i>Diplopeltis eriocarpa</i>
Family: Solanaceae (315)	
	<i>Solanum diversiflorum</i>
Family: Violaceae (243)	
	<i>Hybanthus aurantiacus</i>
Family: Zygophyllaceae (173)	
	<i>Tribulus hirsutus</i>

Appendix 3: Records of Weeds within the Study Area

EASTING	NORTHING	DATE	POPN_SIZE	FAMILY	GENUS	SPECIES
476,548	7,698,878	30/05/2011	scattered	Poaceae	<i>Cenchrus</i>	<i>ciliaris</i>
476,360	7,698,927	30/05/2011	100	Poaceae	<i>Cenchrus</i>	<i>ciliaris</i>
476,404	7,699,022	30/05/2011	100	Poaceae	<i>Cenchrus</i>	<i>ciliaris</i>

Appendix 4: Results of the DEC Flora and Fauna Searches and EPBC Act Protected Matters and DEC Threatened Fauna Database Searches

NatureMap Species Report

Created By Guest user on 05/11/2011

Kingdom	Animals
Conservation Status	Conservation Taxon (T, X, IA, S, P1-P5)
Method	'By Circle'
Centre	116°46' 23" E, 20°48' 33" S
Buffer	40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	24610 <i>Ardeotis australis</i> (Australian Bustard)		P4	
2.	24050 <i>Balaenoptera physalus</i> (Fin Whale)		T	
3.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)		P4	
4.	25336 <i>Chelonia mydas</i> (Green Turtle)		T	
5.	24093 <i>Dasyurus hallucatus</i> (Northern Quoll)		T	
6.	24084 <i>Dugong dugon</i> (Dugong)		S	
7.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
8.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i>		S	
9.	24217 <i>Leggadina leikedownensis</i> (Short-tailed Mouse)		P4	
10.	25168 <i>Lerista quadrivincula</i>		P1	Y
11.	25238 <i>Liasis olivaceus</i> subsp. <i>barroni</i>		T	
12.	24180 <i>Macroderma gigas</i> (Ghost Bat)		P4	
13.	24051 <i>Megaptera novaeangliae</i> (Humpback Whale)		T	
14.	34148 <i>Mormopterus lorae</i> subsp. <i>cobourglana</i> (Little North-western Mastiff Bat)		P1	
15.	25344 <i>Natator depressus</i> (Flatback Turtle)		T	
16.	25196 <i>Notoscincus butleri</i>		P4	
17.	24798 <i>Numenius madagascariensis</i> (Eastern Curlew)		P4	
18.	24411 <i>Phaps histrionica</i> (Flock Bronzewing)		P4	
19.	24233 <i>Pseudomys chapmani</i> (Western Pebble-mound Mouse)		P4	
20.	24064 <i>Sousa chinensis</i> (Indo-Pacific Humpback Dolphin)		P4	

Conservation Codes
 T - Rare or likely to become extinct
 X - Presumed extinct
 IA - Protected under international agreement
 S - Other specially protected fauna
 1 - Priority 1
 2 - Priority 2
 3 - Priority 3
 4 - Priority 4
 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Species Report

Created By Guest user on 05/11/2011

Kingdom Plantae

Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)

Method 'By Circle'

Centre 116°46' 23" E, 20°48' 33" S

Buffer 40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	12573 <i>Acacia glaucocaesia</i>		P3	
2.	17520 <i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>		P3	
3.	38508 <i>Eragrostis surreyana</i>		P3	
4.	18360 <i>Gomphrena cucullata</i>		P2	
5.	17894 <i>Gomphrena leptophylla</i>		P3	
6.	12570 <i>Goodenia pallida</i>		P1	
7.	12832 <i>Gymnanthera cunninghamii</i>		P3	
8.	20862 <i>Rhynchosia bungarensis</i>		P4	
9.	1010 <i>Schoenus punctatus</i>		P3	
10.	4729 <i>Stackhousia clementi</i>		P3	
11.	4260 <i>Tephrosia bidwillii</i>		P3	
12.	5313 <i>Terminalia supranitibolia</i>		P3	
13.	17820 <i>Themeda</i> sp. <i>Hammersley Station (M.E. Trudgen 11431)</i>		P3	
14.	33278 <i>Trilanthema</i> sp. <i>Python Pool (G.R. Guerin & M.E. Trudgen GG 1023)</i>		P2	
15.	35356 <i>Vigna</i> sp. <i>rockpiles (R. Butcher et al. RB 1400)</i>		P3	

Conservation Codes

T - Rare or likely to become extinct

X - Presumed extinct

IA - Protected under international agreement

S - Other specially protected forms

1 - Priority 1

2 - Priority 2

3 - Priority 3

4 - Priority 4

5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



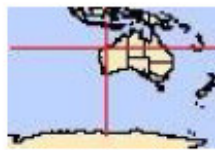
EPBC Act Protected Matters Report: Coordinates

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

Report created: 05/11/11 15:08:45



[Summary](#)

[Details](#)

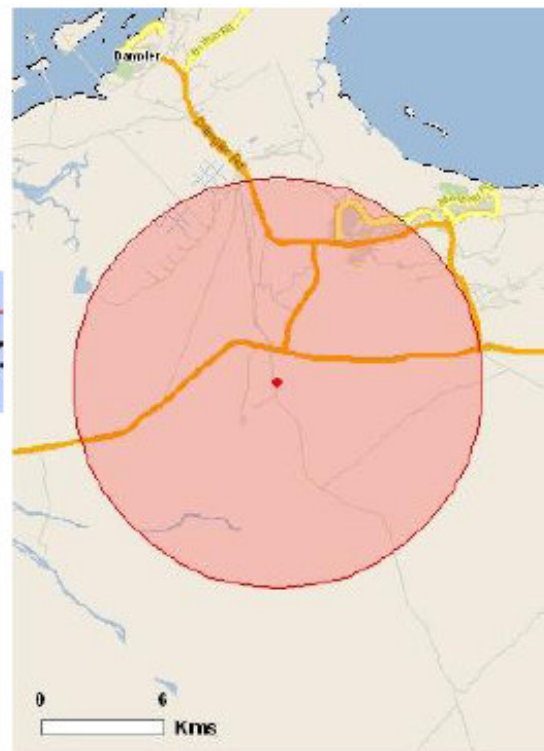
[Matters of NES](#)

[Other matters protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 10.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	4
Migratory Species:	31

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	36
Whales and Other Cetaceans:	None

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	1
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	6
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
MAMMALS		
Dasycercus cristicauda Mulgara [328]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat known to occur within area
Rhinonictes aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area

REPTILES

Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area
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Migratory Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area

Merops ornatus Rainbow Bee-eater [670]	Species or species habitat may occur within area
Migratory Wetlands Species	
Actitis hypoleucos Common Sandpiper [59309]	Species or species habitat known to occur within area
Ardea alba Great Egret, White Egret [59541]	Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]	Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Species or species habitat known to occur within area
Calidris alba Sanderling [875]	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]	Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]	Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]	Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]	Species or species habitat known to occur within area
Limosa lapponica	

Bar-tailed Godwit [844]	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew [847]	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]	Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]	Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]	Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land -

Listed Marine Species [Resource Information]

Name	Status	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area

Calidris acuminata Sharp-tailed Sandpiper [874]	Species or species habitat known to occur within area
Calidris alba Sanderling [875]	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]	Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]	Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]	Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]	Species or species habitat likely to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]	Species or species habitat known to occur within area
Himantopus himantopus Black-winged Stilt [870]	Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]	Species or species habitat may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]	Species or species habitat known to occur within area
Limosa lapponica	

Bar-tailed Godwit [844]	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew [847]	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]	Species or species habitat known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]	Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]	Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]	Species or species habitat known to occur within area
Siltia isabella Australian Pratincole [818]	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]	Species or species habitat known to occur within area
Tringa totanus Common Redshank, Redshank [835]	Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Species or species habitat known to occur within area

Extra Information

Places on the RNE [[Resource Information](#)]

Note that not all Indigenous sites may be listed.

Name	Status
Natural	
Coastal Margin Cape Preston to Cape Keraudren	Indicative Place
WA	

Invasive Species [[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Mammals		
<u>Felis catus</u>		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<u>Oryctolagus cuniculus</u>		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<u>Vulpes vulpes</u>		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
<u>Cenchrus ciliaris</u>		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
<u>Parkinsonia aculeata</u>		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<u>Prosopis spp.</u>		
Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.80917 116.77306

Appendix 5: Framework for Conservation Significance Ranking of Flora and Fauna Species

All native flora in Western Australia is protected under the state *Wildlife Conservation Act* 1950. Protected flora which are deemed to be at risk of extinction, rare, or otherwise in need of special protection are listed as “Rare Flora” and published in the *Wildlife Conservation (Rare Flora) Notice 2008*. Specific written approval by the Minister for the Environment is required to take or harm species listed in Schedule 1 or 2 of the *Wildlife Conservation (Rare Flora) Notice 2008*. Flora species which may be rare or threatened in Western Australia but which have not been adequately surveyed for are included in a supplementary conservation list called the Priority Flora List (Appendix 3).

In addition to state legislation, some Western Australian native plant species are protected under federal law, namely the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). In the Pilbara, two species *Lepidium catapycnon* and *Thryptomene wittweri* are currently listed as “Vulnerable” under the EPBC Act. Proposals that are considered likely to have a significant impact on EPBC Act listed threatened flora are required to be referred to the Federal Minister of Environment for approval.

Categories of conservation significance for flora species under the Wildlife Conservation Act 1950 (Atkins 2006)

Declared Rare Flora - Extant Taxa- 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

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,

Priority One - Poorly known Taxa- Taxa which are known from one or a few (generally <5) populations which are under threat.

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.

Priority Three - Poorly Known Taxa- Taxa which are known from several populations, and the taxa are not believed to be under immediate threat.

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.

Legislative Framework for Conservation Significant Fauna

Wildlife Conservation Act 1950-1979

Native fauna species that are rare, threatened with extinction, or have high conservation value are specially protected by law under the Western Australian *Wildlife Conservation Act 1950-1979* (WC Act). The *Wildlife Conservation (Special Protected Fauna) Notice* classifies rare and endangered fauna using four distinct conservation codes or schedules (see below).

In addition to the above schedules, the DEC produces a supplementary list of Priority Fauna. Priority Fauna are species that have been identified as requiring further survey and evaluation of their conservation status before deciding whether to list them as Schedule Fauna. Five Priority codes are recognised by the DEC and are presented below

DEC Priority Fauna codes

Priority One: Taxa with few, poorly known populations on threatened lands. Taxa which are known from a few specimens or sight records from one or a few localities on lands not managed for conservation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Two: Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not 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. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

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.

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. Taxa which are declining significantly but are not yet threatened.

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.

Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* affords protection to species, populations and ecological communities threatened at a national level or to species listed as migratory under various international agreements (e.g. CAMBA, JAMBA RoKAMBA, Bonn Convention). Conservation categories for

conservation significant species recognised under the EPBC Act are provided in Appendix 4. Categories relevant to the current study include:

- Endangered – Taxa facing a very high risk of extinction in the wild in the near future.
- Vulnerable – Taxa facing high risk of extinction in the wild in the medium-term.

Under the EPBC Act, a proposal which is likely to have a significant impact on threatened species, populations or ecological communities or migratory species must be referred to DEWHA for a decision by the Commonwealth Minister for the Environment. A significant impact is determined through application of Significant Impact Criteria (DEWHA 2000). Specific Significant Impact Criteria exist for Critically Endangered and Endangered species, Vulnerable species and Listed Migratory species (Appendix 4).

Categories of conservation significance for fauna species under the Wildlife Conservation Act 1950 (Atkins 2006)

Native fauna species that are rare, threatened with extinction, or have high conservation value are specially protected by law under the Western Australian *Wildlife Conservation Act 1950-1979* (WC Act). The *Wildlife Conservation (Special Protected Fauna) Notice* classifies rare and endangered fauna using four distinct conservation codes or schedules.

Schedule 1 – Fauna which are rare or likely to become extinct and are declared to be fauna in need of special protection.

Schedule 2 – Fauna which are presumed to be extinct and are declared to be fauna in need of special protection.

Schedule 3 – Birds which 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, which are declared to be fauna in need of special protection, and

Schedule 4 – Fauna that are in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

EPBC Act Significant Impact Criteria

Conservation Code

Significant Impact Criteria

Critically

Endangered and

Endangered Species

An action is likely to have a significant impact on critically endangered or endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a *population*, or
- Reduce the area of occupancy of the species, or
- Fragment an existing *population* into two or more populations, or
- Adversely affect habitat critical to the survival of a species, or
- Disrupt the breeding cycle of a population, or
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat, or
- Interfere with the recovery of the species.

Vulnerable species

An action is unlikely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of an important population of a species, or
 - Reduce the area of occupancy of an important population, or
 - Fragment an existing important population into two or more populations, or
 - Adversely affect habitat critical to the survival of a species, or
 - Disrupt the breeding cycle of an important population, or
 - Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
 - Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat, or
 - Interferes substantially with the recovery of the species
-

Conservation Code**Significant Impact Criteria**

Critically endangered and endangered ecological communities

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of a community, or
- Fragment or increase fragmentation of the community, for example by clearing vegetation for roads or transmission lines, or
- Adversely affect habitat critical to the survival of an ecological community which consists of, or includes, fauna species, or
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns, or
- Cause a substantial change in the species composition of an occurrence of an ecological community, including, but not limited to:
 - Assisting invasive species, that are harmful to the listed ecological community, to become established; and
 - Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- Interfere with the recovery of an ecological community

Listed Migratory Species

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species, or
 - Result in invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species, or
 - Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.
-