

Flora and Fauna Technical Report

Mt Rawdon Operations

March 2013

prepared for Mt Rawdon Operations Pty Ltd

by Northern Resource Consultants



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Client: Mt Rawdon Operations Pty Ltd (MRO)

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Introduction

1. Background

The Mount Rawdon Gold Mine Project is an active open pit gold mine owned by Evolution Mining. The mine is located approximately 80km southwest of Bundaberg, Queensland (Figure 1). Mount Perry is the closest township to the Mount Rawdon Operation (MRO), approximately 15km northwest of the operation

Mount Rawdon is situated on nine mining leases: ML1192, ML1203, ML1204, ML1206, ML1210, ML1231, ML1259, ML50119 and ML80095.

MRO has been operated since 2001 using conventional open pit mining methods. The related processing plant incorporates primary and secondary crushing, SAG and ball milling, followed by conventional cyanide leaching. The mill throughput is maintained at 3.5 million tonnes per annum of ore with a gold recovery of approximately 90 per cent.

The Mount Rawdon gold deposit is a large tonnage, volcanoclastic hosted, low-grade gold deposit. The surface extent of mineralisation forms a roughly ovoid zone of 200m by 300m at gold grade of greater than 0.7g/t of gold.

The current life of the mine is estimated at eight years. Gold occurs either as fine-grained free gold or is associated with sulphides. Processing is undertaken adjacent to the open cut pit, via conventional cyanide leaching extraction. Tailings are stored about 400m north of the open pit in the approximately 100ha tailings storage facility (TSF). Process water and TSF water operates in a closed loop, recycling water where possible.

MRO has commissioned this report as part of an EMP seeking an amendment to the existing Environmental Authority EA MIN102271210 (the EA) to allow for the extension of current mining operations, including a Stage 4 pit cutback and development of a new waste rock dump (WRD) to the south west of current operations. The total area of the proposed West Dump site is of 70.9ha.

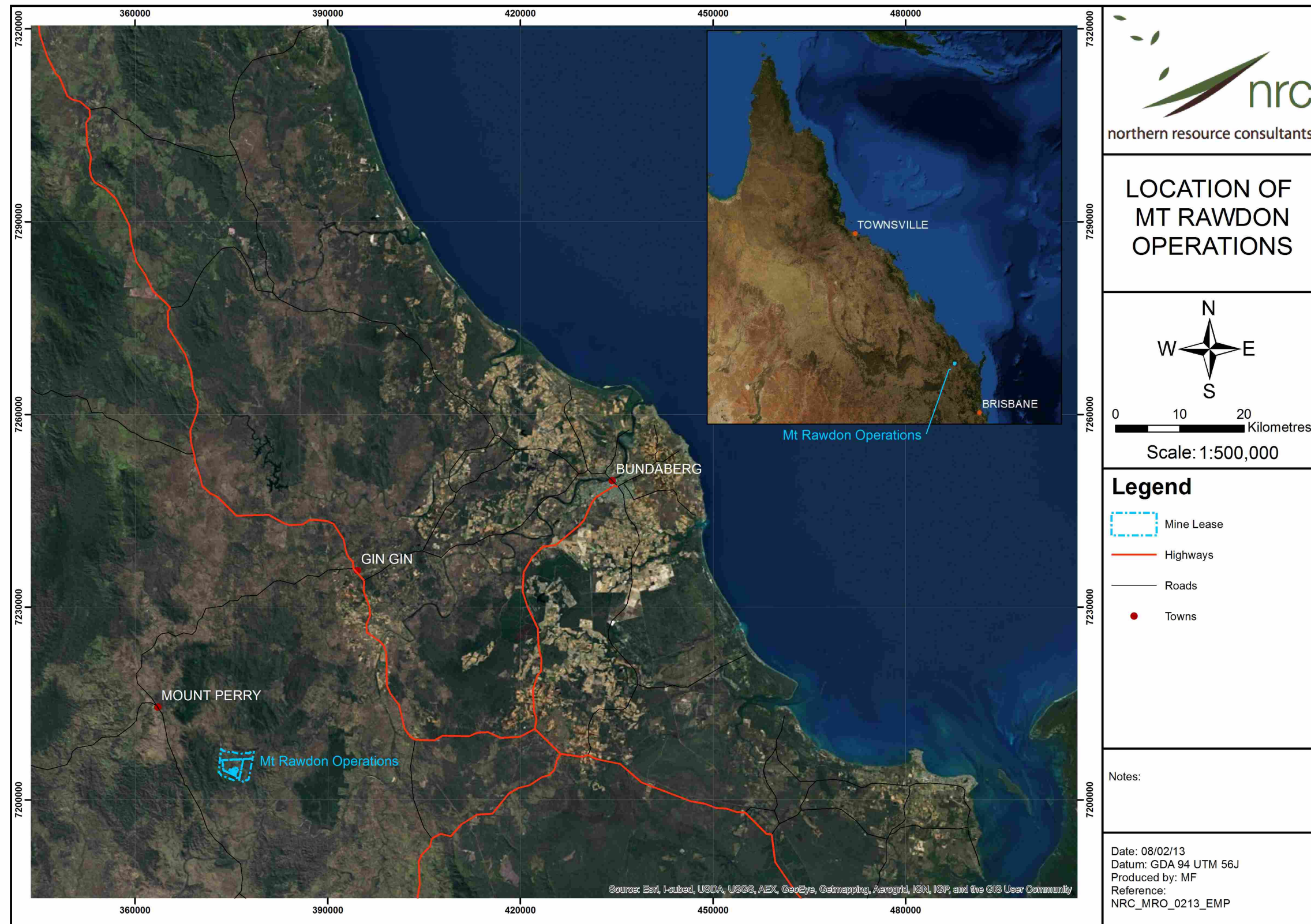


Figure 1: Location of Mt Rawdon Operations, in Queensland

2. Purpose

The purpose of this report is to detail the flora and fauna values relevant to the proposed waste rock dump (WRD) area at MRO – this new WRD is called the West Dump. The assessment methodology and process was designed using standard and accepted survey techniques to identify and locate site ecological values relevant to Federal and State legislation.

Methodology used included a late dry season flora and fauna monitoring event, the focus of which was targeting the proposed West Dump area to provide a comprehensive baseline assessment of flora and fauna values relevant to the proposed project site.

3. Legislation

A number of key legislative requirements with regard to the identification, protection and management of terrestrial flora and fauna in Queensland are relevant to the proposed West Dump area. This legislation incorporates both Commonwealth and Queensland Government Acts. All available databases were reviewed prior to the field assessment and the relevant information was used to plan and guide the terrestrial flora and fauna survey at MRO.

3.1 Commonwealth Legislation

ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, all actions likely to impact on a matter of national environmental significance (MNES) will require approval from the federal environmental minister. Subjects of MNES include:

- World Heritage Properties
- National Heritage Places
- RAMSAR wetlands of international importance
- Listed threatened species and communities
- Migratory species protected under international agreements
- Nuclear actions
- Commonwealth marine environment.

If a development proposal involves an action that may have a significant impact on matters of national significance, it must be referred to the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) for assessment. If SEWPaC determines that the proposed action is likely to have significant impacts, the project will be considered as a controlled action and will require formal assessment and approval.

A desktop review of MNES potentially relevant to the proposed West Dump (within 5km of the project location) was undertaken prior to implementing field studies. Matters potentially relevant to the Mount Rawdon proposed West Dump site include: threatened ecological

communities (TEC), listed threatened species and listed migratory species under international agreements (refer to Table 1 for a summary of the EPBC MNES report).

Table 1: EPBC Act MNES Search Results for Threatened Species and Communities

Threatened Ecological Communities		Status
Lowland Rainforest of Subtropical Australia		Critically Endangered
Threatened Species		
Scientific Name	Common Name	Status
Birds		
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Vulnerable
<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	Vulnerable
<i>Lathamus discolor</i>	Swift Parrot	Endangered
<i>Neochmia ruficauda ruficauda</i>	Star Finch (eastern, southern)	Endangered
<i>Poephila cincta cincta</i>	Black-throated Finch (southern)	Endangered
<i>Rostratula australis</i>	Australian Painted Snipe	Vulnerable
<i>Turnix melanogaster</i>	Black-breasted Button-quail	Vulnerable
Fish		
<i>Neoceratodus forsteri</i>	Queensland Lungfish	Vulnerable
Mammals		
<i>Chalinobus dwyeri</i>	Large-eared Pied Bat	Vulnerable
<i>Dasurus hallucatus</i>	Northern Quoll	Endangered
<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	Vulnerable
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Vulnerable
<i>Phascolarctos cinereus</i>	Koala	Vulnerable
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox	Vulnerable
Plants		
<i>Cycas megacarpa</i>	-	Endangered
<i>Cycas ophiolitica</i>	-	Endangered
<i>Bulbophyllum globuliforme</i>	Miniature Moss-orchid	Vulnerable
<i>Cossinia australiana</i>	Cossinia	Endangered
<i>Cupaniopsis shirleyana</i>	Wedge-leaf Tuckeroo	Vulnerable
<i>Phebalium distans</i>	Mt Berryman Phebalium	Critically Endangered
<i>Samadera bidwillii</i>	-	Vulnerable
<i>Sophora fraseri</i>	-	Vulnerable
<i>Streblus pendulinus</i>	Siah's Backbone	Endangered
<i>Teaniophyllum muelleri</i>	Minute Orchid	Vulnerable
Reptiles		
<i>Delma torquata</i>	Collared Delma	Vulnerable

<i>Egernia rugosa</i>	Yakka Skink	Vulnerable
<i>Furina dunmalli</i>	Dunmall's Snake	Vulnerable
Threatened Migratory Species		
<i>Rostratula benghalensis (sensu lato)</i>	Painted Snipe	Vulnerable
<i>Lathamus discolor</i>	Swift Parrot	Endangered

3.2 State Legislation

ENVIRONMENTAL PROTECTION ACT 1994

The *Environmental Protection Act 1994 (EP Act)* is intended to protect Queensland's environment while allowing for development that improves total quality of life, now and in the future, by encouraging ecologically sustainable development. The Act regulates environmentally relevant activities (ERAs), which include provisions relating to the environmental management of mine sites. The Department of Environment and Heritage Protection (EHP) assesses applications to undertake ERAs, and issues environmental authorities (EAs) that identify environmental conditions to be met to ensure the prevention or minimisation of environmental harm caused by authorised ERAs.

Environmental conditions of particular relevance to this flora and fauna assessment are environmentally sensitive areas (ESAs). An ESA is defined as a location, however large or small, that has:

- Environmental values that contribute to maintaining biological diversity and integrity;
- Intrinsic or attributed scientific, historical or cultural heritage value; or
- is important to providing amenity, harmony or sense of community.

Three categories of ESA exist:

- Category A: areas that have significant ecological values including national parks, marine parks, conservation parks, forest reserves, the Wet Tropics World Heritage Area and the Great Barrier Reef region.
- Category B: areas that include regional ecosystems (REs) with an Endangered biodiversity status, Ramsar wetlands (as per the Ramsar Convention on wetlands of international importance, especially as waterfowl habitat), state forest parks, wilderness areas, areas seaward of the highest astronomical tide, fish habitat areas and areas containing marine plants.
- Category C: areas that typically include REs with an Of Concern biodiversity status, essential habitat, referable wetlands, nature refuges, state forests, timber reserves, declared water catchment areas, Koala habitat areas and resource reserves.

Maps produced using the ESA maps database show that the proposed West Dump area does not contain any "environmentally sensitive" areas listed under the EP Act. However, the RE mapping database (see below) shows that an RE with 'Of Concern' biodiversity status is present within the vicinity of the MRO, and potentially within the proposed West Dump area. This RE would be considered a Category C ESA if present on the site. Details

of ground-truthing for this RE (and others), as well as outcomes and implications are discussed in this report.

VEGETATION MANAGEMENT ACT 1999

Queensland's vegetation management framework regulates the clearing of certain native vegetation. This Act protects Queensland's biodiversity by conserving native vegetation and addressing land degradation issues. A mining activity or Chapter 5A activity under the EP Act is considered an exempt form of development.

While mining activities are exempt under the *Vegetation Management Act 1999*, the framework includes mapping resources, which are utilised within other legislation (i.e. *EP Act*).

Property maps of assessable vegetation (PMAVs) are a part of the framework. PMAV show areas as category A, B, C or X according to the status of the vegetation and the regulations that apply to it. Depending on its purpose, a PMAV will show all or some of the following vegetation category areas:

category X— not containing any assessable vegetation

category A— vegetation subject to compliance notices, offsets, and voluntary declarations

category B— remnant vegetation or vegetation subject to a permit that maintains vegetation

category C— high-value regrowth vegetation.

This mapping was reviewed as a part of the standard flora survey methods (Figure 2). All other areas on this figure are subject to a RE map, remnant map or regrowth vegetation map.

The majority of the proposed West Dump and surrounding area is mapped as remnant vegetation. The RE mapping shows a single heterogeneous polygon over the entire proposed West Dump area, with three different REs and their respective proportions in the polygon (Figure 3).

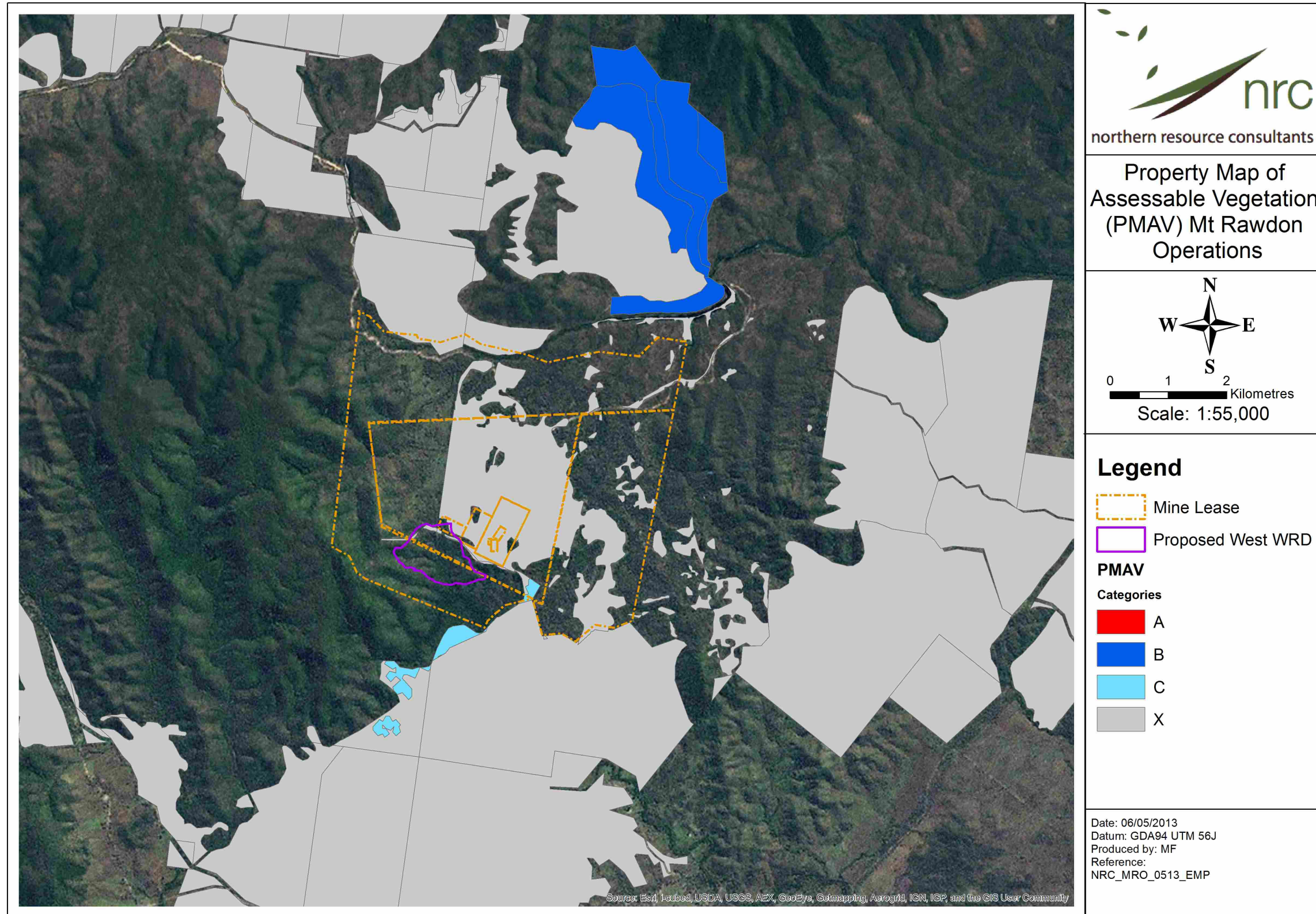


Figure 2: Property map of assessable vegetation



Figure 3: DEHP remnant vegetation and Regional Ecosystem mapping

NATURE CONSERVATION ACT 1992

The *Nature Conservation Act 1992* classifies and protects significant areas in order to protect threatened plant and animal species, including the declaration and management of protected areas, protection of wildlife and habitat, and the sustainable use of native wildlife and areas. The Nature Conservation (Wildlife) Regulation 1994 lists plant and animal species that are extinct in the wild, endangered, vulnerable, rare, near threatened and of least concern.

A review of the Wildlife Online (WildNet) database within a 25km radius of the proposed West Dump area was performed. Refer to Appendix A for full details of threatened species records and relevance to the proposed West Dump area.

LAND PROTECTION (PEST AND STOCK ROUTE MANAGEMENT) ACT 2002

The *Land Protection (Pest and Stock Route Management) Act 2002* and *Land Protection (Pest and Stock Route Management) Regulation 2003* provide objectives for the management of pests to address the impact they have on the economy, environment and society. Three categories exist for declared plants:

- Class 1: Plants or animals not commonly present in the State and, if introduced, would cause an adverse economic, environmental and social impact,
- Class 2 and 3: Plants or animals that are established in the State and are causing or have the potential to cause an adverse economic, environmental or social impact.

Class 2 and 3 pests are distinguished by their significance, impact or potential impact, area affected or likely to be affected, and the extent to which the pest has spread or is likely to spread. A number of listed pests are likely to be present in the area (EPBC Protected Matters search; Table 2).

Table 2: Listed pests under the *Land Protection (Pest and Stock Route Management) Act 2002*

Class Type	Species Name	Common Name
Class 1 Plant	<i>Chrysanthemoides monilifera</i>	Bitou Bush, Boneseed
Class 2 Plant	<i>Cryptostegia grandiflora</i>	Rubber Vine
	<i>Parthenium hysterophorus</i>	Parthenium Weed
	<i>Prosopis spp.</i>	Mesquite
	<i>Salvinia molesta</i>	Salvinia
Class 3 Plant	<i>Lantana camara</i>	Lantana
Class 2 Animal	<i>Felis catus</i>	Cat
	<i>Oryctolagus cuniculus</i>	European Rabbit
	<i>Sus scrofa</i>	Pig
	<i>Vulpes vulpes</i>	Red Fox

QUEENSLAND GOVERNMENT ENVIRONMENTAL OFFSETS POLICY

The Queensland Government Environmental Offsets Policy provides an integrated, consistent and transparent framework for applying environmental offsets in Queensland. When a new development is likely to impact on an important environmental feature, environmental offsets are used to replace the value of environmental features lost during the development. Before an offset is considered, all environmental impacts must be avoided or minimised where possible, and all other governmental standards met. An offset may be located within or outside of the geographic area of impact.

Relevant offset policies that address specific offset issues under the Queensland Government Environmental Offsets Policy include:

- Policy for Vegetation Management Offsets, version 3 (September 2011), administered by EHP
- Biodiversity Offset Policy, Version 1 (October 2011), administered by EHP.

This policy describes offset requirements for impacts to a range of State significant biodiversity values, including:

- EVNT species listed under the Nature Conservation Act
- Wetlands and watercourses
- Endangered and Of Concern REs
- High Value Regrowth and Endangered and Of Concern REs
- Threshold and critically limited REs
- Essential habitat
- Remnant or regrowth areas that are within 500m of a State significant biodiversity value and that provide important connectivity or are at least five hectares in size.

This report assesses the flora and fauna values associated with the proposed West Dump area with respect to the aforementioned legislative framework. Specific methodology employed to identify state and federally listed ecological issues is detailed in the section entitled Flora and Fauna Assessment Methodology. All significant flora and fauna values identified through desktop and field assessments are discussed in this report with respect to the relevant legislation.

Literature Review

1. Fanning and Tipping (1995)

1.1 Survey and Report

A previous report completed for flora and fauna surveys conducted prior to the commencement of the MRO is one of the only known documented studies in the area. This report by Fanning and Tipping (1995) details the outcomes of a fauna and fauna habitat assessment in the vicinity of the current MRO. The outcomes of this report have some bearing on the design of this field study and the potential impacts of the proposed West Dump area.

In their 1995 report, Fanning and Tipping refer to another study that they conducted for a near water storage facility. However, this other study was not available to review in relation to this report.

Fanning and Tipping (1995) found that the vegetated areas were generally grassy open woodland and small isolated stands in paddocks. This vegetation had little or no understory and showed evidence of disturbance from heavy grazing and frequent fires. Watercourses throughout the site supported very little riparian vegetation.

Much of the habitat within the MRO site was pasture and agricultural landscape. Fanning and Tipping (1995) suggest that more valuable habitat is present on the higher slopes to the west of the site, and along watercourses where there is a lower fire frequency.

1.2 Species of Conservation Concern Identified

Fanning and Tipping (1995) recorded two species within the study area that they considered to be of conservation concern, the Little Pied Bat (*Chalinolobus picatus*) and the Ground Cuckoo-shrike (*Coracina maxima*). The Little Pied Bat is currently listed as 'near threatened' under the Queensland NCA (1992). The Ground Cuckoo-shrike, whilst considered 'uncommon' (Pizzey & Knight 1997), is not currently listed as 'threatened' under any Queensland or Commonwealth legislation.

The Little Pied Bat occurs from near the central Queensland coast through western New South Wales and into eastern South Australia. It lives in dry forest and woodland, and despite its broad distribution and habitat preferences it is relatively uncommon (Ford *et al.* 2008). This species was originally considered a cave dweller, but more recent records suggest that it mainly roosts in tree hollows, with an apparent preference for dead trees (Pennay & Freeman 2005 and Schulz *et al.* 1994). However, they have also been observed roosting in houses, sheds, caves and mines (Churchill 2008). It often occurs in areas of ephemeral surface water, but has been recorded travelling 14-34 kilometres between roost sites and pools of water, where they were active throughout the night (Ford *et al.* 2008).

Fanning and Tipping (1995) concluded that the MRO site provided some foraging resources for the Little Pied Bat, but had little value in terms of roosting habitat. Furthermore, they argued that clearing for the MRO would not disturb any critical roosting habitat for this species, and that given the extent of similar habitat in the locality, an adverse affect on this species in the general area was unlikely.

The Ground Cuckoo-shrike occurs in a wide variety of habitats, including open woodland, acacia scrub, and spinifex country, generally west of the Great Dividing Range (Pizzey & Knight 1997). It is an uncommon species that is considered nomadic, particularly in response to rainfall (Pizzey & Knight 1997). Fanning and Tipping (1995) recorded this species on the MRO site in 1995, and reported it as a species potentially of conservation significance. However, they suggest that given the distribution of similar suitable habitat in the general vicinity, the MRO is unlikely to pose any threat to this species in the region. Indeed, the Ground Cuckoo-shrike is not currently listed as 'threatened' or 'near threatened' under any Queensland or Commonwealth legislation.

In the Fanning and Tipping (1995) report for the MRO, the authors refer to another study they conducted in the region for a Perry River water storage facility. They refer specifically to records of the Powerful Owl (*Ninox strenua*) in riparian woodland near the water storage facility. This species is listed as 'Vulnerable' under the Queensland NCA (1992).

Pairs of Powerful Owls occupy large home-ranges in a variety of habitats including mountain forests and gullies, and sparser hilly woodlands (Pizzey & Knight 1997). This species has experienced considerable population declines as a result of clearing for agriculture and pastoralism (Debus and Chafer 1994). This species utilises a very large home-range, generally considered to be ~800-1000ha, with 1500ha considered the maximum value (Higgins 1999). However, recent studies have shown owls covering over 2400ha in just six nights of tracking (Soderquist & Gibbons 2007).

Fanning and Tipping (2005) conclude in their report the MRO site contains little in the way of suitable roosting and nesting habitat. The Powerful Owl was not detected anywhere on the site, and they suggest that if the Powerful Owl is utilising the site at all, it is likely that in only constitutes foraging habitat in a small portion of the birds' extensive home range.

2. Species of Relevance for this Proposed Project

Based on the report by Fanning and Tipping (1995) and the data gained from government database searches, the Little Pied Bat and Powerful Owl are considered to have a moderate relevance to the proposed West Dump area.

This information and other data obtained from government database searches and relevant field guides were used to determine appropriate survey and trapping designs for this study. The potential impacts of the proposed West Dump area on flora and fauna (particularly those listed as threatened) that were identified in previous studies, this study, and database searches are discussed for each species in the relevant sections in this report.

Flora and Fauna Assessment Methodology

1. Overall Assessment Methodology

NRC used a joint approach of desktop surveys and fieldwork in this study. The study team utilised best practice recommendations from sources such as the Department of Science, Information Technology, Innovation and the Arts report entitled *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (August 2012)*.

The following steps were undertaken as part of the methodology for this report:

- Scoping
 - Project planning and definition of objectives
 - Identification of highly qualified senior ecologists and appropriately experienced field ecologists
 - Literature review of species and management impacts
 - Detailed desktop studies
 - Site reconnaissance visit
- Field Surveys
 - Targeted and incidental flora surveys on site
 - Targeted and incidental fauna surveys on site
- Analysis of Findings
 - Group review of field data, photographs and samples
 - Commissioning expert analysis for identification of recorded bat calls

NRC is a registered scientific user with ethics approval to conduct fauna studies from the Department of Agriculture, Fisheries and Forestry (DAFF) Animal Ethics Committee (AEC).

2. Reconnaissance Visit

A reconnaissance visit to the proposed West Dump area was conducted on 26 and 27 September 2012.

The purpose of this visit was to verify information collected during the desktop studies, including regional ecosystem mapping and the verification of watercourses. During the visit, ecologists were able to determine the different habitat types present on the site and surrounding area, look for initial evidence of species of conservation concern, assess accessibility and hazards and meet with the MRO onsite client environmental team on matters that may impact the fieldwork phase.

The information garnered, in conjunction with the desktop assessments detailed in this report, was then used to inform the location of vegetation community surveys and trapping programs, and the specific survey and trapping methods used.

3. Flora Survey Methodology

3.1 Desktop

A number of detailed desktop studies were undertaken before the completion of the field survey. Specific consideration was given to:

- RE mapping including remnant and regrowth vegetation
- Threatened Ecological Communities (TECs)
- Records of listed threatened species (EPBC and WildNet databases)
- Environmentally Sensitive Areas
- Aerial Photography

REGIONAL ECOSYSTEM MAPPING

The Regional Ecosystem mapping shows that the entire proposed West Dump area is comprised of remnant vegetation. The proposed West Dump area is within a large heterogeneous polygon containing three REs with their approximate proportions within the polygon stated. Table 3 details the REs that are mapped on site.

Table 3: EHP mapped Regional Ecosystems on site

Regional Ecosystem	Status*	'Short Description'
12.12.5	Least Concern	<i>Corymbia citriodora</i> and <i>Eucalyptus crebra</i> open forest on Mesozoic to Proterozoic igneous rocks
12.12.13	Least Concern	Araucarian complex microphyll to notophyll vine forest on Mesozoic to Proterozoic igneous rocks
12.12.8	Of Concern	<i>Eucalyptus melanophloia</i> woodland on Mesozoic to Proterozoic igneous rocks

*Status refers to VMA Class Status and Biodiversity Status

THREATENED ECOLOGICAL COMMUNITIES

Database searches identified the potential for one TEC to exist in the proposed West Dump area:

- Critically Endangered: Lowland Rainforest of Subtropical Australia

This TEC is listed as 'may occur in the area' under the *EPBC Act* (see TEC occurrence map in Appendix B). The Mount Rawdon area is at the northern extent of this vegetation's distribution. However, based on rainfall data and known geology characteristics, this vegetation type was considered unlikely to occur. Regardless, detailed field vegetation surveys were conducted in all vegetation communities in the proposed West Dump area to determine if this TEC was present within or near the proposed West Dump area.

Information published by the Federal Government detailing the listing advice, composition and classification of the Lowland Rainforest of Subtropical Australia TEC was used to determine if any of the vegetation on site was characteristic of this TEC.

THREATENED FLORA

Government database searches were performed to gain information on threatened flora species likely to be in the area (see Table 1 and Appendix A). This information was used to determine the potential presence of threatened species on the site and their preferred habitat. This also assisted in selecting appropriate survey techniques and areas for targeted surveys. Appendix C details the habitat and likelihood of occurrence of EPBC listed flora species on the proposed West Dump site.

3.2 General and Targeted Survey Methods

DETERMINATION OF COMMUNITIES

During the reconnaissance visit the habitat and vegetation communities on site were briefly investigated to allow for the determination of appropriate survey methodology. Subsequent observations during the main flora and fauna survey supported the initial findings of the previous reconnaissance visit.

The entire proposed West Dump area and its immediate surroundings were walked to determine any variations in vegetation community structure. Of the three REs shown on the RE mapping (see Table 3) only one was observed within the proposed West Dump area. RE 12.12.5 was found to dominate the proposed West Dump area (as was indicated by the RE mapping), and this community was dominated by Spotted Gum (*Corymbia citriodora*) and Narrow-leaved Ironbark (*Eucalyptus crebra*) in varying proportions.

Only one other vegetation community was observed within the proposed West Dump area, which was a small patch of vegetation dominated by Forest Red Gum (*Eucalyptus tereticornis*). This community was found to be consistent with RE 12.12.12 and was observed toward the south of the site. This community is not shown on the RE mapping.

Another vegetation community, consistent with RE 12.12.13, was observed immediately to the south of the proposed West Dump area. This vegetation community follows the course of Mingham Creek, and is characteristic of dry rainforest.

Specific details on the differences between State RE mapping and the vegetation communities present in the area are provided in this report.

VEGETATION COMMUNITY SURVEYS

Specific sites that were considered representative of each vegetation community were selected for detailed assessments of the structure and floristics of these communities. One detailed survey site was established for each vegetation community, except for within the RE 12.12.5 vegetation (Spotted Gum and Narrow-leaved Ironbark open forest). The RE 12.12.5 vegetation was found to be present as two different variants within the proposed West Dump area, and therefore each of these variants was surveyed

separately. Given the reasonably small size of the proposed disturbance area, and the homogeneity of the habitat within it (excluding between variants as both of these were surveyed), one site for each community was considered adequate.

Four different vegetation community survey sites were established. Two vegetation community surveys were conducted within RE 12.12.5. This was because of the two distinct variants for this vegetation community – areas of slightly higher elevation dominated by *Eucalyptus crebra*, and small gullies and adjacent slopes dominated by *Corymbia citriodora*. One detailed vegetation community survey site was established within the small patch of RE 12.12.12 vegetation.

One detailed vegetation community survey site was also established in the dry rainforest (RE 12.12.13) located outside the proposed West Dump area. Although this community is outside the clearing area, it was considered relevant to the proposed West Dump area. This was based on proximity to the proposed disturbance and that the dry rainforest habitat is considerably different to that within the proposed West Dump area. The species composition within this community and along its margins (particularly any threatened species) was considered important to assessing the potential impacts of the proposed West Dump area. Apart from the RE 12.12.13 vegetation present immediately south of the proposed West Dump area, all other vegetation in the area surrounding the proposed West Dump is the same or similar to the vegetation within it. It was therefore not considered necessary to conduct detailed vegetation surveys in any other vegetation outside the proposed West Dump area.

The detailed vegetation surveys within each community consisted of multiple survey techniques. 100m x 20m plots were established in each of the vegetation communities and all other detailed survey techniques (i.e. transects and quadrats) were conducted within these plots. Details of the attributes measured for each survey technique are provided in Table 4. Other features recorded at each of these sites included landform description, soil type and disturbances.

Table 4: Detailed vegetation survey techniques and attributes

Survey Method	Attributes Measured
Survey Plot 100m x 20m	Canopy species
	Canopy height
	Understory species
	Hollow bearing trees
	Large woody debris
	Weed species and cover
Transect 100m	Canopy cover
	Shrub Cover
Quadrats (x5) 1m x 1m	Ground cover (species and cover)

Each vegetation community is described in detail below (see section titled Existing Vegetation), with corresponding RE code, VMA Class and Biodiversity Status.

RANDOM MEANDER TECHNIQUE

The Random Meander technique documented by Cropper (1993) was utilised throughout the proposed West Dump area. This technique was used to document all flora species observed including any of conservation significance. Targeted meanders were also conducted within specific habitats to search for threatened species. In particular, this technique was used to search for the threatened species *Cycas megacarpa* within the RE 12.12.5 habitat. This technique was also employed to determine the location and boundaries of all vegetation communities.

VEGETATION MAPPING

The RE mapping was ground truthed and the vegetation on site was mapped at the community level. After establishing the different communities present on the site, the boundaries of each community were walked and mapped using handheld GPS.

4. Fauna Survey Methodology

4.1 Desktop

A desktop review was conducted to determine the likelihood of any threatened fauna species occurring within the proposed West Dump area. The following databases were used to generate species lists of threatened fauna that may occur on the site:

- The Department of Sustainability, Energy, Water, Population and Communities (SEWPaC), EPBC Act Online Protected Matters Search Tool database,
- The Department of Environment and Heritage Protection (DEHP) WildNet (Wildlife Online) database.

Database searches of the EPBC Protected Matters incorporated records within a 5km radius of the proposed West Dump area. The WildNet threatened species records were generated from an a 25km radius of the proposed West Dump area. The EPBC Act Online Protected Matters Search Tool, whilst based on some species records, relies on modelling of suitable habitat and is largely predictive. WildNet database is based on actual records of species from a wide variety of observers. For this reason, the WildNet data is considered the most appropriate predictive tool in this instance for determining the likelihood of occurrence of any threatened species.

The results of the government database searches are presented in Table 1 and Appendix A for the EPBC protected matters search and the Queensland Wildlife Online search respectively.

4.2 General and Targeted Survey Methods

TARGETED AND INCIDENTAL FAUNA SURVEY

Three trapping sites were established in three areas characteristic of the main vegetation communities present within or near the proposed West Dump area. All fauna trapping and surveying activities detailed in Table 5 were conducted at each of these sites. Additional surveying and trapping activities were also conducted at other locations within the proposed West Dump area, and incidental observations made throughout the proposed West Dump area were also recorded.




Table 5: Standard fauna survey methods

Survey Method	Description
Elliott traps	20 Type A Elliott traps were placed on the ground approximately 10m apart in a straight line for four nights at each of the trapping sites. These traps were baited with a mixture of rolled oats, sesame seeds, margarine and canola oil. These traps were opened late in the afternoon and cleared early morning in accordance with animal ethics requirements.
Pitfall and Funnel traps	Drift fence lines incorporating pitfall and funnel traps were established for four nights at each of the three trapping sites. At each site three pitfall traps (20 litre buckets) were buried flush to the ground surface along the drift fence. Funnel traps were located along the drift fencing. A shade cloth covering each funnel trap was deployed to protect trapped species from daytime heat. These traps were cleared early morning and late afternoon in accordance with animal ethics requirements.
Quoll traps	Four quoll traps were placed at each of the three sites: two at the ends of the Elliott trap line and 2 perpendicular to these in a square pattern. Quoll traps were baited with sardines. These traps were opened late in the afternoon and cleared early morning in accordance with animal ethics requirements.
Camera traps	Camera traps were spread throughout the proposed West Dump area to target fauna that may be too large or 'shy' for other trapping techniques, or utilising areas outside of the main trapping sites. Camera traps were baited with the rolled oat mixture, placed within aerated bottles, attached to a nearby tree, log etc.
Anabat detectors	Anabat detectors were used for at least one night at each of the main trapping sites, and were also placed opportunistically in likely flyway zones such as watercourses and tracks.
Active diurnal searches	Active diurnal searches were undertaken within each of the three sites. This technique involved intensive investigation of ground layer habitat features (under logs, rocks and leaf litter), low vegetation (under bark and tree stumps) and rock crevices for amphibians and reptiles. Searches were focussed during the parts of the day when reptile activity was likely to be at its peak.
Diurnal bird surveys	Birds were surveyed within each vegetation community for at least one hour in the morning, with incidental observation recorded during other survey techniques. Birds were identified from either direct observation or by their calls.
Nocturnal surveys	A combination of high-powered spotlights and head torches were used to survey nocturnal mammals (flying, arboreal and terrestrial), birds (active nocturnal species, and roosting diurnal species), reptiles and frogs in each of the main trapping sites, as well as other locations within the proposed West Dump area.
Incidental (opportunistic) records	Fauna observations were continuous during the survey period and fauna species records were obtained outside of the systematic methodology of the survey. Any observations, tracks, scats or other signs of fauna were recorded with reference to the vegetation community within which it was found.

DESCRIPTION OF FAUNA TRAPPING AND SURVEY SITES

Table 6 details the location and habitat features for each of the fauna trapping and survey sites. All trapping and survey techniques were conducted at all sites except 'Site 4', where the trapping techniques (Elliott, pitfall, funnel and quoll trapping) were not conducted.

Table 6: Description and photograph of fauna trapping sites

Trap Site	Location (GDA94; 55J)	Habitat Description	Representative Photograph
Site 1 – Spotted Gum Woodland RE 12.12.5	374626, 7204391	Spotted Gum (<i>Corymbia citriodora</i>) woodland to open-forest with a relatively dense shrub layer (to 30%) and dense ground cover of grasses. Site is partially within gully in the upper part of the proposed West Dump area catchment. Very few tree hollows and some large woody debris on ground. Evidence of disturbance from logging/thinning, weed infestation, and fire (less than other sites).	
Site 2 – Narrow-leaved Ironbark Woodland RE 12.12.5	374504, 7204208	Narrow-leaved ironbark (<i>Eucalyptus crebra</i>) woodland with occasional shrubs. Very dense ground cover of mixed grasses. Site is situated at top of slope/ridge near the centre of the proposed West Dump area. There are very few hollow bearing trees and very low levels of large woody debris on ground. Evidence of significant disturbance from frequent and recent fire, and weed infestation.	
Site 3 – Hoop Pine Forest RE12.12.13	374784, 7203535	Hoop pine (<i>Araucaria cunninghamii</i>) Dry Rainforest with canopy cover of 80% and dense leaf litter cover. Site is south of the proposed West Dump area along Mingham Creek. Moderate habitat hollow value. Substantial watercourse through site, however no water present during survey period.	

**Site 4 –
Forest Red
Gum
Woodland
RE12.12.12**

374764, 7203797

Forest Red Gum (*Eucalyptus tereticornis*) with Brown bloodwood (*Corymbia trachyphloia*) Moreton Bay Ash (*Corymbia tessellaris*). Dense shrub layer of Lantana (*Lantana camara*). Site is located in a flat area in the lower part of the proposed West Dump area catchment.

5.

Note: No traps were set at Site 4, only targeted fauna surveys



5.1 Survey Effort

The flora and fauna surveys were conducted over five days from 10 to 14 December 2012. Figure 4 shows the location of the four main fauna trapping and flora survey sites within the proposed West Dump area, as well as the specific location of all traps. Survey effort was focussed on obtaining data from each of the different vegetation communities. Details of total survey effort across the proposed West Dump area for each survey/trapping technique are provided in Table 7.

Table 7: Fauna survey effort

Survey Method	Total Effort
Pitfall Trapping	36 Trap nights
Elliott Trapping (Type A)	240 Trap nights
Elliott Trapping (Type F)	48 Trap nights
Funnel Trapping	48 Trap Nights
Anabat Detectors (2)	5 nights (~60 hours)
Infrared Cameras (6)	24 nights
Avifauna Searches	8 hours (x 3 persons)
Active Reptile Searches	5 hours (x 3 persons)
Amphibian Searches	1.5 hours (x 3 persons)
Spotlight Surveys	7 hours (x 3 persons)

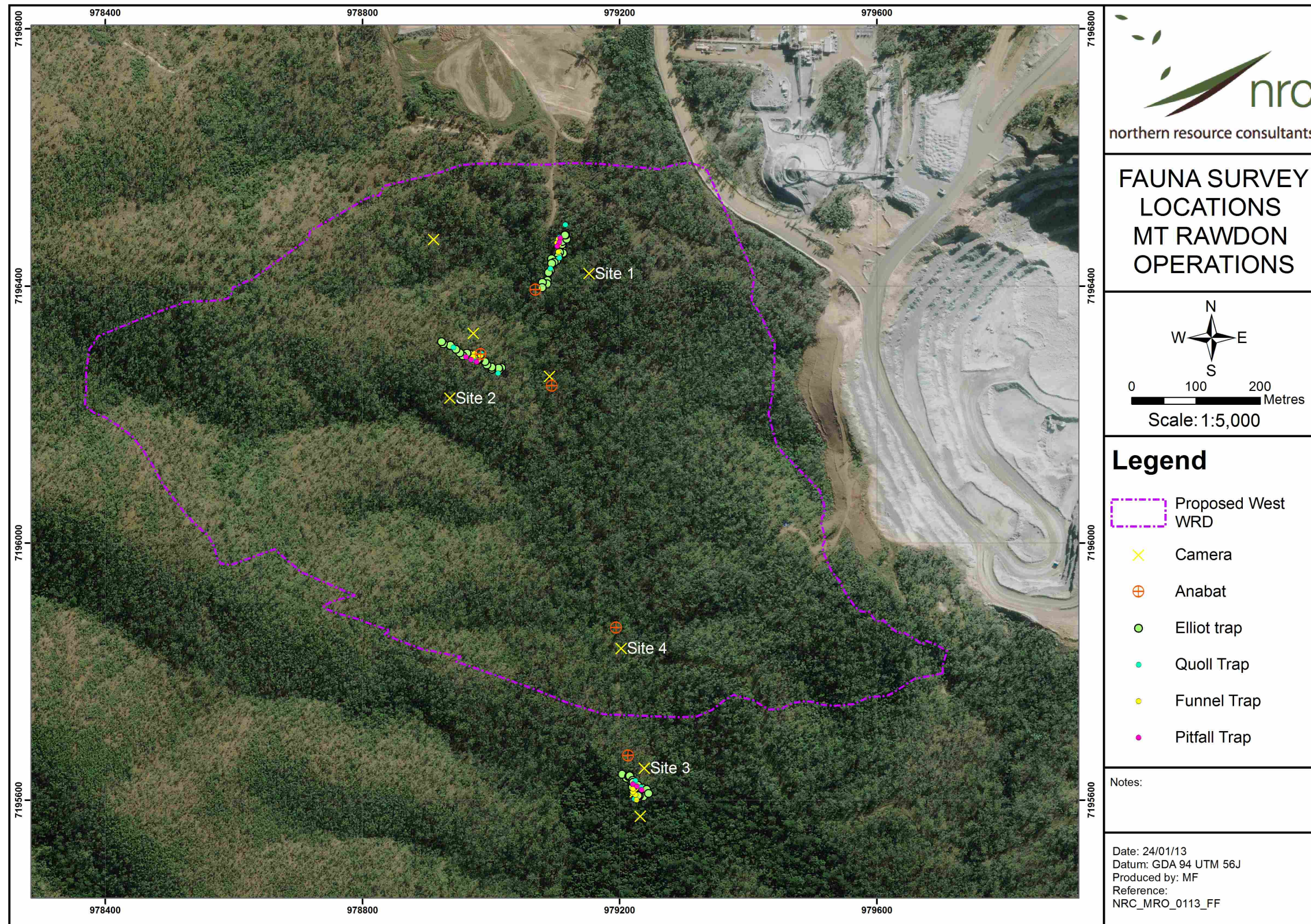


Figure 4: Location of survey sites within the proposed west WRD area

Flora Survey Results

1. Existing Vegetation

1.1 Vegetation Communities

The proposed West Dump area and surroundings are dominated by dry Eucalypt woodland – open forest on generally moderate slopes. There are numerous small gullies and natural drainage lines throughout the proposed West Dump area and the vegetation varies largely in response to its position on the slopes and gullies. Mingham Creek flows along the southern boundary immediately adjacent to the proposed West Dump area and the vegetation along this watercourse is characteristic of Dry Rainforest.

Three main native vegetation communities are present within or immediately adjacent to the proposed West Dump area. The three vegetation community types are:

- Spotted Gum - Narrow-leaved Ironbark Open Forest, which is present throughout most of the proposed West Dump area and surrounding slopes. The dominant canopy species varies between Spotted Gum and Narrow-leaved Ironbark throughout the proposed West Dump area, typically in response to slope. However, despite variation in canopy composition between these two species, the overall floristics and structure are generally consistent. This vegetation community is characteristic of RE 12.12.5.
- Forest Red Gum Woodland, which is present in a relatively flat, low-lying area in the south of the proposed West Dump area. Despite significant disturbance and poor condition, this vegetation is consistent with RE 12.12.12
- Hoop Pine Dry Rainforest, which is present as a narrow corridor along Mingham Creek. This vegetation community is characteristic of RE 12.12.13

1.2 State Mapping

Most of the vegetation within (and adjacent to) the proposed West Dump area is consistent with the State published RE mapping. The RE mapping shows a heterogeneous polygon of 12.12.5/12.12.13/12.12.8 over the entire area of the proposed West Dump (see Figure 3 above). The same polygon also covers a very large area to the west of the proposed West Dump area. Ground-truthing of this mapping showed that the site is dominated by vegetation consistent with RE 12.12.5, which is indicated in the RE mapping. Site observations, RE mapping and aerial imagery suggest that this RE in particular dominates the large remnant unit to the west of the proposed West Dump area.

The Forest Red Gum Woodland is consistent with RE 12.12.12, which has an 'Of Concern' status. This RE is not represented on the RE mapping within the proposed West Dump area or in the broader area. This vegetation community appears to be restricted to a small patch in a flat, low-lying part of the proposed West Dump area.

The Hoop Pine Dry Rainforest is characteristic of RE 12.12.13, which is represented on the RE mapping. This vegetation is not present within the proposed West Dump area, but

is present immediately to the south, along Mingham Creek. This tract of vegetation appears to follow Mingham Creek (and also its tributaries to some extent) for a considerable distance to the west of the site.

The RE mapping indicates that RE 12.12.8 occupies a small proportion of the large remnant unit (15%). This RE has an 'Of Concern' status, and is responsible for the large remnant unit (including within the proposed West Dump area) be mapped as "remnant vegetation containing an Of Concern RE". This RE was not observed anywhere within or near the proposed West Dump area. Indeed, the characteristic canopy species *Eucalyptus melanophloia* was not observed at all. Whilst it is possible that this RE is present elsewhere within the mapped remnant unit, it does not occur anywhere within the vicinity of the proposed West Dump area.

The extent of each of the vegetation communities observed within and near the proposed West Dump area was mapped and the boundaries of each are shown in Figure 5.

Specific vegetation community descriptions based on the results of the vegetation surveys are presented below. Full species lists for native and introduced flora are presented in Appendix C.

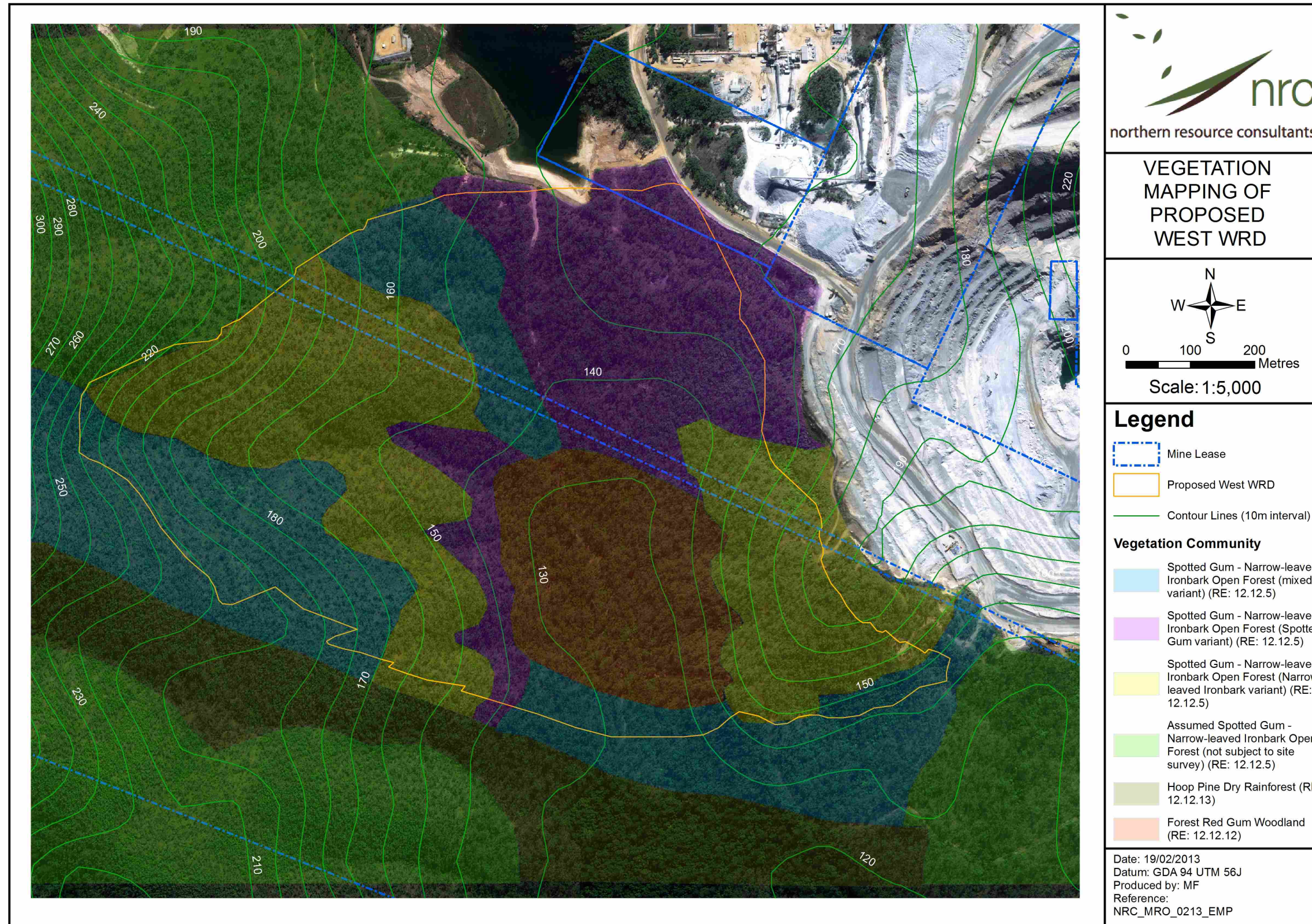


Figure 5: Vegetation communities within the proposed west WRD and surrounding area

1.3 Spotted Gum – Narrow-leaved Ironbark Open Forest

Table 8: RE 12.12.5 Vegetation community overview

Regional Ecosystem	12.12.5
RE 'Brief Description'	<i>Corymbia citriodora</i> and <i>Eucalyptus crebra</i> open forest on Mesozoic to Proterozoic igneous rocks
VMA Class and Biodiversity Status	Least Concern No Concern at Present
EPBC Act Status	Not representative of any TECs
Threatened flora species	No threatened flora species observed

This vegetation community is abundant in the proposed West Dump area, and is also present in substantial areas on the slopes in the surrounding area. The Spotted Gum variant was observed in the north eastern extent and southern part of the proposed West Dump area, in low-lying contours <150m AHD (see Figure 5). The Narrow-leaved Ironbark variant was observed in higher contours (>125 <225m AHD) to the west and east of the proposed West Dump area (Figure 5). The mixed variant was observed to the north, south and far west of the proposed West Dump area (Figure 5).

Spotted Gum (*Corymbia citriodora*) and Narrow-leaved Ironbark (*Eucalyptus crebra*) form the canopy cover (18-24m height, cover varying between 15 and 30%), and was typically denser in areas where Spotted Gum dominated the canopy. Subcanopy species include Brown Bloodwood (*Corymbia trachyphloia*), and in wetter areas Swamp Box (*Lophostemon suaveolens*) (15m). Many areas contain a relatively dense (30-40% cover) low tree layer of Red Ash (*Alphitonia excelsa*) and a tall shrub layer of Early-flowering Wattle (*Acacia leiocalyx*). Ground cover was generally dense and comprised of mixed grasses (native and introduced), particularly Kangaroo Grass (*Themeda triandra*) and Black Spear Grass (*Heteropogon contortus*).

The floristic composition and landzone characteristics of this vegetation community are characteristic of Regional Ecosystem 12.12.5, which has a 'Least Concern' status. The specific boundaries of this RE are not shown on the RE mapping, but rather as a heterogeneous polygon of multiple REs. See Figure 5 for actual boundaries of this community in the proposed West Dump area.

The majority of this vegetation community exhibits signs of significant disturbance in the form of introduced species (in particular the noxious and highly invasive species Lantana; *Lantana camara*), frequent burning, cattle grazing and logging/thinning of canopy species.



Figure 6: Photographs of Spotted Gum variant



Figure 7: Photographs of Narrow-leaved Ironbark variant

1.4 Forest Red Gum Woodland

Table 9: RE 12.12.12 Vegetation community overview

Regional Ecosystem	12.12.12
RE 'Brief Description'	<i>Eucalyptus tereticornis</i> , <i>E. crebra</i> or <i>E. siderophloia</i> , <i>Lophostemon suaveolens</i> open forest on granite
VMA Class and Biodiversity Status	Of Concern
EPBC Act Status	Not representative of any TECs
Threatened flora species	No threatened flora species observed

This vegetation community is present as an isolated patch in a flat, low-lying area in the south of the proposed West Dump area.

Forest Red Gum (*Eucalyptus tereticornis*) dominates the canopy layer (22m, 15%), with scattered Brown Bloodwood (*Corymbia trachyphloia*) and Moreton Bay Ash (*Corymbia tessellaris*) (18m, 5%). There is a dense low shrub layer of Lantana (*Lantana camara*) and scattered Red Ash (*Alphitonia excelsa*).

The floristic composition and landzone characteristics of this vegetation community are consistent with Regional Ecosystem 12.12.12, which has an 'Of Concern' status. This RE is not shown at all on the RE mapping within the vicinity of the proposed West Dump area. The size of this community, the distinction between the floristics of the surrounding vegetation, and the consistency with description for RE 12.12.12 suggest that this community within the proposed West Dump area is of mappable quality for RE mapping. See Figure 5 for the boundaries of this RE in the proposed West Dump area.

The majority of this vegetation community exhibits signs of significant disturbance. Indeed, of all the areas surveyed, this area has the highest density of the declared and highly invasive species Lantana (*Lantana camara*).



Figure 8: Photographs of Forest Red Gum woodland

1.5 Hoop Pine Dry Rainforest

Table 10: RE 12.12.13 Vegetation community overview

Regional Ecosystem	12.12.13
RE 'Brief Description'	Araucarian complex microphyll to notophyll vine forest on Mesozoic to Proterozoic igneous rocks
VMA Class and Biodiversity Status	Least Concern No Concern at Present
EPBC Act Status	Not representative of any TECs
Threatened flora species	No threatened flora species observed

This community is present outside the proposed West Dump area adjacent to the southern boundary. It follows Mingham Creek as a narrow corridor of vegetation present on both sides of the creek and some of the natural drainage lines that feed into it. Hoop Pine (*Araucaria cunninghamii*) dominates the canopy layer (to 35m) with a subcanopy/mid-storey dominated by Northern Towra (*Bosistoa medicinalis*) (total canopy cover 80%). There is a low shrub layer of Soft Acalypha (*Acalypha eremorum*) and Shining Stinging Tree (*Dendrocnide photinophylla*). The ground cover is very limited and is almost entirely comprised of leaf litter.

There are significant disturbances along the margins of this vegetation from exposure to fire and invasion of weeds. However, the community itself exhibits little evidence of disturbance and must be subject to a much lower frequency and intensity of fires than surrounding areas.

The floristic composition and landzone characteristics of this vegetation community are characteristic of Regional Ecosystem 12.12.13, which has a 'Least Concern' status. The specific boundaries of this RE are not shown on the RE mapping, but rather as a heterogeneous polygon of multiple REs. See Figure 5 for actual boundaries of this community in vicinity of the proposed West Dump area.

RE mapping and aerial imagery indicates that this community is reasonably common and widespread in the broader area. Indeed, the Mt Perry region is considered one of the characteristic localities for this RE.



Figure 9: Photographs of Hoop Pine Dry Rainforest

2. Threatened Flora

2.1 Searches

A Wildlife Online search produced records of 11 different species of flora within a 25km radius of the proposed West Dump area that are listed as threatened under the NCA. Two of these species are also listed as threatened under the EPBC Act. Details of these species, their conservation status, the number of records in the region and their potential relevance to the proposed West Dump area are provided in Appendix D.

No threatened species of flora listed in either the NCA or the EPBC Act have been previously recorded within the proposed West Dump area or in its immediate vicinity (this Report and Fanning & Tipping 1995). Whilst in the broader sense there is suitable habitat within the area for some of the threatened species recorded within the region, specific habitat requirements for most are not considered to be present within the proposed West Dump area. Significant disturbance from a history of frequent fire is likely to have a significant impact on many species. Most of the records of threatened species are from the outer extent of the Wildlife Online search area, often in wetter habitats, particularly towards the east in areas such as Goodnight Scrub National Park. The habitat in the proposed West Dump area is significantly different from that of Goodnight Scrub National Park and records of threatened species from this area are unlikely to have any relevance to the proposed West Dump area.

2.2 Threatened Species

Some potentially occurring threatened species such as Cudgerie (*Hernandia bivalvis*) occur within dry rainforest and rainforest margins. Such habitat is present immediately to the south of the WRD site along Mingham Creek. As discussed previously, detailed surveys and targeted meanders were conducted in this area, given its proximity to the proposed area of disturbance. All survey techniques failed to produce any evidence of any threatened flora species in this area.

The only threatened flora species that could be considered likely to occur within the proposed West Dump area is the Cycad *Cycas megacarpa*. This species has scattered and mostly localised populations throughout the region and occurs in woodland to open forest often in conjunction with a grassy understorey. *C. megacarpa* is often found in habitat dominated by Narrow-leaved Ironbark and Spotted Gum such as that found in large parts of the proposed West Dump area. Mature plants of this species are also relatively fire tolerant and may be less vulnerable to the level of disturbance on the site than many other species. However, detailed and targeted searches failed to produce any evidence of this species within the proposed West Dump area. The apparent absence from the proposed West Dump area, the limited dispersal mechanisms of this species, and the abundance of similar habitat outside of the proposed West Dump area, all suggests that the proposed works are unlikely to have a significant impact on this species.

2.3 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) listed under the EPBC Act are present within or near the proposed West Dump area. Whilst there is a linear patch of Dry Rainforest along Mingham Creek, this vegetation community is not considered Lowland Subtropical Rainforest under the EPBC Act. The following factors are considered to exclude this vegetation from TEC status:

- The vegetation community is characteristic of Regional Ecosystem 12.12.13, which is not recognised as a state equivalent vegetation classification for the Lowland Subtropical Rainforest TEC.
- The vegetation, landzone and soil characteristics are typical of Dry Rainforest, which is not considered part of the TEC.
- Annual rainfall is relatively low (<1300mm)
- There is a very low area to boundary ratio

Fauna Survey Results

1. Fauna Habitat

1.1 Vegetation

The entire proposed West Dump area is comprised of Eucalypt woodland and open forest, with variations in canopy and understory species. The vast majority of the proposed West Dump area is dominated by two species in the canopy layer, Narrow-leaved Ironbark (*Eucalyptus crebra*) and Spotted Gum (*Corymbia citriodora*).

There is a relatively small patch of woodland towards the south of the site that is dominated by Forest Red Gum (*Eucalyptus tereticornis*). Sub-canopy and understory species are generally consistent throughout the site, with slight variations associated with slope. Red Ash (*Alphitonia excelsa*) and the invasive species Lantana (*Lantana camara*) are the most common understory species throughout the proposed West Dump area and in some areas these form relatively dense patches. Lantana is particularly common in the Forest Red Gum Woodland.

1.2 Habitat Features

In general, habitat features within the proposed West Dump area are limited. There are very few hollow bearing trees on site which could provide roosting or nesting habitat for microbats, birds and arboreal mammals. Habitat hollow abundance was measured using multiple survey plots throughout the proposed West Dump area and was found to be typically fewer than 10 trees per hectare. The trees that did bear hollows typically only had a single small hollow that were unlikely to be suitable for most species.

This issue is common to a number of Regional Ecosystems containing Spotted Gum, where extensive logging has resulted in a decrease in the number of trees in the larger size classes including many important habitat trees. Whilst logging and thinning are not necessarily the sole factors contributing to the reduction of larger size classes on this site (fire may also have an effect), the impact on the habitat is the same. There is also low diversity of mature trees throughout the proposed West Dump area, which results in limited availability of food resources, particularly with respect to season.

1.3 Impacts of Fire

There is distinct evidence of frequent and recent fire throughout much of the proposed West Dump area, particularly on upper slopes. Consequently, the availability of habitat from large woody debris on the ground is minimal. This habitat is important for reptiles and small terrestrial mammals and the lack of suitable habitat in this form is reflected in the survey results.

The survey data indicates that there is more suitable reptile and small mammal habitat in gullies that are more sheltered from fire. However, there is only a limited amount of this habitat present within the proposed West Dump area, with much of the site characterised

by moderate slopes that are more exposed to fire. There are significantly more of these gullies north, south and west of the site, many of which are larger and potentially less impacted by fire.

1.4 Watercourse Habitat

The gullies and natural drainage features on site ultimately all feed south to Mingham Creek. Mingham Creek itself is an ephemeral stream, and the catchment within the proposed West Dump area is very small. The drainage features within the proposed West Dump area would therefore typically only flow for a short period immediately after rainfall events. It is therefore unlikely that they would provide suitable habitat and potential breeding sites for local amphibian species. There are, however, a large number of similar gullies, drainage features and watercourses to the north, south and west of the site. These include many that are significantly larger and likely to flow and support suitable breeding habitat for longer periods.

Mingham Creek has a substantial linear patch of remnant Dry Rainforest vegetation along its banks. This vegetation provides significantly greater habitat than is found within the proposed West Dump area. There is a substantial ephemeral stream that would provide a seasonal water source for a variety of animals and breeding habitat for amphibians. There is a much greater diversity of flora species present to provide a food resource. There are also a significantly greater number of mature trees bearing hollows for roosting and nesting sites. This site has clearly been much less exposed to disturbance from fire and there is a substantial quantity of fallen woody debris on the ground. Whilst this area appears to provide more suitable habitat for fauna, there was still a reasonably low diversity of fauna detected within this habitat. No threatened species were detected in this habitat, and indeed, no species that would rely on this habitat exclusively were detected.

1.5 Connectivity

The proposed West Dump area is immediately adjacent to the existing MRO and will therefore not cause fragmentation or isolation of any habitat. Remnant vegetation will be cleared for the proposed area, however, this vegetation is on the edge of a much larger remnant unit. Clearing for the proposed West Dump area represents only about 1.5 per cent of this larger remnant unit.

Whilst the habitat within the proposed West Dump area is part of a much larger tract of vegetation, the habitat within the WRD area itself does not create a corridor between different areas or habitats. It cannot be assumed that the movement of fauna in the area will be significantly affected by the clearing of this habitat.

2. Fauna Species

The survey results indicate that fauna diversity throughout the site was generally low for all groups. Areas that were more likely sheltered from fire typically had higher diversity. Species observed were mostly those that are considered common in the region, and many have a relatively high tolerance of disturbance.

2.1 Mammals

Brushtail Possums, Greater Gliders and a Squirrel Glider were all detected within the proposed West Dump area during spotlighting surveys. Most of these were located in the lower part of the main gully where the mature trees are larger and hollow bearing trees are slightly more abundant than elsewhere on the site.

Small terrestrial mammal diversity was low, with the only species captured being the introduced House Mouse (*Mus musculus*). This species frequently responds quickly to fire and is often the first to recolonise after fire events (Fox 1982 and Menkhorst & Knight 2011). A Long-nosed Bandicoot (*Perameles nasuta*) and a Northern Brown Bandicoot (*Isoodon macrourus*) were also observed in the vicinity of Site 1.

At least six and possibly as many as fourteen microbat species were identified within the proposed West Dump area from two Anabat detectors. Over 900 calls were identified overall, with the majority (>80%) produced by a single species, the Little Bentwing Bat (*Miniopterus australis*). Other common and positively identified species were Little Broad-nosed Bat (*Scotorepens greyii*) and Eastern Bentwing Bat (*Miniopterus orianae oceanensis*). *Rhinolophus megaphyllus*, *Chalinolobus gouldii* and *Austronomus australis* were also positively identified from the call data.

The following species potentially occur in the proposed West Dump area, however, they could not be positively identified from the call data:

- Hoary Wattled Bat - *Chalinolobus nigrogriseus*
- Little Pied Bat - *Chalinolobus pictatus*
- Southern Myotis - *Myotis macropus*
- Eastern, Lesser and Gould's Long-eared Bats - *Nyctophilus sp.* (incl. *N. bifax*, *N. geoffroyi* and *N. gouldi*)
- Beccari's Free-tailed Bat - *Mormopterus beccarii*
- Yellow-bellied Sheath-tail Bat - *Saccolaimus flaviventris*

The Little Pied Bat is listed as 'Near Threatened' under the Queensland NCA and this species is discussed further in this report.

Several species of arboreal and flying mammals are clearly utilising the site for foraging purposes, and to some extent they are likely to be roosting and nesting in the area. However, none of these species or their habitat is restricted to the proposed West Dump area. Indeed, the proposed West Dump area represents only a very small proportion of the suitable habitat for these species in the area. The habitat within the gullies, that the arboreal mammals appear to favour, is well represented outside the proposed West Dump area. The habitat on the slopes and ridges (often dominated by Narrow-leaved Ironbark) that covers much of the proposed West Dump area likely provides suitable foraging habitat for numerous microbat species. However, this habitat is present in very extensive areas surrounding the proposed West Dump area. It is therefore unlikely that the removal of this habitat from within the proposed West Dump area would have a significant (if any) impact on the arboreal and flying mammal species present within the area.

3. Reptiles and Amphibians

Reptile diversity and abundance is low across the site, particularly in areas where there is more evidence of recent and frequent of fire. Site 1 is located within a gully and appears partially sheltered from the recent fire event that has affected the upper slopes and ridges (such as around the location of Site 2). This protection from, at least the intensity of fires, is a likely cause for a greater number of reptiles observed in this area. Two skink species (*Carlia foliorum* and *C. vivax*), Burton's Legless Lizard (*Lialis burtonis*) and Gould's Monitor (*Varanus gouldii*) were all observed in the vicinity of Site 1, and a Carpet Python (*Morelia spilota*) was observed in a sheltered gully at the bottom of the slope near Site 2.

Whilst the gully habitats provide some refuge for reptile (and terrestrial mammal) species, they are not specific to the proposed West Dump area. As mentioned previously, these gully habitats are present throughout the area surrounding the proposed West Dump area and many likely provide more suitable habitat than those present within the proposed West Dump area.

Five amphibian species were observed during the fauna survey, including four native species and the introduced Cane Toad (*Rhinella marina*). Two species, the Desert Tree Frog (*Litoria rubella*) and the Broad-palmed Frog (*Litoria latopalmata*) were observed at numerous locations near the northern part of the proposed West Dump area. The Smooth Toadlet (*Uperoleia laevigata*) and the Northern Banjo Frog (*Limnodynastes terraereginae*) were both captured in traps at Site 3, which is to the south of the proposed West Dump area on Mingham Creek. These species are all common in woodland and forest near ephemeral and permanent watercourses (Barker *et al.* 1995). None of these species are likely to be affected by the proposed works given the extent of similar habitat surrounding the proposed West Dump area.

4. Birds

A total of 29 bird species that are common to dry woodland were observed throughout the survey site. Some of the species observed are characteristic of disturbed areas such as the Torresian Crow, Australian Magpie and Noisy Miner (Pizzey & Knight 1997). Other species such as the King Parrot, Pale-headed Rosella, Red-tailed Black Cockatoo, and Rainbow Lorikeet forage over large areas in search of flowering and fruiting trees. These species are likely only transient within the proposed West Dump area, particularly considering the lack of diversity of mature flowering trees (i.e. Eucalypts).

Bird species that prefer a dense understory such as the Eastern Whipbird, White-browed Scrubwren and Little Shrike-thrush were found in areas where there was a high density of the declared pest plant Lantana. This habitat is mostly present toward the lower part of the proposed West Dump area catchment, particularly within the area of Forest Red Gum vegetation (RE 12.12.12).

5. Migratory Species

A single Rainbow Bee-eater was observed at the northernmost extent of the proposed West Dump area, at the edge of the vegetation. This species is listed as a migratory species under the EPBC Act, and species is found throughout Australia where populations move north during the Australian winter. However, populations in the north of Australia are considered resident, and in many northern localities this species is present throughout the year (numerous references in SEWPaC SPRAT database). Rainbow Bee-eaters nest by digging a long tunnel in sandy banks. The only known threats to this species are disturbance to nesting sites from construction activities and predation on nesting sites from introduced species including foxes and cane toads (Boland 2004). This species is not likely to be impacted at all by the works in the proposed West Dump area as it is not relying exclusively on the habitat in this area, and there are no suitable nesting sites.

6. Threatened Fauna Species

No threatened fauna species were positively identified within the proposed West Dump area or the surrounding area (e.g. along Mingham Creek). However, specific consideration has been given to species that have some potential to occur within the proposed West Dump and surrounding area.

6.1 The Little Pied Bat

The 'near threatened' Little Pied Bat is considered to be potentially present on the site based on call data collected from the Anabat detectors. Other threatened species that could utilise the proposed West Dump area for foraging include the Koala, Northern Quoll, Powerful Owl and several bird of prey species. Apart from possible call data from the Little Pied Bat, no evidence of any of these species was observed within the proposed West Dump area or surrounding area during this survey. Whilst a number of threatened species could utilise the habitat within the proposed West Dump area, it is likely that these individuals would either be transient or foraging over a much broader area. It is not likely that development of the proposed West Dump area will have a significant (if any) impact on any of these species.

The Little Pied Bat is listed as near threatened under the Queensland NCA (1992). It occurs in a variety of habitats, most frequently dry, open woodlands, including those dominated by Spotted Gum and Ironbark species (Duncan *et al.* 1999). Based on those basic habitat preferences, the habitat present within the proposed West Dump area is certainly suitable for this species. One of the greatest threats to this species is considered to be the loss of hollow-bearing trees (Duncan *et al.* 1999). There are relatively few hollow bearing trees within the proposed West Dump area and even fewer that would be of significant value to microbats. The loss of suitable hollow bearing trees within the proposed West Dump only represents a very small loss of habitat when the extent of similar habitat in the immediate vicinity is considered. Given this species' highly mobile nature and the abundance of similar habitat in the surrounding area, it is not likely that there would be a significant impact on this species from loss of habitat.

6.2 Northern Quoll

There is an anecdotal record of an individual Quoll found injured adjacent to the MRO haul road in May 2012. No record exists of which species of Quoll was found, but based on current distribution data it is very likely that the species was a Northern Quoll (*Dasyurus hallucatus*). This species was formerly distributed across much of northern Australia, but has contracted significantly since European settlement to several disjunct populations (Oakwood 1998). It is listed as endangered under the Commonwealth EPBC Act (1999).

Poisoning from eating the introduced Cane Toad is a major mechanism for the decline of this species (Oakwood 1998). The MRO is near the southern extent of the distribution of this species in Queensland. Disturbance from fire in the proposed West Dump area has limited the amount of habitat available in the form of ground cover and large woody debris that could provide suitable den sites. The prevalence of the Cane Toad throughout the area is also likely to have significantly impacted historical populations in the area.

Given that this species was specifically targeted (using multiple survey techniques such as trapping and infrared cameras), but not detected on the site, and that suitable habitat features are limited, it is unlikely that the proposed West Dump area would have a significant impact on this species. In any case, there is an extensive area of similar habitat immediately adjacent to the proposed West Dump area.

6.3 Powerful Owl

There are records of the Powerful Owl within the greater area around the MRO, including one on the Perry River referred to in a previous flora and fauna report for the MRO by Fanning and Tipping (1995). This species is listed as vulnerable under the Queensland NCA (1992). No evidence of this species was detected within the proposed West Dump area or surrounding area.

Powerful Owls utilise very large home ranges of at least 800-1000ha (Higgins 1999, Soderquist & Gibbons 2007). It is possible that the proposed West Dump area forms part of a larger home range for individuals of this species. However, the relatively small size of the area to be cleared, and the abundance of similar habitat in the area suggest it is unlikely that there will be a significant impact on this species.

6.4 Other Birds of Prey

Two threatened bird of prey species could potentially occur utilise the proposed West Dump area for foraging, the Square-tailed Kite and the Red Goshawk. The Square-tailed kite is listed as near threatened under the Queensland NCA (1992), and the Red Goshawk is listed as endangered under the Queensland NCA (1992) and vulnerable under the Commonwealth EPBC Act (1999). No evidence of either of these species was detected during the field surveys. Home ranges for both of these species are very large, with reports of approximately 50km² for the Square-tailed Kite (Lutter *et al.* 2004) and between 50 and 220km² for the Red Goshawk (Debus & Czechura 1988). Therefore, even if these species are utilising the habitat associated with the proposed West Dump area, it is not considered that this loss of habitat is likely to significantly impact these species.

6.5 Koala

The VMA Essential habitat mapping shows a record of the Koala north of the MRO near the Perry River water storage facility. These records are not on the MLs, but one is on Swindon Station. Some of the habitat within the proposed West Dump area contains preferred food trees for this species. There is a patch of vegetation toward the south of the proposed West Dump area that is dominated by Forest Red Gum (*Eucalyptus tereticornis*), which is a preferred food tree for the Koala (Martin *et al.* 2008). However, this patch of vegetation is sparse, with a canopy cover of approximately 20% (not all of which is Forest Red Gum). The size of the patch is also relatively small (~11.6ha) and is therefore unlikely to provide any significant habitat or food resource for the Koala, except perhaps transient individuals. In any case, the habitat to the north-east and south-east of the MRO is likely to be more suitable for the Koala as it contains significant areas of remnant and 'high value regrowth' of vegetation communities known to be of value to the Koala. Indeed, much of that vegetation is mapped 'essential habitat regrowth' based on record of the Koala in that area.

Potential Impacts and Recommendations

1. Observations

The proposed West Dump area is entirely comprised of dry woodland to open forest on moderate slopes and gullies. This habitat type is not unique to the proposed West Dump area or the MRO mining leases in general, but is widespread throughout the region. Indeed, immediately adjacent to the site are substantial areas of habitat of the same or similar vegetation and habitat features. The habitat within the proposed West Dump area represents only a very small proportion of the habitat in the area.

The RE mapping shows a heterogeneous polygon of three regional ecosystems within the proposed West Dump and surrounding area. Ground-truthing of these REs showed that two of the three mapped REs are present on the site:

- RE 12.12.5 (Least Concern) is present throughout the proposed West Dump and the broader area;
- RE 12.12.13 (Least Concern) is present as a linear community following the course of Mingham Creek; and
- RE 12.12.8 (Of Concern), was not detected anywhere within or near the proposed West Dump area.

However, a relatively small patch of RE 12.12.12 (Of Concern), which is not represented on the RE mapping, was observed within the proposed West Dump area.

The 12.12.12 (Forest Red Gum Woodland) community is present in a relatively flat part of the site, in an area that is otherwise typically dominated by hills with moderate to steep slopes. Consequently, the patch is restricted to a very small area and is isolated from any similar vegetation. There is significant evidence of disturbance in the form of weed infestation, a lack of large mature canopy species, and fire. This community is therefore considered to have a low capacity for the maintenance of biodiversity values. Despite the low quality of the habitat, this community qualifies as a state significant biodiversity value (listed in the Queensland Biodiversity Offsets Policy) due to its VMA status (Of Concern). Vegetation offsets are required for the removal of this vegetation, and options proposed regarding this requirement are detailed in a separate document.

The habitat throughout the proposed West Dump area shows significant signs of disturbance from fire, grazing and weed infestation. As a result of these disturbances, particularly fire, there is a general lack of important or valuable microhabitat features throughout the proposed West Dump area. There is also a low diversity of flora species. All of these factors likely contribute to the low diversity of fauna observed on the site. Furthermore, this suggests that none of the species present, or indeed any that could potentially be present, are likely to rely exclusively (or even to a significant extent) on the habitat within the proposed West Dump area.

2. Impact Assessment

No threatened flora species were observed within the proposed West Dump area or within the vicinity, such as along Mingham Creek. The records of threatened flora species within the area are generally species that grow in rainforests or along rainforest margins. There is a lack of suitable habitat throughout the proposed West Dump for most locally recorded (within 25km) threatened species. The habitat throughout much of the proposed West Dump area is potentially suitable for the threatened Cycad, *Cycas megacarpa*. However, detailed and targeted searches failed to produce any evidence of this species within the proposed West Dump area. The apparent absence from the proposed West Dump area, the limited dispersal mechanisms of this species, and the abundance of similar habitat outside of the proposed West Dump area, all suggests that the proposed works are unlikely to have a significant impact on this species.

No threatened fauna species were detected within the proposed West Dump area, except for possibly individuals of the Little Pied Bat, which is listed as 'Near Threatened' under the Queensland NCA. Based on call data collected during the field survey, and distribution and habitat preferences, it is possible that this species is using the proposed West Dump area for foraging and potentially roosting (although analysis of calls could not conclusively confirm the presence of this species). However, given the highly mobile nature of this species, the lack of suitable microhabitat features (i.e. roosting sites), and the abundance of similar or same habitat in the area, it is unlikely that the loss of habitat from within the proposed West Dump area will have a significant impact (if any impact) on this species.

Several other threatened species could potentially be using the proposed West Dump for foraging, roosting and nesting. The Koala, Northern Quoll, Powerful Owl, Common Death Adder and several bird of prey species have all been recorded locally (within 25km). However, much (if not all) of the site represents only poor quality habitat (at best) for all of these species. The highly disturbed nature of the site, lack of significant microhabitat features, lack of diversity of food/prey species, and large home range of most of the species suggests that none would be relying solely on the habitat within the proposed West Dump area. Indeed, no evidence of any of these species was detected and it is likely that any individuals present within the WRD area would be transient.

One individual Rainbow Bee-eater was observed at the northern extent of the project area. This species is listed as migratory under the EPBC Act. Due to the highly mobile nature and broad habitat requirements of this species, as well as the abundance of similar habitat in the area, it cannot be assumed that there would be any impact on even individuals of this species from the proposed works.

3. Recommendations

A number of measures should be implemented to minimise impacts and potential harm to fauna present within the proposed West Dump area during construction works. Vegetation clearing should be done sequentially to allow fauna within the site to escape into adjoining habitat. EHP licensed fauna spotter-catchers should be engaged for all vegetation-clearing activities, to assist in determining clearing practices that will minimise the threat to

animal welfare. Fauna spotter-catchers will also be responsible for relocating fauna to an area clear of the construction site. Wherever possible vegetation should be pushed to the boundaries of the construction site to maintain habitat for displaced fauna. Large woody debris should be placed in rehabilitation areas, and finer vegetation should be mulched.

The boundaries of the proposed area to be cleared should be clearly marked to ensure that clearing of vegetation and other disturbances are restricted to this area.

The proposed West Dump area contains a number of gullies and natural drainage features that feed in to Mingham Creek to the south. Leaching from the proposed West Dump has the potential to impact water quality in Mingham Creek, and consequently the flora and fauna associated with that water source.

An erosion and sediment control plan should be implemented to minimise soil loss and reduce downstream impacts. Construction of a downstream dam will be required to minimise the impacts on the water quality of Mingham Creek. The construction of a downstream dam within the proposed West Dump area has the potential to impact fauna that may be attracted to the water body. Waterbirds and amphibians in particular may be attracted to the site. Depending on water quality, management practices may be required to minimise attraction of fauna. Deterrents and methods to prohibit access to the dam should be used wherever appropriate to minimise potential impacts. Regular monitoring of avifauna activity will assist in the determination of appropriate control measures.

Changes and increases in traffic on the site have the potential to impact on terrestrial fauna. However, there should be little variation to the current volume and location of traffic, and current traffic management practices (such as vehicle speed limits) should be adequate. Any traffic incidents that impact on animal welfare could be used to determine if other controls are required.

The proposed West Dump area is immediately adjacent to the existing MRO, and it is therefore unlikely that the expansion would have significantly greater impact on local fauna. Due to the highly disturbed nature of the local habitat in general, many of the species present in the vicinity of the proposed West Dump area are tolerant of disturbance (including noise), or have moved away.

Increases in dust levels during clearing works and during ongoing use of the WRD have the potential to impact on local flora and fauna. However, dust suppression and management techniques currently in practice for existing operations can significantly reduce dust levels. If appropriately managed, it is unlikely that dust levels will have a significant impact on the local flora and fauna.

The disturbance and relocation of vegetation and topsoil will require the implementation of a weed management plan prior to clearing works on the proposed West Dump area. Weed control and other measures will be required to prevent the spread of weeds before clearing works begin.

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Appendices

Appendix A – EHP Wildlife Online Search

Table A1: Results of EHP Wildlife Online search and their relevance to the proposed West Dump area

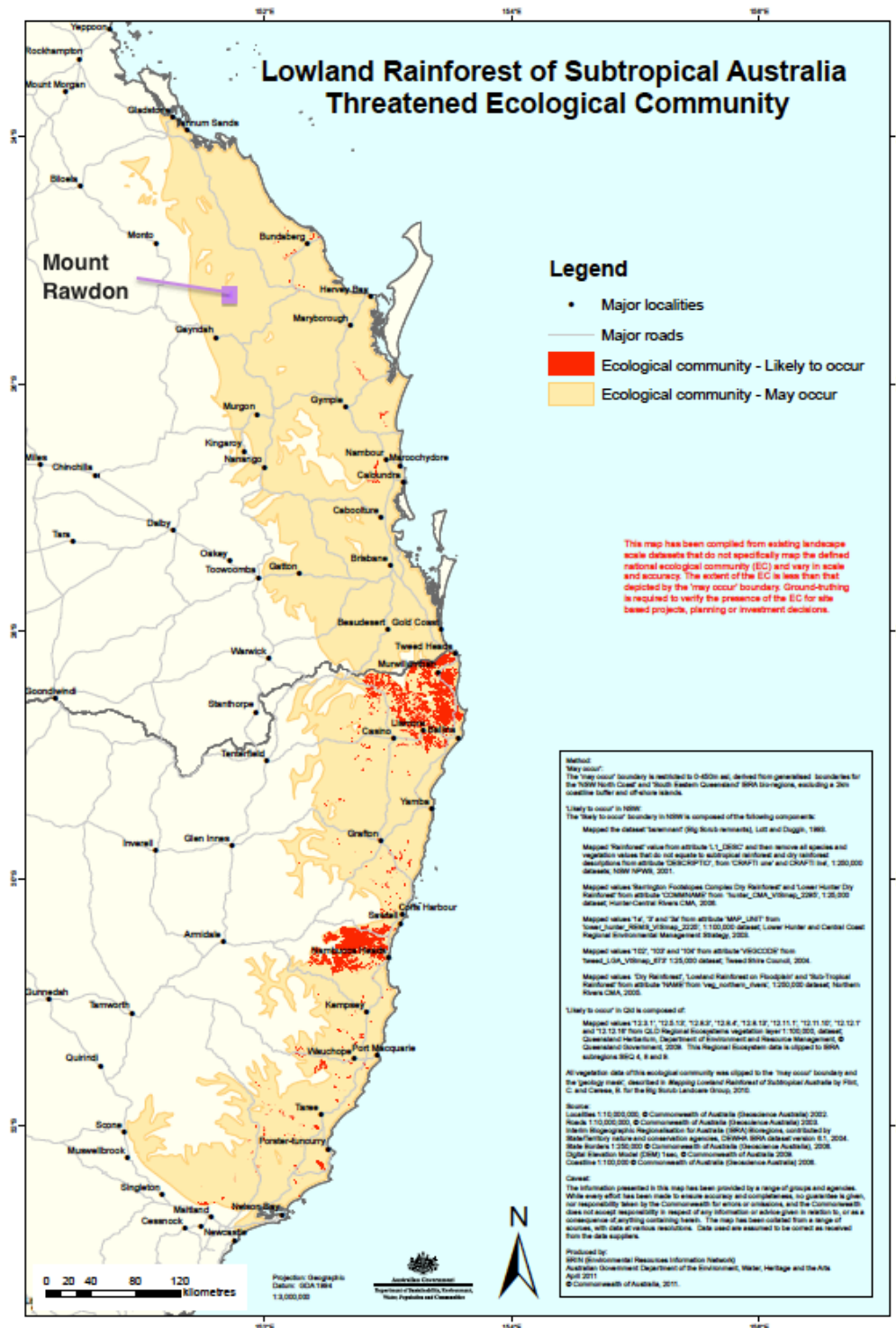
KEY	
Status	Threatened species listing under relevant legislation
Q	Queensland conservation status under the <i>NCA 1992</i>
A	Australian conservation status under the <i>EPBC Act 1999</i>
E	Species listed as Endangered
V	Species listed as Vulnerable
NT	Species listed as Near Threatened
Records	The total number of records of the relevant threatened species in the search area
Relevance	The potential relevance that the threatened species might have to the subject site
H	Considered by NRC to have a high potential relevance to the subject site
M	Considered by NRC to have a moderate potential relevance to the subject site
L	Considered by NRC to have a low potential relevance to the subject site
N	Considered by NRC to have no potential relevance to the subject site
NOTES	
<p>The table below is based on data obtained from the Department of Environment and Heritage Protection Wildlife Online website, www.ehp.qld.gov.au/wildlife/wildlife-online/, and the following notes accompany this dataset:</p> <ul style="list-style-type: none"> The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Copyright the State of Queensland through the Department of Environment and Heritage Protection. Search criteria: “Threatened and Near Threatened” species list generated for a specific point (Latitude 25.2733, Longitude 151.7631, radius 25km) – records retrieved for 26 species. Report generated on 02/12/2012 5:20 PM. 	

Status		Scientific Name	Common Name	Records	Relevance
Q	A				
ANIMALS					
Limnodynastidae					
V		<i>Adelotus brevis</i>	Tusked Frog	3	L
Accipitridae					
NT		<i>Accipiter novaehollandiae</i>	Grey Goshawk	2	L
NT		<i>Lophoictinia isura</i>	Square-tailed Kite	2	L

Accipitridae						
E	V	<i>Erythrotriorchis radiatus</i>	Red Goshawk	1		L
Anatidae						
NT		<i>Nettapus coromandelianus</i>	Cotton Pygmy-goose	6		N
Cacatuidae						
V		<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	2		L
Ciconiidae						
NT		<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	2		N
Meliphagidae						
NT		<i>Melithreptus gularis</i>	Black-chinned Honeyeater	1		L
Phaethontidae						
V		<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	1		N
Podargidae						
V		<i>Podargus ocellatus plumiferus</i>	Plumed Frogmouth	2		N
Strigidae						
V		<i>Ninox strenua</i>	Powerful Owl	9		M
Turnicidae						
V	V	<i>Turnix melanogaster</i>	Black-breasted Button-quail	3		N
Lycaenidae						
V		<i>Jalmenus eubulus</i>	Pale Imperial Hairstreak	1		N
Phascolarctidae						
V	V	<i>Phascolarctos cinereus</i>	Koala	9		L
Elapidae						
NT		<i>Acanthophis antarcticus</i>	Common Death Adder	1		L
PLANTS						
Cycadaceae						
E	E	<i>Cycas megacarpa</i>	-	15		M
Apocynaceae						
V	V	<i>Parsonsia larcomensis</i>	Mt Larcom Silk Pod	2		N
Argophyllaceae						
NT		<i>Argophyllum nullumense</i>	Silver Leaf	1		N

Asteraceae				
NT	<i>Acomis acoma</i>	-	2	N
Caesalpiniaceae				
NT	<i>Senna acclinis</i>	Rainforest Senna	1	N
Corynocarpaceae				
V	<i>Corynocarpus rupestris subsp. arborescens</i>	Southern Corynocarpus	6	N
Myrtaceae				
NT	<i>Eucalyptus decolor</i>	-	1	N
NT	<i>Melaleuca groveana</i>	Grove's Paperbark	1	N
NT	<i>Rhodamnia pauciovulata</i>	Small-leaved Malletwood	3	N
E	<i>Backhousia oligantha</i>	-	4	N
Hernandiaceae				
NT	<i>Hernandia bivalvis</i>	Cudgerie	7	L

Appendix B – Predicted occurrence of Lowland Rainforest of Subtropical Australia TEC



Appendix C – Native and Introduced Flora Species Recorded Within the Proposed WRD Area

Table C1: Native flora species observed within each vegetation community

Vegetation Type	Scientific Name	Common Name
RE 12.12.5 Spotted gum variant	<i>Corymbia citriodora</i>	Spotted Gum
	<i>Acacia leiocalyx</i>	Early-flowering Wattle
	<i>Alphitonia excelsa</i>	Red Ash/Soap Tree
	<i>Angophora floribunda</i>	Rough-barked Apple
	<i>Aristida</i> sp.	Wiregrass
	<i>Breynia oblongifolia</i>	Coffee Bush
	<i>Corymbia trachyphloia</i>	Brown Bloodwood
	<i>Dianella</i> sp.	Dianella
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
	<i>Eustrephus latifolis</i>	Wombat Berry
	<i>Ficus coronata</i>	Sandpaper Fig
	<i>Gahnia aspera</i>	Rough Saw-sedge
	<i>Heteropogon contortus</i>	Black Speargrass
	<i>Jacksonia scoparia</i>	Native Dogwood
	<i>Lophostemon suaveolens</i>	Swamp Box
	<i>Petalostigma pubescens</i>	Quinine Bush
	<i>Themeda triandra</i>	Kangaroo Grass
	<i>Trema tomentosa</i>	Poison Peach
<i>Triodia longiceps</i>	Porcupine Spinifex	
<i>Xanthorrhoea johnsonii</i>	Grasstree	
RE 12.12.5 Narrow-leaved ironbark variant	<i>Acacia leiocalyx</i>	Early-flowering Wattle
	<i>Actinotus helianthi</i>	Flannel Flower
	<i>Alphitonia excelsa</i>	Red Ash/Soap Tree
	<i>Corymbia citriodora</i>	Spotted Gum
	<i>Corymbia trachyphloia</i>	Brown Bloodwood
	<i>Cymbidium canaliculatum</i>	Black Orchid
	<i>Dianella</i> sp.	Dianella
	<i>Eragrostis fallax</i>	Lovegrass
	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
	<i>Eustrephus latifolis</i>	Wombat Berry

	<i>Exocarpos cupressiformis</i>	Wild Cherry
	<i>Heteropogon contortus</i>	Black Speargrass
	<i>Paspalidium constrictum</i>	Knottybutt Grass
	<i>Themeda triandra</i>	Kangaroo Grass
	<i>Triodora shinzii</i>	Feathertop Spinifex
RE 12.12.12 Forest Red Gum Woodland	<i>Alphitonia excelsa</i>	Red Ash/Soap Tree
	<i>Chloris ventricosa</i>	Plump Windmill Grass
	<i>Convolvulus erubescens</i>	Blushing Bindweed
	<i>Corymbia tessellaris</i>	Moreton Bay Ash
	<i>Corymbia trachyphloia</i>	Brown Bloodwood
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
	<i>Glycine sp.</i>	Pea
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Lomandra longifolia</i>	Spiny-head Mat-rush
	<i>Sporobolus mitchelli</i>	Rat's-tail Couch
RE 12.12.13 Hoop Pine Dry Rainforest	<i>Acacia leiocalyx</i>	Early-flowering Black Wattle
	<i>Acalypha eremorum</i>	Soft Acalypha
	<i>Alectryon tomentosus</i>	Hairy Birds Eye
	<i>Araucaria cunninghamii</i>	Hoop Pine
	<i>Bosistoa medicinalis</i>	Northern Towra
	<i>Brachychiton rupestris</i>	Queensland Bottle Tree
	<i>Capparis lorathifolia</i>	Narrow-leaf Bumble
	<i>Capparis sarmentosa</i>	Scrambling Caper
	<i>Cryptocarya bidwillii</i>	Yellow Laurel
	<i>Dendrocnide photinophylla</i>	Shining Stinging Tree
	<i>Exocarpos latifolius</i>	Native Cherry
	<i>Ficus virens</i>	White Fig
	<i>Flinderisa australis</i>	Crows Ash
	<i>Gymnostachys anceps</i>	Settler's Twine
	<i>Mallotus philippensis</i>	Red Kamala
	<i>Marsdenia rostrata</i>	Boat Vine
	<i>Pseudoanthemum variabile</i>	Love Flower
	<i>Pyrrhosia rupestris</i>	Rock Felt Fern
	<i>Smilax australis</i>	Wait-a-while
	<i>Tinospora smilacina</i>	Snake Vine

Table C2: Introduced/pest flora species observed within each vegetation community

Vegetation Type	Scientific Name	Common Name
RE 12.12.5 Spotted gum variant	<i>Ageratum houstonianum</i>	Blue Billygoat Weed
	<i>Lantana camara</i>	Lantana
	<i>Melinis repens</i>	Red Natal Grass
RE 12.12.5 Narrow-leaved ironbark variant	<i>Chromolaena</i> sp.	Chromolaena
	<i>Conyza bonariensis</i>	Fleabane
	<i>Lantana camara</i>	Lantana
	<i>Melinis repens</i>	Red Natal Grass
	<i>Opuntia stricta</i>	Prickly Pear
	<i>Passiflora foetida</i>	Stinking Passionflower
RE12.12.12 Forest Red Gum Woodland	<i>Ageratum houstonianum</i>	Blue Billygoat Weed
	<i>Chloris gayana</i>	Rhodes Grass
	<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush
	<i>Lantana camara</i>	Lantana
	<i>Melinis repens</i>	Red Natal Grass
RE12.12.13 Hoop Pine Dry Rainforest	<i>Commelina benghalensis</i>	Hairy Commelina
	<i>Passiflora foetida</i>	Bush Passionfruit
	<i>Xanthium strumarium</i>	Noogoora Burr

Appendix D – Native and Introduced Fauna Species Recorded Within the Proposed WRD Area

Table D1: Native and introduced fauna recorded in the proposed West Dump area during the December 2012 survey

Status		Common Name	Scientific Name	Site			
Q	A			1	2	3	4
BIRDS							
		Australian Owlet Nightjar	<i>Aegotheles cristatus</i>	X			X
		Australian brush-turkey	<i>Alectura lathami</i>				X
		King parrot	<i>Alisterus scapularis</i>		X		
		Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii</i>				X
		Pheasant coucal	<i>Centropus phasianinus</i>	X			
		Little shrike-thrush	<i>Colluricincla megarhyncha</i>				X
		Torresian Crow	<i>Corvus orru</i>	X			
		Australian Magpie	<i>Cracticus tibicen</i>	X			
		Grey Butcherbird	<i>Cracticus torquatus</i>				X
		Laughing Kookaburra	<i>Dacelo novaeguineae</i>	X			X
		Spangled Drongo	<i>Dicrurus bracteatus</i>		X	X	
		Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>		X		
		Eastern Koel	<i>Eudynamys orientalis</i>	X	X	X	
		Bar shouldered dove	<i>Geopelia humeralis</i>	X		X	X
		Noisy Miner	<i>Manorina melanocephala</i>	X			X
		Lewin's Honeyeater	<i>Meliphaga lewinii</i>		X	X	X
		White-throated Honeyeater	<i>Melithreptus albogularis</i>		X		
		Rainbow bee-eater	<i>Merops ornatus</i>	X			
		Leaden Flycatcher	<i>Myiagra rubecula</i>		X		
		Little Friarbird	<i>Philemon citreogularis</i>		X		
		Noisy Friarbird	<i>Philemon corniculatus</i>	X		X	
		Pale-headed Rosella	<i>Platycercus adscitus</i>				X
		Eastern Whipbird	<i>Psophodes olivaceus</i>			X	
		Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	X			
		White-browed scrubwren	<i>Sericornis frontalis</i>		X		X
		Australian Figbird	<i>Sphecotheres vieillotii</i>	X	X	X	X
		Pied Currawong	<i>Strepera graculina</i>	X	X	X	X

Forest Kingfisher	<i>Todiramphus macleayii</i>		X		
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	X		X	
MAMMALS					
White-striped Freetail Bat	<i>Austronomus australis</i>	X		X	
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	X		X	
Little Bentwing Bat	<i>Miniopterus australis</i>	X	X	X	
Eastern Bentwing Bat	<i>Miniopterus orianae oceanensis</i>	X		X	
Eastern Horseshoe Bat	<i>Rhinolophus megaphyllus</i>	X		X	
Little Broad-nosed Bat	<i>Scotorepens greyii</i>	X		X	
Northern Brown Bandicoot	<i>Isodon macrourus</i>	X			
Long-nosed Bandicoot	<i>Perameles nasuta</i>	X			
House Mouse*	<i>Mus musculus*</i>	X	X		
Greater Glider	<i>Petauroides volans</i>		X		X
Squirrel Glider	<i>Petaurus norfolcensis</i>		X		
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	X		X	
Dog*	<i>Canis lupus familiaris*</i>				X
AMPHIBIANS					
Broad-palmed Frog	<i>Litoria latopalmata</i>	X			
Desert Treefrog	<i>Litoria rubella</i>	X	X		
Northern Banjo Frog	<i>Lymnodynastes terraereginae</i>				X
Cane Toad*	<i>Rhinella marina*</i>	X	X	X	X
Smooth Toadlet	<i>Uperoleia laevigata</i>				X
REPTILES					
Iridescent Litter-skink	<i>Carlia foliorum</i>	X	X	X	X
Lively Rainbow Skink	<i>Carlia vivax</i>	X			
Plain-backed Sunskink	<i>Lampropholis couperi</i>				X
Burton's Snake Lizard	<i>Lialis burtonis</i>	X			
Yellow-faced Whip Snake	<i>Demansia psammophis</i>				X
Carpet Python	<i>Morelia spilota</i>		X		
Blind Snake	<i>Ramphotyphlops sp.</i>		X		
Bearded Dragon	<i>Pogona sp.</i>				X
Sand Goanna	<i>Varanus gouldii</i>	X			

* Introduced/pest species

Table D2: Potential occurrences of microbat species in the proposed West Dump area during the December 2012 survey (based on inconclusive call data)

Status		Common Name	Scientific Name	Site			
Q	A			1	2	3	4
		Hoary Wattled Bat	<i>Chalinolobus nigrogriseus</i>	?		?	
NT		Little Pied Bat	<i>Chalinolobus picatus</i>	?		?	
		Beccari's Freetail Bat	<i>Mormopterus beccarii</i>	?		?	
		Southern Myotis	<i>Myotis macropus</i>	?		?	
		Eastern Long-eared Bat	<i>Nyctophilus bifax</i>	?		?	
		Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>	?		?	
		Gould's Long-eared Bat	<i>Nyctophilus gouldi</i>	?		?	
		Yellow-bellied Sheathtail Bat	<i>Saccolaimus flaviventris</i>	?		?	

? Species not confirmed within proposed West Dump area, record is potential occurrence based on call data

KEY:

Status	Threatened species listing under relevant legislation
Q	Queensland conservation status under the <i>NCA 1992</i>
A	Australian conservation status under the <i>EPBC Act 1999</i>
E	Species listed as Endangered
V	Species listed as Vulnerable
NT	Species listed as Near Threatened

Appendix E – EPBC listed flora in protected matters search and relevance to the project

Species Name	Common Name	EPBC Status	NCA Status	Description	Preferred Habitat	Relevance to proposed West Dump site
<i>Cycas megacarpa</i>	-	E	E	<i>Cycas megacarpa</i> is a small to medium sized cycad with an erect trunk standing approximately 3m tall and 15cm wide. Leaves are long with numerous leaflets.	<i>Cycas megacarpa</i> is endemic to southeast Queensland. Preferred habitat is woodland and open forests, in conjunction with a grassy understorey. Habitat dominated by <i>Eucalyptus crebra</i> and <i>Corymbia citriodora</i> as well as <i>Corymbia erythrophloia</i> , <i>Eucalyptus melanophloia</i> and <i>Lophostemon confertus</i> .	Moderate – Not observed. Preferred habitats containing <i>Eucalyptus crebra</i> and <i>Corymbia citriodora</i> observed on site
<i>Cycas ophiolitica</i>	-	E	-	<i>Cycas ophiolitica</i> is a small to medium sized cycad with erect trunk and rounded crown. <i>Cycas ophiolitica</i> grows to 2m with a trunk diameter of 4-10cm. Leaves are long, glossy blue-green/dark green with numerous leaflets.	<i>Cycas ophiolitica</i> is endemic to Queensland, occurring in woodland or open eucalypt woodlands. <i>Cycas ophiolitica</i> typically grows on hills and slopes in sparse, grassy open forest at altitudes of 80-400m above sea level. This species is often associated with <i>Corymbia dallachiana</i> , <i>C. erythrophloia</i> , <i>C. xanthope</i> and <i>Eucalyptus fibrosa</i> .	None – Not observed. Suitable habitat for this species does not occur within the proposed West Dump area.
<i>Bulbophyllum globuliforme</i>	Miniature Moss-orchid	V	-	<i>Bulbophyllum globuliforme</i> is a tiny rhizomatous orchid that grows tree bark, forming a dense mat. It produces green, globular, bulb-like stems 1-2mm in diameter. Leaves are narrow-triangular.	This species grows only on Hoop Pine, <i>Araucaria cunninghamii</i> , colonising the upper branches of mature trees in upland rainforest.	Unlikely – Not observed No Hoop Pine or upland rainforest present on the proposed West Dump site. Dry rainforest adjacent to WRD area is not considered suitable habitat despite presence of Hoop Pine.
<i>Cossinia australiana</i>	Cossinia	E	E	<i>Cossinia australiana</i> is a shrub or small slender tree to 7m, with a sparse crown. Leaves	<i>Cossinia australiana</i> is known from fragmented patches of Araucarian vineforests and vine thickets in central and	None – Not observed. The dry rainforest south of the proposed West Dump area

Species Name	Common Name	EPBC Status	NCA Status	Description	Preferred Habitat	Relevance to proposed West Dump site
				are compound with a winged rachis and 3-5 elliptical to oblong leaflets.	southern Queensland.	represents potentially suitable habitat for this species- however, this vegetation is not to be cleared.
<i>Cupaniopsis shirleyana</i>	Wedge-leaf Tuckeroo	V	-	<i>Cupaniopsis shirleyana</i> is a small tree growing to 10m. Leaves are glossy green and hairy on underside. Flowering occurs from April to June. Fruits are orange capsules.	<i>Cupaniopsis shirleyana</i> is endemic to south eastern Queensland. <i>Cupaniopsis shirleyana</i> occurs in dry rainforest and scrubby urbanised areas on moderate to steep slopes, gullies, rocky stream channels	None – Not observed. The dry rainforest south of the proposed West Dump area represents potentially suitable habitat for this species- however, this vegetation is not to be cleared.
<i>Phebalium distans</i>	Mt Berryman Phebalium	CE	E	<i>Phebalium distans</i> is a small tree growing to 8m tall with a trunk up to 15cm in diameter. Flowers are cream. Leaves are 2-5m long and smooth on the upper surface.	<i>Phebalium distans</i> is known to occur in south eastern Queensland. <i>Phebalium distans</i> has a severely fragmented distribution. The preferred habitat for this species is semi-evergreen vine thicket. Other vegetation types include microphyll to notophyll vine forest with or without <i>Araucaria cunninghamii</i> .	None – Not observed. This species is only known from three locations, none of which are in close proximity to the proposed West Dump area. within the proposed West Dump area.
<i>Samadera bidwillii</i>	Quassia	V	V	<i>Samadera bidwillii</i> is a small shrub or tree that grows to about 6m, with red flowers and fruit occurring from November to March. Branchlets are ribbed, with fine pale-brown hairs. Leaves are stiff and leathery.	<i>Samadera bidwillii</i> is endemic to Queensland and occurs in lowland rainforest or rainforest margins, open forest and woodland. <i>Samadera bidwillii</i> is commonly found adjacent to temporary and permanent watercourses and commonly associates with <i>Corymbia citriodora</i> , and <i>Eucalyptus tereticornis</i>	Low – Not observed. Habitat similar to preferred habitats containing <i>Corymbia citriodora</i> and <i>Eucalyptus tereticornis</i> are present within the proposed West Dump area.
<i>Sophora fraseri</i>	Brush Sophora	V	-	<i>Sophora fraseri</i> is a softly pubescent, sparsely branched leguminous shrub 1-2m tall.	<i>Sophora fraseri</i> is considered widespread but not common in southeast Queensland. This species grows in moist habitats, often in hilly	None – Not observed. Preferred habitat not present

Species Name	Common Name	EPBC Status	NCA Status	Description	Preferred Habitat	Relevance to proposed West Dump site
<i>Streblus pendulinus</i>	Siah's Backbone	E	-	Leaves are pinnate with oblong to ovate leaflets. <i>Streblus pendulinus</i> is a tree or large shrub up to 6m. Leaves are elliptical or egg-shaped with margins that are regularly toothed.	terrain along rainforest margins in Eucalypt forests or large canopy gaps in closed forest <i>Streblus pendulinus</i> occurs along the whole east coast of Australia. This species is found in warmer rainforests, chiefly along watercourses.	within the proposed West Dump area. None – Not observed. Suitable habitat not present within the proposed West Dump area.
<i>Taeniophyllum muelleri</i>	Minute Orchid	V	-	<i>Taeniophyllum muelleri</i> is a leafless epiphytic or lithophytic herb forming tangled colonies. Leaves are absent. Flowers tubular, opening successively.	<i>Taeniophyllum muelleri</i> occurs in south eastern Queensland, on outer branches and branchlets of rainforest trees or in sheltered areas of open forest, humid gullies and streamside vegetation where it grows on trees and shrubs.	None – Not observed. Suitable habitat not present within the proposed West Dump area.